JOURNAL OF THE MYANMAR ACADEMY OF ARTS AND SCIENCE

Educational Theory and Management, Curriculum and Methodology

Vol. XXI, No.6, November, 2024

Myanmar Academy of Arts and Science

Edition
2024, November, 200 Copies

Published by

Dr Maung Kyaw (00322) Vice-President,
Myanmar Academy of Arts and Science

ISSN 2520-0186
LCCN 2003-323143

Printed by

U Tin Soe (00171), Manager

Universities Press, Yangon, Myanmar

FOREWORD

The Myanmar Academy of Arts and Science (MAAS) was constituted on August-16, 1999 with four major fields of endeavour, namely:

(a) Introduction to Modern Methods of Teaching and Learning
(b) Promotion of Research Activities through Research Guidelines
(c) Dissemination of Knowledge and Emerging Technologies
(d) Motivating New Generation of Experts and Academics

In pursuance of these endeavours, MAAS has, since the year 2001, held Research Conferences and published research papers in the Journal of the Myanmar Academy of Arts and Science.

At the Research Conference held on 19- 21 December 2022, a total of (223) research papers were read and outstanding papers have been published in volume XXI as follows:

Vol. XXI, No.1	Chemistry, Industrial Chemistry
Vol. XXI, No.2	Physics, Mathematics and Computer Studies
Vol. XXI, No.3	Zoology, Botany, Marine Science
Vol. XXI, No.4	Myanmar, Oriental Studies, Archaeology, Anthropology and Library and Information Studies
Vol. XXI, No.5	Geography, History, International Relation, Geology, Statistics, Management Studies, Law, Journalism
Vol. XXI, No.6	Educational Theory and Management, Curriculum and Methodology
Vol. XXI, No.7	Educational Psychology

The executive committee members of Myanmar Academy of Arts and Science had been reconstituted on 4 August 2022 and again reconstituted on 8 March 2024, by the Ministry of Education with the Approval of the Government of the Union of Myanmar. Accordingly, the Publication Committee along with the Editorial Board have been formed. The primary mission of the academy is to develop and promote Higher Education in preparing future generations to meet the challenges in the 21st century.

The majority of the papers in these issues represent findings of research conducted by aspirants as well as postgraduate candidates in partial or total fulfillment of requirement for these degrees. We, the members of MAAS, do appreciate the editing work done by senior professors and scholars of high standing, these papers would prove useful, and not only for other candidates but also for all those who are interested in the results of systematic research and inquiry.

Dr Thet Lwin
President
The Myanmar Academy of Arts and Science

Journal of the Myanmar Academy of Arts and Science
Vol. XXI. No.6

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AN INVESTIGATION INTO PRACTICES OF MENTORS ON MENTORING STRATEGIES*

Phyu Zar Zar Theint[1], Thet Naing Oo[2] & Phyu Phyu Yin[3]

Abstract

This paper intended to study the extent of mentors' practices on mentoring strategies (MSs), to investigate the variations of mentors' practices on MSs according to their regions and to reveal the variations of mentors' practices on MSs according to their gender. The practices of mentors were examined by using seven components (modelling, cognitive coaching, design conversation, feedback, wellbeing conversation, classroom observation and reflective dialogue) of performance management framework for factors of MSs for beginning teachers (BTs). The content validity index was 0.976 and reliability coefficient (Cronbach α) was 0.96 for level of practices about a set of MSs Questionnaire. All 273 mentors were selected by using the census method for mail survey. For interview, 18 mentors were selected by using purposive sampling method. Mixed research method was used. Data were analyzed by using One-Way Analysis of Variance (ANOVA) and Independent Samples *t* Test. Mentors practised to a great extent in overall practices of seven components of MSs. There was a significant difference between central region (CR) and upper region (UR), but there were no significant differences between male and female mentors in overall practices.

Keywords: Mentors & Mentoring Strategies.

Introduction

The significance of mentoring for (Beginning Teacher) BTs is gaining wider recognition throughout the world. In Myanmar, the present situation is a curriculum reform period; it has been implemented exponentially at the primary level. Primary teachers, from BTs to expert teachers, are expected to meet the minimum requirements identified in their respective levels (Ministry of Education [MOE], 2017b). Primary teachers are the building blocks of any education system. For this reason, almost every country in the world is increasingly focusing on the role of primary teachers. Developing countries, including Myanmar, have great challenges in recruiting competent primary teachers, although this one is of the greatest importance. The need for BTs to be professionally developed in the area of classroom instruction in their early years of teaching seems to demand serious attention (Senom & Shahratol, 2013; as cited in Vikaraman, Mansor, & Hamzah, 2017). The importance of mentoring has grown in teacher education, which has increased the responsibilities given to mentors (Power et al., 2002; Sonclair, 1997; as cited in Hudson, 2007). Therefore, in Myanmar, mentoring programs have been implemented for BTs in forty townships since December 2016 under the supervision of the Department of Education Research, Planning, and Training (DERPT), with brilliant teacher educators from the Yangon University of Education (YUOE) and Education Colleges. According to MOE (2017a), firstly, a board of mentor selection was organized with the initiation of a Township Education Officer (TEO). Second, (2022) the board members decided that they should select to whom as mentors in accordance with the MOE's mentor selection criteria. Now, all over the country, this program has been implemented by well-trained mentors in one hundred and fifty townships.

Significance of the Study

The teacher population at the primary level in Myanmar has undergone substantial changes in recent years, with a tremendous need for primary teachers as a result of increasing primary level

* Best Paper Award Winning Paper in Theory and Management

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enrollment and the fulfillment of the policy's requirement of at least five teachers per primary school prescribed by MOE (MOE, 2017a). The next cause is that more experienced primary teachers were promoted to junior teachers if they who had adequate primary teacher services and applied for the junior teacher positions (MOE, 2016). As a result, among the remaining teachers at the primary levels, over 40% of primary teachers had no more than three years of service, according to the data from the selected 40 townships in 2016–17 Academic Year. Department of Basic Education (DBE) appointed about 83% of those teachers in vacant, rural, and remote primary schools. Approximately 70% of those new teachers were recruited as Daily Wages Teachers, and a large proportion of them do not have formal pedagogical training (MOE, 2017a). According to Darling-Hammond (2000; cited in Nalumansi, 2011), teachers who receive little to no training report being significantly dissatisfied with their training and having more difficulties with their teaching duties.

Khin Zaw (2001) proposed that no educational system can be better than its teachers. In order to provide a competent teaching force, teacher education is crucial in the development of teachers. In order to support and direct BTs, mentoring is a complex, comprehensive process employed in teacher education. Mentoring is one of a PD program's components. It is widely accepted that a mentor teacher guides, counsels, and advises a teacher with less experience in a work setting where there is trust and belief (Koki, 1997). Hudson (2010) claims that mentors can strengthen mentees' teaching practices while concurrently improving their own mentoring and teaching practices. This can help mentees better meet the needs of the students. Mentoring practices are essential for improving pedagogical knowledge of BTs called mentees. There are no researches done to investigate the mentoring practices for BTs in Myanmar. Therefore, this study applauds the need for investigation into current, on-going mentoring given by mentors to provide meaningful support to BTs through effective mentoring practices.

Theoretical Framework

This study was based on seven components (modelling, cognitive coaching, design conversation, feedback, wellbeing conversation, classroom observation and reflective dialogue) of performance management framework for factors of MSs for BTs (Phyu Zar Zar Theint, Thet Naing Oo, Phyu Phyu Yin, 2021).

Mentors need to meet with their mentees in a specific time. Their role is to provide possible solutions if the mentee has difficulties (Hudson, 2004; MOE, 2017a). Kolb’s (1984, p. 38) experiential learning theory asserted that, “Learning is the process whereby knowledge is created through the transformation of experience.” Depending on the Kolb’s learning cycle, Honey and Mumford (1986a & 1986b, as cited in Rosewell, 2005) classified the four basic learning styles. Mentors should have background knowledge about the types of learners to decide a mentee is an activist, a reflector, a theorist, a pragmatist or not, to create learning opportunities. Hudson (2004) stated that mentors need to discuss the integration of skills, abilities and interests into teaching with their mentees. They need to speak favourably and enthusiastically about teaching and learning as well as to outline the positive aspects of teaching. They need to ask mentees questions about how to review the previous lessons (MOE, 2017a; University of North Texas, 2018).

To encourage self-reflection practice and being non-judgemental, they need to listen to mentees’ self-evaluation (Hudson, 2004; MOE, 2017a). As a primary teacher, and a colleague, they need to show an interest in the mentee (Hudson, 2004). For instance, thinking how to teach specially after studying the aims of primary level syllabus, and asking how the mentee has fulfilled and outlined impacts on learning outcomes by participating in PD activities, and experiences from school cluster meetings (MOE, 2017a). According to Hartman (2010), they guide their mentees that making error analysis should be performed. Mentors need to direct mentees how to implement the syllabus and focus on areas within it (MOE, 2017a). For particular students with special needs and other students with talents, they need to tell teaching methods based on students' abilities (Hudson, 2004; MOE, 2017b). They need to show them how to search for validated content knowledge (Hudson, 2004). They should outline syllabus requirements for allocated durations (Hudson, 2013b; MOE, 2017b), and explain impacts of extra-curricular activities in cooperation with Parent Teacher Association (MOE, 2017a).

According to self-efficacy theory, mastery experience was recognized as the most impact for adults (Bandura, 1998). Mentors should assist mentees to select the most preferred teaching strategies by discussing student contexts and needs, and allowing mentees opportunities to test out a range of teaching strategies (Hudson, 2013b; MOE, 2017a). Mentors should talk about possible stressful situations, and explain to the mentee the ways of handling issues. They should encourage their mentees to develop problem solving skills (MOE, 2017a). They should explain to the mentee about types of questions and discuss the ways of preparing key questions in consideration with the students. They should explain about assessment related to ways of progressing learning outcomes.

They should tell about rationale for assessment and allow mentees to learn assessment techniques from other colleagues. They should guide how to record students' achievement according to each lesson, and report to parents or guardians (MOE, 2017b). For PD, they should discuss ideas with other mentors (MOE, 2017a). According to Hudson (2004) and University of North Texas (2018), mentors need to ask the mentee to observe the ways of interacting with students (how to recognize and respect students' views and opinions). Mentors should discuss the students' prior knowledge (MOE, 2017a).

Vygotsky (1980) believed that learning was occurred in zone of proximal development since it was a challenging activity. With the guidance and modeling of a mentor, mentees could learn and practise until they performed their functions independently in a situated learning. According to the theory, mentors ought to demonstrate questioning skills throughout the lesson. They need to demonstrate a lesson by using a hands-on approach. They should model and discuss classroom management strategies. They should model how to organize students into groups (Bandura, 1998). They should talk positively about nature of teaching subjects (Hudson, 2004; MOE, 2017b). They should make references to the syllabus when discussing teaching problems. They should fulfill requirements of mentees and discuss the practices with each other (MOE, 2017b). Enhancing mentees' physical well-being and reducing their stresses were involved in physiological arousal since these factors modified beliefs of self-efficacy (Wood & Bandura, 1989).

The credibility, trustworthiness, and expertise of a mentor were the basic concepts in the social persuasion. Mentors should watch the mentee's teaching to provide specific feedback. They should review the mentee's lesson plans before teaching and provide constructive comments (MOE, 2017b). According to goal-setting theory (Locke & Latham, 2002), setting positive and effective goals can increase attention to the current task, the effort, the persistence, motivation and performance by encouraging the development of specific task strategies. If people failed, they could make more effort or use another way. If they succeeded, self-confidence, analytic thinking, and performance would be improved (Bandura, 1993). They should ask the mentees for their thoughts on how the lesson proceeds (MOE, 2017b; University of North Texas, 2018) and the last lesson taught could be improved (Hudson, 2004; MOE,2017b). They should provide oral and written evaluations (Hudson, 2004; MOE, 2017b). They need to inform expectations for the planning, teaching and assessment of lessons clearly. Moreover, they should know that teachers make mistakes when trialing a new lesson (Hudson, 2004).

Research Objectives

(1) To study the extent of mentors' practices on MSs
(2) To investigate the variations of mentors' practices on MSs according to their regions
(3) To reveal the variations of mentors' practices on MSs according to their gender

Research Questions

(1) What is the extent of mentors' practices on MSs?
(2) What are the variations of mentors' practices on MSs according to their region?
(3) What are the variations of mentors' practices on MSs according to their gender?

Definition of Key Terms

- A **mentor** is defined as a person who nurtures, supports, and cares for individuals or a small group of students (Rhodes, Bogat, Roffman, Edelman, & Galasso, 2002).

Limitations of the Study

The study was based on mentors who had mentoring training at only 70 townships in Myanmar. The set of questionnaires that did not measure construct validity was used. Some demographic data were not analyzed because of low effect sizes.

Operational Definition

- **MSs** are operationally defined as approaches used by mentors in mentoring practices to nurture, support, and care for their mentees in order to improve the teaching quality of their mentees. Levels of practices on MSs will be measured by mean values rated by mentors. It was found that the greater the mean values of their responses, the more practices of the mentors in MSs.

Method

In this study, mixed research method was used. A set of questionnaires was developed based on performance management framework for factors of MSs for BTs (Phyu Zar Zar Theint, Thet Naing Oo, Phyu Phyu Yin, 2021). It included gender, age, academic qualification, specialization and service. All 273 mentors were selected using the census method for the mail survey. However, the response rate was 91.94% (N=251). In interview, 18 mentors were selected by using purposive sampling method. For content validity, invaluable advice was appealed to 13 expert teacher educators and 4 expert retired teacher educators from Department of Educational Theory, YUOE. The wordings of some items were revised. A pilot study was conducted with 34 well-trained mentors who did not participate in the main study. The content validity index was 0.976 and the reliability coefficient (Cronbach α) was 0.96. Concerning level of practices, it was necessary for mentors to identify the level of practices in each given statement using a Likert Scale of 1 to 4, where: (1) Never; (2) Sometimes; (3) Often; and (4) Always. In quantitative analysis, One-Way Analysis of Variance (ANOVA) and Independent Samples *t* Test were used. In qualitative analysis, the researcher involved throughout precoding, open coding, and axial coding (Khandkar, n.d).

Findings

Studying the Extent of Practices on MSs Rated by Mentors

Table 1 presents mean values and standard deviations of practices on modelling rated by two hundred and fifty-one mentors.

Table 1 Mean Values and Standard Deviations of Mentors' Practices on Modelling

(N=251)

No.	Modelling	Mean	SD	Remark
1.	Demonstrating a lesson by using a hands-on teaching approach	3.23	0.70	practise to a moderate extent
2.	Observing the ways of interacting with students in demonstrated teaching	3.27	0.65	practise to a great extent
3.	Demonstrating skillful questioning skills	3.35	0.62	practise to a great extent
4.	Discussing classroom management approaches for creating psychological environment	3.42	0.68	practise to a great extent
5.	Making references to the syllabus in discussing difficulties of preparation and teaching	3.53	0.62	practise to a great extent
6.	Discussing students' prior knowledge before starting a lesson	3.45	0.61	practise to a great extent
7.	Showing ways of organizing groups	3.39	0.64	practise to a great extent
8.	Displaying respect for students' views and opinions	3.41	0.67	practise to a great extent
9.	Demonstrating solicitous tenderness	3.35	0.63	practise to a great extent
10.	Telling mentees about students' progress to report to parents or guardians	3.57	0.60	practise to a great extent
11.	Demonstrating classroom management approaches	3.19	0.68	practise to a moderate extent
12.	Showing how to record students' academic performance	3.58	0.58	practise to a great extent
13.	Explaining question levels, directions and techniques relating to children's readiness level	3.44	0.60	practise to a great extent
	Grand Mean	**3.40**	**0.44**	**practise to a great extent**

Scoring Direction

1.00-1.75= do not practise at all	1.76-2.50= practise to some extent
3.26-4.00= practise to a great extent	2.51-3.25= practise to a moderate extent

Overall, mentors practised modelling to a great extent as its grand mean value was 3.40. Associated mean values for observing the ways of interacting with students in demonstrated teaching, demonstrating skillful questioning skills, discussing classroom management approaches for creating psychological environment, making references to the syllabus in discussing difficulties of preparation and teaching, discussing students' prior knowledge before starting a lesson, showing ways of organizing groups, displaying respect for students' views and opinions, demonstrating solicitous tenderness, telling mentees about students' progress to report to parents or guardians, showing how to record students' academic performance, and explaining question levels, directions and techniques relating to children's readiness level were 3.27, 3.35, 3.42, 3.53, 3.45, 3.39, 3.41, 3.35, 3.57, 3.58 and 3.44 respectively. However, demonstrating a lesson by using a hands-on teaching approach and classroom management approaches were practised to a moderate extent since their mean values were 3.23 and 3.19.

Table 2 shows mean values and standard deviations of practices on cognitive coaching rated by two hundred and fifty-one mentors.

Table 2 Mean Values and Standard Deviations of Mentors' Practices on Cognitive Coaching (N=251)

No.	Cognitive Coaching	Mean	SD	Remark
1.	Observing mentees' teaching through planned lessons to provide feedback	3.73	0.50	practise to a great extent
2.	Telling resources for validated content knowledge to mentees	3.31	0.58	practise to a great extent
3.	Assisting mentees to select teaching strategies according to the children's readiness levels	3.45	0.57	practise to a great extent
4.	Guiding teaching methods for focusing areas	3.54	0.60	practise to a great extent
5.	Asking mentees for better teaching methods	3.55	0.56	practise to a great extent
6.	Suggesting use of teaching methods according to pupils' abilities	3.51	0.59	practise to a great extent
7.	Explaining importance of extra-curricular activities	3.38	0.64	practise to a great extent
	Grand Mean	**3.50**	**0.39**	**practise to a great extent**

Scoring Direction
1.00-1.75= do not practise at all 1.76-2.50= practise to some extent
3.26-4.00= practise to a great extent 2.51-3.25= practise to a moderate extent

As the grand mean value of cognitive coaching was 3.50, mentors practised to a great extent. Also, their associated mean values were 3.73, 3.31, 3.45, 3.54, 3.55, 3.51 and 3.38 in the observing mentees' teaching through planned lessons to provide feedback, telling resources for validated content knowledge to mentees, assisting mentees to select teaching strategies according to the children's readiness levels, guiding teaching methods for focusing areas, asking mentees for better teaching methods, suggesting use of teaching methods according to pupils' abilities, and explaining importance of extra-curricular activities.

Table 3 describes mean values and standard deviations of practices on design conversation rated by two hundred and fifty-one mentors.

Table 3 Mean Values and Standard Deviations of Mentors' Practices on Design Conversation (N=251)

No.	Design Conversation	Mean	SD	Remark
1.	Discussing how to prepare questions for different individuals	3.33	0.66	practise to a great extent
2.	Discussing how to prepare questions for asking groups	3.47	0.61	practise to a great extent
3.	Providing positive comments after studying mentees' lesson plans	3.55	0.59	practise to a great extent
4.	Directing courses to be able to teach within the schedule	3.57	0.59	practise to a great extent
5.	Briefing about impact of the mentees' experiences from professional development activities on children's learning outcomes	3.43	0.63	practise to a great extent
	Grand Mean	**3.47**	**0.44**	**practise to a great extent**

Scoring Direction
1.00-1.75= do not practise at all 1.76-2.50= practise to some extent
2.51-3.25= practise to a moderate extent 3.26-4.00= practise to a great extent

In general, mentors practised design conversation to a great extent as its grand mean value was 3.47. Specially, they perceived that they practised to a great extent in discussing how to prepare questions for different individuals, discussing how to prepare questions for asking groups, providing positive comments after studying mentees' lesson plans, directing courses to be able to teach within the schedule, and briefing about impact of the mentees' experiences from professional development activities on children's learning outcomes because of their associated mean values were 3.33, 3.47, 3.55, 3.57, and 3.43 respectively.

Table 4 presents mean values and standard deviations of practices on feedback rated by two hundred and fifty-one mentors.

Table 4 Mean Values and Standard Deviations of Mentors' Practices on Feedback

(N=251)

No.	Feedback	Mean	SD	Remark
1.	Providing practical suggestions for improving teaching practices	3.59	0.56	practise to a great extent
2.	Providing oral and written evaluation	3.59	0.53	practise to a great extent
3.	Talking about mistakes when trying various teaching methods	3.57	0.57	practise to a great extent
4.	Explaining the links among expectations, planning and teaching	3.54	0.58	practise to a great extent
5.	Explaining about rationale for assessment	3.63	0.53	practise to a great extent
6.	Allowing to learn assessment techniques from colleagues	3.45	0.60	practise to a great extent
	Grand Mean	**3.56**	**0.41**	**practise to a great extent**

Scoring Direction

1.00-1.75= do not practise at all   1.76-2.50= practise to some extent
3.26-4.00= practise to a great extent   2.51-3.25= practise to a moderate extent

According to grand mean values of feedback as shown in Table 4, the mentors practised feedback to a great extent. The mean value of providing practical suggestions for improving teaching practices was 3.59, that of providing oral and written evaluation was 3.59, that of talking about mistakes when trying various methods was 3.57, that of explaining the links among expectations, planning and teaching was 3.54, that of explaining about rationale for assessment was 3.63, and that of allowing to learn assessment techniques from colleagues was 3.45.

Table 5 shows mean values and standard deviations of practices on wellbeing conversation rated by two hundred and fifty-one mentors.

Table 5 Mean Values and Standard Deviations of Mentors' Practices on Wellbeing Conversation

(N=251)

No.	Wellbeing Conversation	Mean	SD	Remark
1.	Allowing mentees to test out a range of teaching strategies by themselves	3.40	0.65	practise to a great extent
2.	Developing problem solving skills	3.31	0.69	practise to a great extent
3.	Discussing mentees' teaching practices with other mentors	3.33	0.71	practise to a great extent
4.	Talking about possible stressful situations	3.29	0.66	practise to a great extent
	Grand Mean	**3.33**	**0.51**	**practise to a great extent**

Scoring Direction

1.00-1.75= do not practise at all   1.76-2.50= practise to some extent
2.51-3.25= practise to a moderate extent   3.26-4.00= practise to a great extent

Mentors practised wellbeing conversation to a great extent according to its grand mean value – 3.33, as shown in Table 5. Corresponding mean values in allowing mentees to test out a range of teaching strategies by themselves, developing problem solving skills, discussing mentees' teaching practices with other mentors, and talking about possible stressful situations were 3.40, 3.31, 3.33 and 3.29 respectively.

Table 6 depicts mean values and standard deviations of practices on classroom observation rated by two hundred and fifty-one mentors.

Table 6 Mean Values and Standard Deviations of Mentors' Practices on Classroom Observation (N=251)

No.	Classroom Observation	Mean	SD	Remark
1.	Praising the positive aspects in mentees' teaching	3.67	0.56	practise to a great extent
2.	Listening actively to mentees' reviewing	3.46	0.57	practise to a great extent
3.	Showing an interest as a colleague	3.54	0.58	practise to a great extent
4.	Viewing mentees' classroom practices to fulfill requirements	3.48	0.65	practise to a great extent
	Grand Mean	**3.54**	**0.40**	**practise to a great extent**

Scoring Direction
1.00-1.75= do not practise at all 1.76-2.50= practise to some extent
2.51-3.25= practise to a moderate extent 3.26-4.00= practise to a great extent

Generally, mentors practised classroom observation to a great extent since grand mean value for it was 3.54. Since related mean values were 3.67, 3.46, 3.54 and 3.48, mentors believed that they practised to a great extent in praising the positive aspects in mentees' teaching, listening actively to mentees' reviewing, showing an interest as a colleague, and viewing mentees' classroom practices to fulfill requirements.

Table 7 describes mean values and standard deviations of practices on reflective dialogue rated by two hundred and fifty-one mentors.

Table 7 Mean Values and Standard Deviations of Mentors' Practices on Reflective Dialogue (N=251)

No.	Reflective Dialogue	Mean	SD	Remark
1.	Providing leading questions for mentees' self-reflection on their classroom practices	3.50	0.58	practise to a great extent
2.	Discussing the integration of skills, abilities and interests into teaching with their mentees	3.52	0.56	practise to a great extent
3.	Talking about effective teaching methods according to the nature of subjects	3.33	0.61	practise to a great extent
4.	Analyzing mentees' teaching on learners' learning abilities	3.41	0.63	practise to a great extent
	Grand Mean	**3.44**	**0.41**	**practise to a great extent**

Scoring Direction
1.00-1.75= do not practise at all 1.76-2.50= practise to some extent
3.26-4.00= practise to a great extent 2.51-3.25= practise to a moderate extent

Generally, reflective dialogue was practised by mentors to a great extent as its grand mean value was 3.44. Mean values for providing leading questions for mentees' self-reflection on their classroom practices, discussing the integration of skills, abilities and interests into teaching with their mentees, talking about effective teaching methods according to the nature of subjects, and analyzing mentees' teaching on learners' learning abilities were 3.50, 3.52, 3.33 and 3.41 respectively.

Table 8 presents mean values and standard deviations of mentors' practices on mentoring components according to perceptions of two hundred and fifty-one mentors.

Table 8 Mean Values and Standard Deviations of Mentors' Practices on Mentoring Components (N=251)

No.	Mentoring Components	Mean	SD	Remark
1.	Modelling	3.40	0.44	practise to a great extent
2.	Cognitive Coaching	3.50	0.39	practise to a great extent
3.	Design Conversation	3.47	0.44	practise to a great extent
4.	Feedback	3.56	0.41	practise to a great extent
5.	Wellbeing Conversation	3.33	0.51	practise to a great extent
6.	Classroom Observation	3.54	0.40	practise to a great extent
7.	Reflective Dialogue	3.44	0.41	practise to a great extent

Scoring Direction
1.00-1.75= do not practise at all
1.76-2.50= practise to some extent
2.51-3.25= practise to a moderate extent
3.26-4.00= practise to a great extent

According to Table 8, the mentors in three regions practised to a great extent in all mentoring components.

Investigating Variations of Mentors' Practices on Mentoring Strategies According to Their Regions

Variations of practices of mentors on MSs were investigated in terms of their regions. Regions were composed of UR, CR and lower region (LR).

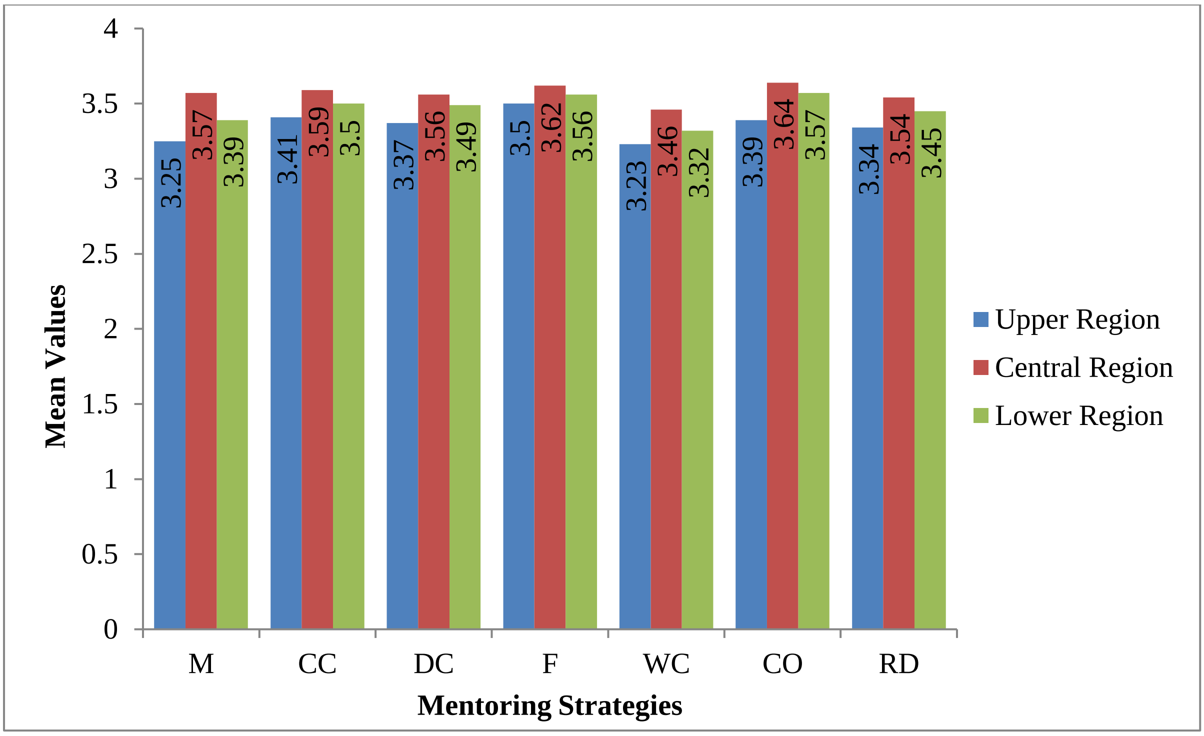
Firstly, Table 9 shows mean values and standard deviations showing mentors' practices on mentoring strategies grouped by regions.

Table 9 Mean Values and Standard Deviations Showing Mentors' Practices on Mentoring Strategies Grouped by Regions (N=251)

No.	Mentoring Strategies	Mean(SD)		
		UR	CR	LR
1.	Modelling	3.25(0.43)	3.57(0.38)	3.39(0.45)
2.	Cognitive Coaching	3.41(0.40)	3.59(0.36)	3.50(0.40)
3.	Design Conversation	3.37(0.48)	3.56(0.39)	3.49(0.44)
4.	Feedback	3.50(0.42)	3.62(0.38)	3.56(0.42)
5.	Wellbeing Conversation	3.23(0.52)	3.46(0.45)	3.32(0.52)
6.	Classroom Observation	3.39(0.38)	3.64(0.36)	3.57(0.40)
7.	Reflective Dialogue	3.34(0.43)	3.54(0.37)	3.45(0.41)
	Grand Mean	**3.36(0.37)**	**3.57(0.33)**	**3.47(0.38)**

Scoring Direction
1.00-1.75= do not practise at all
2.51-3.25= practise to a moderate extent
1.76-2.50= practise to some extent
3.26-4.00= practise to a great extent

According to Table 9, grand mean values for practices of mentoring strategies were 3.36 (UR), 3.57 (CR) and 3.47 (LR). It can be said that mentors in all regions practised to a great extent. It can be seen in Figure 1.



M=Modelling	F=Feedback	CO=Classroom Observation
CC=Cognitive Coaching	WC=Wellbeing Conversation	RD=Reflective Dialogue
DC=Design Conversation		

Figure 1 Comparison for Practices of Mentoring Strategies Grouped by Regions

Table 10 describes One-Way ANOVA results showing MSs of practices of mentors grouped by regions.

Table 10 One-Way ANOVA Results Showing Mentors' Practices on Mentoring Strategies Grouped by Regions (N=251)

Dependent Variables		Sum of Squares	*df*	Mean Square	*F*	*p*
Modelling	Between Groups	3.439	2	1.719	9.433	0.000***
	Within Groups	45.206	248	0.182		
	Total	48.645	250			
Cognitive Coaching	Between Groups	1.024	2	0.512	3.356	0.036*
	Within Groups	37.846	248	0.153		
	Total	38.870	250			
Design Conversation	Between Groups	1.300	2	0.650	3.373	0.036*
	Within Groups	47.797	248	0.193		
	Total	49.098	250			
Wellbeing Conversation	Between Groups	1.783	2	0.892	3.495	0.032*
	Within Groups	63.271	248	0.255		
	Total	65.054	250			
Classroom Observation	Between Groups	2.294	2	1.147	7.669	0.001**
	Within Groups	37.096	248	0.150		
	Total	39.390	250			
Reflective Dialogue	Between Groups	1.343	2	0.671	4.055	0.019*
	Within Groups	41.069	248	0.166		
	Total	42.412	250			
Overall	**Between Groups**	**1.513**	**2**	**0.756**	**5.768**	**0.004****
	Within Groups	**32.515**	**248**	**0.131**		
	Total	**34.028**	**250**			

Note: ***$P<0.001$, ** $P<0.01$, *$P<0.05$

According to the ANOVA results in Table 10, there were significant differences in modelling (df=2, F=9.433, p<0.001), cognitive coaching (df=2, F=3.356, p<0.05), design conversation (df=2, F=3.373, p<0.05), wellbeing conversation (df=2, F=3.495, p<0.05), classroom observation (df=2, F=7.669, p<0.01) and reflective dialogue (df=2, F=4.055, p<0.05) in addition to overall practices (df=2, F=5.768, p<0.01). Table 11 indicates Turkey HSD results showing multiple comparisons for MSs.

Table 11 Turkey HSD Results Showing Multiple Comparisons for Mentoring Strategies (N=251)

Dependent Variables	(I) Region	(J) Region	Mean Difference (I-J)	*p*
Modelling	CR	UR	0.320*	0.000***
		LR	0.178*	0.021*
Cognitive Coaching	CR	UR	0.175*	0.027*
Design Conversation	CR	UR	0.194*	0.030*
Wellbeing Conversation	CR	UR	0.229*	0.025*
Classroom Observation	CR	UR	0.252*	0.001**
	LR	UR	0.173*	0.009**
Reflective Dialogue	CR	UR	0.200*	0.013*
Overall	**CR**	**UR**	**0.212***	**0.002****

Note: ***$P<0.001$, **$P<0.01$, *$P<0.05$

There was a significant difference among three different nominal levels after comparing those levels (region). As test of homogeneity of variance was not significant, Turkey HSD post hoc test was applied in order to know specific pairs of means among regions.

The data presented in the Table 11 showed that mentors in the CR significantly differed from both of those in the UR ($p<0.001$, $d=0.79$) and LR in modelling ($p<0.05$, $d=0.42$). Mentors in both the CR and LR significantly differed from those in the UR in classroom observation ($p<0.01$, $d=0.68$; $p<0.01$, $d=0.46$). Mentors in the CR differed from those in the UR in cognitive coaching ($p<0.05$, $d=0.47$), design conversation ($p<0.05$, $d=0.43$), wellbeing conversation ($p<0.05$, $d=0.47$) and reflective dialogue ($p<0.05$, $d=0.50$). Overall practices, there was a significant difference between the mentors in the CR and UR ($p<0.01$).

Revealing Variations of Mentors' Practices on Mentoring Strategies According to Their Gender

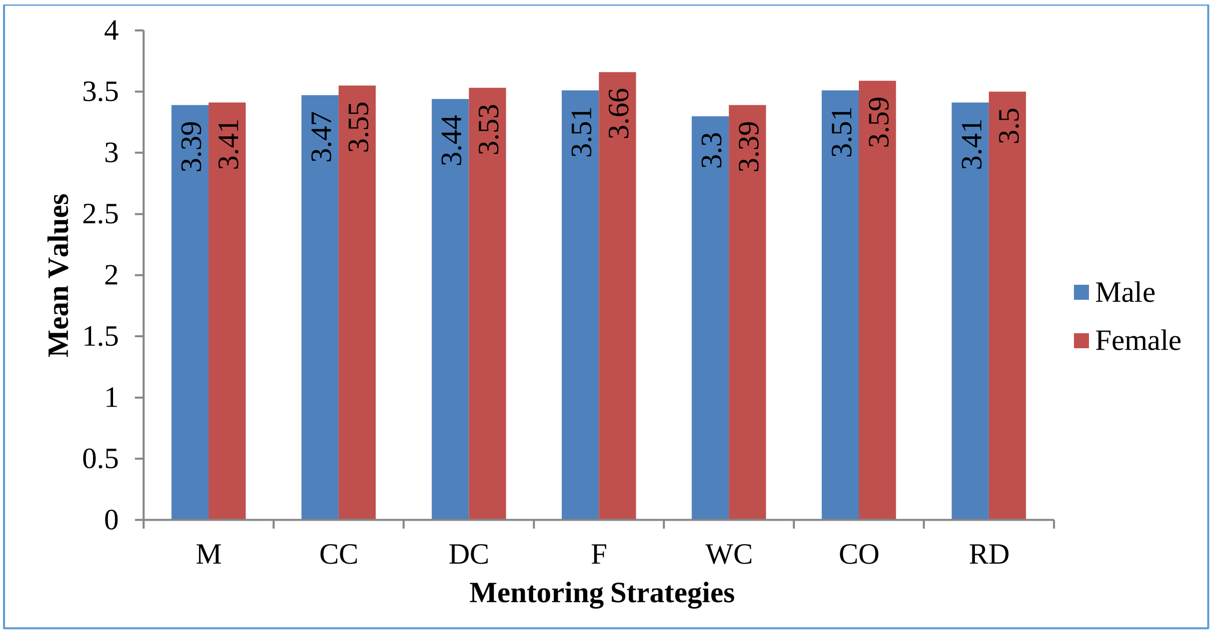
Table 12 describes Independent Samples *t* Test results showing mean comparison of MSs grouped by gender.

Table 12 Independent Samples *t* Test Results Showing Mean Comparison of Mentoring Strategies Grouped by Gender (N=251)

MSs	Gender	N	Mean(SD)	*t*	*df*	*p*
Feedback	Male	162	3.51(0.41)	-2.860	249	0.005**
	Female	89	3.66(0.40)			
Overall	**Male**	**162**	**3.43(0.37)**	**-1.818**	**249**	**ns**
	Female	**89**	**3.52(0.36)**			

Note: **$P<0.01$, ns= no significance

To test the difference between two independent groups (in that case, male mentors and female mentors) on normal dependent variables, the Independent Samples *t* Test was used. According to Table 12, male mentors were significantly different from female mentors ($t=-2.860$, *df*=249, *p*=0.005) in practising feedback. However, there were no significant differences between male and female in overall practices.



M=Modelling
CC=Cognitive Coaching F=Feedback CO=Classroom Observation
DC=Design Conversation WC=Wellbeing Conversation RD=Reflective Dialogue

Figure 2 Comparison for Practices of Mentoring Strategies Grouped by Gender

As shown in Figure 2, female mentors had higher practices on MSs (Mean=3.52) than male mentors (Mean=3.43). Comparison of mean values was seen in Figure 2. For female mentors, feedback had the highest practice (Mean=3.66) but wellbeing conversation had the lowest practice (Mean=3.39). In practices of male mentors, feedback and classroom observation had the highest practices (Mean=3.51) in comparison with other strategies. However, wellbeing conversation had the lowest practice (Mean=3.30).

Results and Discussion

The specific items in modelling were practised to a moderate extent by mentors (Mean=3.19 and Mean=3.23) since *classroom management approaches did not demonstrate well* due to insufficient physical facilities like seating in schools and constraints of time for them (27.78% of the mentors performed them) and *a lesson did not model well using a hands-on teaching approach* because there was only one mentee in the entire school and constraints of time for them and their mentees (33.33% of the mentors conducted it).

After comparing the grand mean of each component, it was found that **feedback** had the highest mean value (Mean=3.56) and well-being conversation had the lowest (Mean=3.33). Based on interview, oral feedback was utilized by mentors to re-teach for slow learners and to praise their mentees' strengths, while written feedback was used to pinpoint the mentees' strengths and what to modify in classroom management and using teaching methods. In written evaluation of Toolkit (4), they listed advantages and what to modify in the next school visit. In the second school visit, it was again checked against with suggestions of the first school visit. A mentor employed videotaping and maintained track of his mentees' portfolios so that he could enable portfolio discussions with his mentees, principals, and his Township Education Officer (TEO) during a release time. Giving and receiving feedback, most of the mentors added, was advantageous for both them and their mentees. This result was consistent with recommendations made by the Northern Territory Department of Education (2014) that mentors should provide and receive feedback. Goal-setting theory claims that feedback was a powerful motivational factor that enabled people to assess their progress (Locke & Latham, 2002).

A few mentors in the **wellbeing conversation** only talked about problem-solving techniques to get over their own obstacles, and then they described how they support their mentees emotionally concerning communication, training, meetings on the weekends, challenges in teaching, classroom management, assessment, and so on, while writing mentoring reports, particularly at their Township Education Offices in the last week of every month despite having little time. This result was in line with the findings of Kilburg's study (Kilburg, 2007), which indicated that not all mentors possess the knowledge and expertise necessary to offer that help.

In comparison of overall practices among **regions**, there was a significant difference between CR and UR. Using the local language to communicate with ethnic groups and having maladjusted mentees (some mentees who received MA/MSc degrees) were found as differences based on interview results. Support from school principals and TEOs, working in schools with a limited number of teachers, and being project areas of some PD programme under MOE were also found to be differences. Mentors claimed that mentoring BTs would be successful if mentors had enough time, administrative help, more interactions with their mentees, a desire to mentor, and access to mentoring skills, according to Frazier (2006; as cited in Vikaraman, Mansor, and Hamzah, 2017).

In hilly areas, particularly during the rainy season, some mentors in UR experienced transportation challenges. Then, mentors spoke of "their not committed mentees to children." The mentees' commitment is essential for effective mentoring. Similarly, Hudson (2013a) found that desirable attributes of mentees were enthusiasm, being personable, commitment to children, lifelong learning or love of learning, being open or reflective to feedback, developing resilience, and taking responsibility for their learning. Similarly, Hall, Draper, Smith and Bullough (2008) found that the mentors who had worked with a struggling mentee teacher more frequently ranked critical feedback and relationship as the most important aspect. In contrast, the mentors who had not worked with a struggling pre-service mentee teacher more frequently ranked opportunities to teach, personal traits and emotional support as the most crucial aspect. Even though some mentors were aware that mentoring was relationship-oriented, they occasionally used office and position power to intimidate their challenging mentees.

There were no significant differences between **male and female mentors**, concerning overall practices. However, male mentors were significantly different from female mentors in **feedback**. In the interview, it was shown that female mentors were more inclined than male mentors to offer their mentees emotional support because of their mutual trust with their mentees. Furthermore, even if they had limited opportunities in the lives of their own BTs, they considered themselves to be the recognized primary teachers four or five years ago and were eager to serve as mentors for BTs. According to their mentees' perceptions, female mentors provided more personal and emotional guidance than male mentors, according to the study by Fowler, Gudmundsson, and O'Gorman (2007). In addition, at the Township Education Office, where there were job vacancies for Assistant Township Education Officers (ATEOs), some male mentors were overworked in the office due to performing additional functions of ATEOs.

Suggestions

The following suggestions are based on the research findings.

1. More physical facilities, like seating, should be provided for remote, rural primary schools. More time should be provided not only mentors for demonstrating a teaching approach and classroom management approaches but also mentees who observe these approaches.
2. The mentors should provide emotional welfare by relieving their mentees' stresses and building a trusting relationship.
3. School principals and TEOs ought to monitor their mentors' mentoring functions occasionally and the workloads of some mentors should be reviewed by TEOs.
4. Due to transportation difficulty in hilly regions in UR and constraints of time in all regions, a school-based mentoring program should be considered.
5. Mentors should be aware of their roles and functions in practising MSs to guide their mentees.
6. Highly capable leader teachers (the highest position in the professional growth and development of teachers in Myanmar) should be attracted to apply for the mentors positions.

Need for Further Studies

Due to regional variations, mentors' challenges in practising mentoring on MSs in their areas, as well as causes of variations in feedback practices between male and female mentors, should be studied.

Acknowledgements

We would like to especially acknowledge Dr. Pyone Pyone Aung (Retired Acting Reactor, YUOE), Dr. Kay Thwe Hlaing (Rector, YUOE), Dr. May Myat Thu, Dr. Khin Khin Oo and Dr. Nyo Nyo Lwin (Pro-Rectors, YUOE), Dr. Aye Aye Cho (Retired Professor, Head of Department, Department of Educational Theory, YUOE), Dr. Khin Mar Ni (Professor, Head of Department, Department of Educational Theory and Management, YUOE), and Dr. Cho Cho Sett (Former Associate Professor, Department of Educational Theory, YUOE) for their valuable expertise and support which have enabled us to carry out this research up to this rightful conclusion.

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RELATIONSHIP BETWEEN SCHOOL LEADERS' INSTRUCTIONAL LEADERSHIP AND TEACHERS' FUNCTIONAL COMPETENCY ACROSS THE 21st CENTURY LEARNING

Hay Man Pyae Pyae Phyo[1] and Su Su Hlaing[2]

Abstract

This study examined the relationship between school leaders' instructional leadership and teachers' functional competency in west district, Yangon Region. The research design was the descriptive research design. For this study, 10 high school leaders who had above 2 years administrative services in the current schools were chosen by using purposive sampling method and 200 teachers from these schools were selected by using simple random sampling method. In this study, both quantitative and qualitative methods were applied. For quantitative study, a set of questionnaires was used. For qualitative study, open-ended and interview questions were used. Descriptive Statistics, Independent Samples t Test, One-way Analysis of Variance (ANOVA) and Pearson Correlation were used for analyzing the collected data. According to the findings, it was found that the level of high school leaders' instructional leadership was high (Mean= 4.16, SD= .63) and there were significant differences in high school leaders' instructional leadership in terms of total service, total administrative service. Moreover, it was found that the level of teachers' functional competency was also high (Mean= 4.34, SD= .55) and there was significant difference in teachers' functional competency in terms of their position. This finding also revealed that there was a strong positive correlation between school leaders' instructional leadership and teachers' functional competency (r =.692, p <.001). This study recommends that school leaders contribute the instructional leadership practices to improve teachers' functional competency.

Keywords: School leaders, Instructional leadership, Functional Competency, 21st Century learning

Introduction

As the principals' success depends on teacher and student performance, the principals' approach as instructional leaders is crucial to build on student achievement. Instructional leadership is one of the key functions in which every school principal or educational leaders should ideally be able to perform to ensure learners achieve the best results from the learning and teaching processes (Vilakazi, 2016). School leaders have responsibility and accountability for effective instructional outcomes. Teachers need a wide range of competencies to face the complex challenges of 21st century. Nowadays, teachers need to focus on three main components in improving their functional competency, namely knowledge, skills related to technology, pedagogy, and subject content. Teachers should always explore and dig for new knowledge that can help improve their level of functional competence. Moreover, a positive school climate will create a conducive environment for teachers to perform teaching and learning processes. In brief, principals' instructional leadership and teachers' functional competency are very important for improving student achievement.

Significance of the study

Principals should serve as instructional leaders, however, in practices few principals act as instructional leaders (Bush et al, 2010). It is obvious that without having an effective instructional leader, schools will be unable to achieve both national and school visions. Successful leaders put the maximum efforts to achieve the established vision. These leaders provide necessary resources,

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share the development and encourage the people work together to attain the school vision (Hallinger, 2005).

Teachers with high level of functional competency will be able to use their content knowledge, pedagogical knowledge and curriculum knowledge. Moreover, they will be able to ensure classroom management and student assessment effectively and to improve 21^{st} century learning skills. School leader and teachers are the most important individuals in successful implementation of the national curriculum and they are a key element in improving the quality education. Therefore, it ensures that the findings of this study and the recommendation given in this study can also contribute to quality education.

Research Objectives

The general objective of this study was to study the relationship between school leaders' instructional leadership and teachers' functional competency across the 21^{st} century learning in Basic Education High Schools.

Research Questions

(1) What is the level of the school leaders' instructional leadership practices across the 21^{st} century learning perceived by teachers in Basic Education High School?
(2) Are there any significant differences in school leaders' instructional leadership practices in terms of their personal factors?
(3) What is the level of teachers' functional competency across the 21^{st} century learning in Basic Education High School?
(4) Are there any significant differences in teacher's functional competency in terms of their personal factors?
(5) Is there any relationship between school leaders' instructional leadership practices and teachers' functional competency across the 21^{st} century learning in Basic Education High Schools?

Theoretical Framework

There are two parts in this study: school leaders' instructional leadership practices and teachers' functional competency across the 21^{st} century learning. Investigating school leaders' instructional leadership practices was based on Instructional Leadership Model developed by Hallinger (2011). In this model, there are three dimensions of Instructional leadership. They are:

- Defining school goal
- Managing instructional programme
- Promoting school climate

The first dimension, ***defining school goal*** includes two functions: framing the school's goals and communicating the school's goal.

The second dimension, ***managing the instructional program***, incorporates three leadership functions: supervising and evaluating instruction, coordinating the curriculum and monitoring student progress.

The third dimensions, ***promoting a positive school learning climate***, include several functions. These are protecting instructional time, providing incentives for teachers, providing incentives for learning, promoting professional development, and maintaining high visibility.

On the other hand, teachers' functional competency was investigated with the following dimensions based on teacher competency theory developed by Medley (1977), 21st century teaching competencies by Nessipbayeva (2012) and Teacher Competency Standards Framework (TCSF, 2020) in Myanmar.

Demonstrating Leadership: Teachers demonstrate leadership in the school by engaging in collaborative and collegial professional learning activities. Teacher must maintain a safe and orderly classroom that facilitates student learning and positive management of student behavior. Teacher must defuse and deescalate disruptive or dangerous behavior of their students. Teachers advocate for schools and students by implementing and adhering to policies and practices positively affecting students' learning and must demonstrate high ethical standard (Nessipbayeva, 2012).

***Establishing a respectful environment for a diverse population of students*:** Teachers should provide an environment in which each child has a positive and nurture learning environment that convey high expectation of every student. Teachers establish a respectful environment by communicating and collaborating with the home and community for the benefit of students (Nessipbayeva, 2012).

***Knowing the content, they teach and understanding how students learn*:** Teachers should know the knowledge required for teaching different ages and stages and level- appropriated subject content competency. Inherent in any focus on subject competency is the necessity to understand how students learn and how they can be effectively taught in the key learning areas (Teacher Competency Standards Framework, 2020).

Facilitating learning for their students: Teachers facilitate student that the appropriate levels of intellectual, physical, social, and emotional development. Teachers use teaching resources needed to address the strengths and weaknesses of students. Teachers consistently encourage and support students to articulate thoughts and ideas clearly and effectively. Teachers integrate technology into their instruction to get their students maximize learning processes (Nessipbayeva, 2012).

***Reflecting on their practice*:** It incorporates teachers' habits, motivation and actions related to their on-going learning and professional improvement. It advocates the importance of all teachers being aware of their role as leaders within the community and highlights the need for active research to support teachers' classroom performance and continuing professional development. (Teacher Competency Standards Framework, 2020).

Definitions of Key Terms

School leader: School leaders are personnel who are in formal positions to occupy various roles in the school (Leithwood & Riehl, 2003).

Instructional Leadership: Instructional leadership is defined as an influence process through which leaders identify a direction for the school, motivate staff, and coordinate school and classroom-based strategies aimed at improvement in teaching and learning (Hallinger and Murphy, 2012).

Competency: Competencies are combination of skills, knowledge, attitudes, and behavior of workers required for effective performance of activity at workplace (Salleh and Sulaiman, 2016).

Functional Competency: A functional competency is a specific knowledge and skill area that relates to successful performance in the job (Guide for Writing Functional Competencies, 2005).

Methodology

In this study, quantitative and qualitative methods were used. This study was conducted with 10 high school leaders and 200 teachers from Basic Education High Schools, in West district, Yangon Region. By using purposive sampling method, 10 high school leaders who had above 2 years administrative service in the current schools were chosen and 200 teachers (72 senior teachers, 86 junior teachers and 42 primary teachers) from these schools were selected by using simple random sampling method.

For quantitative study, a set of questionnaires was used and it consists of three sections; section A is related to demographic factor, section B consists of items related to the school leaders' instructional leadership practices and items of section C is related to the teachers' functional competency. In section B, the school leaders' instructional leadership practices was measured by modifying "Principal Instructional Management Rating Scale (PIMRS) developed by Hallinger and Murphy (1985). There are 50 items for three dimensions of school leaders' instructional leadership practices.

In section C, the instrument for measuring teachers' functional competency was developed based on 21st century teaching competency described by Nessipbayeva (2012) and Teacher Competency Standard Framework (TCSF, 2000) in Myanmar. There are altogether 46 items for five dimension of teachers' functional competency. Five-point likert scale ranging from never to always (1= never, 2= seldom, 3= sometimes, 4= often and 5= always) were used for rating each item of instructional leadership and teachers' functional competency. Moreover, 4 open-ended questions and an interview form was used for qualitative study.

The Cronbach's alpha was used to measure the reliability of the questionnaire. According to the result of pilot testing, the internal consistencies (Cronbach's alpha) were 0.96 for the instructional leadership practices and 0.92 for the teachers' functional competency. Descriptive statistics and independent samples *t* test, One-way Analysis of Variance (ANOVA), Tukey post-hoc test and Pearson product-moment correlation were used to analyze the quantitative data. The researcher analyzed and interpreted the qualitative data manually.

Findings and Discussion

In this section, findings of school leaders' instructional leadership practices and teachers' functional competency were presented through analyzing the collected data. Firstly, quantitative findings were described.

Table 1. Means and Standard Deviations the Dimension of Instructional Leadership Practices Perceived by Teachers (N=200)

No.	Variables	Mean	SD	Remark
1	Framing School Goals	**4.42**	**.68**	High
2	Communicating School Goals	4.33	.68	High
Defining School Goals		**4.37**	**.64**	High
3.	Supervise and evaluation instruction	4.01	.72	High
4.	Coordinating the curriculum	4.32	.71	High
5.	Monitoring student progress	4.01	.75	High
Managing Instructional Programmes		**4.15**	**.68**	High
6	Protecting instructional time	**3.84**	**.63**	Moderately High
7	Maintaining high visibility	4.17	.76	High
8	Providing Incentive for teachers	4.10	.79	High
9	Promoting professional development	4.20	.81	High
10	Providing Incentives for Students	4.33	.77	High
Promoting School Climate		4.10	.67	High

Scording direction: 1.00-2.00= low 2.01-3.00 moderately low
3.01-4.00= moderately high 4.01-5.00= high

According to table 1, the sub-dimensions of instructional leadership practices, "Protecting instructional time" have the lowest mean value of 3.84. And, the dimension "Framing school goals" having the highest mean value of 4.42.

Table 2. Mean Values and Standard Deviations of School Leaders' Instructional Leadership Practices Grouped by Total Service (N= 200)

Variables	Total Service	N_1	N_2	Mean	SD	*F*	*P*
Defining School Goals	20 yrs and below	3	84	4.32	.65	6.61 6	.002**
	31-40yrs	6	110	4.46	.60		
	above 40	1	6	3.53	.73		
Managing Instructional Programmes	20 yrs and below	3	84	4.03	.71	6.81	.001**
	31-40yrs	6	110	4.27	.62		
	Above 40	1	6	3.44	.36		
Promoting School Climate	20 yrs and below	3	84	3.93	.74	7.43	.001**
	31-40yrs	6	110	4.25	.57		
	Above 40	1	6	3.58	.64		
Instructional Leadership	**20 yrs and below**	**3**	**84**	**4.04**	**.68**	**7.55**	**.001****
	31-40yrs	**6**	**110**	**4.29**	**.56**		
	above 40	**1**	**6**	**3.52**	**.51**		

Note: *p < .01, **p<.001 n_1 = number of school leaders n_2 = number of teachers

Table 3 One-Way ANOVA Results Showing Significantly Different Areas in School Leaders' Instructional Leadership Practices Grouped by Total Service (N= 200)

Variables		Sum of Squares	*df*	Mean Square	*F*	*P*
Defining School Goals	Between Groups	5.29	2	2.61	6.62	.002**
	Within Groups	77.68	197	0.39		
	Total	**82.91**	**199**			
Managing the Instructional Programmes	Between Groups	5.91	2	2.95	6.81	.001**
	Within Groups	85.52	197	0.43		
	Total	91.43	199			
Promoting School Climate	Between Groups	6.37	2	3.18	7.43	.001**
	Within Groups	84.44	197	0.43		
	Total	90.81	199			
Instructional Leadership	**Between Groups**	**5.72**	**2**	**2.86**	**7.55**	**.001****
	Within Groups	**74.62**	**197**	**0.38**		
	Total	**80.34**	**199**			

Note: **p<01, ***p<.001

Table 4 Tukey Results HSD Showing Significant Difference in School Leaders' Instructional Leadership Practices Grouped by Total Service (N= 200)

Variables	Total Service (I)	Total Service (J)	Mean Differences	*P*
Defining School Goals	above 40	20 years and below 31-40years	-.78939* -.92364*	.009** .002**
Managing the Instructional Programmes	31-40years	20 years and below above 40	.24360* 83351*	.031* .008**
Promoting School Climate	31-40years	20 years and below above 40	25613* .77873*	.003** .041*
Instructional Leadership	31-40years	20 years and below above 40	.24360* .77873	.031* .008**

Note: *p<.05, **p< .01

In order to table (4), according to Tukey HSD results, two groups of school leaders who had the total service of 20 years and below exceeded the group of school leaders who had the total service of above 40 years in defining school goals. In managing instructional programmes, promoting school climate, and overall instructional leadership practices, the groups of school leaders who had total service of 31 to 40 years surpassed the other two groups.

Table 5 Mean Values and Standard Deviations of School Leaders' Instructional Leadership Practices Grouped by Total Administrative Services (N= 200)

Variables	Total Administrative Services	n_1	n_2	Mean	SD	*F*	*P*
Defining School Goals	5years and below	1	15	4.51	.40	**1.76**	**ns**
	6-10yrs	5	119	4.40	.64		
	11-15yrs	3	42	4.39	.66		
	above 15	1	24	4.10	.71		
Managing Instructional Programmes	5years and below	1	15	3.94	.47	**7.76**	**.000***
	6-10yrs	5	119	4.26	.62		
	11-15yrs	3	42	4.22	.59		
	above 15	1	24	3.59	.89		
Promoting School Climate	5years and below	1	15	4.30	.21	**6.34**	**.000*****
	6-10yrs	5	119	4.14	.65		
	11-15yrs	3	42	4.19	.53		
	above 15	1	24	3.56	.92		
Instructional Leadership	**5years and below**	**1**	**15**	**4.23**	**.20**	**5.74**	**.001****
	6-10yrs	**5**	**119**	**4.23**	**.61**		
	11-15yrs	**3**	**42**	**4.23**	**.54**		
	above 15	**1**	**24**	**3.68**	**.85**		

Note: $^{**}p<.01$, $^{***}p<.001$ n_1 = number of school leaders n_2 = number of teachers

Table 6 One-Way ANOVA Results Showing Significantly Different Areas in School Leaders' Instructional Leadership Practices Grouped by Total Administrative Service

(N= 200)

Variables		Sum of Squares	*df*	Mean Square	*F*	*P*
Managing the Instructional Programmes	Between Groups	9.70	3	3.236	7.762	.000***
	Within Groups	81.72	196	.417		
	Total	**91.43**	**199**			
Promoting School Climate	Between Groups	8.04	3	2.679	6.344	.000***
	Within Groups	82.77	196	.422		
	Total	**90.81**	**199**			
Instructional Leadership	**Between Groups**	**6.49**	**3**	**2.164**	**5.744**	**.001****
	Within Groups	**73.85**	**196**	**.377**		
	Total	**80.34**	**199**			

Note: $^{**}p<.01$, $^{***}p<.001$

As shown in table 6, there were significant differences among school leaders in all variables. So, Tukey test was used to analyze.

Table 7 Tukey Results HSD Showing Significant Difference in School Leaders' Instructional Leadership Practices Grouped by Total Administrative Service

(N= 200)

Variables	Total Administrative Service (I)	Total Administrative Service (J)	Mean Differences (I-J)	*P*
Managing the Instructional Programmes	above 15	6-10yrs	-.66572*	.000**
		11-15yrs	-.62815*	.001**
Promoting School Climate	above 15	5years and below	-.73621*	.004**
		6-10yrs	-.57888*	.001**
		11-15yrs	-.62438*	.001**
Instructional Leadership	**above 15**	**5years and below**	**-.55356***	**.034***
		6-10yrs	**-.55316***	**.000*****
		11-15yrs	**-.55835***	**.003****

Note: ***p <.001, **p<,01, **p<.05

In order to Table 7, according to Tukey HSD results, three groups of school leaders who had the total administrative service of 5 years and below, 6 to 10 years and 11 to 15 years exceeded the group of school leaders who had the total administrative service of above 15 years in managing instructional programme and overall instructional leadership practices, the groups of school leaders who had total administrative service of 6 to 10 years and 11 to 15 years surpassed the group of school leaders who had total administrative service above 15 years in managing the instructional programme.

Table 8 Means and Standard Deviations of Teacher's Functional Competency

(N=200)

Variable	Mean	SD	Remark
Demonstrating Leadership	4.44	0.58	High
Establishing a respectful environment	4.24	0.63	High
Knowing the content they teach and understanding how students learn	4.41	0.56	High
Facilitating learning for their students	4.33	0.62	High
Reflecting on their practices	4.26	0.64	High
Teachers' Functional Competency	**4.34**	**0.55**	**High**

Scording direction: 1.00-2.00= low 2.01-3.00 moderately low
3.01-4.00= moderately high 4.01-5.00= high

Finding on variations of teachers' functional competency in terms of their personal factors

Table 9 Mean Values and Standard Deviations of Teacher Functional Competency by Teacher Position (N=200)

Variables	Position	N	Mean	SD	*F*	*P*
Demonstrating leadership	PT	42	4.71	.28	7.02	.001**
	JT	86	4.43	.54		
	ST	72	4.30	.69		
Establishing respectful environment	PT	42	4.52	.34	6.19	.002**
	JT	86	4.22	.58		
	ST	72	4.10	.76		
Knowing the content they teach and understanding how students learn	PT	42	4.56	.37	2.15	ns
	JT	86	4.41	.46		
	ST	72	4.33	.72		
Facilitating learning for their students	PT	42	4.55	.34	4.98	.008**
	JT	86	4.36	.56		
	ST	72	4.18	.77		
Reflecting on their practices	PT	42	4.40	.47	2.11	ns
	JT	86	4.28	.54		
	ST	72	4.15	.80		
Functional Competency	**PT**	**42**	**4.55**	**.27**	**5.32**	**.006****
	JT	**86**	**4.34**	**.47**		
	ST	**72**	**4.21**	**.70**		

Note: *p<. 05, **p<.01, ns= no significance

Table 10 One-Way ANOVA Results Showing Significantly Different Areas in Teachers' Functional Competency Grouped by Teacher Position (N=200)

Variables		Sum of Squares	*df*	Mean Square	*F*	*P*
Demonstrating Leadership	Between Groups	4.47	2	2.23	7.03	.001**
	Within Groups	62.72	197	.32		
	Total	67.19	199			
Establishing a respectful environment	Between Groups	4.72	2	2.36	6.19	.002**
	Within Groups	75.05	197	.38		
	Total	79.77	199			
Facilitating learning for their students	Between Groups	3.77	2	1.87	4.98	.008**
	Within Groups	74.53	197	.38		
	Total	78.31	199			
Functional Competency	**Between Groups**	**3.12**	**2**	**1.56**	**5.32**	**.006****
	Within Groups	**57.76**	**197**	**.29**		
	Total	**60.88**	**199**			

Note: *p<.05, **p<.01

Table 11. Tukey Results HSD Showing Significant Difference in Teachers' Functional Competency Grouped by Teacher Position (N= 200)

Variables	Teacher Positions(I)	Teacher Position (J)	Mean Difference	*p*
Demonstrating leadership	PT	ST	.41*	.001**
		JT	.28*	.025*
Establishing a respectful environment	PT	ST	.42*	.002**
		JT	.29*	.032*
Facilitating learning for their students	PT	ST	.37*	.006**
Functional Competency	**PT**	**ST**	**.34***	**.004****

Note: *p<.05, **p<.01

According to table 11, Tukey HSD results indicated that in the dimension of demonstrating leadership, establishing a respectful environment, the group of primary teachers exceeded both the groups of junior teachers (p<.05) and senior teachers (p<.01). In also the dimension of facilitating learning for their students, the groups of primary teachers exceeded the group of senior teachers (p<.01). Moreover, the group of primary teachers surpassed the group of senior teachers in functional competency (p<.01).

Table 12. The Relationship Between School Leaders' Instructional Leadership Practices and Teacher's Functional Competency (N=200)

Variables	Instructional Leadership Practices	Teacher's Functional competency
Instructional Leadership Practices	1	.692**
Teacher's Functional competency	.692**	1

"Correlation is significant at the 0.01 level (2-tailed)

In table (12), it was found that there was a strong positive relationship between school leaders' instructional leadership practices and teachers' functional competency. Therefore, school leaders' instructional leadership practices and teachers' functional competency across the 21st century learning were highly related (r=.692**, $p < 0.01$).

4.2 Qualitative Research Finding

The responses on open-ended and interview questions were presented as the qualitative findings. There are four open-ended questions for teachers, and various responses are described in detail as follow.

Q. 1 Describe the proposals that you want to add concerning with your school leader's instructional leadership practices.

Most of the teachers (n= 134, 67%) answered that no need to add concerning with their school leaders' instructional leadership practices.

- Good at instructional leadership practices. (n= 17, 8.5%)
- Support teaching aids (n=9, 4.5%).
- Organize to participate all staff. (n=2, 1%)
- Take accountability and responsibility. (n=1, 0.05%)
- Supervise their staff during teaching. (n=5, 2.5%)
- Supervise teachers to use instructional time effectively (n=3,1.5%)
- Occasionally teach students by himself (n=1, 0.05%).
- Discuss with the parents of low- achieving students (n=5, 2.5%).
- Focus more on the instructional leadership practices (n=6, 3%).

Q.2 Do you have the ability to teach your students to get 21st century skills (5Cs)? How to you perform?

- Most of teachers (n=100, 50%) answered that they can teach student to get 21st century skills (5Cs) by using the teaching methods suggested by teaching experts, mentors and instructors. Some teachers can perform to get 21st century skills (5Cs) by:
- Teaching by using technology (n=20, 10%)
- Using teaching aids and making experiments (n= 19, 9.5%)
- Reading books, papers, articles written by educational experts. (n=35, 17.5%)
- Teaching to get communication with each other, cooperation and innovation, own critical thinking, solving the problem, to actively participate in social affairs and group discussion (n=19, 9.5%)

Q.3 Describe your practices in order to effectively implement the new education system for 21st century learning.

- Studying to get more knowledge (n=20, 10%)
- Using child-centered approach (n=12, 6%)
- Attending on-line teaching class and getting information concerned with teaching and learning from google, you-tube and other social media (n=35, 17.5%)
- Using the teachers' guide and teaching aids (n= 16, 8%)
- Applying new knowledge obtained from subject refresher courses, teacher training programs, summer short-term courses, laboratory training courses (n= 56, 28%)
- Sharing and discussing with each other, group discussion and evaluation (n =14,7%)

Q.4 Which difficulties do you face to implement the new education system for 21st century learning?

- Lack of ICT skills (n= 71, 35.5%)
- Weakness in parents' support (n=15,7.5%)
- Inadequate teaching aids (n=16, 8%)
- Not having enough teaching period (n=23, 11.5%)
- Weakness in cooperation (n= 12, 6%)
- Lacking of children's previous knowledge (n=10,5%)
- Poor language proficiency (n=12,6 %)

- Having family economic affair (n=3, 1.5%)
- Having a large number of students in classroom (n=18, 9%)
- Having difficulty for teaching the various subjects (n=5, 2.5)

To know the instructional leadership practices of school leaders in more detail, eight principals were selected to conduct interview based on the qualitative results from Basic Education High Schools, in West district, Yangon Region. The responses of these principals were presented as follows.

Q.1 What factors do you consider when you set the yearly goals for your school? What do you do to implement those purposes?

The school leader of school (1) said that she set the school's goals based upon the spirt, discipline and education. She cooperated with parents, teachers and school communities to develop the physical infrastructure and to improve the mental development of students. And, she said that she usually communicates the school's academic goals to her staffs and students. She used both formal communication channels (e.g- staff bulletins, assemblies and goal statements) and informal ones (e.g parents- teachers conferences, curriculum meeting, other discussion with staff).

The school leader of school (2) said that she framed the school goals for the physical, intellectual, spiritual, social and emotional development of students, and incorporated data on past and current student performance and insisted on the staff to include actively for achieving the set goals. School leader communicated the school' goals to teachers, parents, students etc. both formal and informal communication channel.

The school leader of school (3) said that she set the school goals according to students' learning capability, parents' support capability and support capability of Department of Education. She articulated not only teachers at the meeting but also students at the assemblies concerning the school goals.

The school leader of school (4) said that she set the school goals depending on students' effort and learning, and set accordance with the schools' calendar during the school year. And then, she communicated the school goals to the teachers, parents and students at the meeting and assemblies.

The school leader of school (5) said that she had set purposes of school for students' future improvement. She informed teachers about the purposes at meeting, call for assemblies every Monday to inform students about the school purposes.

The school leader of school (6) said that when setting school goals, she aimed to develop learning purposes and to be all round developed students. When acting to know the school goals, the subject deans, class teachers and class monitors are called to meeting and assemblies.

The school leader of school (7) said that she set educational purposes to be well-rounded citizens and to get higher education. Before setting school goals, she discussed with teachers first. And she informed students and parents at the parents-teacher meetings, assemblies and by using the bulletin board and the goals of school are depicted in the school leaders' office.

The school leader of school (8) said that she set school goals based on the school calendar, students' learning capability, parents' support capability and support capability of Department of Education. She communicated the school goals to teachers, students and parents at the parents and teacher meetings, assemblies and using the bulletin board and the goals of school are depicted in the school leaders' office. The school's academic goals were displayed highly visible in the school.

Q.2 How do you manage your instructional programmes at school?

The school leader of school (1) answered that she supervised teachers' work by inspecting records such as notes of lesson, class attendance records and period register book. She checked students' exercise books regularly (weekly with the help of subject deans). She checked teachers' note of lesson and align the curriculum and advice where necessary. She analyzed students' examination result and discussed with the subject teachers, students and their parents related to the weak subject.

The school leader of school (2) said that she formed "Board of Study" and forced to teach accordance with the monthly syllabus. She directed teachers to assess during teaching and learning process. According to the student' achievement result, she discussed across the grade level staff and individual teacher. She looked at daily dairy of individual teachers on every Friday and sometimes checked the record of correction. Moreover, she fulfilled teaching aids, scientific tools and chemical materials and supervised to use teaching aids effectively. She monitored teaching-learning conditions and gave the suggestions as needed.

The school leader of school (3) answered that she managed the instruction programmes. She collaborated with teachers in developing curriculum and instruction to improve the academic performance of pupil. To achieve good academic results, she discussed with the subject deans and subject teachers. She conducted informal observations in classrooms and then she pointed out specific strengths and weaknesses in teacher's instructional practices.

The school leader of school (4) said that she supervised the teaching method and made frequent classroom observation and evaluated teachers' performance and then advised to improve their teaching and learning processes. To be successful the curriculum, she coordinated with subject deans and subject teachers to connect accordance with the grade level. She sometimes checked the students' exercise books and informed teachers if their students' exercise books were not completed. She directed teachers to do correction of students' exercise books.

The school leader of school (5) answered that she checked whether the monthly syllabus and the current lessons match or not. She supervised teachers' work by inspecting records such as notes of lesson, class attendance records and period register book. Sometimes, she carried out informal observation such as looking at the situation of learning activities carried out by the teachers in the classroom and then met individually with teacher to discuss the weaknesses of teaching.

The school leader of school (6) said that she assigned teachers to teach the subjects according to their specializations. She monitored teachers to use Child-centered Approach (CCA). She checked the students' book whether the syllabus and lesson match or not. She visited classes to observe the teaching process, and then gave feedback towards these observations. And she discussed with the teachers about the child who weak in academic performance or problems related to that student. Sometimes she provided private feedback to some teachers who are in low performance.

The school leader of school (7) answered that to improve the teaching and learning processes, she supported teaching aids. She organized and motivated the parents and teachers to cooperate for students' all- round development.

The school leader of school (8) answered that she conducted informal observations in classrooms and then she pointed out specific strengths and weaknesses in teacher's instructional practices. Moreover, she provided private feedback to some teachers who are in low performance. She met teachers individually to discuss student progress. She informed the school's academic progress the students.

Q.3 How do you act to improve your school climate?

The school leader of school (1) said that she forced teachers to take the class punctually. She provided private feedback to the teachers' low performance and public praise of outstanding teachers' performance. Moreover, she provided private feedback to students in low academic achievement and public praise of outstanding students' performance. For professional development, she encouraged the teachers to attend the subject refresher courses, teacher training programs, summer short-term courses, laboratory training courses and to share the information each other.

The school leader of school (2) answered that she performed emergency meeting during class time occasionally. She instructed teachers to teach the co-curriculum effectively. When she visited informally to the class, and evaluate teachers' performance and provided private feedback to teachers' classroom instruction. She informed and consulted with parents about their children who are low in morale value. For professional development, she encouraged the teachers to attend the subject refresher courses, teacher training programs, summer short-term courses, laboratory training courses and the information was discussed each other.

The school leader of school (3) said that she acted as substitute teachers in the absence of class teacher. She held school meeting at the end of the school time. She reinforced teachers to cooperate the school activities. The teachers were rewarded for their special effort and teaching performance by school leader (e.g monetary reward, regularly attendance, etc.). She recognized and rewarded the outstanding students for academic accomplishment or for their good behavior (e.g hanging the outstanding students' photos in the hall, trophies in the school trophy case).

The school leader of school (4) said that she admitted that she cannot protect the instructional time occasionally from the external interruption. But then, she held faculty meeting at the end of the school time. Sometime, she performed as a substitute teacher in the absence of class teacher. She was used reward system for the special efforts and performance of teachers. Moreover, she provided the incentives for students who do the best academic achievement and for good behavior. Teachers were motivated to try to expertise in their respective subject. For the professional development, she encouraged the teachers to attend the subject refresher courses, teacher training programs, summer short- term courses, laboratory training courses and to share information each other. Accordance with the 21st century learning, she encouraged mainly teachers to use the teaching aids, to do group projects, and she supported teaching and learning materials as such as possible.

The school leader of school (5) said that she encouraged the teachers to attend the subject refresher courses, teacher training programs, summer short-term courses, laboratory training courses and the information was discussed each other for the professional development. She recognized and rewarded the outstanding students for academic accomplishment or for their good behavior (e.g hanging the outstanding students' photos in the hall, trophies in the school trophy case).

The school leader of school (6) said that she protected classroom instructional time from interruption and erosion (e.g held the school meeting at the end of the school time). She reinforced her staff to make the effective use of teaching aids, to study from you-tube, google and other media and then to apply it in their teaching, and instructed that the lessons had to be well-prepared. She urged that the respective subjects were discussed monthly. For the outstanding teachers' performance, teachers were recognized and rewarded. She recognized superior students with their academic achievement and the good behavior or citizenship (such as displaying academic award, giving the trophies in the school trophy case).

The school leader of school (7) said that she discussed with parents whose children have the difficulties in learning. She held faculty meeting at the end of the school time. The school leader recognized superior students with their academic achievement and the good behavior or citizenship (such as displaying academic award, giving the trophies in the school trophy case, placing names of students with outstanding performance on the honor roll and publishing annual school magazines). For the professional development, she encouraged the teachers to attend the subject refresher courses, teacher training programs, summer short-term courses, laboratory training courses and to share and discuss the information each other.

The school leader of school (8) answered that she protected classroom instructional time without interruption and erosion (e.g held the school meeting at the end of the school time). School leader performed to replace the teacher who helps for the absence of the class teacher. According to 21st century learning, she urged teachers on to use google, you-tube and other media platform for teaching and learning processes. She encouraged teachers to teach the co-curriculum activities on instructional time.

Discussion

According to the quantitative findings, the mean value of school leaders' instructional leadership practices perceived by teachers was 4.16. That is, the responses of teachers indicated that school leaders always performed instructional leadership practices.

The mean score of the school leaders' instructional leadership was high when analyzed according to their qualification. The mean value of the school leaders who got BEd degree was higher than that of the school leaders who got PhD. This finding indicated that the school leaders who got PhD in Physics and Chemistry are less qualified in the educational administration than the school leaders who got BEd. Durango (2008) claims that leadership presupposes many skills and the use of effective tools tailored to the situation at hand.

This finding indicated that the group of school leaders who had the total service of 31 to 40 years performed instructional leadership practices more than the two groups of school leaders who had the total service of 20 years and below and above 40. Finding suggested that the school leaders who had the total service of 40 years and above will be retired and they are unwilling to meet the new requirement.

This finding indicated that the mean value of school leader who were total service (20years and below) is lower than the school leader who were total service (31-40) years. The school leaders who had the total service of (31-40) years had the adequate experiences, knowledge, skills and willing to try new things. the This finding suggested, the school leader who were total service of 20years and below may be less experiences, skills and knowledge.

According to their administrative services, there were significant differences in all areas of school leaders' instructional leadership. It could be concluded that the group of school leaders 5years and below and 6- 10 years of administrative service more performed managing the instructional programmes and promoting school climate than the school leaders' who had above 15 years of total administrative service. According to open-ended questions, some teachers expressed that they want their principal to focus more on the instructional leadership practices (n=6, 3%), some teachers suggested their principals to support the teaching aids (n=9, 4.5%), some teachers wanted their principal to supervise their teaching (n=5, 2.5%). Moreover, she rejected to do interview because of her health problem. So, this finding revealed that the school leaders' who had above 15 of total administrative service was less in interested her school because of her health problem. Principals' work intensification can lead to excessive work- related stress, burn-out, and mental health, reduce their self-efficacy and sense of personal accomplishment, and lead them to develop negative feelings towards the profession (Bauer& Brazer, 2013; Drummond & Halsey, 2013; Federici & Skaalvik, 2012).

On the other hand, in the results of quantitative findings, the mean valve of teachers' functional competency was 4.34. This indicated that the level of teachers' functional competency was high level. Bennett (1988) reported that competencies need to be thoroughly conversant with the subject matter children's understanding and misconceptions, differentiate curriculum in relation to students, task design, portray curriculum, organize classroom settings, monitor a variety of classroom events, create and maintain good social relationships and relate and work with parents. In this study, teachers' functional competency was high, and so it can be said that they can perform all of their functions well.

Moreover, the mean value of teachers' demonstrating leadership was 4.44 or higher than the other function. The quantitative result, teachers always actively performed in demonstrating leadership for their schools. Katzenmeyer and Moller, 2001 affirm how teacher leader lead inside and outside of classrooms, nurturing other teachers to become leaders, and influencing improved educational practice.

The group of teachers who had above 31 years of teaching service had high level of teachers' functional competency than the rest groups. This finding revealed that the teachers who had above 31 years of teaching service can conduct their teaching functions more than the other groups of teachers because they had more experiences in teaching.

The group of teachers who had attended such teacher training as PATC, JATC, PGDT and PGDMA, DTEd and DTECT and BEd had high level of teachers' functional competency. The group of teachers who had attended PATC significantly exceeded the other groups of teachers. Indeed, the group of teachers who had attended PATC was primary teachers, and they had attended workshops of new curriculum implementation for primary levels in Myanmar. Teachers are key performers for any educational in institution, hence, they need to be equipped with proper skill (Carnoy, Khavenson, & Ivanova, 2015).

Moreover, the finding of this study indicated that, school leaders' instructional leadership practices was positively and highly correlated with teachers' functional competency. This finding agreed with the statements that school leaders' instructional leadership practice is able to increase the level of teachers' functional competency (Ross Hogaboam-Gray, & Gray, 2004; Ebmeier, 2003) and also success in teachers' classroom instructions; and at the same time the increase in students' academic achievement can be realized (Hendriks & Steen et al, 2012).

Suggestions

The following recommendation are based on the analyses of the research findings to improve the school leaders' instructional leadership practices and functional competency of teachers.

- The school leaders should provide private feedback to teacher who are in low performance.
- School leader should hold a continuous discussion with teachers individually to know the students' academic development and achievement.
- School leaders should discuss with the staff as a whole, and individual teachers based on student achievement data.

- School leaders should avoid spending too much time on non-instructional issues and minimize school- wide announcements that interrupt classroom teaching.
- School leaders should speak informally with teachers and students during recess and lunch breaks
- School leaders shouldn't stay in the office all day and provide direct instruction to classes occasionally. As a result, school leaders can assess level of student engagement, check instructional strategies and assessment procedures undertaken by the teachers.
- School leaders should be given the training concerning Educational Administration, supervision and instructional leadership as much as possible.
- It is necessarily important to give the new curriculum training to teachers at all levels of Basic Education effectively and efficiently to be quality education.
- It is greatly necessary that the Ministry of Education should fulfill the teaching aids and facilitates required for 21^{st} century learning.
- Teachers should identify various teaching method to help students with different background and the special need of child.
- Teachers should learn instructional resources (such as educational journal, articles and papers etc.) for their continuous development.

Acknowledgement

First and foremost, I would like to express my respectful thanks to Dr. Kay Thwe Hlaing (Rector, Yangon University of Education), Dr. May Myat Thu (Pro-Rector, Yangon University of Education), Dr. Khin Khin Oo (Pro-Rector, Yangon University of Education), and Dr. Nyo Nyo Lwim (Pro-Rector, Yangon University of Education). Secondly, our respectful gratitude and thanks to Dr. Khin Mar Ni (Professor, Head of Department, Department of Educational Theory and Management, Yangon University of Education) for her administrative support, expert guidance in the preparation of this study, reasonable and detailed suggestion, timely and invaluable advices, and warmhearted advocation for all the times during this study. I would like to appreciate my external examiner U Tun Oo Kyaw (Lecturer, Retired) Department of Educational Theory and Management, Yangon University of Education) for her excellent guidance, warmhearted advocation and knowledgeable suggestions.

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J. Myanmar Acad. Arts Sci. 2023 **Vol. XXI. No.6**

A STUDY OF PRINCIPALS' SUSTAINABLE LEADERSHIP PRACTICES

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Abstract

The primary purpose of this study is to study sustainable leadership practices of principals. By using purposive sampling, 30 principals and a total of 399 teachers from Basic Education High Schools in Four Townships of Hinthada District in Ayeyarwaddy Region were selected as the participants. Two sets of questionnaire and open-ended questions were used to collect the required data. The internal consistency (Cronbach's alpha) of the questionnaire for principals' practices was (0.96). Descriptive research method was used to tabulate the mean values and standard deviations for groups of items. Moreover, Independent Samples *t*-Test, One-way ANOVA and post-hoc test by Tukey were used for the analysis of the data. The results found that the extent of principals' sustainable practices was 3.46. According to the mean value, all principals participated in this study were found that ***sometimes practiced*** on principals' sustainable leadership practices. Statistically significant differences were found in some areas of sustainable leadership practices according to their personal factors perceived by teachers. When investigating the levels of sustainable leadership practices of principals according to the qualitative findings, it was found that the principals performed in sustainable leadership practices according their responses.

Keywords: sustainable leadership, leadership practice, sustainable leadership practice

Introduction

Today's leaders need to adopt appropriate leadership to lead the organization and subordinates. It is to face and live up to the challenges of the 21century. Sustainable leadership is a new concept in leadership approaches in organizational aspects (Avery, 2005). Sustainable leadership respects future, present and past and builds on the past in its quest to create a better future (Hargreaves, 2007). Positive Changes brought towards the meaningful progress of the organization can be attained by sustainable leadership (Rushton, 2003). Sustainable leadership now very popular leadership style that transforming the narrow image of organization into the broad concept (Rehman, S. *et al*, 2019). Sustainable leadership practices are prevalent in education and it can be utilized what direction school leadership should be going in order to create lasting and positive change in leadership practices (Hargreaves & Fink, 2006). Based on scientific research results, sustainable leadership involves ethical, social, and responsible all aspects. It can be assumed that the idea of a sustainable leadership practices related to the principals for the development of organization competencies that can help to create better future. Therefore, the principals' sustainable leadership practices are needed to study.

Significance of the Study

Myanmar is trying to enhance the quality of education and upgrade the education system. In doing so, this can only be achieved through well-trained leadership and informed staff about the globalization trends as well as education standards coupled with the problems and challenges of the community. There is an urgent need in education today for a new type of Leadership_ one that makes the long-term sustainability. Sustainable leaders look beyond immediate, short-term gains to see the role their organization plays in a larger context. Sustainable leadership practices can balance short-term and long-term priorities and create value for a variety of stakeholders (Russell Reynolds Associates, 2015). Principals' sustainable leadership practices is essential to the academic growth of students and professional growth of faculties and staff (Hargreaves, 2007). Therefore, it is vital for us to explore the role of principal sustainable leadership and their actual practices.

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Objectives of the Study

General Objective

The general objective of the study is:

- To study principals' sustainable leadership practices in Basic Education High Schools

Specific Objectives

The specific objectives of the study are:

- To study the extent of principals' sustainable leadership practices in Basic Education High Schools
- To study the differences of teachers' perception on the extent of principals' sustainable leadership practices in terms of the principals' personal factors

Research Questions

This study is especially targeted to answer the following research questions:

- To what extent do the principals perform sustainable leadership practices in Basic Education High schools?
- Is there any significant difference in teachers' perception on the extent of sustainable leadership practices of principals in terms of their personal factors?

Limitation of the Study

The research area was geographically limited by thirty Basic Education High Schools in four Townships of Hinthada District in Ayeyarwaddy Region.

Theoretical Framework

According to Hargreaves and Fink (2003), sustainable leadership matters, spreads and lasts, and is fundamental to enduring and widespread school improvement. Hargreaves and Fink (2003) developed a model of sustainable leadership in education sector particularly primary, secondary and post-secondary. The model is comprised of seven dimensions including such aspects as: length, depth, justice, breadth, resourcefulness, diversity and conservation (Hargreaves & Fink, 2003). Hargreaves and Fink's (2003) work have been developed for a number of subsequent models such as Hill (2006), Davies (2007), Fullan (2005) and Lambert (2011).

In this study, the principals' sustainable leadership practices are based on the seven principles of sustainable leadership practices by Hargreaves and Fink (2006). The following dimensions will be used to measure the sustainable leadership practices.

a. Balancing Short-term and Long-term Objectives

Sustainable leadership contributes and creates synergy between the long-term objectives of the organization and short-term targets. It preserves and advances the most valuable aspects of life over time, from one leader to the next and capacity building for the future (Lambert, 2011).

b. Developing a Sustaining Learning Community

Sustainable leadership seeks to work collaboratively to ensure deep learning that available meets the needs of locality. Sustainable leadership makes the learning the paramount priority in all leadership capacities (Hargreaves & Fink, 2006).

c. Developing Leadership at all Levels

It develops and depends on the leadership of others, not just one person at the top. In order for to be sustainable, the leadership in a school must be properly distributed (Hargreaves & Fink, 2006). Sustainable leadership empowers individuals at all levels of the organization to engage in leadership activities which bring about sustainable improvement (Lambert, 2011).

d. Building up the Issues of Social Justice

Sustainable leadership fosters opportunities to work collaboratively and develop partnership (Lambert, 2011). Justice in sustainable leadership presents a challenge in looking out for not only what is best for a principal's own school, but what is best for the surrounding schools and community. Sustainable leadership is socially just and focused on the common good at all (Hargreaves & Fink, 2006).

e. Developing the Diversity and Capacity in Professional Learning Community

Sustainable leadership learns from diversity, creating social inclusion and cohesion (Hargreaves & Fink, 2006). Sustainable leadership recognizes and cultivates many kinds of excellences in learning, teaching and leading and provides the networks to be shared in across-fertilizing processes of improvement (Lambert, 2011).

f. Transforming and Renewing the Resources

Sustainable leadership pays careful attention to its resources, both financial and personal. In order for leadership effective, leaders must look after themselves and the people around them (Hargreaves & Fink, 2006). Sustainable leadership provides intrinsic rewards and extrinsic incentives that attract and retain the best leadership and it provides time and opportunities for leaders to network, learn from and support each other, as well as coach and mentor their successors (Lambert, 2011).

g. Sustaining the Leadership and Learning Environment

Conservation requires that the leaders learn from the past in order to benefits the future (Hargreaves & Fink, 2006). Sustainable leadership honor and learn from the past to create a better future (Lambert, 2011).

This theoretical framework leads to the following research work.

Definition of Key Terms

Leadership Practice

Leadership Practices are the actions, behaviors or strategies a leader employs in order to achieve desired outcomes (Pitman, 2008).

Sustainable Leadership

Sustainable Leadership is defined as the preserving and developing everything that spreads and continues deeply, without being damaged, and positively influencing others, both today and in the future (Hargreaves, 2007, cited in Yue et al., 2021).

Sustainable Leadership Practices

Sustainable Leadership Practices is defined as the creating current and future profits for an organization while improving the lives of all concerned (MoCAnn & Holt, 2010)

Operational Definition of Principals' Sustainable Leadership Practices

In this study, principals' sustainable leadership practices is defined as the practices of principal that underpin balancing long-term and short-term objectives, developing a sustaining learning community, developing leadership at all levels, building up the issues of social justice, developing the diversity and capacity in professional learning community, transforming and renewing the resource and sustaining the leadership and learning environment.

These seven dimensions were used to measure the principals' sustainable leadership.

Methodology

In this study, both quantitative and a research method were used to collect the required data. For the quantitative research study, questionnaire survey was used. For quantitative research study, the open-ended questions and interviews were applied. For participants, 30 High School principals and 399 teachers from Basic Education Schools in Hinthada District, Ayeyarwady Region were selected by using purposive sampling method.

The questionnaire survey was used to investigate the teachers' perception on principals of sustainable leadership practices. There are 49 items through the five-point Likert Scale ranging 1-5 (1=never), 2=seldom, 3=sometimes, 4=often, 5=always) to measure the teachers' perception of actual practices of principals' sustainable leadership. Quantitative methods such as open-ended questions were used to investigate principals' sustainable leadership practices.

Quantitative Research Findings

Quantitative Research Findings

In this study, the levels of sustainable leadership practices of principals were investigated by teachers' ratings. Moreover, the variations of the teachers' perceptions on the principals' sustainable leadership practices levels in terms of their personal factors were also investigated.

Findings on the Extent of Sustainable Leadership Practices of Principals

Table 1 Mean Values and Standard Deviations Showing Perceptions of Teachers on the Extent of Principals' Sustainable Leadership Practices (N=399)

No.	Variables	Mean (SD)	Remark
1.	Balancing short-term and long-term objectives	3.21(0.39)	Sometimes
2.	Developing a sustaining learning community	3.00(0.40)	Sometimes
3.	Developing leadership capacities at all levels	3.45(0.39)	Sometimes
4.	Building up the issues of social justice	3.15(0.40)	Sometimes
5.	Developing the diversity and capacity in professional learning community	3.36(0.45)	Sometimes
6.	Transforming and renewing the resources	3.21(0.44)	Sometimes
7.	Sustaining the leadership and learning environment	3.46(0.50)	Sometimes
Principals' Sustainable Leadership Practices		**3.26(0.36)**	**Sometimes**

Scoring Range: 1.00-1.49=Never, 1.5-2.49=Seldom, 2.5-3.49=Sometimes, 3.5-4.49=Often 4.5-5.00=Always

According to the data presented in Table 1, the mean values across all items for Balancing short-term and long-term objectives was (3.21), the mean values across all items for Developing a sustaining learning community was (3.00), the mean values across all items for Developing leadership capacities at all levels was (3.45), the mean values across all items for Building up the issues of social justice was (3.15), the mean values across all items for Developing the diversity and capacity in professional learning community was (3.36), the mean values across all items for

Transforming and renewing the resources was (3.21) and the mean values across all items for Sustaining the leadership and learning environment was (3.46) respectively.

Generally, as the overall mean value for the extent of the principals' sustainable leadership practices was (3.26). It implied that the teachers perceived their principals as having ***sometimes practiced*** on the sustainable leadership practices.

The Variations of Sustainable Leadership Practices of Principals Perceived by Teachers in terms of their Personal Factors

To investigate the variations in sustainable leadership practices of principals, their personal factors as gender, their age, administrative service, current school service and total service were utilized in this study.

The overall mean values for male and female groups of principals were 3.30 and 3.24 respectively. It can be found that the mean values between two gender groups were slightly different. Therefore, it was found that both male and female principals sometimes practiced on sustainable leadership practices. There was no significant difference in all areas of sustainable leadership practices between male and female principals.

In order to analyze whether principals' sustainable leadership practices perceived by teacher depended on principals' age groups or not, one-way ANOVA was utilized.

According to the Table 2, it was found that there were significant differences in three areas such as "Balancing short-term and long-term objectives" (p<.01), "Developing leadership capacities at all levels" (p<.01), and "Transforming and renewing the resources" (p<.001) among seven areas of principals' sustainable leadership practices.

Table 2 One-Way ANOVA Results Showing Differences in the Perception of Teachers on the Principals' Sustainable Leadership Practices Grouped by Age

(N=399)

Variables	**Age (Years)**		
	31-40 years (N1=2)	**41-50 years (N1=6)**	**Above 50 years (N1=22)**
	N2=399	**N2=399**	**N2=399**
	Mean (SD)	**Mean (SD)**	**Mean (SD)**
Balancing short-term and long-term objectives	3.24(0.16)	3.07 (0.49)	3.24 (0.37)
Developing a sustaining learning community	3.09(0.27)	2.96 (0.51)	3.00 (0.39)
Developing leadership capacities at all levels	3.62(0.31)	3.52 (0.41)	3.41 (0.39)
Building up the issues of social justice	3.20(0.30)	3.23 (0.41)	3.12 (0.41)
Developing the diversity and capacity in professional learning community	3.57(0.38)	3.38 (0.53)	3.35 (0.43)
Transforming and renewing the resources	3.39(0.34)	3.36 (0.38)	3.14 (0.46)
Developing the diversity and capacity in professional learning community	3.57(0.38)	3.38 (0.53)	3.35 (0.43)
Transforming and renewing the resources	3.39(0.34)	3.36 (0.38)	3.14 (0.46)
Sustaining the leadership and learning environment	3.64(0.42)	3.52 (0.52)	3.43 (0.51)
Overall Sustainable Leadership Practices	**3.39(0.24)**	**3.30 (0.41)**	**3.24 (0.35)**

Scoring Range: 1.00-1.49 = Never, 1.5-2.49 = Seldom 2.5-3.49 = Sometimes,
3.5-4.49= Often, 4.5-5.00 = Always

In order to analyze whether there were significant differences of teachers' perception on sustainable leadership practices among age groups of principals or not, Tukey HSD was conducted.

Table 3 Tukey HSD Results of Principals' Sustainable Leadership Practices Perceived by Teachers Grouped by Age (N=399)

Variables	(I) Age (Years)	(J) Age (Years)	Mean Difference (I-J)	*p*
Balancing short-term and long-term objectives	41-50	Above 50	-0.16*	0.002**
Developing leadership capacities at all levels	31-40	Above 50	0.19*	0.040*
Transforming and renewing the resources	Above 50	31-40	-0.22*	0.034*
		41-50	-0.13*	0.039*

Note: *p<.05, **p<.01

As shown in Table 3, Tukey HSD results indicated that there were significant differences among the principals. The principals who had age of 41-50 years and above 50 years differed significantly in their practices of "Balancing short-term and long-term objectives". The principals who had age of 31-40 years and above 50 years differed significantly in their practices of "Developing leadership capacities at all levels". The principals who had age of above 50 years and the principals who had age of (31-40) years, (41-50) years were differed significantly of "Transforming and renewing the resources.

According to Table 3, the overall mean value for a group of 1-5 administrative service years of principals and a group of 6-10 administrative service years of principals were 3.39 and 3.00 respectively. Therefore, it was found that all groups of principals ***sometimes practiced*** on all areas of principals' sustainable leadership practices.

Table 4 Independent Samples *t*-Test Results Showing Differences in the Perceptions of Teachers on Principals' Sustainable Leadership Practices Grouped by Administrative Service (Years) (N=399)

Variables	Admin Services (Years)	N1	N2	Mean (SD)	*t*	*df*	*p*
Balancing short-term and long-term objectives	1-5	2	27	3.24(0.16)	0.92	397	.004**
	6-10	28	392	3.20(0.40)			
Developing a sustaining learning community	1-5	2	27	3.09(0.27)	1.25	397	n.s
	6-10	28	392	3.00(0.41)			
Developing leadership capacities at all levels	1-5	2	27	3.62(0.30)	2.35	397	n.s
	6-10	28	392	3.43(0.39)			
Building up the issues of social justice	1-5	2	27	3.20(0.30)	0.72	397	n.s
	6-10	28	392	3.15(0.41)			
Developing the diversity and capacity in professional learning community	1-5	2	27	3.57(0.37)	2.35	397	n.s
	6-10	28	392	3.35(0.46)			
Transforming and renewing the resources	1-5	2	27	3.38(0.34)	2.15	397	n.s
	6-10	28	392	3.19(0.45)			
Sustaining the leadership and learning environment	1-5	2	27	3.64(0.41)	1.89	397	n.s
	6-10	28	392	3.45(0.51)			
Overall Sustainable Leadership Practices	**1-5**	**2**	**27**	**3.39(0.24)**	**1.96**	**397**	**n.s**
	6-10	**28**	**392**	**3.00(0.41)**			

Note:*p<0.5, **p<.01, ***p<.001, ns= no significance

To analyze whether there were significant differences of principles' sustainable leadership practices perceived by teachers depended on principals' administrative or not, independent samples *t*-test was used. Table 5 presented the results of independent sample *t*-test of principals' sustainable leadership practices grouped by administrative service.

It was found that there were statistically significant differences between administrative services groups in the areas of "Balancing Short-term and Long-term Objectives" (p<.01).

Moreover, Table 6 presented the overall mean values for the principals who had 1-5 years at current school and the principals who had of 6-10 years at current school were 3.23 and 3.70 respectively.

To analyze whether principals' sustainable leadership practices perceived by teachers depended on principals' current school service or not, independent samples *t*-test was conducte.

Table 6 presented the results of independent sample *t*-test of principals' sustainable leadership practices, group by current school service. Out of three areas of principals' sustainable leadership practices, it was found that there were statistically significant differences between current school's services groups in the areas of "Developing a sustaining learning community" (p<.05), "Developing leadership capacities at all levels" (p<.01) and "Building up the issues of social justice" (p<.001). Moreover, there was statistically significant difference in overall sustainable leadership practices between two groups of principals (p<.05).

Table 5 Independent Samples *t*-Test Results Showing Differences in the Perceptions of Teachers on Principals' Sustainable Leadership Practices Grouped by Service Years at Current School (N=399)

Variables	Current Service (Years)	N1	N2	Mean (SD)	*t*	*df*	*p*
Balancing short-term and long-term objectives	1-5	28	373	3.17 (0.37)	-6.50	397	n.s
	6-10	2	26	3.66 (0.42)			
Developing a sustaining learning community	1-5	28	373	2.97 (0.38)	-4.91	27.07	.023*
	6-10	2	26	3.46 (0.49)			
Developing leadership capacities at all levels	1-5	28	373	3.42 (0.37)	-4.34	26.96	.009**
	6-10	2	26	3.85 (0.50)			
Building up the issues of social justice	1-5	28	373	3.12 (0.36)	-3.78	26.18	.000***
	6-10	2	26	3.59 (0.62)			
Developing the diversity and capacity in professional learning community	1-5	28	373	3.33 (0.43)	-6.13	397	n.s
	6-10	2	26	3.87 (0.47)			
Transforming and renewing the resources	1-5	28	373	3.18 (0.42)	-5.14	397	n.s
	6-10	2	26	3.63 (0.56)			
Sustaining the leadership and learning environment	1-5	28	373	3.44 (0.50)	-3.94	397	n.s
	6-10	2	26	3.84 (0.58)			
Overall Sustainable Leadership Practices	**1-5**	**28**	**373**	**3.23 (0.33)**	**-5.10**	**26.80**	**.014***
	6-10	**2**	**26**	**3.70 (0.46)**			

Note: *p<0.5, **p<.01, ***p<.001, n.s= no significance

The overall mean values for a group of principals who had total services of (11 -20) years, a group of principals who had total services of (21-30) years and a group of principals who had total services of (21-30) years and a group of principals who had total services of above 30 years were 3.39, 3.26 and 3.25 respectively. Therefore, it was found that all total services groups of principals sometimes practiced on Principals' Sustainable Leadership.

In order to analyze whether principals' sustainable leadership practices perceived by teachers depended on principals' total service or not, one-way ANOVA was utilized.

Table 7 presented one-way ANOVA results of principals' sustainable leadership practices grouped by total service.

Out of four areas of principals' sustainable leadership practices, it was found that there were statistically significant differences between two groups of principals in the areas of "Balancing short-term and long-term objectives", "Developing leadership capacities at all levels" and "Transforming and renewing the resources". However, there was no significant difference in overall sustainable leadership practices between two groups of principals.

Table 6 One-Way ANOVA Results Showing Differences in the Perception of Teachers on Principals' Sustainable Leadership Practices Grouped by Total Service (N=399)

Variables		Sum of Squares	*df*	Mean Square	*F*	*p*
Balancing short-term and long-term objectives	Between Groups	1.28	2	0.64	4.27	.015*
	Within Groups	59.38	396	0.15		
Developing a sustaining learning community	Between Groups	0.57	2	0.28	1.74	n.s
	Within Groups	64.45	396	0.16		
Developing leadership capacities at all levels	Between Groups	0.97	2	0.48	3.13	.045*
	Within Groups	61.07	396	0.15		
Building up the issues of social justice	Between Groups	0.13	2	0.07	0.41	n.s
	Within Groups	64.27	396	0.16		
Developing the diversity and capacity in professional learning community	Between Groups	1.18	2	0.59	2.91	n.s
	Within Groups	80.59	396	0.20		
Transforming and renewing the resources	Between Groups	1.44	2	0.72	3.64	.027*
	Within Groups	78.37	396	0.19		
Sustaining the leadership and learning environment	Between Groups	1.20	2	0.60	2.35	n.s
	Within Groups	101.21	396	0.26		
Overall Sustainable Leadership Practices	**Between Groups**	**0.47**	**2**	**0.23**	**1.85**	**n.s**
	Within Groups	**49.92**	**396**	**0.13**		

Note: *p<.05, n.s= no significance

In order to analyze whether there were significant differences of teachers' perception on sustainable leadership practices among principals' total service or not, Tukey HSD was conducted.

Table 7 Tukey HSD Results of Principals' Sustainable Leadership Practices Perceived by Teachers Grouped by Years of Total Service (N=399)

Variables	(I) Total Service (Years)	(J) Total Service (Years)	Mean Difference (I-J)	*p*
Balancing short-term and long-term objectives	21-30	Above 30	-0.12*	0.012*
Developing leadership capacities at all levels	11-20	Above 30	0.19*	0.045*
Developing the diversity and capacity in professional learning community	11-20	21-30	0.23*	0.045*

Note: *p<.05, **p<.01

As shown in Table 8, Post Hoc test results indicated that principals who had total services of 21-30 years and principals who had total service of above 30 years differed significantly in the practices of "Balancing short-term and long-term objectives" ($p<.05$). The principals who had total services of 11-20 years and principals who had total services of 21-30 years and above 30 years differed significantly on "Developing leadership capacities at all levels" and "Developing the diversity and capacity in professional learning community" ($p<.05$).

Qualitative Research Findings

Responses to Open-ended Question

As the qualitative findings, the open-ended questions were conducted in this study to investigate the principals' sustainable leadership knowledge and practices. There are eight open-ended questions for principals in this study and the principals' various responses for these questions are described in detail as follow.

When investigating the levels of sustainable leadership practices of principals according to the qualitative findings, it was found that the principals performed in balancing short-term and long-term objectives according their responses. The principals emphasized on the teaching learning process as a priority of their schools therefore they performed to develop the sustaining learning community. The principals shared the experience in terms of management and leadership skills to improve the leadership skills of teachers for developing leadership at all levels. The principals emphasized common good at all to build up the issues of social justice. They provided opportunities for teachers to work and learn together and emphasized to respect individual differences to develop the diversity and capacity in professional learning community. The principals energized people for transforming and renewing the resources. The principals reflected the previous work experiences and aligned with the current situation. They always reflect the past experiences to sustain the leadership and learning environment.

Cook (2014) argued that sustainable leadership has sets of activists to involve people, and creates an educational environment with community diversity, enabling cross-pollination of great views and compelling experiences in organizations of collective learning and development.

According to McCann and Holt (2010), leaders in today's organizations are attempting to utilize their concepts of sustainability to adjust and continually improve overall performance. Therefore, it was concluded that principals' sustainable leadership practices were essential for the all-round development of the schools at the long-term.

Conclusion and Discussion

When investigating the levels of sustainable leadership practices of principals, it was found that the mean values for the perceptions of teachers on the principals' sustainable leadership practices on balancing short-term and long-term objectives, developing a sustaining learning community, developing leadership capacities at all levels, building up the social justice, developing the diversity and capacity in professional learning community, transforming and renewing the resources and sustaining the leadership and learning environment were 3.21, 3.00, 3.45, 3.15, 3.36, 3.21 and 3.46 respectively. Generally total mean value of principals' sustainable leadership practices was 3.26. Therefore, the principals' sustainable leadership practices were ***sometimes practiced.***

When investigating the differences of the teachers' perception on the levels of sustainable leadership practices of principals according to their personal factors, it was found that there were significance differences in age, administrative services years at current school and total service.

When investigating the levels of sustainable leadership practices of principals according to the qualitative findings, it was found that the principals sometimes performed in principals' sustainable leadership practices according to their responses.

Suggestions

Based on the results of this study, the following suggestions are presented for principals' sustainable leadership practices in Basic Education High Schools. It is important for policy makers to provide the principals to conduct the work-shops and training programs with regard to the specialized in leadership and management which are arranged in accordance with the building of leadership capacity before posting them as principals. For the long-term development of the schools, the policy makers need to provide the School Improvement Fund based on the necessities of each school and the principals should be provided adequate personal and financial resources because there are some limitations in time, financials and resources regionally. For the long-term development of the schools, the tenure of principals served at current schools need to be enough for a dual commitment to short-term and long-term results. Therefore, the policy makers need to provide a plan to create positive flow of leadership across many years. The principals should fully-equip themselves with up to date and relevant knowledge, skills and practices in order to lead the schools effectively.

Need for Further Study

This study should be conducted to cover with principals at different state and region in order to represent the principals in Myanmar. It should be conducted at education college sector and higher education. Thus, the studies at all levels of institution may explore the principals' sustainable leadership practices.

Further research should be conducted to verify the leadership framework to perform the sustainable leadership practices of principals proposed in this study.

Acknowledgements

We would like to express my gratitude to Dr. Kay Thwe Hlaing (Rector, Yangon University of Education), Dr. May Myat Thu (Pro-Rector, Yangon University of Education), Dr. Khin Khin Oo (Pro-Rector, Yangon University of Education), Dr. Nyo Nyo Lwin (Pro-Rector, Yangon University of Education) and Dr. Khin Mar Ni (Professor and Head of Department of Educational Theory and Management, Yangon University of Education). Special thank goes to external examiner, Dr. Htay Htay Maw (Retired Professor, Head of Department of Educational Theory and Management, Yangon University of Education). We also appreciate to all persons who willingly helped us in carrying out this research.

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J. Myanmar Acad. Arts Sci. 2023 **Vol. XXI. No.6**

A STUDY OF PRIMARY LEVEL PRINCIPALS' PRACTICES ON PARENTAL INVOLVEMENT

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Abstract

The general objective of the research is to study primary level principals' practices on parental involvement. The specific objectives are to examine primary level principals' practices on parental involvement and to reveal the variations of primary level principals' practices on parental involvement according to their demographic data. Mixed method was used in this study. The samples for quantitative study are 170 primary level principals from Eastern District, Yangon Region by using cluster sampling method. For qualitative study, 8 primary level principals were interviewed by using purposive sampling method. The reliability coefficient (Cronbach's alpha) for primary level principals' practices on parental involvement questionnaire was 0.84. Descriptive Statistics, Independent Samples *t* Test, and One-Way Analysis of Variance (ANOVA) were used. Primary level principals practised to a moderate extent in overall parental involvement. With respect to gender, there was a significant difference between male and female. With regard to age groups, primary level principals between the age groups of 27-37 years and 49-59 years were statistically significant different in 'Communicating', 'Learning at Home' and 'Decision Making'. Based on qualitative study, although primary level principals practised parental involvement, they had struggle conditions that make delay for implementing their practices. Since this study found that there were weakness in "Volunteering" practices, all stakeholders should support volunteer activities in order to involve parents as volunteers.

Keywords: Parental involvement & Primary level principals

Introduction

Parents take an active role for children's ability to succeed in school and their environment because they are first teacher of a child. Parents are one of the significant stakeholders of the school community. Parents' participation in their children educational process and experience can be called parental involvement (Jeynes, 2005). The importance of parental involvement was recognized and acknowledged by many countries for over 40 years. In the USA, the "No Child Left Behind" policy encouraged to establish for parent partnerships with schools. In the UK, the "Children's Plan" emphasized the key role of parents in children's education. Moreover, the "Schooling Strategy" was prescribed in New Zealand and highlighted for improving parent and family involvement in children's education along with improving the quality of teaching and increasing evidence based practice (Hornby, 2011).

In Myanmar, Parent Teacher Association (PTA) was established and has been functioning parental involvement programmes in accordance with the rules and regulations prescribed by the Basic Education Department since 1952-1953. Curriculum was also modernized and students are more active and keen on new teaching and learning styles. Schools need more support from government, parents and community for the children to improve their academic engagement. Therefore, we should study principals' practices on parental involvement for effective implementing parental involvement practices in schools.

Significance of the Study

Parental involvement is an important indicator for students' success in schools. The more parental involvement in schools, the higher achievement, more positive attitude and behavior in

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students. Therefore, most of the countries were highlighting for improving parental involvement and encouraging to establish parent partnership in recent years.

In Myanmar, parental involvement were being implementing by PTA and Board of Trustee (BOT). Myanmar Education Report registered that there was a well-developed parental involvement in school. Nowadays, schools need to establish more powerful parental involvement. For building a culture of parental involvement, leadership is a foundation and then, principals become crucial roles.

For improving parental involvement in schools, principals must have an understanding of the various barriers to parental involvement thoroughly and a good knowledge of strategies and techniques. Although there could be some difficulties in implementing parental involvement in schools, principals should encourage parents, teachers and community to involve in school activities and make many practices for school improvement and holistic development of students. Therefore, this research is conducted for studying practices of primary level principals on parental involvement.

Research Objectives

General Objective

- To study primary level principals' practices on parental involvement

Specific Objectives

- To examine primary level principals' practices on parental involvement
- To reveal the variations of primary level principals' practices on parental involvement according to their demographic data

Research Questions

- What are the levels of primary level principals' practices on parental involvement?
- Are there any significant variations in primary level principals' practices on parental involvement according to their demographic data?

Limitations of the study

This study was geographically restricted to the primary level principals in Basic Education Primary Schools from Eastern District, Yangon Region due to time constraints. In this study, construct validity was not measured due to limited time and cost for a variety of participants.

Theoretical Framework of the Study

In this study, the theoretical framework is established based on the related literature. Parental involvement practices undergoes six areas. They are:

1. Parenting
2. Communicating
3. Volunteering
4. Learning at Home
5. Decision Making
6. Collaborating with Community (Epstein et al., 2002).

Parenting refers to helping all families establish home environments to support children as students. In parenting, information is provided to all families i.e. the families who attend the workshops or meetings at school, the families who do not attend or cannot attend and the families who really need the information by the schools. It is also important for schools to gather information from families for helping educators, to understand students and their families, such as their backgrounds, goals, strengths, and needs (Epstein, 2001). Activities should contain information for parents and from parents about their families (Epstein et al., 2002).

Communicating refers to designing effective forms of school-to-home and home-to-school communications about school programmes and student progress. There are multiple ways for communication between school and home by using conferences, PTA meetings, weekly or monthly folders of student work, handbooks, parent pick up of report cards, notes, emails, newsletters, phone calls, and websites to produce effective communication between the home and the school. But it is essential that communication must be clear and useful (Epstein et al., 2002). Schools need to consider the factors such as language barriers and literacy of families that could affect the understanding of the shared information (Epstein, 2001).

Volunteering refers to recruiting and organizing people to assist and support the school and the students (Epstein, 2001). Volunteering is not only being present at the school. It consists of supporting the goals of the school and the learning process in any way, in any place, and at any time. Volunteer activities include (1) recruiting and training volunteers; (2) arranging schedules, locations, and activities for volunteers; and (3) recognizing parents who serve as an audience for student events and performances (Epstein et al., 2002).

Learning at Home refers to providing ideas to families on ways to assist their children in learning activities at home including homework and other related activities to curriculum, decision making, and planning. Learning at home activities can be extremely beneficial to the learning experience of students but they can be difficult to design and implement. When learning at home activities are effectively designed and implemented, students' skills, abilities, and test scores can be expected to rise (Epstein et al., 2002).

Decision Making refers to including families in school decision making and developing parent leaders and representatives within the school. In decision making activities and programmes, it is important to include parents from all racial, ethnic, socioeconomic, and other groups from within the school population. Schools should offer appropriate training for the parent leaders to assist for developing their leadership skills and to represent families (Epstein et al., 2002).

Collaborating with Community refers to coordinating resources and services from the community for families, students, and the school to support students' learning. The community comprises everyone influencing the educational experiences of students, not just those living in neighborhoods: near or around the school. The community can contribute to students, schools, and families by offering many services such as business partnerships, cultural organizations, health services, recreational centers, governmental agencies, and other groups (Epstein et al., 2002).

Definitions of Key Terms

Practice

Practice is defined as the basic unit of activity as bodily doings and sayings (Schatzki, 2002).

Parental Involvement

Parental involvement is families and community taking an active role in designing a caring education environment for children (Epstein, 1995).

Operational Definition

Parental Involvement

In this study, parental involvement refers to parents' participation at home, school and in the community for both the academic achievement and all-round development of their children. Levels of practices on parental involvement were measured by mean values of parental involvement rated by primary level principals. It was found that the greater the mean value of their responses, the more practices of primary level principals in parental involvement.

Methodology

Sample

For quantitative study, 8 Townships were selected from Eastern District of Yangon Region by using cluster sampling. The number of samples were 170 primary level principals. The response rate is 89.47%. Among the primary level principals in selected townships, eight primary level principals were interviewed by using purposive sampling method.

Instrumentation

In quantitative study, a set of questionnaire was constructed based on Epstein's six areas of parental involvement which are parenting, communicating, volunteering, learning at home, decision making and collaborating with community (Epstein et al., 2002) and related literature in order to study primary level principals' practices on parental involvement. A set of questionnaires contains the demographic data such as gender, age and academic qualification and 36 items related to practices on parental involvement which used five-point Likert Scale. The levels of practices were accessed ranging from 'Do not practise at all', 'Practise to a rarely extent', 'Practise to some extent' and 'Practise to a moderate extent', 'Practise to a great extent'. The reliability coefficient (Cronbach's alpha) for a set of questionnaire related to primary level principals' practices on parental involvement was 0.84.

For qualitative study, a set of interview questionnaires was developed to obtain the required in-depth information. The interview form were reviewed by expert teacher educators from Department of Educational Theory and Management, Yangon University of Education.

Procedure

After having permission from Eastern District Education Office, the researcher handed the questionnaires to the selected Township Education Office during 25^{th} – 27^{th} September, 2021 and the responses were recollected after two weeks later.

The interview was conducted in order to get in-depth information about principals' practices on parental involvement in primary schools. An interview period was ranged 15 minutes to 30 minutes for each participant. The researcher recorded the detailed notes and also used audio-taped for accurate information during interview after getting the permission of participant.

Data Analysis

The data were analyzed by using the Statistical Package for the Social Science (SPSS) version 26. Descriptive statistics, independent samples *t*-test, and One-Way ANOVA were used.

After interviewing, the information was analyzed thoroughly by precoding, open coding and axial coding (Khandkar, n.d). Finally, the in-depth information were emerged as research findings.

Findings

Investigating Parental Involvement Practices of Primary Level Principals

Table 1. Mean Values and Standard Deviations of Primary Level Principals' Practices on Parental Involvement for Parenting (N= 170)

No.	Parenting	Mean	SD	Remark
1.	Conducting workshops to provide information to parents on primary children development.	3.66	0.74	Practise to a moderate extent
2.	Providing information to not only parents who attend workshop at school but also parents who are unable to attend.	3.24	0.83	Practise to some extent
3.	Encouraging parents to support the child's strengths, talent and innate abilities.	4.00	1.00	Practise to a moderate extent
4.	Providing parents with information on developing home conditions that support learning.	3.92	0.93	Practise to a moderate extent
5.	Respecting the different cultures in parents, teachers and students.	4.00	1.04	Practise to a moderate extent
6.	Home visiting on parenting of families.	2.97	0.85	Practise to some extent
	Grand Mean	**3.63**	**0.60**	**Practise to a moderate extent**

Scoring Direction: 1.00 – 1.80 = Do not practise at all 1.81 – 2.60 = Practise to a rarely extent
2.61 – 3.40 = Practise to some extent 3.41 – 4.20 = Practise to a moderate extent
4.21 – 5.00 = Practise to a great extent

According to the Table 1, it was found that primary level principals practised to a moderate extent in parenting because grand mean was 3.63.

Table 2. Mean Values and Standard Deviations of Primary Level Principals' Practices on Parental Involvement for Communicating (N= 170)

No.	Communicating	Mean	SD	Remark
1.	Establishing two-way communication between parents and teachers.	4.07	1.02	Practise to a moderate extent
2.	Conducting a formal conference with parents.	3.83	0.85	Practise to a moderate extent
3.	Sending clear and accurate notifications and educational information to parents.	4.41	0.88	Practise to a great extent
4.	Informing school activities on school billboards to students and parents.	4.05	0.92	Practise to a moderate extent
5.	Sending students home-activity and homework to parents.	4.07	0.87	Practise to a moderate extent
6.	Using telephone, memo and invitation letter to communicate with parents.	3.73	0.93	Practise to a moderate extent
	Grand Mean	**4.03**	**0.68**	**Practise to a moderate extent**

Scoring Direction: 1.00 – 1.80 = Do not practise at all 1.81 – 2.60 = Practise to a rarely extent
2.61 – 3.40 = Practise to some extent 3.41 – 4.20 = Practise to a moderate extent
4.21 – 5.00 = Practise to a great extent

According to the Table 2, it was found that primary level principals practised to a moderate extent in communicating because grand mean was 4.03.

Table 3. Mean Values and Standard Deviations of Primary Level Principals' Practices on Parental Involvement for Volunteering (N=170)

No.	Volunteering	Mean	SD	Remark
1.	Conducting an annual survey to identify interest, talents and volunteer activities to meet the school requirements.	3.08	0.82	Practise to some extent
2.	Encouraging parents to be human and financial resources for school improvement.	3.19	0.99	Practise to some extent
3.	Scheduling school meeting at different times for attending all families.	3.18	1.16	Practise to some extent
4.	Providing meals and snack for parents in conferences.	3.32	0.98	Practise to some extent
5.	Recognizing parents who perform as volunteers for their time and efforts.	3.85	1.13	Practise to a moderate extent
6.	Training parents who carry out volunteers so they use their time productively.	2.71	1.14	Practise to some extent
	Grand Mean	**3.22**	**0.75**	**Practise to some extent**

Scoring Direction: 1.00 – 1.80 = Do not practise at all 1.81 – 2.60 = Practise to a rarely extent
2.61 – 3.40 = Practise to some extent 3.41 – 4.20 = Practise to a moderate extent
4.21 – 5.00 = Practise to a great extent

According to the Table 3, it was found that primary level principals practised to some extent in volunteering because grand mean was 3.22.

Table 4. Mean Values and Standard Deviations of Primary Level Principals' Practices on Parental Involvement for Learning at Home (N= 170)

No.	Learning at Home	Mean	SD	Remark
1.	Providing information to parents on how to monitor and discuss schoolwork at home.	3.24	1.05	Practise to some extent
2.	Informing parents about the subjects that students need to be improve through teachers.	3.90	0.97	Practise to a moderate extent
3.	Giving advice to parents how to support their child's weakness.	3.88	0.97	Practise to a moderate extent
4.	Making parents aware of the importance of reading at home and listening to the child read.	3.96	0.89	Practise to a moderate extent
5.	Giving advice to parents to give their children the opportunity to make their own choices.	3.89	0.94	Practise to a moderate extent
6.	Giving advice to parents to set regular reading schedule for their children.	3.63	0.92	Practise to a moderate extent
	Grand Mean	**3.75**	**0.75**	**Practise to a moderate extent**

Scoring Direction: 1.00 – 1.80 = Do not practise at all 1.81 – 2.60 = Practise to a rarely extent
2.61 – 3.40 = Practise to some extent 3.41 – 4.20 = Practise to a moderate extent
4.21 – 5.00 = Practise to a great extent

According to the Table 4, it was found that primary level principals practised to a moderate extent in learning at home because grand mean was 3.75.

Table 5. Mean Values and Standard Deviations of Primary Level Principals' Practices on Parental Involvement for Decision Making (N= 170)

No.	Decision Making	Mean	SD	Remark
1.	Having an active PTA or other parent organizations.	4.26	1.13	Practise to a great extent
2.	Consulting on student safety issues with parents.	4.27	0.94	Practise to a great extent
3.	Involving parents in students' talent competitions as judges.	2.71	1.32	Practise to some extent
4.	Including parents from all racial, ethnic groups and different socioeconomic status in school organization.	3.99	1.15	Practise to a moderate extent
5.	Developing formal networks to link all parents with schools.	2.86	1.50	Practise to some extent
6.	Dealing with conflict openly and respectfully.	3.80	1.09	Practise to a moderate extent
	Grand Mean	**3.65**	**0.85**	**Practise to a moderate extent**

Scoring Direction: 1.00 – 1.80 = Do not practise at all 1.81 – 2.60 = Practise to a rarely extent
2.61 – 3.40 = Practise to some extent 3.41 – 4.20 = Practise to a moderate extent
4.21 – 5.00 = Practise to a great extent

According to the Table 5, it was found that primary level principals practised to a moderate extent in decision making because grand mean was 3.65.

Table 6. Mean Values and Standard Deviations of Primary Level Principals' Practices on Parental Involvement for Collaborating with Community (N= 170)

No.	Collaborating with Community	Mean	SD	Remark
1.	Providing as Community Resource Directory for parents and students.	3.21	1.04	Practise to some extent
2.	Working with local organization for the development of school clinic and school library.	3.84	1.02	Practise to a moderate extent
3.	Inviting community organization to attend the awards ceremony and the education fair.	3.84	1.01	Practise to a moderate extent
4.	Carrying out field work for all school-age children in the area with community organization.	3.86	1.05	Practise to a moderate extent
5.	Working with local business, community organization for school health and school improvement.	3.74	0.99	Practise to a moderate extent
6.	Solving school funding and stuff issues with school trustees and PTA.	3.45	1.37	Practise to a moderate extent
	Grand Mean	**3.65**	**0.79**	**Practise to a moderate extent**

Scoring Direction: 1.00 – 1.80 = Do not practise at all 1.81 – 2.60 = Practise to a rarely extent
2.61 – 3.40 = Practise to some extent 3.41 – 4.20 = Practise to a moderate extent
4.21 – 5.00 = Practise to a great extent

According to the Table 6, it was found that primary level principals practised to a moderate extent for collaborating with community because grand mean value was 3.65.

The mean values of primary level principals' practices were described in Figure 1.

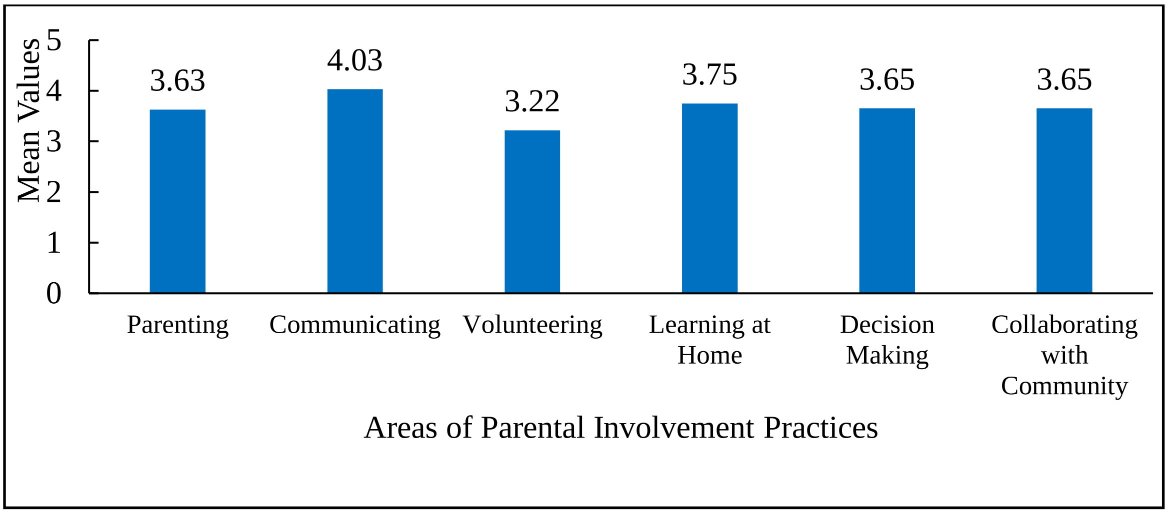

Figure 1. Mean Values Showing Primary Level Principals' Practices on Parental Involvement

Revealing the Variations in Primary Level Principals' Practices on Parental Involvement in terms of the demographic data: gender, age and academic qualification

Table 7. Independent Samples *t* Test Result Showing Mean Values of Parental Involvement Practices Grouped by Gender (N=170)

Parental Involvement Practices	Gender	N	Mean	SD	*t*	*df*	*p*
Parenting	Male	21	3.30	0.77	-2.158	22.982	.042*
	Female	149	3.68	0.55			
Communicating	Male	21	3.67	0.96	-2.630	168	.009**
	Female	149	4.08	0.62			
Volunteering	Male	21	2.79	0.84	-2.839	168	.005**
	Female	149	3.28	0.72			
Learning at Home	Male	21	3.13	0.86	-4.271	168	.000***
	Female	149	3.84	0.69			
Decision Making	Male	21	3.26	1.02	-2.272	168	.024*
	Female	149	3.70	0.81			
Collaborating with Community	Male	21	3.27	0.97	-2.411	168	.017*
	Female	149	3.71	0.75			
Overall	**Male**	**21**	**3.24**	**0.80**	**-3.430**	**168**	**.001****
	Female	**149**	**3.72**	**0.57**			

Note: *$p<0.05$, **$p<0.01$, ***$p<0.001$

Table 7 described there were significant differences between male and female primary level principals in *Parenting* ($p<0.05$, $d=0.655$), *Communicating* ($p<0.01$, $d=0.609$), *Volunteering* ($p<0.01$, $d=0.666$), *Learning at Home* ($p<0.001$, $d=0.997$), *Decision Making* ($p<0.05$, $d=0.525$) and *Collaborating with Community* ($p<0.05$, $d=0.655$).

Table 8. One-Way ANOVA Results Showing Primary Level Principals' Practices on Parental Involvement Grouped by Age (N=170)

Parental Involvement Practices		**Sum of Squares**	***df***	**Mean Square**	***F***	***p***
Parenting	Between Groups	.794	2	.397	1.118	n.s
	Within Groups	59.311	167	.355		
	Total	60.105	169			
Communicating	Between Groups	4.258	2	2.129	4.765	.010*
	Within Groups	74.614	167	.447		
	Total	78.872	169			
Volunteering	Between Groups	1.364	2	.682	1.200	n.s
	Within Groups	94.911	167	.568		
	Total	96.275	169			
Learning at Home	Between Groups	3.952	2	1.976	3.626	.029*
	Within Groups	91.006	167	.545		
	Total	94.958	169			
Decision Making	Between Groups	4.373	2	2.187	3.129	.046*
	Within Groups	116.718	167	.699		
	Total	121.092	169			
Collaborating with Community	Between Groups	3.740	2	1.870	3.046	n.s
	Within Groups	102.514	167	.614		
	Total	106.254	169			
Overall	**Between Groups**	**2.375**	**2**	**1.187**	**3.197**	**.043***
	Within Groups	**62.032**	**167**	**.371**		
	Total	**64.407**	**169**			

Note: *p<0.05, n.s = no significance

As shown in Table 8, there were significant differences in three areas of parental involvement practices for *"Communicating"*, "*Learning at Home*" and "*Decision Making*" (p<0.05) among three age groups of primary level principals.

Table 9. Post Hoc Multiple Comparison of Primary Level Principals' Practices on Parental Involvement Grouped by Age (N=170)

Dependent Variable	**(I) Age Group**	**(J) Age Group**	**Mean Difference (I-J)**	***p***
Communicating	27-37 years	49-59 years	$-.510^{*}$	.007**
Learning at Home	27-37 years	49-59 years	$-.491^{*}$	.021*
Decision Making	27-37 years	49-59 years	$-.450^{*}$	.031*
Overall	**27-37 years**	**49-59 years**	$\mathbf{-.374^{*}}$	**.037***

Note: *p<0.05, **p<0.01

Table 9 indicated that the primary level principals from 27-37 years were significantly differed from 49-59 years primary level principals in *"Communicating"* (p<0.01, d=0.759), *"Learning at Home"* (p<0.05, d=0.682) *and "Decision Making"* (p<0.05, d=0.532). Moreover, the overall parental involvement practices of primary level principals between 27-37 years and 49-59 years were significantly different (p<0.05, d=0.615).

Table 10. Independent Samples *t* Test Result Showing Mean Values of Parental Involvement Practices Grouped by Academic Qualification (N=170)

Parental Involvement Practices	Academic Qualification	N	Mean	SD	*t*	*df*	*p*
Parenting	BA / BSc	157	3.65	0.59	.994	168	n.s
	BEd	13	3.47	0.68			
Communicating	BA / BSc	157	4.04	0.69	.572	168	n.s
	BEd	13	3.92	0.67			
Volunteering	BA / BSc	157	3.23	0.75	.468	168	n.s
	BEd	13	3.13	0.88			
Learning at Home	BA / BSc	157	3.75	0.75	.288	168	n.s
	BEd	13	3.69	0.76			
Decision Making	BA / BSc	157	3.65	0.85	.096	168	n.s
	BEd	13	3.63	0.90			
Collaborating with Community	BA / BSc	157	3.67	0.80	.793	168	n.s
	BEd	13	3.49	0.67			
Overall	**BA / BSc**	**157**	**3.66**	**0.61**	**.611**	**168**	**n.s**
	BEd	**13**	**3.56**	**0.67**			

Note: n.s = no significance

According to Table 10, there were no significant differences in all areas of parental involvement practices between primary level principals who got BA or BSc and those who got BEd academic qualification.

Qualitative Findings

For qualitative findings, 8 primary level principals were interviewed. In grouping the primary level principals, four principals who gained the highest mean values were assigned as Group A and those who had the lowest mean values were defined as Group B.

Ways of Implementing Parental Involvement Practices

With respect to **parenting** practices, principals from Group A responses during interview, 75% of principals (n=3) made parenting activities that were concerned with health; 25% of principals (n=1) held workshop for children's nutrition and body daily-hygiene. Most principals in Group A said that, "*We always explain that parents are the most important persons who take care of the children's health. School stands second. In order to be a healthy and outstanding students, both school and home should combine strongly."*

But 100% of principals (n=4) from Group B explained "*In those days, it is difficult to advice parents how to culture and monitor the primary school children. Moreover, most parents does not want to join with the school because of pandemic."*

With respect to **communicating** practices, principals from Group A and Group B presented during interview that they used two-way communication. They mostly connected parents with phone, viber group and formal meeting. But 50% of principals (n=2) from Group A said that

"We have telephone numbers of parents and viber groups with parents that can inform parents about the school activities and can also notify me of follow-up comments by message. We assign the level of interest of parents in school into grade A, B and C. The parents who are unable to engage with school for various reasons are motivated by the parents who are active in school routines and programmes. There is school meetings that can also attend parents every Monday."

In Group B, 25% of principals (n=1) said, "*Some parents tell about the developments and problems of their children through their class teachers during sending their children to school. Teachers often discuss about students in school meeting."*

With respect to **volunteering**, most principals from both Group A and B organized PTA and served mostly school improvement activities. Among them, most of principals from Group A described that

"*There are nutrition programmes that leading parents in our school every month. Moreover, a grate number of building, road, fence and sun-shade were built under the management of PTA. Moreover, in primary school, school cleaning system has many difficulties. Because children are young and are not able to do some house-holding such as toilet washing and trash cleaning. Therefore, parents serve as general staff and take responsible for school environment cleaning."*

Although principals from Group B practiced volunteering with PTA, one of principals from Group B said, "*It is awkward in these days to collaborate with parents in school activities. But some parents support for safety and security of students."*

With respect to **learning at home**, 75% of principals (n=3) said, "*We introduced parents to their children's class teacher, dean and tell which lessons are taught in which period in the beginning of school year. We often tell parents about the new curriculum how to teach, how to monitor and how to help the children reading, writing and in their homework."*

In Group A, 25% of principals (n=1) explained that "*I sometimes explain parents that helping the children in their studying will encourage their social, intellectual, emotional and physical development. It is more essential in Kindergarten and Grade-1 than other Grades."*

The principals from Group B said as follow:

"*We explained parent about the new curriculum and ways how to teach their children at home in the beginning of the school year. We sometimes inform parents for letting their children attend the school regularly. I always sometimes request parent to help their children in home-activities and student's homework."*

With respect to **decision making**, all principals from Group A explained "*We always pre-consult with teachers on what to do during the academic year before associating with parents. Then, tell parents about the school procedure in parent-teacher meeting and parents give suggestion for some school activities and events and also support as much as they can. Parent-Teacher meetings are celebrate at least once a year. Our school has PTA and BOT in which there are at least 9 members from class teachers and students' parents. Most of the school buildings and school events were supported by these organizations. In addition, we also invited parents in art and dance or talent competition of students. In some competitions, voting system is also applied in which parents, teachers and students can vote."*

In Group B, 75% of principals (n=3) *said, "They had PTA established with 9 members from teachers, parents and the person near by the school who is interested in school improvement.* But one principal answered, "*We can't make PTA because of a few parents who interest in school activities and inadequate number of teachers."*

With respect to **collaborating with community**, all principals from Group A said *"We collaborate with parents and community for cleaning and greening school-environment, for student safety, spraying mosquito repellent under the instructions of superior department especially Township Education Office, with donation groups for school library, student playground and having clean and hygienic toilet. Moreover, in every academic year, we have awarded outstanding students who are specialized in academic, one subjects, social, physical and innate talent. In this ceremony, we always invites parents, township administrators, quarter administrators and other donation associations."*

In Group B, most principals explained, "*In those day, security of students is essential. Therefore, the headmaster, the school teachers, some parents and members of township administers collaborate to serve for safety environment for children. We do not allow to pass a motorcycle during come to and come down school periods."*

In interviewing **difficulties for parental involvement**, most principals from Group A said parents' socioeconomic status, education level, self-efficacy, their work-hour and parents' unawareness of importance of parental involvement resist the practices of parental involvement. Principals from Group B answered reorganizing PTA and BOT with new and unexperienced members, parents' low socioeconomic status, inadequate number of teachers, parents' unawareness delays theirs parental involvement activities.

In discussing about **crucial role of parental involvement** in primary school, two groups of primary level principals agreed the importance of parental involvement in primary schools. Principals from Group A said,

"*There are some conditions that are impossible to accomplish with only parents or teachers. Those are well finished with the strength of parent-teachers communication. There is no perfect school for primary children. Although there might not be perfect, we will try to implement a good school by collaborating teachers and parents."*

Most principals from Group B discussed, *"It is the best having PTA and BOT because every school has many responsibilities and tasks. Parents help school in some school programmes and activities while teachers are trying to make their children knowledgeable and clever. It is a good the mutualistic relationships."*

Conclusion and Discussion

For examining primary level principals' practices on parental involvement, it was found that primary level principals were practised to **a moderate exten**t in "Parenting" but there was a little home visiting on parenting families due to time constrains. They practised to **a moderate extent** in "Communicating" and found that they used more informal ways for two-way communication between school and home than formal ways. They practised to **some extent** in "Volunteering" and found that they motivated parents to be volunteer for school activities, and for having healthy and safety school environment. But training for volunteers parents was uncommon because of a great number of tasks of principals and teachers. They practised to **a moderate extent** in "Learning at home" and it was found that they told parents about the new primary curriculum and advice and support parents for the children's home-study based on interview. They practised to **a moderate extent** in "Decision Making" but they needed more invitation to parents as judges and there could be weakness in establishing PTA and BOT due to parents' working hours and low socioeconomic status. Finally, they practised to **a moderate extent** in "Collaborating with Community". It was found that they collaborated with some parents and community more especially for children's health because of Covid-19 pandemic but they sometime provide as Community Resource Directory for parents and students.

To sum up, primary level principals practised to a moderate extent in overall areas of parental involvement and it could be interpreted that the findings of current study support Epstein's overlapping sphere theory because primary level principals tried to coordinate with school, home and community for students' successful learning, growth and development. Based on results of interview, it was realized that most primary level principals had difficulties in implementing parental involvement practices because of parents' low self-efficacy, unawareness, lot of task and role for their students' education which were consistent with Hoover-Dempsey and Sandler Parental Involvement Model (1997) in which parent role construction and parental self-efficacy; invitations and parents' life context are the critical points that support a higher level of parental involvement.

For revealing the variations of primary level principals' practices on parental involvement according to their demographic data, it was found that there were significant differences between female and male. The mean value of female was higher than that of male. It could be interpreted that female principals could encourage parents, explain the importance of parents in children's education and implement parental involvement practices as much as they could be possible within challenges based on interview. With regard to age, there were significant differences between 27-37 years and 49-59 years in "Communicating", "Learning at Home" and "Decision Making". It could be interpreted that the elders were more experienced and had a lot of tricks to encourage parents. With regard to academic qualification, there was no significant difference. But mean value of principals who got BA or BSc had slightly higher than those who got BEd. This could be the fact that primary level principals who got BEd might encourage and collaborate with parents who have more difficulties such as working hours, low socioeconomic status and low self-efficacy, etc. to involve and support in school activities.

Suggestions

The findings of this study have a number of important implications for future practice. Based on the quantitative and qualitative research findings, the following suggestions were suggested.

- Since primary level principals had a few home visit programmes, they should study parenting style in order to give advice and help parents by collaborating with teachers and other PTA members.
- Since primary children are not old enough to deliver detail information to parents, primary level principals should apply formal invitations such as memo and invitation letter for home-school communication rather than through students in order to inform more accurate and clear information.
- Since volunteering practices were less than other practices areas, primary level principals should invite and actively encourage parents to be volunteers in their children's school-activities and occasional school events and for school improvement.

- Primary level principals should provide more information to parents how to monitor and discuss school work at home because parents play key roles for their children success in school.
- Primary level principals should invite and encourage parents from different ethnic groups, socioeconomic status, etc. to participate in students' academic achievement and school improvement procedure.
- Primary level principals should launch programmes such as establishing libraries and formation of Red-Cross, etc. and encourage parents to be energetic representatives in the community based organizations with the aims of school-community collaboration running smoothly.
- Since elder primary level principals had practised parental involvement than younger primary level principals, there should be primary level principals' initial training programmes for parental involvement that were conducted under the guidelines of Township Education Office.
- Effective home-school communication make parents interested and more involved in school activities. Therefore, primary level principals should communicate with home and community by using various communicating channels such as memo, newsletter, telephone, etc. for school improvement and students' holistic development.

Acknowledgements

Firstly, I would like to express my gratitude to Dr. Kay Thwe Hlaing, (Rector, Yangon University of Education {YUOE}); Dr. May Myat Thu, Dr. Khin Khin Oo and Dr. Nyo Nyo Lwin, (Pro-Rectors, YUOE). Secondly respectful thanks go to Dr. Khin Mar Ni (Professor and Head, Department of Educational Theory and Management, YUOE) and Dr. Daw Mya Kywe (Retired Professor and Head, Department of Educational Theory, YUOE) for their valuable advice. We would like to present our sincere thanks to all teachers and friends for their sharing knowledge and valuable suggestions.

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J. Myanmar Acad. Arts Sci. 2023 **Vol. XXI. No.6**

FACTORS AFFECTING PRINCIPALS' INSTRUCTIONAL SUPERVISION PRACTICES

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Abstract

The general objective of this study is to study factors affecting principals' instructional supervision practices in Basic Education High Schools in Pathein and Thapaung Townships. In this study, sample size of respondents such as thirty-six principals and 216 teachers from Basic Education High Schools were selected by using purposive sampling for principals and equal-size sampling for teachers. The questionnaires and open-ended questions were developed and modified the items by reviewing on Wanjiru's (2015) items, theorical framework and previous related literature to collect the required data. Four-point and five-point Likert-scales were employed to identify the level and extent of principals' instructional supervision practices (Coklar et al., 2016). The internal consistencies (Cronbach's alpha) were 0.87 for principals and 0.96 for teachers. Descriptive statistics, One-way ANOVA, Independent Samples *t*-Test and Multiple Regression were used to analyze the quantitative data. Principals' instructional supervision practices practiced in this study was high (Mean=3.36, SD=.37). There were no significant differences in practices of principal instructional supervision between the groups of gender and administrative experience. There were significant differences in principals' instructional supervision practices between the groups by age, position and school size. According to the results of multiple regression analysis, position, work load and teachers' attitude are the best predictors of factors on principals' instructional supervision practices. As the results of qualitative study, open-ended responses of principals and teachers were consistent with the findings of quantitative study.

Keywords: Principal, instructional supervision, practices

Introduction

Education is the primary agent of transformation towards sustainable individual, socio-economic growth and development of the society. It increases people's capacities to transform their visions for the society into reality. The World Bank (2010) contended that systems of supervisions and support to schools are frequent areas of reform employed by world nations to improve their education outcomes and mitigate education challenges associated with global education policies. Reepen and Barr (2010) said that supervision ensures all the staffs who reflect appropriate rules, routine, procedures and regulations to achieve set objectives. In a school setting, the overall supervisor is referred as the principal, the head teacher. Every head teacher's dream as a supervisor is to get his school ranked among the best in national examination and discipline.

The practice of instructional supervision by head teachers is deeply ingrained in the basic education programs in Europe. A survey carried out by the World Bank(2011) found out that the head teachers have been allocated duties by the jurisdictions to undertake specific supervisory roles over the teachers. The head teachers have the privilege of appointing experienced teachers to help them in mentoring and supervising the newly posted and inexperienced teachers. Although principals' instructional supervision practices are vital to improving teaching and learning process in basic education, principals are failing in serving these practices because of the factors that affected on them. Hence, the levels of principals' instructional supervision practices are identified and which factors are prominent in Basic Education High Schools. So that the principals will serve to improve the teaching and learning process and to get the quality education.

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Objectives of the Study

The general objective of the study is to study factors affecting principals' instructional supervision practices. The specific objectives are as follow:

1. To identify the levels of principals' instructional supervision practices
2. To investigate the variations in principals' instructional supervision practices regarding to personal factors and school related factors
3. To investigate the extent of principals' instructional supervision practices regarding to institutional factors
4. To find out the prominent factors that affect principals' instructional supervision practices

Research Questions

1. What are the levels of principals' instructional supervision practices?
2. Is there any significant variation in principals' instructional supervision practices regarding to personal factors and school related factors?
3. What is the extent of principals' instructional supervision practices regarding to institutional factors?
4. What are the prominent factors that affect principals' instructional supervision practices?

Definition of the Key Terms

Principal refers to an assignee of the government responsible for overall administration, instructional leadership and coordination of curricular and co-curricular programs of a secondary school (Mbae, 2016).

Instructional supervision refers to constant process that aims at improving teaching and learning through provision of needed services to teachers (Kipngeno, 2014).

Practices refer to doing something repeatedly in order to improve performance through instructional supervision (Ekyaw, 2014).

Theoretical Framework

In this research, the level of principals' instructional supervision practices would be measured by Wanjiru (2015). He asserted that instructional supervision practices in the school organization should analytically examine the following variables closely on the regular basis.

1. Classroom visitation: According to Fischer (2011), classroom visits may include informal walk through and formal class observation. During such visits the teachers' practices are observed and documented.

2. Holding pre-observation and post-observation conferences: The pre-observation discussion helped to develop a rapport between the teacher and the supervisor which enabled the head teacher to give feedback and guidance on the observed classroom teaching (Olembo, Wanga, & Karagu, 1992). A study by Blaise and Blaise (2000) stated that post observation conference involves giving feedback, making purposeful and non-threatening suggestions, modeling, using inquiry and soliciting advice and opinions.

3. Checking teachers' professional documents: Checking teachers' professional records was another important instructional supervision activity asserted by Watene (2011). This included: schemes of work and lesson plans, records of work and mark books, progress records, class attendance register, and students' report forms.

4. Checking students' note books: There were five tips to make checking students' note books more efficient. These included; institute note books checking days, read no more than three entries per students, limit your feedback, use a rubric and photocopy or scan if you prefer to look at note books at home (Grace, 2014).

5. Organizing staff development programs: Programs that were appropriately linked to the goals of the school will be ineffective if the training is not sound. Nearly all teachers were able to gain mastery of new skills and incorporate those skills in their teaching repertoire if their training provides presentation of the theory supporting the innovation, demonstration, initial practice in the training session, prompt feedback regarding their efforts and coaching until the skill is mastered (Showers, Joyce, & Bennett, 1987).

The affecting factors will be divided into three types, (1) personal factors such as gender, age, position and administrative experience, (2) school related factors such as school size, staffing level, work load and learning facilities and resources and (3) institutional factors such as team work, financial management and teachers' attitude.

Review of Related Literature

Instructional supervision unlike other forms of supervision is school based and therefore, an internal process. It drew its data from actual teaching events and involves face to face interactions between the supervisor and the teacher in the analysis of teaching behavior activity for instructional improvement (Goldhammer et al., 1980).

According to Acheson and Gall (1987), instructional supervision unlike inspection was interactive, democratic and teacher centered. It was a supportive and a friendly encounter where the supervisor and the supervisee engaged in dialogue and consultation with the aim of counseling the teachers while helping them to improve. According to Okumbe (1998), instructional supervision was that dimension of educational administration which was concerned with improving instructional effectiveness. All those activities which were undertaken to help teachers maintain and improve their effectiveness in the classroom characterize instructional supervision.

Instructional supervision is the supervision carried out by the head teacher, subject heads, and other assigned supervisors in a school with the aim of providing guidance and support to teachers (Tesfaw & Hofman, 2014). Therefore, in a bid to ensure improved instructional process, school administrators must guarantee that teachers: planned their lessons promptly; structured their lessons with an interesting beginning; revised previous knowledge and summarized major points at the end of the lesson among others (Onumah, 2016). Instructional supervision was the service provided to help teachers in order to facilitate their own professional development so that the goals of the school might be better attained. However, there were several factors which tend to militate against effective supervision of instruction in schools.

Methodology

Research Method

In this study, both quantitative and qualitative methods were used to collect the required data. In quantitative study, questionnaire survey was used and in qualitative study, open-ended questions were used to explain the survey responses.

Population and Sample

There were (36) principals in Basic Education High schools. Principals, were at least 2 service years in that school, were used as sample from all of these schools by census method.

Moreover, a total of (216) teachers were selected as sample from these schools in 6 teachers by proportionate sampling method. The participants were selected 16 (44.4%) principals and 96 (44.4%) teachers from Pathein Township. The participants were selected 20 (55.6%) principals and 120 (55.6%) teachers from Thapaung Towinship.

Validity and Reliability

In order to obtain the content validity of the questionnaire, instrument was reviewed by (8) experts who have sound knowledge and experience from the Department of Educational Theory and Management, Yangon University of Education. To measure the reliability of the questionnaire, a pilot test was conducted with (30) teachers and (30) principals in Basic Education Schools. The internal consistency (Cronbach's alpha) of the instrument for principals was (0.87) for principals and (0.96) for teachers. Therefore, the questionnaire was reliable to use for this study.

Data Analysis

The data obtained from questionnaire survey were analyzed by using the Statistical Package for Social Science (SPSS) version 26 as it is widely used in quantitative research. Descriptive statistics was used to examine means and standard deviation. Furthermore, independent sample *t*-Test and One-way ANOVA were used to investigate whether there was significant difference between groups. Moreover, multiple regression analysis was also utilized to find out the best predictor of factors affecting principals' instructional supervision practices.

Findings

Principals' instructional supervision practices are investigated in five areas such as classroom visitation, holding pre-observation and post-observation conferences, checking teachers' professional documents, checking students' note books and organizing staff development programs.

According to Table 1, the mean value for overall principals' instructional supervision practices was 3.36, principals conducted them in ***high level***. However, principals conducted the area of checking students' note books (mean=3.22) and organizing staff development program (mean=3.18) were in ***moderately high***.

Table 1. Mean Values and Standard Deviations of Levels of Principals' Instructional Supervision Practices (N=252)

No.	Variables	Mean	SD	Level
1	Classroom Visitation	3.27	.47	High
2	Holding Pre-observation and Post-observation Conferences	3.38	.47	High
3	Checking Teachers' Professional Documents	3.67	.42	High
4	Checking Students' Note Books	3.22	.52	Moderately High
5	Organizing Staff Development Programs	3.18	.49	Moderately High
Overall Principals' Instructional Supervision Practices		**3.36**	**.37**	**High**

Scoring Direction: 1.00-1.75=low 1.76-2.50=satisfactory
2.51-3.25=moderately high 3.26-4.00=high

Differences in Principals' Instructional Supervision Practices in terms of the Demographic Data

The differences in principals' instructional supervision practices in terms of gender, age, position and administrative experience were investigated in this study.

First of all, according to the descriptive analysis, it could be analyzed that two groups (male and female) of principals. According to *t*-Test results, there were no significance differences not only in overall principals' instructional supervision practices but also in the dimensions between the group of male and female principals.

To analyze and evaluate whether there is a significant difference between principals' instructional supervision practices and age, one-way ANOVA was used. According the results, there were significant differences in overall principals' instructional supervision practices ($p<0.05$) and in three areas. The results of Table 2 stated that principals grouped by 31-40 years old were significant differences from grouped by 41-50 years old and 51 years old and above in these dimensions and overall principals' instructional supervision practices.

Table 2. Games-Howell Results Showing Principals' Instructional Supervision Practices Grouped by Age (N=252)

Dependent Variable	(I) age	(J) age	Mean Difference (I-J)	Std. Error	*p*
Holding Pre-observation and Post-observation Conferences	31-40years	41-50 years	-.25526*	.08517	.01*
		51 and above	-.24770*	.08918	.02*
Checking Teachers' Professional Documents	31-40years	41-50years	-.17766*	.07215	.04*
Organizing Staff Development Programs	31-40years	51 and above	-.23546*	.08019	.01*
Principals' Instructional Supervision Practices	31-40years	41-50years	-.17427*	.05924	.01*
		51 and above	-.18117*	.06643	.02*

*p<.05, **p<.01, ***p<.001, ns=no significance

Then, principals were categorized into two groups according to position. There were significant differences between middle head and high head in overall principals' instructional supervision practices ($p<0.05$), independent sample *t*-Test was conducted. According to the results, there were significant differences between high head and middle head in the area of checking students' note books ($p<0.05$).

Table 3. Independent Samples *t*-Test Results Showing Principals' Instructional Supervision Practices Grouped by Position (N=252)

Variables	Position	N_1	N_2	Mean	SD	*t*	*df*	*p*
Checking Students' Note Books	Middle-H	24	168	3.27	.48	2.354	140.88	.02*
	High-H	12	84	3.10	.58			
Principals' Instructional Supervision Practices	Middle-H	24	168	3.40	.33	2.259	250	.03*
	High-H	12	84	3.29	.41			

N_1= number of principals N_2= number of participants
*p<.05, **p<.01, ***p<.001, ns=no significance
Scoring Direction: 1.00-1.75=never 1.76-2.50=sometimes
2.51-3.25=often 3.26-4.00=always

Principals were categorized into three groups by total services of administrative experience. To analyze and evaluate whether there is a significant difference between principals' instructional supervision practices and administrative experience, one-way ANOVA was used. According to the results, there were no significant differences not only in overall principals' instructional supervision practices but also in the dimensions of all principals' instructional supervision practices.

Investigating the School Related Factors and Institutional Factors that Affect Principals' Instructional Supervision Practices

School related factors affecting principals' instructional supervision practices namely school size, staffing level, workload and learning facilities and resources.

Principals were categorized into three groups by school size. To analyze and evaluate whether there is a significant difference between groups, one-way ANOVA was used. According to results, there were significant differences in overall principals' instructional supervision practices ($p<0.05$) and in two areas. According to Tukey HSD results, principals grouped by school size 500 and below were significantly different from principals grouped by school size 900 and above in the dimensions and overall principals' instructional supervision practices. Moreover, principals grouped by school size between 500 and 899 were significantly different from principals grouped by school size 900 and above in the dimension of checking teachers' professional documents.

Table 4. Tukey HSD Results Showing Principals' Instructional Supervision Practices Grouped by School Size (N=252)

Dependent Variable	(I) SZ	(J) SZ	Mean Difference (I-J)	Std. Error	*p*
Checking Teachers' Professional Documents	>500	>900	.26605*	.08365	.005**
	500-899	>900	.28571*	.09279	.007**
Checking Students' Note Books	>500	>900	.27096*	.10394	.026*
Principals' Instructional Supervision Practices	>500	>900	.17996*	.07387	.041*

*p<.05, **p<.01, ***p<.001, ns=no significance

According to the mean values and standard deviation of school related factors, it can be said that principals had no suggestion in the factors of staffing level (3.15). However, principals strongly disagreed in the item "under-staffing makes instructional supervision easier" with mean (1.72). Moreover, work load factor was (4.13) and therefore it can be said that they agreed on the affecting principals' instructional supervision practices. Principals had no suggestion in the factors of learning facilities and resources (3.39) in the mean of between 2.61 and 3.40.

Investigating the Institutional Factors Affecting on Principals' Instructional Supervision Practices

Institutional factors affection principals' instructional supervision practices namely teamwork, financial management and teachers' attitude were instigated.

According to the mean values and standard deviation on institutional factors, the mean values of team work (4.20) and financial management (4.06) were between 3.41 and 4.20 therefore it can be said that principals had agree on the affection principals' instructional supervision practices. However, the mean value of teacher's attitude (3.31) was between 2.61 and 3.40, it can be said that they had no suggestion.

Potential Factors Affecting Principals' Instructional Supervision Practices

There were eleven variables identified as predictors for factors on principals' instructional supervision practices: gender (G), age (A), position (P), administrative experience (AE), school size (SZ), staffing level (SL), work load (WL), learning facilities and resources (LFR), teamwork (TW), financial management (FM) and teachers' attitude (TA).

Simultaneous multiple regression was used to investigate prominent factors on principals' instructional supervision practices. The beta coefficients were presented, position, workload and teachers' attitude significantly predict factors on principals' instructional supervision practices among the eleven variables. The adjusted R squared value was .28. This indicates that 28% of the variance in the factors on principals' instructional supervision practices was explained.

Table 5. Simultaneous Multiple Regression Analysis for Factors Affecting Principals' Instructional Supervision Practices (N=36)

No.	Variables	B	Std. Error	Beta (β)
1	Position (P)	-.242	.119	-.30*
2	Work Load (WL)	.285	.129	.32*
3	Teachers' Attitude (TA)	.250	.121	.31*

R^2=.34, F=5.44, *p<.05

According to the beta weight, teachers' attitude appears to be the first predictor of factors on principals' instructional supervision practices and principals' age appears to be the second predictor of factors on principals' instructional supervision practices.

Qualitative Research Findings

According to the open-ended question (1) **"Describe principals' instructional supervision practices to improve teaching and learning in basic education high schools?"** responded by principals and teachers, principals participated in classroom visitation (69%), holding pre-observation and post-observation conferences (37%), checking teachers' professional documents (53%), checking students' note books (20%) and organizing staff development program (2%).

According to the open-ended question (2) **"What factors can make weaknesses to principals' instructional supervision practices?"** responded by principals and teachers, principals' instructional supervision practices can be made weakness because of school size (5%), staffing level (48%), workload (49%), learning facilities and resources (11%), teamwork (29%), teacher attitude (7%), other factors (2%) and not difficult in supervision (3%).

According to the open-ended question (3) **"How do you solve the weaknesses of instructional supervision practices to convenient in your school?"** responded by principals, they solve the weaknesses of instructional supervision practices to be convenient in their school by providing to attend the courses (17%), fulfilling the teaching with principal (11%), delegating the responsibilities of supervision practices to the subject leaders (8%), collaborating with students, teachers and parents to find the teaching aids (19%) and organizing, coordinating and discussing with the board of study and technical staff (31%).

According to the open-ended question (3) **"What factors can make strength to principals' instructional supervision practices?"** responded by teachers, they wanted to principals of having technical skills (39%), working in time limit and giving the exact direction

(12%), cooperating with teachers, parents and association (31%), having collaborating skills (7%), interesting in teaching and learning process (9%), and learning the teaching forever (6%).

According to the open-ended question (4) **"Recommend the factors that improve the principals' instructional supervision practices?"** responded by principals and teachers, they wanted to fulfill the staffing level in accordance with the number of teachers distribution and the need of relevancy with subject major (32%), to discuss and share the knowledge with the board of study (40%), to provide the desks, chairs, equipment, teaching aids and buildings (21%), to collaborate the students, teachers and parents, furthermore, the parent teacher association (5%), to build the trust and respect (2%).

Discussion and Conclusion

Effective instructional supervision is vital if the government is to achieve its objective of providing quality basic education that is relevant to its development goals. This study is principally aimed at examining the factors that are associated with principals' instructional supervision practices.

Based on the responses of principals' instructional supervision practices, the overall mean value was 3.36. Therefore, principals' instructional supervision practices were at high level in this study.

According to gender and administrative experience as a personal factor, the study found that there were no significant differences in principals' instructional supervision practices between male and female. This finding does not agree with Lowe (2011) who observed that men and women principals differ in leadership behaviors.

There were significant differences between age groups in overall principals' instructional supervision practices and in three areas. This study revealed that principals who were 31 to 40 years old performed in instructional supervision less than principals who were 40 years old and above. The findings imply that the schools in the Townships were headed by older, mature and energetic principals who can handle instructional supervision in schools. Observation of Reyes (1990), majority of head teachers are likely to be committed to administration tasks of which instructional supervision. He argued that age and experience usually bring about self-confidence, self-esteem and high level of responsibility, hence, influencing overall job satisfaction and commitment of teachers to their job.

By comparing the positions, the study found that there were significant differences in overall principals' instructional supervision practices and in the area of checking students' note books between middle head and high head. The findings imply that principals who were middle head position headed in High Schools (Branch), had less workload and tasks than ones in High School. This finding agrees with Kipngeno (2014) who observed that principals could not plan for instructional supervision practices since they spend more time on administrative issues in expense of supervision instructions.

On the other hand, principals were categorized into three groups by their school size. This study revealed that principals who were in 900 and above school size performed in instructional supervision less than principals who were in less than 900 school size. The findings imply that principals in large school size cannot perform instructional supervision very well. It leads to increase workload amongst the principals and the available staff. This finding agrees with Violet (2015) who observed that the principals' workload becomes heavy as they have to focus more time on school management issues because of the result of large classes.

According to staffing level, the study found that principals had no suggestion in the factors of staffing level. However, principals strongly disagreed with “under-staffing makes instructional supervision easier”. And principals and teachers said that the number of teachers in their schools is not enough and they required the teachers per subjects. The findings imply that staffing shortfalls in the schools forced principals to undertake more teaching duties. Moreover, since there are less teachers, the available teachers have to take in more lessons meaning that they have to forego adequate lesson preparation and thus principals have to take up lessons themselves. The findings are in agreement with Rotich (2014) who observed that schools were understaffed and as a result the quality of teaching and learning is low since head teachers rarely engage in meaningful instructional supervision practices.

Studying on workload, principals agreed on the affecting principals’ instructional supervision practices in the factors of workload. It could also probably be due to shortage of teachers in schools which forces head teachers to teach more lessons than outlined by the government. The findings therefore, imply that teaching duties impact negatively on head teachers’ instructional supervision practices. The majority of principals found chairing staff, committee meetings and participating in community activities as the least demanding activities. This could also be attributed to principals’ ability to delegate these activities to other members of staff. The findings are in agreement with Kiamba (2011) who observed that teaching load significantly influenced head teachers’ ability to observe teachers in class, give feedback after classroom observation and check the teaching aids used by teachers as a result of understaffing in schools.

In learning facilities and resources, the study found that principals had no suggestion in the factors of learning facilities and resources. However, principals disagreed with “providing to teach ICT for every class”. The findings imply that learning facilities and resources were not enough in their schools. Most of respondents wanted to fulfill the staffing level in accordance with the number of teachers distribution and the need of relevancy with subject major. This finding shows that the relevant academic levels expected to equip them with adequate knowledge on academic matters and instructional supervision practices. Fajoyomi (2007) argued that success of any educational enterprise depended largely on availability of professional teachers.

An institutional factor, teamwork, is found that principals had agree with various statements of affecting principals’ instructional supervision practices in the institutions. Moreover, most of respondents wanted to collaborate with students, parents and associations for improving teaching and learning processes. The findings agree with Opudo (2015) who observed that the principals must motivate and provide the team so that each person performs well individually and as a team to a great extent.

According to financial management, the study found that principals had agreement with various statements of affecting principals’ instructional supervision practices in the institutions. Therefore, principals needed to be prepared to manage the finance effectively and to reduce the use of most funds for construction and furniture. They should use the funds for teaching and learning resources. The findings agree with Opudo (2015) who observed that the principals needed sound financial management skills to achieve their plans as a curriculum leader to a great extent.

Principals had no suggestion on the affecting principals’ instructional supervision practices in the teachers’ attitude. Because, principals agreed that teachers viewed principal’s instructional supervision as a fault-finding mission. Some respondents suggested to build the trust and respect from teachers and parents and to obey the instruction of principals. These findings agreed with Marwanga (2004) who indicated that teachers' negative attitude towards supervision posed a challenge to head teaches' frequency of instructional supervision in schools.

In this study, there were eleven variables identified as predictors for factors on principals' instructional supervision practices: gender, age, position, administrative experience, school size, staffing level, work load, learning facilities and resources, teamwork, financial management and teachers' attitude. Work load appears to be the first predictor, teachers' attitude appears to be the second predictor and position appears to be the third predictor of factors on principals' instructional supervision practices.

The aim of this study is to study factors affecting principals' instructional supervision practices in Basic Education High Schools. The results in this study show that work load, teachers' attitude and position are the best predictors that affect on principals' instructional supervision practices and thus a great demand for instructional supervision strategies and techniques which give supporting to teachers' professional development and teaching-learning processes. Therefore, Ministry of Education should ensure that adequate training is offered to principals before they are posted to schools and a follow-up should be provided on a systematic program of supervision. So that, all teachers are actively involved in supervision exercise and can be changed their attitude by their good managed. Moreover, Department of Education should consider to fulfill the staffing level in accordance with the number of teachers distribution and the need of relevancy with subject major.

Recommendation for Further Study

This study analyzed the factors affecting principals' instructional supervision practices at Basic Education High Schools in Pathein and Thapaung Townships. Then investigating how primary school principals and middle school principals performed their instructional supervision practices will need to be done as further research. Next studies can be made by including variables such as educational background of the principals, their teaching experience, educational background of teachers and geographical location of the schools. Further researcher could be done to investigate the strategies for instructional supervision of principals and head/senior teachers and the relationship between these practices and teachers' professional development.

Acknowledgements

I would like to express sincere thanks to Dr. Kay Thwe Hlaing (Rector of Yangon University of Education), Dr. May Myat Thu (Pro-Rector of Yangon University of Education), Dr. Khin Khin Oo (Pro-Rector of Yangon University of Education), and Dr. Nyo Nyo Lwin (Pro-Reactor of Yangon University of Education) for their permission to present this thesis. I would like to offer my note of respectful appreciation to Dr. Khin Mar Ni (Professor and Head of Department of Educational Theory and Management, Yangon University of Education), my supervisor, for her expert guidance, valuable advice, assistance and encouragement and long-standing commitment during research. I would like to express my heartfelt thanks to all my teachers at the Department of Educational Theory and Management, valuable and timely advice, love and help that become a good motivation to me. Moreover, my special thanks go to Librarian and staff members of the Yangon University of Education for the helpful assistance.

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J. Myanmar Acad. Arts Sci. 2023 **Vol. XXI. No.6**

A STUDY OF PRINCIPALS' PRACTICES ON ORGANIZATIONAL JUSTICE IN EDUCATION DEGREE COLLEGES

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Abstract

This study intended to investigate principals' practices on organizational justice perceived by teacher educators in Education Degree Colleges. Participants were 150 teacher educators and 4 principals, selected by using a purposive sampling method. Both quantitative and qualitative methods were used in this study. Questionnaires were used for teacher educators' expectations on organizational justice practised by principals and principals' practices perceived by teacher educators. The reliability coefficient (Cronbach α) was 0.97 for the questionnaire of teacher educators' expectations and 0.85 for the questionnaire of principals' practices on organizational justice. Descriptive statistics, Independent Samples *t* test and Paired Samples *t* test were used to analyse the collected data. Quantitative findings revealed that teacher educators highly expected on principals' practices on overall organizational justice in Education Degree Colleges. However, principals moderately practised on overall organizational justice perceived by teacher educators. There were significant differences in the principal's practices on organizational justice according to their personal factors. Moreover, the qualitative study analysed the principals' responses to open-ended questions. According to qualitative findings, principals answered that they practised organizational justice such as providing rewards to teacher educators for their contributions to the organization, and distributing tasks based on teacher educators' skills and qualifications. Further, they considered teacher educators' opinions, expressed respect to teacher educators' suggestions, and provided the detailed information from different media to all teacher educators.

Keywords: organizational justice

Introduction

Education plays a central role in the nation's social and economic development. The kind of education needed today requires teachers to be high-level knowledge workers who constantly advance their own professional knowledge and that of their profession (OECD, 2012). Dr. Khin Zaw (2001) mentioned that "No educational system can ever be better than its teachers. No teacher, regardless of race, creed or grade, can emerge fully qualified from an inferior teacher education program". Further, the National Education Strategic Plan (NESP) (2016-2021) stated the priorities for teacher reform undertaken by the Myanmar Government. The Ministry of Education is making efforts to strengthen teacher education in Myanmar and reform teacher education training programs. In implementing teacher education reform, principals and teacher educators are also key change agents in Education Degree Colleges.

The problem of quality in the education system is that human resource studies need to be improved in educational institutions. To use human resources more efficiently, organizations should give more attention to the organizational justice concept. In a fairly located environment, members/workers have positive attitudes towards organizations and contribute to the organization to achieve its goals (Tang and Gilbert,1994).

Educational institutions should provide adequate consideration to organizational justice to increase the performance, productivity, and commitment of teacher educators. As educational leaders, principals must consider the importance of organizational justice. If teacher educators perceive low organizational justice perceptions, their job satisfaction and organizational citizenship behaviours will be low. Therefore, this study is focused on a study of principals' practices on organizational justice in Education Degree Colleges.

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Significance of the Research

Professionals have great interest in organizational justice because it ensures equal opportunities and outcomes for all people (Gracia, 2015). Greenberg (1990) stated that organizational justice is required both for the personal satisfaction of individuals and organizations in a way to fulfil their functions effectively.

The literature reflects that previous research studies on organizational justice have targeted higher education institutions, universities, primary schools, and secondary schools. Nevertheless, there is still a research gap on organizational justice in teacher education and training, especially in Myanmar. Therefore, this study intended to study the principals' practices on organizational justice in Education Degree Colleges. This research results will benefit the policymakers in the Ministry of Education to identify the extent of principals' practices in Education Degree Colleges and will provide suggestions for achieving organizational justice among principals in Education Degree Colleges.

Aims of the Research

Main Aim

- To study the principals' practices on organizational justice in Education Degree Colleges

Specific Aims

1. To identify the degree of teacher educators' expectations on principals' practices on organizational justice in Education Degree Colleges
2. To investigate the extent of the principals' practices of organizational justice perceived by teacher educators in Education Degree Colleges
3. To study the differences in the principals' practices on organizational justice according to their personal factors

Research Questions

1. To what extent do teacher educators expect on principals' practices of organizational justice in Education Degree Colleges?
2. To what extent do the principals practise organizational justice from teacher educators' perceptions in Education Degree Colleges?
3. Are there any significant differences in the principals' practices on organizational justice according to their personal factors?

Limitations of the Study

This study is limited to four Education Degree Colleges due to time constraints. The populations in this study were principals and teacher educators from the selected Education Degree Colleges. Therefore, the findings of this study could not cover any other Education Degree Colleges and Universities.

Theoretical Framework

As a theoretical framework of this research, it is based on Adam's Equity Theory. Organizational justice is a perception of members about what is fair and unfair in the organization where they work. The early development of organizational justice study can be traced through Adams' Theory of Equity. The equity theory postulates that organizational justice is a motivation for workers to have fair treatment, where the principle of justice is to balance between inputs and outputs of the individual (Adam ,1965).

In this study, an analysis of principals' practices of organizational justice will be conducted in terms of four dimensions of organizational justice (Colquitt, 2001): distributive justice, procedural justice, interpersonal justice and informational justice. These dimensions were described in brief as follows:

Distributive Justice**:** Colquitt (2001) defined distributive justice as the fairness associated with the decision related to the distribution of resources within an organization. Distributive justice is based on Adams' Theory of Equity, and refers to a fairness of output accepted by someone. Outputs include salary, benefit, work status, and other variables accepted by organization if compared to personal attributes such as effort, education background, experience, skill, age, social status (Hiariey, 2020).

Procedural Justice**:** Procedural justice was suggested by Thibaut and Walker (1975) based on their observation of individual conflict. Procedural justice refers to employees' judgments of fairness of all organizational policies, management, and procedures leading to taking decisions (Colquitt, 2001).

Interpersonal Justice**:** Interpersonal justice refers to the level to which employees within an organization are treated with politeness, respect, and dignity by supervisors (Colquitt, 2001).

Informational Justice: Informational justice refers to the perception of whether an employer is providing timely and adequate information and explanation. (Colquitt,2001).

Definition of Key Terms

Organizational Justice

Organizational justice is a judgment made by the members/workers of an organization about the fairness of distributing outcomes, processes of allocating outcomes and interpersonal relationships at the workplace (Greenberg, 1990).

Methodology

Research Method

In this study, a mixed method research design was used, involving a quantitative method to investigate teacher educators' expectations and the principals' practices on organizational justice perceived by teacher educators, and a qualitative method to acquire insight into principals' perceptions on their own practices on organizational justice.

Sample

The target population was teacher educators and principals from 25 Education Degree Colleges. Samples were selected by a purposive sampling method. The 150 teacher educators and 4 principals from the selected 4 Education Degree Colleges participated in this study.

Instrumentation

After the thorough review of the literature. two sets of questionnaires were developed for quantitative data collection: one for teacher educators and other for principals.

Questionnaire for teacher educators included two parts: the first part for teacher educators' demographic data, the second part for investigating the teacher educators' expectations and principals' practices on organizational justice. The first part included 5 items for demographic data of teacher educators and the second part involved 41 items regarding four dimensions of organizational justice practiced by principals such as distributive justice, procedural justice, interpersonal justice, and informational justice. Teacher educators were requested to response these items based on their expectations and principals' practices on organizational justice through the use of four-point Likert scales: (1= never expect, 2 = sometimes expect, 3 = often expect, 4 = always expect), and (1 = never practise, 2 = sometimes practise, 3 = often practise, 4 = always practise).

Questionnaire for principals included 6 items concerning demographic data of principals. These data were used to investigate the variations on principals' practices on organizational justice according to their personal factors. 9 open-ended questions were used for qualitative data collection.

The internal consistency using Cronbach's Alpha coefficient was used to measure the consistency among the items. The reliability coefficient or Cronbach's alpha of the questionnaire for teacher expectations on organizational justice was 0.97 and of the questionnaire for principals' practices on organizational justice was 0.85.

Procedure

First, the relevant literature concerning organizational justice was explored. The instrument was developed to collect the required data under the guidance of the supervisor. Then, to ensure the content validity of the instrument, expert opinions were taken from 10 experienced teachers from the Department of Educational Theory and Management, Yangon University of Education. For qualitative study, open-ended questions were constructed by the guidance of the supervisor and the content validity was examined by experienced teachers. After taking expert validity, the pilot testing for the instruments was conducted in December 2021. The modified instruments were distributed to all participants of the four Education Degree Colleges. After two weeks, the instruments were recollected with the assistance of the respective principals.

Data Analysis

The collected data were systematically analysed by using the Statistical Package for the Social Sciences (SPSS) software version 23. Descriptive statistics, independent samples *t*-test and Paired samples *t* Test were used to analyse the data. Descriptive analysis was used to compute means and standard deviations for each item, each dimension of organizational justice. Independent samples *t* Test was used to compare means and to determine any differences in the principals' practices of organizational justice according to their demographic data. Paired samples *t* Test was conducted to find out the differences between the degree of teacher educators' expectations and the extent of principals' practices on organizational justice.

The data obtained from the open-ended questions were analysed to reveal the similarities and differences in the findings.

Findings

Quantitative Research Findings

The analysis of the collected data was intended to investigate the degrees of teacher educators' expectations on organizational justice practised by principals, and the extent of principals' practices on organizational justice from teacher educators' perspectives. Also, the gap between the degrees of teacher educators' expectations and the extent of principals' practices on organizational justice was identified. Further, variations in the principals' practices on organizational justice according to their personal factors were studied.

Investigating the Degree of Teacher Educators' Expectations on Organizational Justice Practised by their Principals

Table 1. Means and Standard Deviations of Teacher Educators' Expectations on Organizational Justice (N=150)

Dimensions of Organizational Justice	Mean (SD)	Remark
Distributive Justice	3.55 (.57)	highly expect
Procedural Justice	3.48 (.55)	highly expect
Interpersonal Justice	3.59 (.54)	highly expect
Informational Justice	3.47 (.56)	highly expect
Teacher Educators' Expectations on Overall Organizational Justice	**3.52 (.50)**	**highly expect**

Scoring Direction: 1.00-1.75=not expect at all 2.51-3.25=moderately expect
1.76-2.50=somewhat expect 3.26-4.00=highly expect

According to Table 1, The mean values of teacher educators' expectations on distributive justice, procedural justice, interpersonal justice and informational justice practised by principals were 3.55, 3.48, 3.59 and 3.47 respectively. Moreover, the overall mean value for teacher educators' expectations on organizational justice was 3.52.

Investigating the Extent of Principals' Practices on Organizational Justice Perceived by Teacher Educators

Table 2 Means and Standard Deviations of Principals' Practices on Organizational Justice Perceived by Teacher Educators (N=150)

Dimensions of Organizational Justice	Mean (SD)	Remark
Distributive Justice	3.20 (.67)	moderately practise
Procedural Justice	3.12 (.67)	moderately practise
Interpersonal Justice	3.30 (.69)	highly practise
Informational Justice	3.22 (.66)	moderately practise
Principals' Practices on Overall Organizational Justice	**3.21 (.64)**	**moderately practise**

Scoring Direction: 1.00-1.75=not practise at all 2.51-3.25=moderately practise
1.76-2.50=somewhat practise 3.26-4.00=highly practise

According to data in Table 2, principals highly practised on interpersonal justice because of its mean value (Mean=3.30) and moderately practised on distributive justice, procedural justice, informational justice as their mean values were 3.20, 3.12 and 3.22. Moreover, it can be found that principals moderately performed on overall organizational justice, as the overall mean value was 3.21.

Differences between the Degree of Teacher Educators' Expectations and the Extent of Principals' Practices on Organizational Justice Perceived by Teacher Educators

Table 3 Comparison between the Degree of Teacher Educators' Expectations and the Extent of Principals' Practices on Organizational Justice Perceived by Teacher Educators (N=150)

Dimensions of Organizational Justice	Mean (SD)		*t*	*df*	*p*
	Expectations	Practices			
Distributive Justice	3.55(.57)	3.20(.67)	6.17	149	.000***
Procedural Justice	3.48(.55)	3.12 (.67)	6.80	149	.000***
Interpersonal Justice	3.59(.54)	3.30 (.69)	5.38	149	.000***
Informational Justice	3.47(.56)	3.22 (.66)	4.92	149	.000***
Overall Organizational Justice	**3.52(.50)**	**3.21(.64)**	**6.36**	**149**	**.000*** **

Note: ***p < 0.001, Scoring Direction:

Degree of Expectations	Extent of Practices
1.00-1.75=not expect at all	1.00-1.75=not practise at all
1.76-2.50=somewhat expect	1.76-2.50=somewhat practise
2.51-3.25=moderately expect	2.51-3.25=moderately practise
3.26-4.00=highly expect	3.26-4.00=highly practise

Table 3 shows that there were significant differences between the level of teacher educators' expectations and the level of principals' practices on all domains of organizational justice and overall organizational justice at p<0.001 level. Based on the results of the paired samples t test analysis, it was found that the mean values of the level of teacher educators' expectations were higher than the mean values of the level of principals' practices on overall organizational justice, t (149) = 6.36, p<0.001. A clearer understanding can be seen in Figure 1.

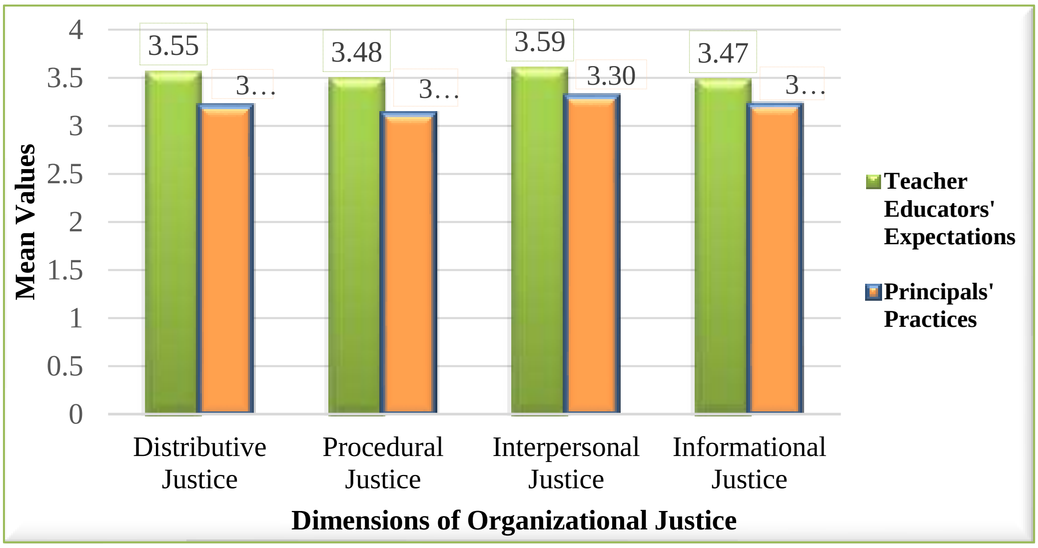

Figure 1 Mean Comparisons between Teacher Educators' Expectations and the Principals' Practices on Organizational Justice

Figure 1 presents that the mean values of the levels of teacher educators' expectations were higher than that of principals' practices on all dimensions of organizational justice such as distributive justice, procedural justice, interpersonal justice and informational justice.

Variations of the Extent of Principals' Practices on Organizational Justice according to their Personal Factors

Table 4 Independent Samples *t* Test Results of Principals' Practices on Organizational Justice Grouped by Gender (Perceived by Teacher Educators) (N=150)

Variables	Gender	N_1	N_2	Mean	SD	*t*	*df*	*p*
Distributive Justice	Male	1	39	3.41	.58	2.30	148	.023*
	Female	3	111	3.12	.68			
Procedural Justice	Male	1	39	3.33	.57	2.35	148	.020*
	Female	3	111	3.04	.69			
Interpersonal Justice	Male	1	39	3.49	.54	2.30	87.93	.024*
	Female	3	111	3.23	.72			
Informational Justice	Male	1	39	3.39	.51	2.07	91.75	.041*
	Female	3	111	3.17	.70			
Principal Practices on Overall Organizational Justice	**Male**	**1**	**39**	**3.40**	**.52**	**2.25**	**148**	**.026***
	Female	**3**	**111**	**3.14**	**.66**			

Note: *$p < 0.05$, N_1= number of principals, N_2= number of teacher educators

According to Table 4, there were significant differences in all dimensions of organizational justice practised by principals according to their gender. The male principal performed differently from the group of female principals on the overall organizational justice practice, t (148) = 2.25, p<0.05.

Table 5 Independent Samples *t* Test Results of Principals' Practices on Organizational Justice Grouped by Age (Perceived by Teacher Educators) (N=150)

Variables	Total Services	N_1	N_2	Mean	SD	*t*	*df*	*p*
Distributive Justice	≤55 years	2	80	3.28	.65	1.60	148	ns
	>55 years	2	70	3.10	.69			
Procedural Justice	≤55 years	2	80	3.22	.62	2.01	148	.046*
	>55 years	2	70	3.00	.71			
Interpersonal Justice	≤55 years	2	80	3.42	.65	2.32	148	.022*
	>55 years	2	70	3.16	.71			
Informational Justice	≤55 years	2	80	3.34	.66	2.35	148	.020*
	>55 years	2	70	3.09	.64			
Principals' Practices on Overall Organizational Justice	**≤55 years**	2	**80**	**3.31**	**.60**	**2.20**	**148**	**.029***
	>55 years	2	**70**	**3.09**	**.66**			

Note: ns= no significance, *$p < 0.05$, N_1= number of principals, N_2= number of teacher educators

According to Table 5, the group of principals who were 55 years and under 55 years of age performed differently from the group of principals who were above 55 years of age on three dimensions of organizational justice such as procedural justice, interpersonal justice, and informational justice, but not on distributive justice. Based on the results of principals' practices on overall organizational justice, it was found that there was a significant difference between the practices of two age-groups of principals, t (148) = 2.20, p< 0.05.

Table 6 Independent Samples *t* Test Results of Principals' Practices on Organizational Justice Grouped by Academic Qualifications (Perceived by Teacher Educators (N=150)

Variables	Academic Qualifications	N_1	N_2	Mean	SD	*t*	*df*	*p*
Distributive Justice	M.A., M.Sc.	3	111	3.12	.68	-2.30	148	.023*
	M.Ed.	1	39	3.41	.58			
Procedural Justice	M.A., M.Sc.	3	111	3.04	.69	-2.34	148	.020*
	M.Ed.	1	39	3.33	.57			
Interpersonal Justice	M.A., M.Sc.	3	111	3.23	.72	-2.30	87.93	.024*
	M.Ed.	1	39	3.49	.54			
Informational Justice	M.A., M.Sc.	3	111	3.17	.70	-2.07	91.75	.041*
	M.Ed.	1	39	3.39	.51			
Principals' Practices on Overall Organizational Justice	**M.A., M.Sc.**	**3**	**111**	**3.14**	**.66**	**-2.25**	**148**	**.026***
	M.Ed.	**1**	**39**	**3.40**	**.52**			

Note: *p < 0.05, N_1= number of principals, N_2= number of teacher educators

Table 6 presents that there were significant differences between the principal who got M.Ed. degree and the principals who got M.A. or M.Sc. degree in their practices on all dimensions at p<0.05 level. Moreover, there was a significant difference between two groups of principals in overall organizational justice practices, t (148) = -2.25, p<0.05.

Table 7 Independent Samples *t* Test Results of Principals' Practices on Organizational Justice Grouped by Total Services (Perceived by Teacher Educators)(N=150)

Variables	Total Services	N_1	N_2	Mean	SD	*t*	*df*	*p*
Distributive Justice	≤35 years	3	111	3.12	.68	-2.30	148	.023*
	>35 years	1	39	3.41	.58			
Procedural Justice	≤35 years	3	111	3.04	.68	-2.34	148	.020*
	>35 years	1	39	3.33	.57			
Interpersonal Justice	≤35 years	3	111	3.23	.72	-2.30	87.93	.024*
	>35 years	1	39	3.49	.54			
Informational Justice	≤35 years	3	111	3.17	.70	-2.07	91.75	.041*
	>35 years	1	39	3.39	.51			
Principals' Practices on Overall Organizational Justice	**≤35 years**	**3**	**111**	**3.14**	**.66**	**-2.25**	**148**	**.026***
	>35 years	**1**	**39**	**3.40**	**.52**			

Note: *p < 0.05, N_1= number of principals, N_2= number of teacher educators

According to Table 7, statistically significant differences were found in all dimensions of organizational justice practised by principals according to their total services. The principal whose total services were above 35 years performed differently from principals whose total services were 35 years and under 35 years in their practices on overall organizational justice, *t* (148) = -2.25, *p*<0.05.

Table 8 Independent Samples *t* Test Results of Principal Practices on Organizational Justice Grouped by Administrative Services (Perceived by Teacher Educators) (N=150)

Variable	Total Services	N_1	N_2	Mean	SD	*t*	*df*	*p*
Distributive Justice	≤5 years	3	111	3.12	.68	-2.30	148	.023*
	>5 years	1	39	3.41	.58			
Procedural Justice	≤5 years	3	111	3.04	.68	-2.35	148	.020*
	>5 years	1	39	3.33	.57			
Interpersonal Justice	≤5 years	3	111	3.23	.72	-2.30	87.93	.024*
	>5 years	1	39	3.49	.54			
Informational Justice	≤5 years	3	111	3.17	.70	-2.07	91.75	.041*
	>5 years	1	39	3.39	.51			
Principals' Practices on Overall Organizational Justice	**≤5 years**	**3**	**111**	**3.14**	**.66**	**-2.25**	**148**	**.026***
	>5 years	**1**	**39**	**3.40**	**.52**			

Note: *p < 0.05, N_1= number of principals, N_2= number of teacher educators

According to Table 8, there were significant differences between the principals whose administrative services were above 5 years and the principals whose administrative services were 5 years and under 5 years in their practices on all dimensions of organizational justice at p<0.05 level. Based on the results of the overall practices on organizational justice, the principal whose administrative services were above 5 years performed differently from the principals whose administrative services were 5 years and under 5 years, *t* (148) = -2.25, p<0.05.

Qualitative Research Findings

Principals' responses to open-ended questions were presented as qualitative findings.

Question (1) As a principal of an Education Degree College, do you think the practice of organizational justice is important? Why?

Principals answered that the practices of organizational justice in Education Degree Colleges is important because practices of justice build trust and respect between principals and teacher educators (n=2, 50%). Without justice, staff's negative emotions will interfere with the working process, and they will not perform effectively administrative tasks (n=2, 50 %).

Question (2) As a principal of an Education Degree College, how do you practise to be just in recognising teacher educators' efforts and performance?

Principals reported that they provided rewards to teacher educators who contributed to organizational success, encouraged teacher educators who has fewer efforts and motivated them to improve their performance (n=1, 25%), conducted evaluation process on teachers educators' performances in an objective way for job promotions (n=1, 25%), distributed the incentives to apply teacher educators' knowledge and skills (n=1, 25%), and set the criteria for teacher educators' job performance, and appraised them with defined criteria (n=1, 25%).

Question (3) As a principal of an Education Degree College, how do you make teacher educators realise that the job decisions are just?

According to the principals' responses, they collected accurate and reliable facts and data from teacher educators before making job decisions, obtained group agreement for important tasks (n=1, 25%), explained all teacher educators about the procedures and plans in detail (n=2, 50%), allowed teacher educators to express their opinions and suggestions for improving teaching practices in meeting and made final decisions representative to their ideas (n=1, 25%).

Question (4) In what ways do you implement the administrative tasks with justice in Education Degree College?

Principals answered that they tried to understand the strengths and weaknesses of individual teacher educators in assigning the tasks (n=2, 50%), allocated the duties and responsibilities based on teacher educators' skills and experiences, monitored and supported them if needed (n=1, 25%), involved everyone in implementing organizational developmental plans, decreased centralised system and gave autonomy to control their work and monitored their progress (n=1, 25%).

Question (5) To ensure interpersonal justice, how do you interact with teacher educators in discussing the school-related issues?

Principals responded that they considered the teacher educators points of views (n=2, 50%), used two-way communication in discussing the school related matters, and gave constructive feedback on their ideas, (n=1, 25%), demonstrated respect and value on teacher educators' expressions, and actively listened to everyone suggestions and opinions (n=1, 25%).

Question (6) How do you practise justice in sharing the relevant information to teacher educators in Education Degree College?

According to the principals' responses, they announced the information on the notice board (n=1, 25%), released the detailed information from different media to all teacher educators (n=1, 25%), assigned the professors to provide the update news and information to teacher educators from their respective departments (n=2, 50%).

Question (7) As a principal of an Education Degree College, do you face any challenges in performing the workloads and tasks with justice? If so, discuss.

Principals answered that they faced challenges because some teacher educators requested private chance for their personal gain when working with others, and their emotions will interrupt the working environment (n=1, 25%), some teacher educators took no responsibility and less committed to their works that led to have burdensome on others, and it was difficult to manage them to be just (n=1, 25%), collaboration between teacher educators was low (n=1, 25%) , and one principal answered that there was no difficulty in doing tasks with justice in the workplace (n=1, 25%),

Question (8) How could you achieve organizational justice in taking actions for changes and improvement of your degree college?

Principals answered that they could apply the democratic ways, make decisions based on agreements of most people, and respect ideas of the minority people (n=1, 25%), practise shared decision-making style for organizational development (n=1, 25%), develop the quality assurance team, design the working plan, set criteria for performance appraisal, record the individual performance and data for continuous professional development, give appropriate rewards on teacher educators' efforts and contributions (n=1, 25%), and develop trust between principal and teacher educators, enhance collaboration in workplace (n=1, 25%).

Conclusion and Discussion

Organizational justice is important in the workplace because perceptions of justice in organizations affect the performance of members and the development of organizations. To achieve the goals of teacher education in Myanmar, teacher educators must give more efforts and more commitment to the organization, and principals should practise organizational justice in the working environment. Therefore, this study aimed at investigating principals' practice on organizational justice in Education Degree College.

The results of the study indicated that teacher educators reported that principals moderately practised on three domains organizational justice such as distributive justice, procedural justice and informational justice, however, principals highly practiced on interpersonal justice. The qualitative results supported this finding. According to the principals' responses to open-ended questions, they considered teacher educators' opinions, used two-way communication in discussing the school related matters, and expressed respect and value on teacher educators' points of views. They also reported that practices of justice build trust and respect between principals and teacher educators. Lind (1988) demonstrated that employees' perceptions of organizational justice increased their trust in their supervisors. Moreover, principals responded that injustice caused staff's negative emotions that will interfere with the working process, and administrative tasks will not be performed effectively. Adam's Equity Theory (1965) suggested that employees give various favourable or unfavourable reactions according to their perceptions on organizational outcomes in the work environment.

Moreover, this study investigated the differences in the extent of principals' practices on organizational justice according to their personal factors such as gender, age, academic qualifications, total services and administrative services. The results of the study showed that the mean value of male principal was significantly higher than the mean values of female principals in the practices on organizational justice. Therefore, it can be concluded that male principals practised Organizational Justice more than female principals in Education Degree Colleged. Moreover, it was found that the mean values of the group of principals who were 55 years and under 55 years of age are higher than that of principals who were above 55 years of age on the overall organizational justice practices. Therefore, it can be noted that principals who were 55 years and under 55 years practised organizational justice more than principals who were above 55 years of age.iz

Furthermore, the results of the principals' practices on organizational justice grouped by academic qualifications demonstrated that the mean value of principal who got M.Ed. degree are higher than that of principals who got M.A. or M.Sc. degree in all dimensions of organizational practiced organizational justice more than the principals who were M.A. M.Sc. degree holders. In addition, the principal whose total services were above 35 years showed significantly higher mean value than that of principals whose total services were 35 years and under 35 years in their practices on organizational justice. Therefore, it can be analysed that principal whose total services were above 35 years practised organizational justice more than principals whose total services were 35 years and under 35 years. Finally, it was found that the mean values of the principal whose administrative services above 5 years were higher than that of principals whose administrative services were 5 years and under 5 years in their organizational justice practices. It can be analysed that the principal who had above 5 years of administrative services practised organizational justice more than principals who had 5 years and under 5 years of administrative services.

Regarding teacher educators' expectations, it was found that teacher educators highly expected principals to practice on all four dimensions of organizational justice. Therefore, principals need to be aware of the teacher educators' expectations and improve their organizational justice practices in order to meet their practices with teacher educators' expectations in Education Degree Colleges.

However, principals reported that they faced challenges in performing the tasks with justice that some teacher educators sought particular opportunity for their personal gain, and their grievances interrupted the working processes. Furthermore, they answered that some teacher educators were less responsible and had less commitment to their tasks that led to have burdensome on others, and so it was difficult to be just among teacher educators. Therefore, it should be questioned how principals address challenges faced in practising organizational justices in Education Degree Colleges. This can be one research question for future studies.

Recommendations

In the light of the study results, the following suggestions and recommendations were drawn to be considered to improve the organizational justice practices. Principals should:

- Interact with teacher educators from different departments equally.
- Treat teacher educators in different positions fairly.
- Express concerns for teacher educators' dignity.
- Not provide more support to teacher educators who are relatives or friends of principals than others.
- Discuss teacher educators about their professional experiences in a respectful manner.
- Distribute the rewards according to teacher educators' effort and performance.
- Give appropriate opportunities for the professional development needs of each teacher educator.
- Allow teacher educators to challenge the job decisions made by the principal for fixing mistakes and ensure justice.
- Consider teacher educators' voices for the development of organization.
- Assign the tasks and duties based on teacher educators' conditions and performance.
- Resolve the disputes between teacher educators with respect to justice.
- Release detailed information of professional development activities to all teacher educators, regardless of their positions.
- Provide job-related information in a timely-manner.

Need for Further Research

This research was conducted in selected four Education Degree Colleges. The conclusions were drawn based on the findings from the limited research setting. Therefore, further study should be expanded in other Education Degree Colleges to make more generalisations in the context of Education Degree Colleges. This study intended to study the principals' practices on organizational justice only in Education Degree Colleges. Further studies should be conducted to investigate the principals' organizational justice practices at Basic Education Schools, and the leaders' practices on organizational justice at Higher Education Institutions.

In this study, a mixed method research design involving questionnaire survey and open-ended questions was used. Further research should be conducted to study the principals' practices on organizational justice by using another qualitative method, such as an interview technique. The present study examined the extent of principals' practices on organizational justice in Education Degree Colleges. The researchers should explore the challenges faced by principals in practising organizational justice in workplace and coping strategies. This study is concerned with principals' practices on organizational justice perceived by teacher educators. Further studies should be explored the impact of organizational justice practices on teacher educators' work attitudes and students' learning achievement.

Acknowledgements

Firstly, I would like to express my respectful gratitude to all teachers in my life and my parents. We would like to express my honourable thanks and deep respects to Dr. Kay Thwe Hlaing (Rector, Yangon University of Education) and Dr. May Myat Thu (Pro-Rector, Yangon University of Education), Dr. Khin Khin Oo (Pro-Rector, Yangon University of Education), Dr. Nyo Nyo Lwin (Pro-Rector, Yangon University of Education), Dr. Khin Mar Ni (Professor and Head of Department of Educational Theory and Management, Yangon University of Education) for their valuable advice to do this research study and vigilance to complete this research throughout the study period. Furthermore, we would like to describe my heartfelt gratitude towards teachers from the Department of Educational Theory and Management for their support. Finally, we would like to thank to principals and teacher educators from Education Degree Colleges for willingness, their time, and cooperation in this study.

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J. Myanmar Acad. Arts Sci. 2023 **Vol. XXI. No.6**

A STUDY OF KNOWLEDGE AND PRACTICES OF HIGH SCHOOL PRINCIPALS ON HUMAN RESOURCE MANAGEMENT

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Abstract

The objectives of this study are to investigate principals' knowledge, practices and difference in human resource management practices in terms of their knowledge level in Kyaukpyu and Yanbye Townships. As the research method is a mixed method, both quantitative and qualitative methods were applied. In this study, two sets of questionnaires were used. The first one is the questionnaire for principals and the second one is for teachers. There are 35 True-False items to investigate the principals' knowledge on human resource management, and 5 open-ended questions for their practices and challenges. The questionnaire for teachers consists of 59 items for measuring principals' human resource management practices. A total of 50 high school principals who had at least 2 years of administrative services and 300 teachers from Kyaukpyu and Yanbye Townships were selected by using purposive sampling method. Descriptive Statistics, Item Percent Correct (IPC) and One-way Analysis of Variance (ANOVA) were used for analyzing the collected data. According to the findings, it was found that most of the high school principals (n=35, 70%) had average knowledge level of human resource management. However, the participant principals had moderately performed on HRM practices. There was no statistically significant difference in principals' practices on human resource management in terms of their knowledge level. It can impact stakeholders and policy makers if they consider and implement developmental programs in accordance with findings and suggestions of this study.

Keywords: human resource management, human resource management practice

Introduction

In the modern world, the human resource is one of the most critical and difficult resources to plan for more than one reason. The human resource has a far-reaching impact on the profitability of the enterprises. Human resources may be thought of as the total knowledge, skills, creative abilities, talents and aptitudes of an organization's workforce, as well as the values, attitudes and benefits of an individual involved. The term human resource management (HRM) has popularized in management literature over the last three decades. Human resource management is an important and distinct skill in organizational management, which refers to a person's ability to integrate effectively with people for work related matters. HRM in schools is not much different as compared to other organizations. In the school context, human resources can be considered as teachers, students and the support staff. When the principals have implemented the human resource management functions as the strategic approaches more professionally to staff management, human resources can be a big advantage and a great source of strength for the schools (Sothy, 2019).

Significance of the Study

Human resource management in education is considered as the process of motivating workers to maximize their performance in order to obtain maximum output starting from the day they are recruited. That means utilizing people to perform duties and functions in the school (Oduma, 2012). The practice of HRM in school is vital for school effectiveness. It brings several implications towards teachers, students and stakeholders, not just the school as a single learning institution. It is expected to be beneficial to the management and staff of high schools as it will

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be a source of information and reference material on human resource management practices. Therefore, it will be a great help for stakeholders and policy makers while considering and implementing effective Professional Development programs. Moreover, it can be pointed out through the findings that training programs for principals about human resource management are tremendously needed for improvement.

Objectives of the Study

General Objective

To study knowledge and practices of high school principals on human resource management

Specific Objectives

1. To investigate the level of high school principals' knowledge on human resource management
2. To investigate the extent of human resource management practices of high school principals
3. To investigative the difference in human resource management practices of high school principals in terms of their knowledge level

Research Questions

1. What is the level of high school principals' knowledge on human resource management?
2. To what extent do the high school principals perform human resource management practices?
3. Is there any significant difference in human resource management practices of high school principals in terms of their knowledge level?

Theoretical Framework

This study was based on AMO theory: the components of Ability, Motivation, and Opportunity developed by Bos-Nehles et al., (2013) and the dimensions of human resource management functions described by Ghosh (2000), Armstrong (2010), Robbins (2010), and Mondy and Martocchio (2016).

According to Ghosh (2000), the human resource management functions today are (1) recruitment and selection, (2) training and development, (3) performance evaluation and (4) compensation. Armstrong (2010) mentioned that the important functions in human resource management are (1) recruitment and selection, (2) training and development, (3) compensation and benefits, and (4) employee performance management. DeCenzo and Robbins (2010) proposed four basic functions: (1) staffing, (2) training and development, (3) motivation and (4) maintenance. Besides, Mondy and Martocchio (2016) claimed that the six functional areas are associated with effective HRM: (1) staffing, (2) human resource development, (3) performance management, (4) compensation, (5) safety and health, and (6) employee and labor relations.

In this study, the human resource management functions are adapted and refined to suit public schools in Myanmar context. Therefore, the human resource management practices of high school principals will be investigated according to the following dimensions;

1) Staffing
   - Strategic human resource planning,
   - Placement
   - Induction and orientation

2) Training and development
   - Employee training
   - Career development
3) Motivation
   - Motivation theories and job design
   - Performance appraisals
   - Rewards and compensation
4) Maintenance
   - Safety and health
   - Communication
   - Employee relations

Staffing: Staffing is a process through which an organization ensures that it always has the proper number of employees with the appropriate skills in the right jobs, at the right time, to achieve organizational objectives (DeCenzo & Robbins, 2010).

- ***Strategic human resource planning:*** It is the systematic process of matching the internal and external supply of people with job openings anticipated in the organization over a specific period of time (Mondy & Martocchio, 2016).
- ***Placement:*** Placement is assumed as the determination of the job to each of the selected candidates. It is not enough just recruiting employees in the organization, but it is really important assigning the right man in the right place (Ghosh, 2000).
- ***Induction:*** Induction is a process of the introduction of the employees to the job concerned with purposes, policies and practices of the organization. Basically, it is also considered as a welcoming process (Omenyi, 2007).
- ***Orientation:*** The orientation takes place after following the placement. Proper instructions, job description and job analysis, all give the newly recruited teacher a way to orient himself/herself with what is expected and required to be successful in the position (Omenyi, 2007).

Training and development: Training and development involve improving the employees' skills and enhancing their potentiality to fit in the ever-changing situation. It is asserted that training and development of the employees is not an option, and it is an intrinsic part of the practice of human resource management and is an investment in people (Ghosh, 2000).

- ***Employee training:*** Employee training is a work program that provides employees with specific knowledge and skills to facilitate and improve job performance in current roles (DeCenzo & Robbins, 2010). According to Edem (2006), a trained teacher is more likely to be highly motivated, competent and productive.
- ***Career development***: Career development refers to a set of programs designed to match an individual's needs, abilities, and career goals with current and future opportunities in the organization (DeCenzo & Robbins, 2010).

Motivation: The term motivation encompasses variables such as drive, incentives, need, reward etc. It is the act of generating, stimulating, directing and moving someone's behavior to achieve a desired goal (Greenberg & Baron ,1995).

- ***Motivational Theories:*** The motivational theories provide insights into the way people behave and what motivates them to work towards a particular goal or outcome. Motivational theories are all linked and they lead to serving satisfaction in employees (Badubi, 2017).
- ***Job Designs:*** The motivational level of an employee can be influenced by the structure of his work. The considerable and applicable techniques or job designs for increasing motivation are job enrichment, job rotation and job enlargement (Ghosh, 2000). In school context, a school principal is the determining factor in the motivation aspects of staff (Dimmock & Walker, 2005).
- ***Performance Appraisal***: According to Flippo (1984), performance appraisal is the systematic, periodic and an impartial rating of an employees' excellence in matters pertaining to his present job and his potential for a better job.
- ***Rewards and Compensation:*** In order to motivate and keep their best employees, a "package" is provided by organizations in terms of rewards and compensation. The staff who are found to have exceeded expectations should be compensated for their action. Some of compensation may be holidays offered, end of year bonuses, awards, salary increments and promotion.

Maintenance: Maintenance is the process of designing safety and health measures and supplication of welfare services. It can be defined as prevention from desertion and sustaining people within an organization (Javadin, 2006, as cited in Shahriari, 2016).

- ***Safety and Health:*** Safe and healthy working conditions enables the employees to work with vigour and vitality (Padala, 2011). That means employees are not interested in doing the work in unsafe conditions even though they get a high amount of remuneration. Ensuring the school environment is safe and orderly with active support for staff; and provide materials and supplies to all staff in consistent, timely and inclusive manner.
- ***Communication:*** Staff will be comfortable in an institution if there is a clear channel of communication, establishment of clear staff policy and principles of justice and fair play (Adeyemi, 2009).
- ***Employee Relation:*** Employee relation is the organization's concerted effort in adopting several mechanisms to regulate relationship amongst employees towards the achievement of the organization goals. Effective employee relations focus also on creating an open-door system in the organization where employees can freely express their grievances, initiate ideas, suggestions without fear of intimidation and suppression (Jing, 2013).

Limitations of the Study

The scope of this study is geographically limited to Basic Education High Schools from Kyaukpyu and Yanbye Townships, Rakhine State. This study is concerned with human resource management practices of high school principals.

Definition of Key Terms

Human Resource Management - a strategic and coherent process of managing employees who are the priceless organizational asset contributing to the attainment of organizational objectives and ensuring the organizational survival in the competition (Armstrong, 2010).

Human Resource Management Practice- a strategic approach to acquiring, developing, managing, motivating and gaining the commitment from employees who are seen as the organization's asset (Armstrong, 2009).

Operational Definitions

In this study, ***human resource management practices*** mean practices performed by the principals such as staffing, training and development, motivation and maintenance at schools. HRM practices will be determined by the mean values of the teachers' responses to the items of HRM practices questionnaire. The greater the mean value indicates that the principals have higher HRM practices level.

Knowledge on human resource management means information, understanding, or skill that the principals get from experience or education. It will be measured by true mean score of the principals' responses to the items of HRM knowledge questionnaire. The greater the true mean score indicates that the principals have higher HRM knowledge level.

Methodology

In this study, both quantitative and qualitative methods were applied to collect the required data. For quantitative and qualitative research study, questionnaires and open-ended questions were used respectively. As two sets of questionnaires were used, the first one is the questionnaire for principals and the second one is for teachers. A total of 50 high school principals who had at least 2 years of administrative services and 300 teachers from Kyaukpyu and Yanbye Townships were selected by using purposive sampling method.

The questionnaire for principals consists of 35 True-False items to investigate the principals' knowledge on human resource management, and 4 open-ended questions for their HRM practices. The questionnaire for teachers consists of 59 items for measuring four dimensions such as *staffing, training and development, motivation* and *maintenance*. Pertaining to the extent of principals' performance on human resource management practices, they were measured by using four-point Likert Scale ranging from "never" to "always" (1= never performed, 2=sometimes performed, 3=frequently performed and 4= always performed). Descriptive Statistics, Item Percent Correct (IPC) and One-way Analysis of Variance (ANOVA) were used for analyzing the collected data.

Findings

In this session, human resource management practices of high school principals through analyzing the collected data were presented. Firstly, quantitative findings on human resource management practices of high school principals were described.

Table 1 Item Percent Correct (IPC) Values Showing the Number of High school Principals Giving Correct Answer on Each Item (N=50)

No	Items	No. of Correct Principals	IPC (%)
1	Human resource management can be considered as the management of employees' prior knowledge, skills and abilities in the workplace.	6	12.0
2	In 21st century, advancement of modern technology is a basic requirement for the development of nation or human society among abundance of natural resources, modern technology and high performance of human resources.	15	30.0
3	The fundamental objective of every organization is to get profit.	27	54.0
4	Except HR manager, his subordinates cannot take part in human resource management process.	43	86.0
5	Human resource management takes place only in government area.	42	84.0
6	High quality and skill of employees do not directly relate to high performance of organization.	39	78.0
7	HR manager must fully focus on the present workforce planning without determining future prospects.	45	90.0.
8	Organization's vision and mission should be set only for short term to review periodically.	20	40.0
9	Recruitment and selection is considered as the core function of human resource management.	19	38.0
10	New employees must be assigned to work independently instead of working together with the experienced ones.	45	90.0
11	Proper placement can reduce employee turnover, accidents and absenteeism. *	48	96.0
12	Orientation is not a must for introducing tasks, workplace and colleagues to new employees.	40	80.0
13	Allowing employees to attend in-service training can cause loss for organization as it is time consuming and costs lot of money.	43	86.0
14	The success or failure of a training program highly depend on the accuracy with which the organizational need has been identified and the training objective specified.*	47	94.0
15	After training, it is not a must to evaluate its effectiveness.	40	80.0
16	Whenever an organization's objective is achieved, each employee's one is too.	10	20.0
17	Job rotation within the fixed time encourages employees' career development. *	48	96.0
18	Career development programs for each employee implement to obtain only for their present opportunities in organization.	30	60.0

No	Items	No. of Correct Principals	IPC (%)
19	The operational performance of a HR manager depicts a kind of behavior that highly depends upon authority.	26	52.0
20	Considering the employee voice can disturb the accomplishment of tasks.	32	64.0
21	Assigning employees to perform the challenging tasks along with authority can reduce enthusiasm and skills in their present job.	36	72.0
22	Frequently movement of employees on different job roles can gain various knowledge and experience in their jobs.	5	10.0
23	Besides the present jobs, assigning employees to perform additional work at the same level of skill and responsibility reduce boredom and monotony. *	44	88.0
24	Objective of performance appraisal system is to identify the developmental needs of each employee.*	45	90.0
25	Frequently recognition and rewarding to employees cannot attract them to get interested in their jobs.	46	92.0
26	Majority of the disputes in organization are related to the problem of wages, salaries and benefits.*	34	68.0
27	Only enormous amount of salary can attract employees to persist and work happily.	8	16.0
28	Seniority should be prioritized rather than ability when promotion comes.	37	74.0
29	Although employee needs are fulfilled, it cannot prevent turnover and corruption at work.	19	38.0
30	Security and safety in jobs make employees more productive. *	47	94.0
31	Some cases such as bullying, racism and using drugs at workplace occur as usual so it cannot affect the organization success.	38	76.0
32	As a HR manager, it is not necessary to explain instantly using solid evidences for spreading non-sense rumor within organization.	33	66.0
33	Employees' less willingness to work, absenteeism and turnover do no directly relate to that manager.	37	74.0
34	Whenever the problems and conflicts breed among employees, the HR manager must warn them not to happen again rather than engage them.	27	54.0
35	Only employees who benefit the organization must be considered as human resources.	16	32.0

Note: (*) = True item

Therefore, the item with the lowest number and percentage was item (22), and it can be concluded that only 10% of the high school principals had knowledge concerned with this item. In contrast, the items with the highest number and percentage were items (11) and (17), and 96% of the high school principals had knowledge related to these items.

Table 2 Mean and Standard Deviation of Principals' Knowledge on HRM

Variable	N	Mean Score	SD
High School Principals' Knowledge on HRM	50	22.74	4.74

According to Table 2, the mean score of high school principals' knowledge on HRM was 22.74, and the standard deviation was 4.74. Based on the results, the scores above 27.48 ($\bar{X}$ +SD) are defined as above average level, the scores between 18 ($\bar{X}$ - SD) and 27.48 ($\bar{X}$ +SD) are defined as average level, and the scores below 18 ($\bar{X}$ - SD) are defined as below average level of knowledge on HRM.

Table 3 Number and Percentage of Participant Principals Showing the Level of Knowledge on Human Resource Management (N=50)

Variable	No. of principals (%)	Knowledge level
High School Principals' Knowledge on HRM	6 (12%)	Below average
	35 (70%)	Average
	9 (18%)	Above average

Scoring direction: <18 = below average 18 -27.48 = average >27.48 = above average

Table 3 indicates that 6 (12%) of high school principals had below average and 35 (70%) of high school principals had average level. In addition, 9 (18%) of high school principals had above average knowledge level on human resource management among groups.

Findings on the Extent of Human Resource Management Practices of High School Principals

To know the extent of the extent of human resource management practices of high school principals, mean values and standard deviations of teachers who responded on each item for principals' HRM practices were calculated. These are shown in Table 4.

Table 4 Means and Standard Deviations of Principals' Performance on HRM practices Perceived by Teachers (N=300)

No.	Variables	Mean (SD)	Remark
1.	Principals' performance on staffing	3.39 (.54)	Highly performed
2.	Principals' performance on training and development	3.01 (.61)	Moderately performed
3.	Principals' performance on motivation	3.10 (.59)	Moderately performed
4.	Principals' performance on maintenance	3.38 (.48)	Highly performed
Principals' performance on HRM practices		**3.21 (.50)**	**Moderately performed**

Scoring direction: 1.00-1.75 = not at all performed 1.76-2.50 = somewhat performed
2.51-3.25 = moderately performed 3.26-4.00 = highly performed

As found in Table 4, the principals had moderately performed on HRM practices with its overall mean value of 3.21.

Table 5 Means and Standard Deviations of Staffing Perceived by Teachers

(N= 300.)

No.	Items	Mean	SD
1	Implementing school development plans	3.35	.74
2	Planning the list of employee allocation, appointment and requirement	**3.60**	.67
3	Asking help for the attainment of subject teachers from the management team	3.42	.80
4	Introducing new staffs to students and staffs from school	3.49	.81
5	Caring new teachers as a family member to ensure satisfaction	3.37	.78
6	Introducing new staffs to school's established vision, mission and policy	3.32	.82
7	Placement of teachers to fit with their major subjects and assigned teaching subjects	3.57	.66
8	Assigning new teachers to work with experienced ones in instruction	3.26	.86
9	Asking less experienced teachers to learn about managing classroom and teaching methods from old service teachers	**3.10**	.89
10	Managing to get full access to school furniture and teaching materials	3.44	.78
11	Managing systematically the substitution of teacher for those who take leave	3.55	.76
12	Proper placement of individual teacher in school tasks according to his or her skill level	3.47	.74
13	Observation of periodic follow up measures after the placement	3.11	.88
	Principals' performance on staffing	**3.39**	**.54**

Scoring direction: 1.00-1.75 = not at all performed 1.76-2.50 = somewhat performed
2.51-3.25 = moderately performed 3.26-4.00 = highly performed

As found in Table 5, the principals had highly performed on ***staffing*** dimension with its overall mean value of 3.39.

Table 6 Means and Standard Deviations of Training and Development Perceived by Teachers (N= 300)

No.	Items	Mean	SD
1	Implementing board of study according to their respective subjects	3.17	.84
2	Observing the board of study by himself in school	3.16	.89
3	Encouraging all teachers to participate in their respective board of study	3.34	.81
4	Allowing teachers to attend township level refresher courses and workshops	3.40	.80
5	Inviting experts outside of the school for the development of teacher quality	2.32	1.02
6	Evaluation of training programs held in school for upgrading teacher performance	3.02	.90
7	Arranging to observe the schools that achieve high results in township	2.68	1.01
8	Giving lectures and discussions to colleagues on knowledge and experience embraced from refresher courses and workshops	3.12	.89
9	Encouraging teachers to learn punctually about the concept of subjects and instructional methods	3.29	.85
10	Creating enough learning space and challenges to improve teachers' skills	2.95	.85
11	Directing and teaching action research to teachers by himself for the purpose of educational development	2.64	.93
12	Encouraging teachers to do action research by individual or group	2.71	.98
13	Doing workshops and teaching practices led by experienced and subject matter expert teachers	2.82	.96
14	Encouraging teachers to attend talk shows for gaining other knowledge besides educational knowledge	2.98	.98
15	Supporting teachers to discuss each other their difficulties in teaching	3.11	.91
16	Encouraging knowledge sharing session after reading instructional books	3.15	.87
17	Allowing teachers to attend professional development courses and post graduate class	3.27	.93
Principals' performance on training and development		**3.01**	**.61**

Scoring direction: 1.00-1.75 = not at all performed 1.76-2.50 = somewhat performed
2.51-3.25 = moderately performed 3.26-4.00 = highly performed

As shown in table 6, the principals had moderately performed on ***training and development*** dimension with its overall mean value of 3.01**.**

Table 7 Means and Standard Deviations of Motivation Perceived by Teachers

(N= 300)

No.	Items	Mean	SD
1	Allowing teachers to express their ideas and philosophy during school activities	**3.33**	.79
2	Creating opportunities for teachers to apply their abilities by holding competition (e.g. Teaching aids competition)	2.81	.97
3	Allowing staffs to suggest him concerning with his management and supervision	3.16	.95
4	Showing his trust in teachers' ability for accomplishing the established goals	3.18	.85
5	Assigning teachers to perform school activities that can challenge their ability	3.05	.93
6	Reviewing teachers' low performance and absenteeism	2.89	.88
7	Giving positive feedback to teachers after observing their classroom teaching	3.09	.91
8	Trusting in that teachers can lead their own way as he can	3.24	.91
9	Praising teachers who teach students outside the school time	3.11	.96
10	Rewarding staffs in the special ceremony for the appreciation of their performance	3.14	1.03
11	Encouraging teachers to be passionate about their job and work enthusiastically	3.21	.89
12	Prioritizing the finish of lessons rather than the actual accomplishment of teaching and learning process	**2.73**	1.13
13	Encouraging teachers to be able to perform their tasks giving full authority, and taking responsibility and accountability	3.31	.85
Principals' performance on motivation		**3.10**	**.59**

Scoring direction: 1.00-1.75 = not at all performed 1.76-2.50 = somewhat performed
2.51-3.25 = moderately performed 3.26-4.00 = highly performed

As shown in table 7, the principals had moderately performed on ***motivation*** dimension with its overall mean value of 3.10**.**

Table 8 Means and Standard Deviations of Maintenance Perceived by Teachers

(N= 300)

No.	Items	Mean	SD
1	Managing the safety and security of school environment for smooth instruction	3.58	.70
2	Checking and maintaining the school furniture punctually	3.43	.75
3	Prioritizing the mental and physical well beings of teachers and students	3.45	.77
4	Managing school environment keep clean and healthy	3.55	.71
5	Holding meeting during instructional time or after school as usual	**2.22**	.95
6	Treating everyone fairly in school without discrimination	3.59	.69
7	Sharing information transparently to staffs sent by the upper management	**3.62**	.72
8	Manipulating over staffs using his authority	3.33	1.02
9	Treating everyone warmly in school	3.51	.76
10	Informing the extent of performing school activities to teachers	3.50	.72
11	Engaging staffs to have mutual understanding and respect each other	3.40	.76
12	Providing accommodation for teachers who come from far away with the help of public support	3.32	.80
13	Consulting teachers to get relief whenever they express their feeling and personal problems	3.28	.84
14	Helping to solve teachers' social issues and problems as much as he can (e.g. School leave, loan)	3.13	.96
15	Managing fairly teachers' benefits	3.54	.71
16	Directing clearly how to do school activities	3.60	.67
Principals' performance on maintenance		**3.38**	**.48**

Scoring direction: 1.00-1.75 = not at all performed 1.76-2.50 = somewhat performed
2.51-3.25 = moderately performed 3.26-4.00 = highly performed

As found in the above Table 8, the principals had highly performed on maintenance dimension with its overall mean value of 3.38**.**

Table 9 One-Way ANOVA Results of Human Resource Management Practices of High School Principals Grouped by their Knowledge Level (Perceived by Teachers) (N=300)

No.	Variables	Knowledge level	N_1	N_2	Mean	SD	*F*	*p*
1.	Staffing	Below average	6	235	3.36	.46	.16	n.s
		Average	35	32	3.40	.54		
		Above average	9	15	3.36	.59		
2.	Training and development	Below average	6	235	3.03	.45	.37	n.s
		Average	35	32	2.99	.60		
		Above average	9	15	3.07	.72		
3.	Motivation	Below average	6	235	3.06	.61	.36	n.s
		Average	35	32	3.09	.57		
		Above average	9	15	3.16	.65		
4.	Maintenance	Below average	6	235	3.40	.42	.07	n.s
		Average	35	32	3.38	.49		
		Above average	9	15	3.36	.51		
Principals' performance on human resource management practices		Below average	6	235	3.21	.42	.06	n.s
		Average	35	32	3.21	.49		
		Above average	9	18	3.23	.56		

Note: n.s = no significance, N_1= number of principals N_2= number of teachers

Table 9 indicates that there was no significant difference in human resource management practices of high school principals in terms of their knowledge level.

Qualitative Findings

In this qualitative study, the open-ended questions were used to investigate the high school principals' human resource management practices and some challenges of principals performing in human resource management in their schools. Responses to these open-ended questions were described as qualitative findings as follows.

Question (1) While assigning and delegating responsibilities to staff, how do the principals manage these considering on which factors?

Generally, most of the principals (n=42, 84%) responded that responsibilities are assigned and delegated to staff considering their skill, ability and attitude towards jobs. Besides, (n=11, 22%) of principals rely on staff who take responsibility and accountability to their activities. In addition, they answered that those who have creativity, initiative, interest and active participation in school activities are priceless human assets for their schools.

Question (2) Besides teaching work, how do the principals implement school activities and Professional Development (PD) that enrich the improvement of teachers' quality?

Some principals (n=6, 12%) responded that they observe and supervise teachers' classroom teaching and develop positive feedbacks concerning with the areas that need to improve. In the 21st century, it will go backwards if the schools fail to fulfill and meet the needs of their staff. Therefore, the principals (n=24, 48%) who have a sense of school improvement, commonly, implement Board of Study, workshop and allow teachers to attend PD courses. They believe that it can bring all wellbeing not only for school but for their staff.

Question (3) Express how to handle that teachers' low performance and less willingness to work are observed in the workplace.

Most principals answered that they have confronted these issues as usual in the workplace. To deal with these, some principals (n=5, 10%) usually find the sources and listen to their staff's voice in order to express empathy with people. Then they sometimes take a role of counsellor to help and support teachers with problems one by one. Furthermore, (n=42, 84%) of principals care about creating opportunities for staff to show their talents and abilities, and what is more, praising their efforts and mentioning their advantages. In contrast, (n=7, 14%) of principals use "carrot and stick" method to induce a desired behavior. Finally, yet importantly, the school principals must be a role model for his school to exemplify his actions and thoughts.

Question (4) Discuss the welfare services that enrich the safe and healthy workplace for embracing teachers' wellbeing and satisfaction?

Some principals (n=9, 18%) responded that they provide accommodation for those who came from distant areas. By doing so, they believe that their staff could be feel a sense of safety and it could lead to produce positive impacts towards school. Moreover, they mentioned how to manage the benefits of their staff fairly. (n=11, 22%) of principals answered that keeping the school environment safe is a must to promote staff's physical and mental wellbeing. Then, (n=9, 18%) of principals strongly claimed that the word "discrimination" should not exist in the area of school as it could be the destructive power of school and teachers' wellbeing. Some principals replied that it is necessary to trust their staff and let them take responsibilities along with autonomy. What's more, some of them know that their staff have economic affairs so they provide school loans for those in need.

Question (5) Express the challenges faced by the principals while performing the following sectors in their schools.

(a) Challenges of Principals while assigning and delegating responsibilities to their staff

In general, (n=15, 30%) of principals answered that there is no enough staff including both academic and non-academic staff to perform school stuff effectively. Therefore, (n=16, 32%) of them could not manage to assign the right man in the right place. Moreover, some principals (n=7, 14%) responded that because of improper placement in the workplace, unskillful staff do not perform and accomplish the tasks completely and they become less responsible at work. (n=9, 18%) of principals sighed that some of teachers are lacking of obedience and good at giving inappropriate reasons in order to avoid tasks.

(b) Challenges of Principals while promoting teachers' school activities and professional development (PD) for their improvement

Some of the principals reacted that they cannot reach out some opportunities because of poor communication and transportation. In addition to poor infrastructure and no facilities and resources, (n=10, 20%) of principals fail to fulfill their staff's career development. Controversially, (n=6, 12%) of principals mentioned that some teachers do not assume professional development (PD) as an effective and useful process. According to the responses of principals (n=7, 14%), some teachers would like to stay in comfort zone and they are afraid of change so they avoid tasks and training programs. Moreover, some teachers are weak in team work.

(c) Challenges of Principals while motivating teachers' willingness to work

It is common for (n=20, 40%) of principals to face disturbance because of poor salary and over-workload. Then, there is no fair benefits between those who do properly and those who do not. Therefore, (n=18, 36%) of principals answered that some teachers in their schools seem dull and having less enthusiasm and commitment towards jobs but they only know and prioritize their own business except school work. Moreover, there is no initiative in the workplace to make decision and take action but they wait for principals to tell them what to do. Lastly, some principals mentioned that they have faced difficulties in informing the recipients of information in advance by the related upper management team.

(d) Challenges of Principals while creating opportunities for teachers' wellbeing and satisfaction in the workplace

According to the responses of some principals (n=9, 18%), they had difficulties to provide accommodation for staff. As having conflicts among staff, they hinder school improvement and develop toxic relationship. In addition, (n=18, 36%) of principals claimed about over workload but no benefits, what is more, it reduces teachers' wellbeing and satisfaction in the workplace. Controversially, one of the principals mentioned that "Teachers seem missing something like commitment and they only prioritize their own business so it is hard to make them satisfied with jobs." Last but not least, (n=15, 30%) of principals added staff family's economic affairs and then staff manage to struggle these issues so they do not fully give attention to their profession.

In accordance with the findings, there was no significant difference in human resource management practices of high school principals in terms of their knowledge level. Therefore, it was found that the principals who had high level of HRM knowledge could not perform their practices well. Tracing back to the causes, these principals pointed out that they have no enough staff including both academic and non-academic staff. Similarly, they mentioned that some of their teachers show no interest towards their workload. Moreover, half of these principals responded that their teachers only know and prioritize their own business. Especially, they also mentioned that their staff have no commitment and initiative in the workplace. Therefore, it is hard for the principals to implement and manage as they intend to do despite having high level of HRM knowledge.

Suggestions

According to the findings of this research, the following suggestions are made for the education.

(1) As most of the principals had average level of HRM knowledge, they should be taught and shared the theories and practices of HRM for improving their knowledge through training programs.
(2) The principals should conduct workshops by inviting the experts outside of the school for the development of teacher quality.
(3) To motivate both principals and teachers, it is crucial that heavy workload and burden of paper work should be lessened. However, good salary and fair benefits should be provided for their effort.

(4) The principals should encourage the process of teaching and learning instead of prioritizing the finish of lessons. Plus, it should have space time for school meeting rather than holding it during teaching time.
(5) As change never changes, the principals should adapt and equip themselves with 21st century skills by themselves.
(6) The principals should develop mentoring programs in order to improve less experienced teachers' academic areas. It is essential to assign less experienced teachers to work with experienced ones.
(7) As stakeholders and policy makers have authority and autonomy, they should consider how to fulfill the need of adequate staff, infrastructure, facilities and resources, and staff accommodation and fair benefits.
(8) Giving more autonomy to the headmasters to make decision on certain issues of management can be a more favorable choice.

Need for Further Study

It is advisable for the future researchers who would like to study the similar content with the present study that human resource management practices should be conducted for comparative purposes i.e. between public and private schools. It is suggested to do this kind of study in primary and middle schools as the present study was done in high schools in Kyaukpyu and Yanbye Townships, Rakhine State. There is need to investigate the relationship between principals' human resource management practices and other variables such as student performance, teachers' involvement and school effectiveness.

Acknowledgements

We would like to express our gratitude to Dr. Kay Thwe Hlaing (Rector, Yangon University of Education), Dr. May Myat Thu (Pro-Rector, Yangon University of Education), Dr. Khin Khin Oo (Pro-Rector, Yangon University of Education), Dr. Nyo Nyo Lwin (Pro-Rector, Yangon University of Education) and Dr. Khin Mar Ni (Professor and Head of Department of Educational Theory and Management, Yangon University of Education). Special thanks go to our external examiner, Dr. San San Hla (Retired Lecturer, Department of Educational Theory and Management, Yangon University of Education. We also appreciate all persons who willingly helped us in carrying out this research.

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J. Myanmar Acad. Arts Sci. 2023 **Vol. XXI. No.6**

THE RELATIONSHIP BETWEEN SCHOOL CULTURE AND TEACHERS' ORGANIZATIONAL COMMITMENT

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Abstract

This study was to investigate the relationship between school culture and teachers' organizational commitment at Basic Education High Schools (including Branch High Schools) in Sagaing Township, Sagaing Region. Correlation research design was used in this study. Totally 160 teachers, including 31 male teachers and 129 female teachers were chosen as participants by using simple random sampling method. School Culture Survey (SCS) developed by Gruenert and Valentine (1998) was used to measure the perceptions of teachers on school culture and TCM Employee Commitment Survey developed by Meyer and Allen (1991, as cited in Meyer, Allen & Smith, 1993) was used to investigate the perceptions of teachers on their organizational commitment. According to the research findings, teachers from selected high schools perceived that "Professional Development" was the highest and "Collaborative Leadership" was the lowest among dimensions of school culture, and the result revealed that "Affective Commitment" is higher than "Continuance and Normative Commitment". However, teachers' perceptions on school culture and their organizational commitment were at high levels in all selected high schools. The independent samples t-test for school culture showed that there was statistically significant difference in the dimension of "Learning Partnership" ($p=.025$) according to gender and the teachers' perception on their organizational commitment showed that there was no significant difference according to gender. It was found that the value of correlation coefficient is ($r=.311$, $p<0.01$) so there is a statistically significant and moderate relationship between school culture and teachers' organizational commitment. Based on the findings of the study, it is recommended that as school culture and organizational commitment affects each other, these two variables should be compromised in school setting.

Keywords: school culture, teachers' organizational commitment

Introduction

The term "culture" has a long history. The meaning of the word has been discussed for many years in a number of different fields, including anthropology, sociology, history, and English. From humanities to the hard sciences, the meaning of the term has inspired conversations and stirred controversy (Stolp & Smith, 1995). Organizational culture includes visible artifacts, espoused beliefs, values, rules and behavioral norms, and tacit, taken-for-granted and basic underlying assumptions (Schein, 2004).

Every organization has its own culture and has become firmly anchored as an important aspect, an element in the organization (Bedarkar, Pandita, Agarwal & Saini, 2016, as cited in Veeriah, Piaw & Li, 2017). DuPont (2009, as cited in Veeriah et al., 2017) stressed that school leaders–principals or headmasters understand the importance of school culture. When a good culture is present in a school, teachers will be more committed to contribute better for a healthy and sustainable achievement. According to Shoaib, Zainab, Maqsood, and Sana (2013, as cited in Veeriah et al., 2017), organizational culture is closely associated with the concept of commitment.

Organizational commitment serves as the power of employees' participation in an organization (Colquitt, LePine & Wesson, 2009, as cited in Malathy & Nataraj, 2018). Organizational commitment reflects the dependency on the supervisor, the working group, the top management, and on the organization (Becker, Meyer & Vandenberghe, 2004, as cited in Malathy & Nataraj, 2018). High commitment will encourage the employees to work hard in accomplishing their tasks in relation to their responsibility for the organization and they are willing to carry out activities out of their responsibility. Lack of organizational commitment

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makes the employees unwilling to retain the job and thus they tend to leave it or turn over (Wright & Bonett, 2002, as cited in Malathy & Nataraj, 2018).

Significance of the Study

Some researchers said that a positive school culture influences the motivation of students and teachers, academic achievement of the students, job satisfaction, commitment and cooperation of the teachers, employee dedication and motivation, and structure of the school community (Karadag, Kilicoglu & Yilmaz, 2014). Hallinger and Heck (2010, as cited in Veeriah et al., 2017) stressed that the failure to maintain teachers' commitment might cause problems to the school management. The reason being, teachers' commitment towards the schools is considered to be the main thrust in determining the success of the education system as teachers are implementing every educational policy within the school organization (Leithwood, Jantzi & Hopkins, 2006, as cited in Veeriah et al., 2017).

A desirable culture of a certain organization n is a key to success of that organization. Teachers in a strong school culture may be happy, satisfied, motivated and dedicated. That, their commitment to work for the improvement of their school will be undoubtedly high. It is undeniable that school principal are the most important and influential individuals in any school. Therefore, principals of schools are requested and exhorted to create the school satisfactory environment for teachers and students, and teachers also are encouraged to support their principals in schools' general affairs for the betterment of the students' academic and social achievement, and for the attainment of school goals.

Purposes of the Study

The main purpose of this study is to investigate the relationship between school culture and teachers' organizational commitment at selected Basic Education High Schools (including Branch High Schools) in Sagaing Township, Sagaing Region.

The specific purposes of this study are:

- To explore the perceptions of teachers on their school culture,
- To investigate the differences in the perceptions of teachers on their school culture according to their demographic data (gender, positions, teaching services),
- To examine the perceptions of teachers on their organizational commitment,
- To investigate the differences in the perceptions of teachers on their organizational commitment according to their demographic data (gender, positions, teaching services), and
- To explore the relationship between school culture and teachers' organizational commitment.

Research Questions

1. What are the perceptions of teachers on their school culture?
2. Are there any differences in perceptions of teachers on their school culture according to their demographic data (gender, positions, teaching services)?
3. What are the perceptions of teachers on their organizational commitment?
4. Are there any differences in perceptions of teachers on their organizational commitment according to their demographic data (gender, positions, teaching services)?
5. Is there a statistically significant relationship between school culture and teachers' organizational commitment?

Definitions of Key Terms

School Culture: School culture can be defined as historically transmitted patterns of meaning that include the norms, values, beliefs, traditions, and myths understood by members of the school community (Stolp & Smith, 1995).

Teachers' Organizational Commitment: Teachers' organizational commitment can be defined as the relative strength of a teacher's identification with and involvement in a particular school (Tsui & Cheng, 1999).

Scope of the Study

1. This study was conducted at selected high schools.
2. The participants of this study were all teachers from selected high schools in Sagaing Township, Sagaing Region.

Review of Related Literature

Importance of School Culture

A strong school culture can be established if the principal and teachers come together around a common value, norm and beliefs. In such a strong school culture, when bureaucratic rules diminish and teachers arrange their own behaviors, principal's duty of supervision diminishes as well (Celik, 2002, as cited in Ayik & Atas, 2014). A school principal who understands the effect of school culture and its importance in terms of management processes can manage the school culture more successfully. The first duty of school principal in terms of managing school culture is to create a strong school culture (Celik, 2002, as cited in Ayik & Atas, 2014).

Six Categories of School Culture Survey (SCS)

The School Culture Survey (SCS) has a six-factor. *Collaborative Leadership* measures the degree to which school leaders establish and maintain collaborative relationships with school staff. *Teacher Collaboration* measures the degree to which teachers engage in constructive dialogue that furthers the educational vision of the school. *Professional Development* measures the degree to which teacher values continuous personal development and school-wide improvement. *Unity of Purpose* measures the degree to which teachers work toward a common mission for the school. *Collegial Support* measures the degree to which teachers work together effectively. *Learning Partnership* measures the degree to which teachers, parents, and students work together for the common good of the student (Gruenert & Valentine, 1998).

Importance of Organizational Commitment

Organizational commitment is an important variable of employee behavior towards his organization, and it covers a range of attitudinal and behavioral responses about the organization and is sometimes described simply as loyalty (Das, 2017). Employees' organizational commitment has serious and potential effects on organization's performance and can be an important predictor of organizational effectiveness (Allen & Meyer, 1990).

Commitment towards the organization is important as highly committed employees could demonstrate positive work behaviors (Nurharani, Norshidah, & Anida, 2013, as cited in Veeriah et al., 2017). Commitment towards the organization will have lower intentions to leave and would work with more effectiveness and loyalty (Pascal, Pierre-Sebastien, & Lamontagne, 2011, as cited in Veeriah et al., 2017).

Teachers' Organizational Commitment

According to Potvin (1991, as cited in Mustafa, Buntat, Omar, Razzaq & Ahad, 2019), staff with high commitment are more concerned with the task of fulfilling the organizational sense than their own needs, otherwise, low level commitment staff would delay work, not be at work, prioritizing personal matters and not wanting to work over time. There are two reasons to emphasize teacher commitment. First, it is an internal force coming from teachers themselves, with their need for greater responsibility, variety, and challenge in their work as their educational levels have grown. Second, it is an external force coming from the reform movement seeking high standards and accountability, which are dependent upon teachers' voluntary commitment. Teacher commitment is a critical predictor of a teacher's job performance and of the quality of education (Tsui & Cheng, 1999).

The Three-Dimensional Model of Organizational Commitment

Organizational commitment contains three components, namely *affective commitment, continuance commitment, and normative commitment* (Allen & Meyer, 1990). Affective commitment is a characteristic of psychological state of the relationship between organization and workers. They argued that affective commitment is an expression of the desire to continue working at an organization within an employee sympathizing and devoting all of the minds to organization and enjoyment as a member of the organization. Continuance commitment refers to commitment based on the costs that employees associate with leaving the organization. Normative commitment refers to employees' feelings of obligation to remain with the organization (Allen & Meyer, 1990).

Methodology

Research Method

Descriptive research method was used in this study.

Population and Sample

The target population for this study was all teachers (senior, junior, and primary teachers) from Basic Education High Schools (including Branch High Schools) in Sagaing Township, Sagaing Region. There are 33 Basic Education High Schools (including Branch High Schools) in Sagaing Township, Sagaing Region. Out of 33 schools, 4 Basic Education High Schools and 4 Branch High Schools were chosen for collecting the data. For the teacher sample, 169 teachers (primary teachers, junior teachers, and senior teachers) from selected schools were chosen as participants by using simple random sampling method. Out of 169 teachers, 160 teachers completed the questionnaires. Thus, the response rate of teachers was 94.67.

Research Instruments

In this study, two research instruments, "School Culture Survey (SCS)" developed by Gruenert and Valentine (1998) and "TCM Employee Commitment Survey" developed by Meyer and Allen (1991, as cited in Meyer, Allen & Smith, 1993) were used to collect the data. In this study, a five points Likert scales ranging from 1 to 5 (where 1 = strongly disagree; 2 = disagree; 3 = undecided; 4 = agree; and 5 = strongly agree) were used to examine the perceptions of teachers on their school culture and organizational commitment.

Instrument items were modified and reconstructed in Myanmar Language. After preparing the questionnaire, face validity was determined by expert judgement. According to their suggestions and recommendations, the questionnaire was adapted. After getting the validity of the questionnaire, pilot testing was conducted with teachers from selected two Basic Education High Schools and two Branch High Schools in Sagaing Township. The preliminary instruments were tested by 37 teachers representing four selected high schools. In order to measure the reliability of instrument, the Pearson product-moment correlation method (Average Item Total Correlation) was used for internal consistency reliability.

As internal consistency, the reliability coefficient (Cronbach's alpha) for school culture was 0.931 and the reliability coefficient (Cronbach's alpha) for organizational commitment was 0.602. According to Sekaran and Bougie (2010, as cited in Veeriah et al., 2017), the Cronbach's alpha values that are below .60 are poor, while values between .60 and .70 are acceptable, and alpha values that are over .80 are good.

Data Collection and Analysis

To collect the required data, the questionnaires were distributed to teachers of selected high schools on December 14, 2021 and compiled them on December 17, 2021. After collecting the data, data entry was carried the use of SPSS (Statistical Package for the Social Science) software version 20. To calculate the mean percent and standard deviations, descriptive statistics were used. The independent sample t-test, one-way ANOVA were applied to analyze whether there were significant differences between gender, among teaching service and positions on school culture and organizational commitment. Moreover, Post hoc test by Tukey (HSD) method was conducted to determine which group had significant difference. Finally, Pearson product-moment correlation was conducted to provide information about the relationship between school culture and teachers' organizational commitment.

Findings

Quantitative Research Findings for School Culture at Selected High Schools

Table 1 shows the mean values and standard deviations for school culture of selected schools.

Table 1 Mean Values and Standard Deviations for School Culture of Selected Schools

Dimension	Mean & SD	High Schools								Composite Mean
		A	B	C	D	E	F	G	H	
CL	Mean	4.00	3.71	3.98	4.09	4.00	3.97	3.96	4.03	**3.96**
	SD	0.288	0.612	0.269	0.239	0.354	0.419	0.82	0.236	0.366
TC	Mean	3.85	4.05	3.98	4.06	3.99	4.06	3.97	3.97	**3.99**
	SD	0.404	0.219	0.331	0.209	0.367	0.178	0.96	0.284	0.289
PD	Mean	4.14	4.14	4.08	4.20	4.12	4.20	3.97	4.03	**4.12**
	SD	0.381	0.311	0.212	0.319	0.316	0.394	0.115	0.306	0.310
UP	Mean	3.90	4.02	4.03	4.14	4.00	4.09	3.95	4.02	**4.02**
	SD	0.461	0.304	0.321	0.365	0.349	0.215	0.90	0.259	0.319
CS	Mean	4.11	4.11	3.99	4.04	4.06	4.17	4.17	4.06	**4.08**
	SD	0.274	0.357	0.379	0.254	0.303	0.373	0.163	0.228	0.308
LP	Mean	4.06	4.06	3.92	4.05	3.89	4.03	3.69	4.01	3.97
	SD	0.398	0.277	0.335	0.258	0.425	0.353	0.241	0.249	0.339
Overall School Culture	Mean	**4.01**	**4.02**	**3.99**	**4.09**	**4.01**	**4.08**	**3.95**	**4.01**	**4.03**
	SD	0.329	0.294	0.259	0.246	0.325	0.275	0.018	0.243	0.271

Scoring range: 1.00-2.33=low level, 2.34-3.67=moderate level, 3.68-5.00=high level

CL = Collaborative Leadership, UP = Unity of Purpose

TC = Teacher Collaboration, CS = Collegial Support

PD = Professional Development, LP = Learning Partnership

According to teachers' ratings shown in Table 1, the mean values for all dimensions of school culture, such as "Collaborative Leadership", "Teacher Collaboration", "Professional Development", "Unity of Purpose", "Collegial Support" and "Learning Partnership", were at high levels.

One-way ANOVA was used to analyze whether or not there was significant differences in school culture grouped by schools. Table 2 presents the ANOVA results for school culture perceived by teachers at selected high schools.

Table 2 ANOVA Results for School Culture Perceived by Teachers at Selected High Schools

Variable	Region Group	Sum of Squares	df	Mean Square	F	p
Learning Partnership	**Between Groups**	**1.698**	**7**	**.243**	**2.212**	**.036***
	Within Groups	**16.675**	**152**	**.110**		
	Total	**18.373**	**159**			

Note: * The mean difference is significant at the 0.05 level.

It was found that there was significant difference between groups and within groups in "Learning Partnership" at $p<0.05$ level ($F=2.212$)

In order to find out which particular groups had the greatest differences, Post hoc multiple comparisons test Tukey (HSD) test was conducted. The results of multiple comparisons test for teachers' perceptions on school culture grouped by schools were shown in Table 3.

Table 3 Results of Multiple Comparisons Test for Teachers' Perceptions on School Culture Grouped by Schools

Variable	School (I)	School (J)	Mean Difference (I-J)	p
Learning Partnership	School B	School G	.369*	.046

Note: * The mean difference is significant at the 0.05 level.

According to Table 3, teachers' perception was significantly difference in "Learning Partnership" between School B and School G.

The mean values and standard deviations of male and female teachers' perception on school culture are shown in Table 4.

Table 4 Mean Values and Standard Deviations of Teachers' Perceptions on School Culture Grouped by Gender

Variable	Gender	Number of Teachers	Mean	SD
Collaborative Leadership	Male	31	3.94	.29
	Female	129	3.97	.38
Teacher Collaboration	Male	31	3.94	.36
	Female	129	4.01	.27
Professional Development	Male	31	4.06	.29
	Female	129	4.13	.31
Unity of Purpose	Male	31	3.97	.36
	Female	129	4.04	.31
Collegial Support	Male	31	4.02	.33
	Female	129	4.09	.30
Learning Partnership	Male	31	3.87	.41
	Female	129	3.99	.31
Overall School Culture	Male	31	3.97	.29
	Female	129	4.04	.26

Scoring range: 1.00-2.33=low level, 2.34-3.67=moderate level, 3.68-5.00=high level

According to Table 4, it was found that there was high level in all dimensions of school culture according to gender.

In order to analyze whether or not there was a significant difference in teachers' perceptions on school culture by gender, independent samples t-test was employed. The results of independent sample t-test for teachers' perceptions on school culture grouped by gender are presented in Table 5.

Table 5 Results of Independent Sample t-Test for Teachers' Perceptions on School Culture Grouped by Gender

Variable	Gender	N	t	df	p
Learning Partnership	Male	31	-1.580	38.936	.025*
	Female	129			

Note: * The mean difference is significant at the 0.05 level.

According to Table 5, it was found that there was significant difference only in "Learning Partnership" ($t = -1.580$, $df = 38.936$, $p<0.05$ level). And there were no significant differences in other dimensions of the school culture

Teachers were grouped such as senior, junior, and primary teachers. Mean values and standard deviations for school culture perceived by teachers according to positions are described in Table 6.

Table 6 Mean Values and Standard Deviations for Teachers' Perceptions on School Culture Grouped by Positions

Variable	Position	Number of Teachers	Mean	SD
Collaborative Leadership	SAT	51	3.90	.53
	JAT	63	4.00	.30
	PAT	46	3.98	.22
Teacher Collaboration	SAT	51	3.93	.36
	JAT	63	4.01	.29
	PAT	46	4.02	.19
Professional Development	SAT	51	4.13	.35
	JAT	63	4.15	.29
	PAT	46	4.05	.29
Unity of Purpose	SAT	51	3.94	.38
	JAT	63	4.06	.32
	PAT	46	4.04	.24
Collegial Support	SAT	51	4.09	.32
	JAT	63	4.05	.32
	PAT	46	4.05	.28
Learning Partnership	SAT	51	3.96	.42
	JAT	63	4.00	.34
	PAT	46	3.93	.26
Overall School Culture	SAT	51	3.99	.33
	JAT	63	4.04	.27
	PAT	46	4.02	.21

Scoring range: 1.00-2.33=low level, 2.34-3.67=moderate level, 3.68-5.00=high level

SAT = Senior Assistant Teacher PAT = Primary Assistant Teacher

JAT = Junior Assistant Teacher

According to Table 6, it was found that there was high level in all dimensions of school culture according to positions.

One-way ANOVA was used to analyze whether or not there was significant differences in school culture grouped by teachers' positions. According to ANOVA results, there was no significant difference in teachers' perceptions on school culture according to teachers' positions.

Total teaching service of teachers are also divided into four groups such as <5 years, 5 to 14 years, 15 to 24 years and > 24 years. In Table 7, mean values and standard deviations for the teachers' perceptions on school culture grouped by teaching services are shown.

Table 7 Mean Values and Standard Deviations for Teachers' Perceptions on School Culture Grouped by Teaching Services

Variable	Teaching Services	Number of Teachers	Mean	SD
Collaborative Leadership	<5 years	5	3.98	.08
	5-14 years	41	4.02	.27
	15-24 years	46	3.88	.43
	>24 years	68	3.99	.38
Teacher Collaboration	<5 years	5	3.93	.15
	5-14 years	41	4.02	.27
	15-24 years	46	3.99	.27
	>24 years	68	3.98	.32
Professional Development	<5 years	5	4.00	.00
	5-14 years	41	4.08	.32
	15-24 years	46	4.13	.29
	>24 years	68	4.13	.33
Unity of Purpose	<5 years	5	4.04	.09
	5-14 years	41	4.02	.32
	15-24 years	46	3.98	.32
	>24 years	68	4.05	.33
Collegial Support	<5 years	5	4.10	.14
	5-14 years	41	4.14	.34
	15-24 years	46	4.12	.29
	>24 years	68	4.02	.30
Learning Partnership	<5 years	5	3.80	.21
	5-14 years	41	4.00	.30
	15-24 years	46	4.01	.31
	>24 years	68	3.94	.38
Overall School Culture	<5 years	5	3.98	.06
	5-14 years	41	4.05	.27
	15-24 years	46	4.02	.27
	>24 years	68	4.02	.29

Scoring range: 1.00-2.33=low level, 2.34-3.67=moderate level, 3.68-5.00=high level

According to Table 7, it was found that teachers whose teaching service with (5-14 years) had the highest mean values in "Collaborative Leadership", "Teacher Collaboration", and "Collegial Support". Teachers whose teaching service with (15-24 years) had the highest mean values in "Professional Development" and "Learning Partnership". Teachers whose teaching service with (>24 years) had the highest mean values in "Professional Development" and "Unity of Purpose". According to the perceptions of teachers by teaching services, teachers with less than 5 years of teaching services had lowest mean values in "Learning Partnership" and teachers whose teaching service with (5-14 years) were highest mean value in "Collegial Support".

One-way ANOVA was conducted to examine whether there were statistically significant differences in teachers' perceptions on school culture according to teaching services or not. There was no significant difference in teachers' perceptions on school culture according to teaching services.

Quantitative Research Findings for Organizational Commitment at Selected High Schools

Table 8 shows the mean values and standard deviations for organizational commitment in selected high schools.

Table 8 Mean Values and Standard Deviations for Organizational Commitment at Selected High Schools

Dimension	Mean & SD	High Schools								Composite Mean
		A	B	C	D	E	F	G	H	
AC	Mean	4.03	3.98	3.89	3.83	4.05	4.19	4.07	4.05	**4.00**
	SD	0.28	0.34	0.67	0.29	0.38	0.39	0.43	0.35	0.42
CC	Mean	4.18	3.85	3.65	3.54	3.83	4.04	3.78	3.62	**3.80**
	SD	0.23	0.49	0.56	0.49	0.52	0.44	0.33	0.42	0.49
NC	Mean	4.05	3.81	3.83	3.67	3.76	4.00	4.07	3.93	**3.87**
	SD	0.16	0.33	0.58	0.37	0.56	0.34	0.27	0.36	0.42
Overall Commit-ment	Mean	4.08	3.88	3.79	3.68	3.88	4.08	3.97	3.86	**3.89**
	SD	0.11	0.32	0.57	0.28	0.44	0.34	0.22	0.33	0.39

Scoring range: 1.00-2.33=low level, 2.34-3.67=moderate level, 3.68-5.00=high level
AC = Affective Commitment, NC = Normative Commitment
CC = Continuance Commitment

According to Table 8, it was observed that the mean value of all dimensions of organizational commitment were at high levels.

One-way ANOVA was conducted to examine whether there were statistically significant differences in organizational commitment perceived by teachers according to school or not. The ANOVA results for organizational commitment perceived by teachers at selected high schools are presented in Table 9.

Table 9 ANOVA Results for Organizational Commitment Perceived by Teachers at Selected High Schools

Variable	Region Group	Sum of Squares	df	Mean Square	F	p
Continuance Commitment	Between Groups	6.246	7	.892	4.167	.000***
	Within Groups	32.543	152	.214		
	Total	**38.788**	**159**			
Normative Commitment	Between Groups	2.670	7	.381	2.234	.034*
	Within Groups	25.953	152	.171		
	Total	**28.623**	**159**			

Note: *** The mean difference is significant at the 0.001 level.
* The mean difference is significant at the 0.05 level.

Based on the research findings, there were significant differences in teachers' perceptions on "Continuance Commitment" at $p<0.001$ level ($F=4.167$), and "Normative Commitment" at $p<0.05$ level ($F=2.234$).

In order to find out which particular groups had the greatest differences, Post hoc test by Tukey (HSD) was conducted. Results of multiple comparisons test for teachers' perceptions on organizational commitment grouped by schools were shown in Table 10.

Table 10 Results of Multiple Comparisons Test for Teachers' Perceptions on Organizational Commitment Grouped by Schools

Variable	**School (I)**	**School (J)**	**Mean Difference (I-J)**	**p**
Continuance Commitment	School A	School C	.530*	**.008**
		School D	.640*	**.001**
		School H	.559*	**.007**
	School F	School D	.500*	**.024**

Note: * The mean difference is significant at the 0.05 level.

According to Table 10, it was observed that there were significant differences in "Continuance Commitment" between School A and School C, School A and School D, and School A and School H. Moreover, there was significant difference in "Continuance Commitment" between School F and School D.

The mean values and standard deviations of teachers' perception on organizational commitment grouped by gender are shown in Table 11.

Table 11 Mean Values and Standard Deviations of Teachers' Perceptions on Organizational Commitment Grouped by Gender

Variable	**Gender**	**Number of Teachers**	**Mean**	**SD**
Affective Commitment	Male	31	4.05	.38
	Female	129	3.99	.43
Continuance Commitment	Male	31	3.98	.42
	Female	129	3.76	.50
Normative Commitment	Male	31	3.97	.36
	Female	129	3.85	.44
Overall Commitment	Male	31	4.00	.34
	Female	129	3.87	.39

Scoring range: 1.00-2.33=low level, 2.34-3.67=moderate level, 3.68-5.00=high level

According to Table 11, the mean values of male and female teachers were highest in "Affective Commitment".

In order to analyze whether there was a significant difference in teachers' perceptions on organizational commitment according to gender, independent samples t-test was employed. There were no significant differences in all dimensions of the organizational commitment perceived by gender.

Teachers were grouped by positions such as senior, junior, and primary teachers. Mean values and standard deviations for teachers' perception on their organizational commitment according to positions are described in Table 12.

Table 12 Mean Values and Standard Deviations for Teachers' Perceptions on Organizational Commitment Grouped by Positions

Variable	Position	N	Mean	SD
Affective Commitment	SAT	51	3.97	.45
	JAT	63	4.01	.44
	PAT	46	4.04	.38
Continuance Commitment	SAT	51	3.83	.49
	JAT	63	3.76	.39
	PAT	46	4.01	.42
Normative Commitment	SAT	51	3.82	.41
	JAT	63	3.80	.49
	PAT	46	3.81	.59
Overall Commitment	SAT	51	3.87	.42
	JAT	63	3.88	.42
	PAT	46	3.91	.44

Scoring range: 1.00-2.33=low level, 2.34-3.67=moderate level, 3.68-5.00=high level
SAT = Senior Assistant Teacher, PAT = Primary Assistant Teacher,
JAT= Junior Assistant Teacher

According to Table 12, the mean values of teachers' organizational commitment according to positions were at high level.

One-way ANOVA was used to examine whether there were statistically significant differences in teachers' perceptions on their organizational commitment according to teachers' position or not. There was no significant difference in teachers' perceptions on organizational commitment according to grouped by teachers' positions.

Total teaching service of teachers are also divided into four groups such as <5 years, 5 to 14 years, 15 to 24 year and > 24 years. In Table 13, mean value and standard deviations for the teachers' perceptions on organizational commitment dimensions by teaching services are shown.

Table 13 Mean Values and Standard Deviations for Teachers' Perceptions on Organizational Commitment Grouped by Teaching Services

Variable	Teaching Services	Number of Teachers	Mean	SD
Affective Commitment	<5 years	5	4.27	.19
	5-14 years	41	3.99	.44
	15-24 years	46	4.02	.37
	>24 years	68	3.99	.46
Continuance Commitment	<5 years	5	3.50	.37
	5-14 years	41	3.70	.58
	15-24 years	46	3.91	.46
	>24 years	68	3.81	.46
Normative Commitment	<5 years	5	4.00	.26
	5-14 years	41	3.82	.47
	15-24 years	46	3.87	.39
	>24 years	68	3.89	.43
Overall Commitment	<5 years	5	3.92	.23
	5-14 years	41	3.84	.43
	15-24 years	46	3.93	.35
	>24 years	68	3.90	.39

Scoring range: 1.00-2.33=low level, 2.34-3.67=moderate level, 3.68-5.00=high level

According to Table 13 y it was found that teachers will less than 5 years of teaching services rated the highest mean value in “Affective Commitment” and “Normative Commitment”, and the lowest mean values for “Continuance Commitment”. Teachers whose teaching service with (15-24 years) rated the highest mean values in “Continuance Commitment”. Teachers whose teaching service with (<5 years) was moderate in “Continuance Commitment”.

One way ANOVA was conducted to examine whether there were statistically significant differences in teachers’ perceptions on their organizational commitment according to teaching service. There was no significant difference in teachers’ perceptions on their organizational commitment according to teaching services.

The Relationship between Teachers’ Perception on School Culture and their Organizational Commitment

To investigate the relationship between school culture (independent variable) and teachers’ organizational commitment (dependent variable), the Pearson-product moment correlation coefficient was utilized. According to Cohen (1988), it can be interpreted that “r” between .50 to .69 would be described as “large”, “r” between .30 to .49 would be called “medium”, and “r” between .10 to .29 would be “small”. Table 14 showed the correlations between teachers’ perceptions on dimensions of school culture and their organizational Commitment in selected schools.

Table 14 Correlations between Teachers’ Perceptions on Dimensions of School Culture and their Organizational Commitment

Variables	1	2	3	4	5	6	7
Collaborative Leadership	1						
Teacher Collaboration	.599**	1					
Professional Development	.621**	.656**	1				
Unity of Purpose	.668**	.635**	.740**	1			
Collegial Support	.534**	.563**	.714**	.689**	1		
Learning Partnership	.625**	.687**	.737**	.654**	.653**	1	
Organizational Commitment	.236**	.165**	.362**	.276**	.324**	.211**	1

Note: ** Correlation is significant at the 0.01 level (2-tailed).

According to Table 14, it was found that the dimensions of school culture such as “Professional Development” (r=.362, p=.000) and “Collegial Support” (r=.324, p=.000) were moderately and positively correlated with teachers’ organizational commitment. “Collaborative Leadership” (r=.236, p=.000), “Teacher Collaboration” (r=.165, p=.000), “Unity of Purpose” (r=.276, p=.000), and “Learning Partnership” (r=.211, p=.000) was positive and weak correlated with organizational commitment.

Pearson-product moment correlation coefficient was computed to assess the correlation between school culture and teachers’ organizational commitment. Table 15 showed the correlation between school culture and teachers’ organizational commitment.

Table 15 Correlation between School Culture and Teachers' Organizational Commitment

Variables	1	2
School Culture	1	.311**
Teachers' Organizational Commitment	.311**	1

Note: ** Correlation is significant at the 0.01 level (2-tailed).

According to Table 15, it was found that the value of correlation coefficient is ($r=.311$, $p<0.01$) so, there is a statistically significant, moderate relationship between school culture and teachers' organizational commitment.

Discussion and Conclusion

Discussion

Analysis of quantitative data collected from the study attempted to answer the five research questions. ***Research question one*** investigated the perceptions of teachers on school culture at selected schools. When investigating the school culture perceived by teachers from selected high schools, although the overall school culture of the selected school was at high level, teachers from all selected schools perceived "Professional Development" highest and "Collaborative Leadership" lowest. The study outcomes suggested that teachers in selected schools had a high sense of their professional development. It can be concluded that teachers in all selected schools seek out their professional development and growth, value school-wide improvement, and increase their current knowledge about the learning process.

Research question two examined significant difference in perceptions of teachers on school culture according to demographic data. According to gender, it was found that female teachers' perceptions are higher than male teachers in school culture and there was significant difference in "Learning Partnership". It can be interpreted that the female teachers are more participated in "Learning Partnership" and their attitudes towards schools are better than those of male teachers. It was found that the teachers (senior teachers, junior teachers and primary teachers) are highly participated in "Professional Development". According to this result, it can be assumed that all teachers value and try out to develop their professional development. According to teaching services, it was found that teachers with less than 5 years of teaching service less perceived in "Learning Partnership" than other teachers. Thus, it can be said that the more teaching services, the teachers have, the stronger their learning partnership.

Research question three investigated the teachers' perceptions on their organizational commitment. It was found that teachers from selected schools more preferred "Affective Commitment" and less preferred "Continuance Commitment". It can vividly be seen that teachers in selected schools want to spend the rest of their career with their schools, they commit to achieve the objectives of the school, and they are satisfied with the work they are doing. They thought their school's problems as their own.

Research question four examined significant difference in perceptions of teachers on their organizational commitment according to their demographic data. According to gender, it was found that male teachers were highly committed in organizational commitment compared to female teachers, and it can be said that male teachers are more committed to their organization than female teachers. But, there were no statistically significant differences in all dimensions of organizational commitment perceived by gender. In addition, according to positions, it is found that the teachers (senior teachers, junior teachers and primary teachers) are highly committed in "Affective Commitment". Regarding teaching services, it was found that teachers who had (<5) year of teaching service are less committed in "Continuance Commitment" than those who had

(5-14), (15-24) and (>24) years of teaching services. It can be said that the more teaching services they have, the more worried they become to leave their job because they have invested time and energy in their organization. They may consider the costs lost by leaving their schools. Therefore, it can be concluded that the more the teaching services, the greater the teachers continuously committed in the workplace.

Research question five found out whether there is any significant relationship between school culture and teachers' organizational commitment at selected schools. As a result, it was found that the dimensions of school culture: "Professional Development" and "Collegial Support" were moderately and positively correlated with Teachers' Organizational Commitment. "Collaborative Leadership", "Teacher Collaboration", "Unity of Purpose" and "Learning Partnership" had positive and weak correlation with Teachers' Organizational Commitment. There is a statistically significant and moderate relationship between school culture and teachers' organizational commitment. As school culture and its dimensions are important in organizational commitment, principals should create the school culture for improving teachers' commitment and student outcomes. Based on the result, it is suggested that the better the school culture, the stronger the teachers' commitment to their school.

Conclusion

It is obvious that, strong teacher-administrator relationships cultivate a positive school culture, help teachers support and participate in school policies, lead to better teacher classroom instruction, better student-teacher relationship, minimize teacher burnout. (Celik, 2002, as cited in Ayik & Atas, 2014) Therefore, the policy makers, especially the Ministry of Education should put more effort and attention to schools. And, administrative authorities should consider and understand the real situation of teachers in schools. In so doing, teaching and learning will become more effective, school excellence will be achieved, and the vision and mission of the Ministry of Education will materialize. In short, the findings of this study will be beneficial to teachers, principals and decision makers in formulating school policies and administrative measures to create school better places for teachers and students.

Acknowledgements

Special gratitude goes to U Aung Thaike Tun (Rector, University for the Development of the National Races of the Union), Dr. Moe Moe (Pro-Rector, Academic, University for the Development of the National Races of the Union), Dr. Zin Nwe Than (Professor and Head of Department, Department of Educational Theory and Management, Sagaing University of Education), and Daw Thi Thi Khine (Professor, Head of Department of Educational Theory, University for the Development of the National Races of the Union) for their valuable insights, priceless support, constructive suggestions and criticism to complete this work. Moreover, special words of thanks are extended to principals and teachers from selected Basic Education High Schools (including Branch High Schools) in Sagaing Township, for cooperation and willingness to participate in this study.

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J. Myanmar Acad. Arts Sci. 2023 **Vol. XXI. No.6**

RELATIONSHIP BETWEEN PRINCIPALS' PRACTICE OF BUILDING PROFESSIONAL CAPITAL AND TEACHER JOB SATISFACTION

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Abstract

The purpose of this study was to investigate the relationship between principals' practice of building professional capital and teacher job satisfaction at selected Basic Education High Schools in Sagaing Township. Mixed methods research was applied to collect data. A total of 108 teachers from seven selected high schools participated in the quantitative study while 12 teachers from two selected high schools were interviewed for the qualitative study. The quantitative study was conducted by using two instruments; "*Teachers' Perception of Principals' Practice of Building Professional Capital Questionnaire"* developed by Adams (2016) to measure the principals' practice of building professional capital and *"Teacher Job Satisfaction Questionnaire (TJSQ)"* developed by Lester (1987, as cited in Waters, 2013) to measure teacher job satisfaction. Data were analyzed by the use of descriptive statistics such as means and standard deviations, independent samples *t*-test, ANOVA, multiple comparison analysis, and correlations through SPSS software. When studying the mean values of the principals' practice of building professional capital and teacher job satisfaction, teachers perceived that their principals had high levels of practice in building three components of professional capital: *"Human Capital"*, *"Social Capital"* and *"Decisional Capital"*. Moreover, they were highly satisfied with their job. In addition, *"Human Capital"* was positively and moderately related to *"Job Satisfaction"* (r=0.625, p=<0.01); *"Social Capital"* was positively and highly related to *"Job Satisfaction"* (r=0.701, p=<0.01); and *"Decisional Capital"* was significantly and positively related to *"Job Satisfaction"* (r=0.631, p=<0.01); *"Professional Capital"* was positively and highly related to *"Job Satisfaction"* (r=0.738, p=<0.01). The findings of this study provided important implications for the relationship between principals' practice of building professional capital and teacher job satisfaction. Further research needs to be conducted to extend the study in other school building levels and townships or regions to determine if principals' practice of building professional capital is associated with teacher job satisfaction.

Keywords: Professional Capital, Human Capital, Social Capital, Decisional Capital, Job Satisfaction

Introduction

Professional capital refers to an investment in the development of educators to increase teacher quality and student achievement (Watts, 2018). Similarly, Hargreaves and Shirley (2012, as cited in Johnson, 2017) defined professional capital as the assets residing within teachers and teaching that yield the optimal quality of teaching and student learning. Professional capital is essential for effective teaching, and it is essential in the most challenging educational circumstances. Over time, professional capital policies and practices build up the expertise of teachers individually and collectively to make a difference in the learning and achievement of all students. Professional capital in the teaching profession as a critical component of improving is an individual, raising the performance of the team, and increasing quality across the whole profession (Watts, 2018).

Moreover, teachers' job satisfaction is important because satisfied teachers are likely to be more enthusiastic and to spend more time and energy on educating students (Cerit, 2009). Furthermore, they tend to be productive teachers, commit to their job, have lower levels of absenteeism and improve students' achievement (Bare-Oldham, 1999). On the other hand, teachers with less satisfaction have negative attitudes toward teaching as a career and plan to leave their profession (Bull, 2005). Therefore, satisfied and productive teachers are a key factor in the success of education and can contribute to student achievement (Ostroff, 1992, as cited in Hasan, 2011). Again, teachers' job satisfaction would have a significant direct effect on their professional capital development (Belay, Melese, & Seifu, 2021).

The focus of this study is to examine the relationship between principals' practice of building professional capital and teacher job satisfaction at Basic Education High Schools in Sagaing Township. By doing so, the researcher believes that this study can provide a better understanding of principals' practice for building professional capital and how principals' practice of building professional capital have an impact on teacher job satisfaction which will be beneficial for principals and teachers from Basic Education High Schools.

Purpose of the Study

The purpose of this study was to examine the relationship between principals' practice of building professional capital and teacher job satisfaction at selected Basic Education High Schools in Sagaing Township.

Research Questions

The following research questions guide the direction of the study:

1. What are the perceptions of teachers on their principal's practice of building professional capital at selected Basic Education High Schools in Sagaing Township?
2. What are the perceptions of teachers on their job satisfaction at selected Basic Education High Schools in Sagaing Township?
3. Are there any differences in teachers' perceptions of principals' practice of building professional capital and teacher job satisfaction among selected high schools?
4. Does teachers' demographic data make any significant difference in teachers' perceptions of principals' practice of building professional capital and teacher job satisfaction?
5. What is the relationship between principal's practice of building professional capital and job satisfaction at selected Basic Education High Schools in Sagaing Township?

Scope of the Study

1. The scope of this study was geographically limited to Basic Education High Schools and Branch High Schools in Sagaing Township.
2. The sample schools were limited to those schools in which the principals had at least two years of administrative service at the present school and participants were teachers who had at least two years of teaching service at the current school.
3. The findings of the study may not be generalized to any other schools than the Basic Education High Schools in Sagaing Township.

Definitions of Key Terms

This study is guided by the following definitions of key terms.

Professional Capital is defined as the assets teachers must possess in order to transform their teaching practice and, in turn, transform schools (Hargreaves & Fullan, 2012). In this study, professional capital is measured by using three components such as "**Human Capital"**, "**Social Capital"**, and "**Decisional Capital"**.

1. Human Capital is defined as the knowledge and skills a teacher possessed (Becker, 1992).

2. Social Capital is defined as the interactions and relationships among the teachers of any school that support a common cause (Fullan, 2013).

3. Decisional Capital is defined as the ability to make sound judgments in the absence of rote procedural responses (Hargreaves & Fullan, 2012).

Job satisfaction is defined as the pleasurable emotional state resulting from the appraisal of one's job as achieving or facilitating one's job values (Locke, 1969). In this study, job satisfaction was measured by seven dimensions such as **"Advancement"**, **"Supervision"**, **"Colleagues"**, **"Work Itself"**, **"Working Conditions"**, **"Recognition",** and "**Responsibility"**.

Conceptual Framework of the Study

The conceptual framework guiding this study is summarized in following Figure 1.

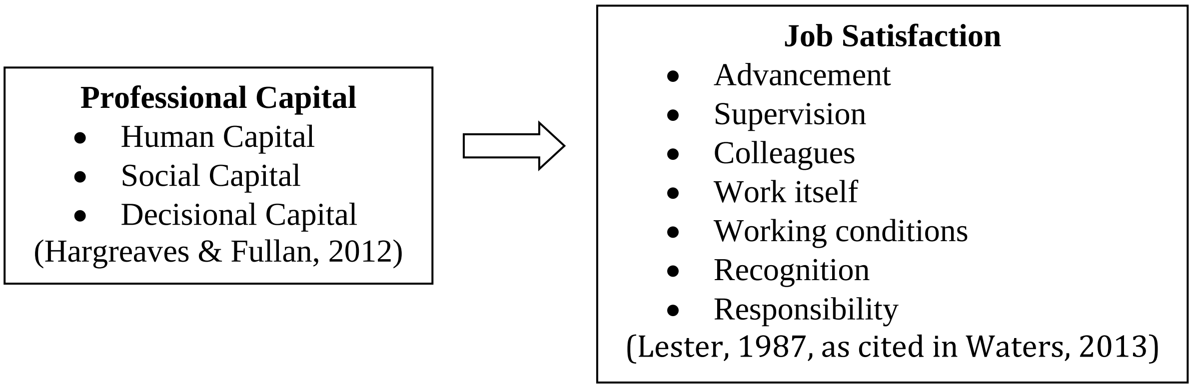

Figure 1 Conceptual Framework for Professional Capital and Job Satisfaction

Review of Related Literature

Professional Capital

Professional capital refers to the assets that teachers must possess in order to transform their teaching practice and, in turn, transform schools (Hargreaves & Fullan, 2012). According to Pentland (2014), professional capital is the collective capacity of the profession and its responsibility for continuous improvement and for the success of all students. Building professional capital in education is important because it fosters what educators and teachers know and can do individually, with whom they know it and do it collectively, and how long they have known it and done it and deliberately gotten better at doing it over time (Fullan, 2013). In addition, Hargreaves and Fullan (2012) asserted that in order to invest in education and yield transformative teaching, professional capital must exist.

In this study, the three components of professional capital such as human capital, social capital and decisional capital are used. Firstly, human capital is about the individual talent that is having and developing the requisite knowledge and skills (Johnson, 2017). This capital is about knowing the subject and knowing how to teach it, knowing the children and understanding how they learn (Becker, 1993). Secondly, social capital refers to how the quantity and quality of interactions and social relations among people affect their access to knowledge and information. It is critical not only to share and circulate individual resources and information within the group but also to maintain the group identity to somehow restrict the benefits only to the members (Ikoma, 2016).

Finally, decisional capital refers to the capital that professionals acquire and accumulate through structured and unstructured experience, practice, and reflection capital. Basically, it is the capacity to choose well and make good decisions (Liker & Meier, 2007, as cited in Fullan, 2013).

Job Satisfaction

Job satisfaction is defined as an emotional response to a job and it is understood by how well outcomes meet or exceed expectations, and results from a combination of several effective factors and significant characteristics of a job (Luthans, 1998). Job satisfaction is essential to the success of any organization (Gregory, 2011). It is important for the organization because it can enhance employee retention; increase productivity; enhance employee loyalty; increase customer satisfy action; reduce turnover, recruiting and training costs; reduce wastages and breakages; reduce accidents; produce more energetic employees; improve teamwork; improve work motivation and organizational citizenship behavior and lead to the success of the organization (Singh & Jain, 2013). In this study, there are seven components of teacher job satisfaction such as supervision, recognition, work itself, working conditions, responsibility, advancement, and colleagues.

First, advancement can be defined as the promotion of a worker to be in charge of another job position that is better than the previous job in terms of salary, prestige, job level, status, and having greater responsibilities and skills (Kosteas, 2011). Second, supervision is the act of monitoring and directing the teachers or delegated activities, and the ability of supervisors to assist the teachers and establish a good relationship with them (Tepper, 2000). Third, colleagues are likely to be the people who spend the most time with apart from their closest family (McCormick, 1985). Fourth, work itself is the extent to which the job provides the individual teachers with stimulating tasks, opportunities for learning and personal growth, and the chance to be responsible and accountable for results (Robbins, 2003).

Fifth, working conditions is the factor that involves the physical environment of the job involving amount of work, facilities for performing work, light, tools, temperature, space, ventilation, and general appearance of the work place (Waters, 2013). Sixth, recognition is defined as which is an effective motivation tool that validates their efforts to help the school succeed (Grote, 2002). It is a program that can have a positive impact by producing higher levels of teacher motivation, increasing levels of respect for the field, and emphasizing for students, parents, and community members that they have exceptional educators in their schools. Finally, responsibility is derived from being given control of teacher work or the work of others and/or new job responsibilities (Castillo, Cano, & Conklin, 1999).

Methodology

Research Method

Quantitative and qualitative research methods were used to collect the required data in this study.

Participants

All teachers (108 teachers) from seven selected Basic Education High Schools who had at least two years of teaching service at their present schools were chosen as participants in the quantitative study. For the qualitative study, 12 teachers from two selected high schools were interviewed.

Instruments

For quantitative analysis, data were collected by using two instruments, *"Teachers' Perception of Principals' Practice of Building Professional Capital* Questionnaire" developed by Adams (2016) to measure teachers' perception of principals' practice of building professional capital and *"Teacher Job Satisfaction Questionnaire (TJSQ)"* developed by Lester (1987, as cited in Waters, 2013) to measure job satisfaction of teachers. Both questionnaires used a 5-point Likert scale, ranging from strongly disagree (1) to strongly agree (5). Furthermore, the researcher developed interview questions based on the questionnaires and related literature in order to obtain qualitative data.

Data Collection Procedures

Before field testing the instruments with a sample of teachers, the instruments used in this study were reviewed by a panel of experts who have special knowledge and close relationship with this area, from Department of Educational Theory. Next, the preliminary instruments were field tested by 40 teachers representing 5 Basic Education High Schools. The Pearson product moment correlation method (*Average item total correlation*) was used for the internal consistency reliability. In this study, the reliability coefficient for *"Teachers' Perception of Principal Practice of Building Professional Capital Questionnaire"* ranged from 0.878 to 0.918, using Cronbach's Alpha 0.898. Moreover, the reliability coefficient for *"Teacher Job Satisfaction Questionnaire (TJSQ)"* ranged from 0.899 to 0.722, using Cronbach's Alpha 0.811.

When collected data was calculated in terms of the reliability, the researcher reviewed and revised the items which had less than a 0.3 correlation coefficient. In order to collect quantitative data for the main study, questionnaires were distributed to 7 selected Basic Education High Schools (including branch high schools) in Sagaing Township on 20th September, 2021 to 30th September, 2021 and collected them after lasting 10 days. After collecting and analyzing the quantitative data, 12 teachers from selected high schools were interviewed from 22 th December, 2021 to 27 th December, 2021 for acquiring qualitative data.

Data Analysis

Using SPSS, descriptive statistics such as means and standard deviations were calculated to explore teachers' perception of principals' practice of building professional capital and teacher job satisfaction at Basic Education High Schools (including branch high school) in Sagaing Township. The decision rule for interpreting the level of principals' practice of building professional capital and teacher job satisfaction was that the mean value between 1.00 and 2.33 was defined as "low level"; the mean value between 2.34 and 3.66 was defined as "moderate level"; and the mean value between 3.67 and 5.00 was defined as "high level".

Furthermore, Analysis of Variance (ANOVA), Independent Samples *t*-Test, and Post Hoc Multiple Comparisons (Games-Howell) were also used to determine whether there were significant differences in teachers' perceptions of principals' practice of building professional capital and teacher job satisfaction according to their demographic information. In addition, Pearson product-moment correlation was utilized to examine the relationship between teachers' perceptions of principals' practice of building professional capital and teacher job satisfaction. In addition, data collected from qualitative analysis (interviews with teachers) was categorized and analyzed to complement quantitative findings on principals' practice of building professional capital and teacher job satisfaction.

Findings

Quantitative Analysis

Table 1 presents the mean values for principals' practice of building professional capital perceived by teachers from 7 selected high schools.

Table 1 Mean Values for Principals' Practice of Building Professional Capital Perceived by Teachers

Schools / Dimensions	School 1	School 2	School 3	School 4	School 5	School 6	School 7
Human Capital	4.07	4.38	4.08	3.83	3.97	4.05	4.08
Social Capital	4.10	4.31	4.03	3.74	3.97	3.99	4.15
Decisional Capital	3.89	4.16	3.82	3.83	4.00	3.96	3.99
Professional Capital	**4.02**	**4.28**	**3.98**	**3.80**	**3.98**	**4.00)**	**4.07**

1.00-2.33=low level 2.34-3.66=moderate level 3.67-5.00=high level

It was found that teachers from all selected high schools perceived that their principals practiced all three components of professional capital: *"Human Capital"*, *"Social Capital"* and *"Decisional Capital"* at high levels. In order to study whether there were significant differences in perceptions of teachers on their principals' practice of building professional capital among selected high schools or not, analysis of variance (ANOVA) was employed to analyze the data in Table 2. According to Table 2, it was found that there were significant differences in all dimensions of professional capital.

Table 2 ANOVA Results for Principals' Practice of Building Professional Capital Perceived by Teachers among Selected High Schools

Dimensions		**Sum of Squares**	***df***	**Mean Square**	***F***	***p***
Human Capital	Between Groups	2.397	6	.399	5.141	**.000*****
	Within Groups	7.537	97	.078		
	Total	9.934	103			
Social Capital	Between Groups	2.253	6	.376	4.695	**.000*****
	Within Groups	7.759	97	.080		
	Total	10.013	103			
Decisional Capital	Between Groups	1.532	6	.255	3.110	**.008****
	Within Groups	7.965	97	.082		
	Total	9.498	103			
Professional Capital	Between Groups	1.813	6	.302	5.067	**.000*****
	Within Groups	5.786	97	.060		
	Total	7.599	103			

Note: ** $p<0.01$, *** $p<0.001$

Therefore, Post Hoc Multiple Comparisons (Games-Howell) test was employed in order to find out which particular groups had the greatest differences in three components of principals' practice of building professional capital (See: Table 3).

Table 3 Results of Multiple Comparisons for Principals' Practice of Building Professional Capital Perceived by Teachers

Dimension	School (I)	School (J)	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Human Capital	School 2	School 4	.550*	.117	**.003**	.16	.94
		School 5	.412*	.099	**.005**	.10	.73
		School 6	.332*	.103	**.040**	.01	.65
Social Capital	School 2	School 4	.574*	.145	**.036**	.03	1.11
		School 5	.340*	.080	**.004**	.08	.60
		School 6	.322*	.077	**.006**	.07	.57
Decisional Capital	School 2	School 3	.350*	.092	**.008**	.06	.64
		School 4	.416*	.110	**.024**	.04	.79
Professional Capital	School 2	School 3	.309*	.079	**.007**	.06	.56
		School 4	.483*	.093	**.001**	.18	.79
		School 5	.304*	.072	**.005**	.07	.53
		School 6	.283*	.074	**.011**	.05	.52

Note:* p<0.05, ** p<0.01

Accordingly, the mean values for perceptions of teachers on principals' practice of building *"Human Capital"* and *"Social Capital"* in School 2 were higher than those of School 4, School 5 and School 6. There were also significant differences in perceptions of teachers on principals' *"Decisional Capital"* between School 2 and School 3; and between School 2 and School 4. According to Table 4, it was found that all teachers from selected high schools had high levels of job satisfaction in 7 sub-skills: *"Advancement"*, *"Supervision"*, *"Colleagues"*, *"Responsibility"*, *"Working Condition"*, *"Recognition"* and *"Work Itself"*.

Table 4 Mean Values for Teachers' Job Satisfaction Perceived by Teachers in Selected High Schools

Schools / Dimensions	School 1	School 2	School 3	School 4	School 5	School 6	School 7
Advancement	3.90	4.25	3.91	3.80	3.98	3.96	3.91
Supervision	4.08	4.24	4.01	3.92	3.89	3.92	4.06
Colleagues	4.07	4.25	3.80	4.00	4.03	4.07	4.00
Work Itself	4.0	4.37	4.01	s4.00	3.97	4.02	3.97
Working Condition	4.02	4.30	3.89	3.96	4.00	4.05	3.89
Recognition	4.10	4.48	3.99	4.02	3.94	4.10	4.10
Responsibility	4.03	4.32	3.94	3.95	3.95	4.02	3.98
Job Satisfaction	**4.03**	**4.32**	**3.94**	**3.95**	**3.95**	**4.02**	**3.98**

1.00-2.33=low job satisfaction 2.34-3.66=moderate job satisfaction 3.67-5.00=high job satisfaction

In order to study whether there were significant differences in teachers' perceptions of their job satisfaction among selected high schools or not, a simple analysis of variance (ANOVA) was employed to analyze the data. The results are shown in Table 5. According to Table 5, it was found that there were significant differences in all sub-skills and overall job satisfaction among selected high schools.

Table 5 ANOVA Results for Teachers' Job Satisfaction Perceived by Teachers in Selected High Schools

Dimensions		**Sum of Squares**	***df***	**Mean Square**	***F***	***p***
Advancement	Between Groups	2.020	6	.337	3.002	**.010***
	Within Groups	10.881	97	.112		
	Total	12.901	103			
Supervision	Between Groups	1.444	6	.241	4.288	**.001*****
	Within Groups	5.444	97	.056		
	Total	6.888	103			
Colleagues	Between Groups	1.925	6	.321	4.625	**.000*****
	Within Groups	6.731	97	.069		
	Total	8.656	103			
Work Itself	Between Groups	3.180	6	.530	8.544	**.000*****
	Within Groups	6.016	97	.062		
	Total	9.196	103			
Working Condition	Between Groups	2.446	6	.408	6.270	**.000*****
	Within Groups	6.306	97	.065		
	Total	8.752	103			
Recognition	Between Groups	2.410	6	.402	2.404	**.033****
	Within Groups	16.205	97	.167		
	Total	18.615	103			
Responsibility	Between Groups	3.602	6	.600	8.338	**.000*****
	Within Groups	6.985	97	.072		
	Total	10.587	103			
Job Satisfaction	Between Groups	2.143	6	.357	6.418	**.000*****
	Within Groups	5.398	97	.056		
	Total	7.541	103			

Note: *$p<0.05$, **$p<0.01$, ***$p<0.001$

Therefore, Post Hoc Multiple Comparisons (Games-Howell) test was conducted in order to find out which particular groups had the greatest differences in teacher job satisfaction. According to the findings shown in Table 6, there were significant differences in all dimensions of job satisfaction.

Table 6 Results of Multiple Comparisons for Teachers' Job Satisfaction Perceived by Teachers in Selected High Schools

Dimension	Service (I)	Service (J)	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Supervision	School 2	School 4	.322*	.095	**.037**	.01	.63
		School 5	.347*	.106	**.042**	.01	.69
		School 6	.322*	.092	**.020**	.03	.61
Colleagues	School 2	School 3	.320*	.084	**.013**	.05	.59
		School 5	.416*	.108	**.010**	.07	.76
		School 7	.337*	.099	**.025**	.03	.65
Work Itself	School 1	School 3	.226*	.058	**.010**	.04	.41
	School 2	School 3	.517*	.097	**.000**	.21	.82
		School 5	.322*	.092	**.026**	.03	.62
		School 7	.351*	.099	**.020**	.04	.66
	School 5	School 3	.195*	.042	**.001**	.06	.33
	School 6	School 3	.238*	.065	**.018**	.03	.45
Working Condition	School 2	School 3	.359*	.088	**.007**	.08	.64
		School 5	.402*	.091	**.003**	.11	.69
		School 6	.353*	.097	**.016**	.05	.66
		School 7	.403*	.099	**.005**	.09	.71
Responsibility	School 2	School 1	.385*	.110	**.022**	.04	.73
		School 3	.486*	.088	**.000**	.20	.77
		School 4	.457*	.091	**.001**	.16	.75
		School 5	.538*	.105	**.000**	.21	.87
		School 7	.382*	.112	**.024**	.03	.73
Job Satisfaction	School 2	School 3	.380*	.086	**.003**	.11	.65
		School 4	.364*	.103	**.027**	.03	.70
		School 5	.369*	.084	**.003**	.10	.64
		School 7	.342*	.097	**.019**	.04	.65

Note: $^{*}p<0.05$, $^{**}p<0.01$, $^{***}p<0.001$

In order to study which particular groups had significant differences in teachers' job satisfaction according to their age, ANOVA was conducted. According to Table 7, it was found that there was only a significant difference in perceptions of teachers on *"Advancement"* at $p<0.05$ level according to their age.

Table 7 ANOVA Results for Teachers' Job Satisfaction in Advancement Perceived by Teachers according to their Age

Dimensions		Sum of Squares	*df*	Mean Square	*F*	*p*
Advancement	Between Groups	.772	2	.386	3.213	**.044***
	Within Groups	12.130	101	.120		
	Total	12.901	103			

Note:* $p<0.05$

In Table 8, Post Hoc Multiple Comparisons (Tukey) were conducted in order to find out which particular groups had the greatest differences in one factor of job satisfaction. In accordance with the results, teachers who were 50 and above years old were more satisfied with their job than teachers who were less than 40 years old.

Table 8 Results of Multiple Comparisons for Advancement Perceived by Teachers according to their Age

Dimension	Age (I)	Age (J)	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Advancement	50 and above	Less than 40	.227*	.092	**.041**	.01	.45
		40-49	.105	.079	.380	-.08	.29

Note:* $p<0.05$

Table 9 shows the relationship between principals' practice of building professional capital and job satisfaction of teachers in selected high schools. It was found that *"Human Capital"* was positively and significantly related to *"Job Satisfaction"* (r=0.625, p=<0.01); *"Social Capital"* was positively and highly related to *"Job Satisfaction"* (r=0.701, p=<0.01); and *"Decisional Capital"* was positively and significantly related to *"Job Satisfaction"* (r=0.631, p=<0.01). It was also found that *"Professional Capital"* was positively and highly related to *"Job Satisfaction"* (r=0.738, p=<0.01) in selected high schools.

Table 9: Relationship between Principals' Practice of Building Professional Capital and Job Satisfaction of Teachers in Selected High Schools

	Human Capital	Social Capital	Decisional Capital	Professional Capital	Job Satisfaction
Human Capital	1				
Social Capital	.782**	1			
Decisional Capital	.554**	.682**	1		
Professional Capital	.877**	.927**	.848**	1	
Job Satisfaction	.625**	.701**	.631**	.738**	1

Note: **$p<0.01$

Open-ended Responses

At the end of the questionnaire, teachers were asked four open-ended questions. The **first** question asked teachers to describe how the principal helps them to increase their professional development. Eighty teachers (76.92%) answered this question. Thirty nine teachers (48.75%) responded that their principals helped them attend refresher courses, new curriculum courses and workshops. In addition, 6 teachers (7.50%) reported that their principals encouraged them to read weekly newsletters and magazines and also provide necessary books and publications for their professional development. Similarly, 17 teachers (21.25%) presented that their principals provided them with teaching aids such as radio, tape-recorder, diagrams, charts, actual objects, and equipment and chemicals for science laboratory and 18 teachers (22.50%) answered that their principals helped them use 21st century skills to improve their teaching.

The **second** question asked teachers to describe the condition of interpersonal relationship with their principals. Eighty two teachers (78.85%) answered this question. Twenty seven teachers (32.93%) described that their principals valued their beliefs, skills and expertise. Similarly, 32 teachers (39.02%) answered that their principals recognized them as a professional and treated them with respect. Moreover, 23 teachers (28.05%) reported that their principals treated them as family members and expressed their sympathy and gave advice to them whenever they needed help.

The **third** question asked teachers to state what kinds of decisions they made improve their instruction. Seventy three teachers (70.19%) answered this question. Among teacher respondents, 12 (16.44%) teachers replied that they made decisions about instructions weekly and monthly but 33 teachers (45.21%) replied that they made decisions about choosing necessary teaching aids, activities and exercises. Moreover, 4 teachers (5.48%) answered that they made decisions about duties and responsibility of teachers. On the other hand, 24 teachers (32.87%) replied that they made decisions about choosing teaching methods in accordance with contents of the lessons in order to improve students' critical thinking, creativity, collaboration, communication, and citizenship.

The **fourth** question asked teachers to describe why they were satisfied with their jobs. Seventy Seven teachers (74.04%) responded to this question. Among teachers, 34 teachers (44.16%) answered that they had great satisfaction with their job because their principals helped them whenever they needed help and their colleagues collaborated and cooperated with them in carrying out activities of schools. Accordingly, 20 teachers (25.97%) answered that they were satisfied with their jobs because teachers in their schools helped each other and also had good relationships. In addition, 11 teachers (14.29%) answered that they were satisfied with their jobs because teaching was their hobby and they also loved children and 12 teachers (15.58%) answered that they were satisfied with their jobs because their students collaborated with them in order to maintain student discipline, and they were obedient and principals recognize abided the rules of discipline.

Qualitative Analysis

In order to obtain detailed information about the principals' practice of building professional capital and teacher job satisfaction, interviews were conducted with 12 teachers from two selected Basic Education High Schools in Sagaing Township.

The **first** interview question asked teachers to describe how their principals support them to develop their knowledge and skills. Teachers explained that, *"Their principals fulfil the necessary teaching aids and reference books for teachers. Their principals give advise them to learn new teaching materials and teaching aids through social media, and provide them with Bluetooth boxes and microphone in order to teach English vocabulary effectively".*

The **second** interview question asked teachers to express the opportunities that the principal created for teachers to improve their teaching skills. According to the teachers' responses, *"Their principals create opportunities for them to attend the training of new Grade 10 curriculum, refresher courses (not only as a trainee but also as a trainer) and other training courses related to occupational safety and health. Their principals provide them with opportunities for improving their teaching by creating subject-wise discussions, holding board of study, and making discussions with teachers from other schools".*

The **third** question asked teachers to describe the relationship between the principal and teachers and how their principal supports them to improve their relationship with colleagues.

Regarding to the third question, all teachers answered that, "*Their principals listen to the voices of teachers, treat them fairly and equitably, give equal opportunities for everyone and make cooperation to improve their relationship among teachers. Their principals usually treat them as her family members. They also never use negative words and give advice to them on how to behave in a positive way to improve the relationship among them."*

The **fourth** interview question asked teachers to describe the school take assigned by the principal for teacher to cooperate among them. All teachers responded that, "*Their principals organize teachers as teams and committees such as the board of studies, maintenance of scientific laboratory equipment, school disciplinary committee, etc. By teaming up, they acquire new knowledge and skills, are more experienced, perform well in their work, learn from each other and help each other to solve problems. Their principals assign tasks to teachers to work together in school family day, clean and green the school environment and cultivate the plants and vegetables".*

The **fifth** interview questions asked teachers to answer whether their principal allowed them to involve in making decisions related to teaching and learning and school activities or not. Regarding to this question, all teachers answered that, "*Their principals allow them to involve in making decisions about teaching and learning and school activities. Their principals collaborate with teacher leaders, subject deans, class teachers in carrying out school tasks and empower them to make decisions related to those tasks".*

The **sixth** interview question asked teachers to state the decisions that teachers made in order to meet the needs of their students. Regarding to this interview question, all teachers described that, *"Their principals allow them to make the decisions about their students. They know about how to provide students' needs and how to motivate them to be interested in learning. By getting suggestions from the principals, they discuss with parents and other teachers to provide stationery such as pens and pencils to students".*

The **seventh** interview question asked teachers to describe the benefits or opportunities from their teaching profession. Regarding this question, all teachers answered that, *"They have not only to read as many books related to their teaching subjects but also to attend many trainings in order to develop their ideas, knowledge and skills. Since teaching is their hobby, they are very happy in working with students. They earn love and respect from their colleagues and students".*

The **eighth** interview question asked teachers to explain how their principals support their teaching. Regarding this question, all teachers answered that, *"Their principals provide them with old questions, reference books, and journals for their teaching to be effective. Moreover, their principals give advice to them to study new teaching strategies through media and online. In addition, their principals provide necessary materials for teaching such as Bluetooth boxes and microphone. In addition, their principals motivate them to observe other teachers' teaching and they provide teachers constructive feedback if necessary".*

The **ninth** interview question asked teachers to describe their interpersonal relationship with their colleagues. In relation to this question, all teachers answered that, *"Since they believe that unity is strength, there is no problem between them, and if there is a problem in their schools, they solve it together and are always ready to help with one another. They and their colleagues have a close relationship like sisters or brothers".*

The **tenth** interview question asked teachers to express their attitudes toward teaching. With regard to this question, all teachers stated that, *"They see teaching as a job that opens their mind, increases their knowledge and skills, gains new ideas and insights; and develops their imagination and creative thinking skills. They can learn new teaching methods, get good ideas, improve new knowledge and skills and enrich vocabulary through teaching".*

The **eleventh** interview question asked teachers to explain their working condition in their school. Regarding to this interview question, all teachers answered that, "*There are many classrooms and desks for all students in their school. Their campus is spacious and students can get clean and pure water and sufficient lighting in every classroom. In addition, the teacher-student ratio is fair, students are polite and obedient and all teachers have a good relationship with their students".*

The **twelfth** interview question asked teachers to describe how their principal recognized them for their work accomplishments. Teachers described that, *"Their principals recognize them by praising and giving good comments for their work accomplishments at the staff meetings. When teachers clean the school and plant, water, and cultivate flowers, vegetables and trees, their principals recognize and acclaim their work. Even if they make any mistake in business, their principals give them advice on what to do instead of scolding".*

The **thirteenth** interview question asked teachers to state the school tasks which they had to perform in their school. Regarding this interview question, all teachers described that, *"They have to perform several tasks in their schools such as teaching the students as their class teachers, and training the students as their sports teachers. In addition, they have to perform as teacher leaders and also carry out making school to clean and green".*

Conclusion and Discussion

Analysis of quantitative and qualitative data collected from the study attempted to answer the five questions. **Research question one** explored the teachers' perceptions of their principals' practice of building professional capital at selected high schools in Sagaing Township. According to the teachers' responses, it can be concluded that their principals had high levels of building professional capital in their schools. When comparing the mean values of three dimensions of professional capital, *"Human Capital"* was the highest and *"Decisional Capital"* was the lowest. This finding was consistent with the findings of Watts (2018) in which most international school leaders and their teachers had high levels of human capital, social capital and decisional capital. Moreover, teachers from selected high schools answered that their principals helped them to increase their professional capital by providing the necessary books and teaching materials; creating opportunities in school to share their ideas and opinions; and allowing them to involve in the decision-making process of the school in their interviews. According to the quantitative and qualitative findings, it can be interpreted that all teachers from selected high schools perceived that their principals highly practiced building professional capital at their schools.

Research question two examined the teachers' perceptions of their job satisfaction at selected high schools in Sagaing Township. According to the ratings of teachers, they had high levels of job satisfaction in all dimensions. When comparing the mean values of all dimensions of job satisfaction, *"Recognition"* was the highest and *"Advancement"* was the lowest according to the responses of teachers. However, Waters (2013) found that *"Responsibility"* was the highest and *"Advancement"* was the lowest in his study. In interview responses, teachers from selected high schools answered that they were highly satisfied with their job because they got opportunities for improvement in their teaching; their principals supported them to improve their teaching; the working conditions of their schools were favorable; and their efforts were recognized and awarded by their principals. According to the quantitative and qualitative results, it can be concluded that all teachers from selected high schools were highly satisfied with their job.

Research question three studied whether there were significant differences in teachers' perceptions of principals' practice of building professional capital and their job satisfaction among selected high schools or not. According to the findings, there were significant differences among selected high schools. More specifically, it was found that the practice of the School 2 principal in building *"Professional Capital"* for teachers was higher than those of principals from School 3, School 4, School 5, and School 6. Similarly, it was found that the teachers from School 2 had higher "*Job Satisfaction*" than teachers from School 3, School 4, School 5 and School 7. In qualitative analysis, it was found that the principal of School 2 treated teachers equally, did not discriminate among teachers, and gave positive comments, suggestions, and guidance whenever teachers needed her help. Thus, it could be inferred that School 2 principals' practice of building teachers' professional capital and the teachers' satisfaction were significant among selected high schools.

Research question four analyzed the significant differences in teachers' perceptions of principals' practice of building professional capital and their job satisfaction according to teachers' demographic data. According to the responses of teachers, there was no significant difference in principals' practices of building professional capital perceived by teachers according to their gender, position, age, academic qualification, and teaching service. On the one hand, data obtained in this study showed that there was a significant difference in only one dimension of job satisfaction, *"Advancement"*, according to their age levels. It was found that older teachers were more experienced, knowledgeable, and skillful than younger teachers; and they could have more opportunities to get promotions. Thus, they were more satisfied than other teachers. This was consistent with Shrestha (2019) who found that the age groups significantly influenced job satisfaction among school teachers because senior teachers got more prestige, honor, attention, and pay than junior teachers.

Research question five was to investigate the relationship between principal's practice of building professional capital and teachers' job satisfaction at selected high schools. According to the results of quantitative analysis, it was found that *"Human Capital"* was positively and significantly related to *"Job Satisfaction"* (r=0.625, p=<0.01); *"Social Capital"* was positively and highly related to *"Job Satisfaction"* (r=0.701, p=<0.01); and *"Decisional Capital"* was positively and significantly related to *"Job Satisfaction"* (r=0.631, p=<0.01). In fact, it was found that *"Professional Capital"* was positively and highly related to *"Job Satisfaction"* (r=0.738, p=<0.01). Therefore, it can be interpreted that principals' practice of building teachers' professional capital would increase teachers' job satisfaction. These results were congruent with the findings of Belay et al. (2021) who found that teachers' job satisfaction was related to their professional capital development through high professional abilities and skills; collaborative relationship with the school community; and involvement in school-wide decision making.

Recommendations for Further Research

This research was geographically limited to Basic Education High Schools in Sagaing Township. Therefore, similar research should be conducted at primary schools, middle schools, high schools in other townships, states or regions.

Acknowledgements

The research would like to express our sincere thanks and appreciation to Dr. Myat Myat Thaw (Rector, Sagaing University of Education), Dr. Khin Hnin Yee (Pro-rector, Sagaing University of Education), Dr. San San Lwin (Pro-rector, Sagaing University of Education), Daw Swe Swe Nwe Tun (Associate Professor and Head of Department, Department of English, Sagaing University of Education), Dr. Htay Htay Maw (Retired Principal, Bogalay Education Degree College), and Daw May Moe Ei (Assistant Lecturer, Department of Educational Theory and Management, Sagaing University of Education) for their invaluable guidance, support, constructive suggestions and feedback about our study. Most importantly, we are indebted to the principals and teachers from Basic Education High Schools in Sagaing Township who participated in our study for their time, responses, reflections and willingness to participate.

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J. Myanmar Acad. Arts Sci. 2023 **Vol. XXI. No.6**

RELATIONSHIPS AMONG PRINCIPALS' AUTHENTIC LEADERSHIP STYLE AND TEACHERS' TRUST AND ENGAGEMENT

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Abstract

The purpose of this study was to explore the relationships among principals' authentic leadership style and teachers' trust and engagement at selected Basic Education High Schools in Mandalay. Quantitative research method was used in this study. Three hundred and fifteen teachers from six selected high schools participated in this study. "*Authentic Leadership Questionnaire (ALQ)*" developed by Walumbwa, Avolio, Gardner, Wernsing & Peterson (2008), "*Workplace Trust Survey (WTS)*" developed by Ferres and Travaglione (2003, as cited in Bird, Wang, Watson & Murray, 2009) and "*Gallup Organization's Q12 Survey*" developed by Buckingham and Coffman (1999, as cited in Bird *et al.*, 2009) were used to collect quantitative data on principals' authentic leadership style, teachers' trust and teachers' engagement. For data analysis, descriptive statistics such as means and standard deviations, and Pearson-product moment correlation coefficient were calculated by using SPSS version 22. It was found that principals sometimes practiced authentic leadership style, and teachers had high levels of trust and engagement in selected Basic Education High Schools according to teachers' ratings. Moreover, there was a positive and moderate correlation between principals' authentic leadership style and teachers' trust (r=.589, p<0.01). Similarly, there was a positive and moderate correlation between principals' authentic leadership style and teachers' engagement (r=.524, p<0.01). Besides, there was a positive and high correlation between teachers' trust and engagement (r=.762, p<0.01). It can be said that teachers believed in their principals, colleagues, and schools although the principals sometimes practiced authentic leadership style and then they actively engaged in their school activities. It can be concluded that principals who practice the authentic leadership style can earn the trust of their teachers and motivate teachers to engage in school activities.

Keywords: Authentic Leadership, Trust, Engagement

Introduction

The role of the principal is critical in creating an environment where students can succeed (Martin, 2015). School principals are currently facing increasing pressures and challenges in their daily lives. Reasons for this include the increasing diversity of society as well as the uncertainty and tension that permeate school leadership. However, there is considerable cynicism and disregard for organizational leaders, and entrenched public perception regards their rhetoric as misaligned with workplace realities (Bhindi, Smith, Hansen, & Riley, 2008, as cited in Feng-I, 2016). A call for a new type of genuine and values-based leadership, known as authentic leadership, is emerging. Authentic leaders are concerned with ethics and morality, especially as they relate to deciding what is significant, what is right and what is worthwhile (Duignan, 2006, as cited in Feng-I, 2016). Authentic leadership is a metaphor for professionally effective, morally sound, and deliberately reflective practices in educational administration. This leadership implies a sincere type of leadership and a hopeful, open, visionary and creative response to social situations. The prerequisites for such authentic leadership in school principals are self-knowledge, a capacity for moral reasoning, and sensitivity to others' intentions (Begley, 2001, as cited in Feng-I, 2016). Authentic leadership enhances trust, a critical element in fostering organizational success. Trust in supervisors is positively related to worker engagement (Byrne, & Flood, 2014, as cited in Martin, 2015). This study will explore the relationships among principals' authentic leadership style and teachers' trust and engagement at Basic Education High Schools in Mandalay.

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Significance of the Study

The core of authenticity is "to know, accept, and remain true to oneself" (Avolio, Gardner, Walumbwa, Luthans, & May, 2004). Authenticity reflects a leader's moral capacity to align "responsibilities the self, to the followers, and to the organization in order to maintain cooperative efforts within and outside of the organization (Novicevic, Harvey, Ronald, & Brown-Radford, 2006). Authentic leadership deals with a principal's desire to understand oneself and others and act in accordance with his/her core values in order to lead the school to success (Avolio & Mhatre, 2011, as cited in Kulophas, Ruengtrakul, & Wongwanich, 2015). The authentic leadership model is distinct from other forms of leadership. This is a model that will enhance trust, hope, and optimism (Avolio, Gardner, Walumbwa, Luthans, & Douglas, 2004). Trust in the principal has been shown to have a positive relationship with teacher work engagement and student achievement (Tschannen-Moran & Hoy, 2000). Trust is a necessary factor to create employee engagement. Trust is "the outcome of interactions among people's values, attitudes, moods, and emotions" (Vragel, 2013, as cited in Mason, 2019). Authentic leaders also possess positive values that instill qualities of hope, positive emotions, and trust in their followers (Gardner, Avolio, Luthans, May, & Walumbwa, 2005). These qualities have a positive impact on followers' work attitudes of commitment, job satisfaction, meaningfulness, and engagement (Avolio *et al.*, 2004). Authentic engagement is based on the psychological conditions of being engaged at work (Kahn, 1990).

Purpose of the Study

The main purpose of the study is to explore the relationships among principals' authentic leadership style and teachers' trust and engagement at Basic Education High Schools in Mandalay.

The specific purposes of the study are as follows:

- To examine the perceptions of teachers on their principals' authentic leadership style,
- To examine the level of teachers' trust perceived by teachers themselves,
- To examine the level of teachers' engagement perceived by teachers themselves,
- To investigate the relationship between principals' authentic leadership style and teachers' trust,
- To examine the relationship between principals' authentic leadership style and teachers' engagement, and
- To find out the relationship between teachers' trust and engagement.

Research Questions

The following research questions guide the study.

1. To what extent do teachers perceive principals' authentic leadership style?
2. What are the levels of teachers' trust perceived by teachers themselves?
3. What are the levels of teachers' engagement perceived by teachers themselves?
4. Is there any relationship between principals' authentic leadership style and teachers' trust?
5. Is there any relationship between principals' authentic leadership style and teachers' engagement?
6. Is there any relationship between teachers' trust and their engagement?

Theoretical Framework of the Study

The theoretical framework utilized the components of authentic leadership. Walumbwa *et al.* (2008) explained that authentic leadership is based on strong ethical principles and positive psychological qualities (confidence, hope, optimism, and resistance). According to Walumbwa *et al.* (2008), an authentic leader is defined as one who exhibits four types of behaviors: self-awareness, relational transparency, balanced processing, and internalized moral perspective. In this study, the above components of authentic leadership were used as the theoretical framework for authentic leadership. Authentic leaders instill high levels of trust in their followers which is linked to followers' work attitudes of commitment, job satisfaction, meaningfulness and engagement (Avolio *et al.*, 2004). According to Hoy and Kupersmith (1985), a faculty trust is a collective form of trust in which the faculty has an expectancy that the word, promise, and actions of another group or individual can be relied on and that the trusted party will act in the best interests of the faculty. They summarized the three components of trust including trust in principal, trust in colleagues and trust in the school organization. Therefore, this study used these components of trust defined by Hoy and Kupersmith (1985, as cited in Forsyth *et al.*, 2011) as the theoretical framework for trust. Authentic engagement is based on the psychological conditions of being engaged at work. Engagement was defined in terms of physical behavior, cognitive behavior, and emotion (Kahn, 1990). The perceptions of meaning, safety, and availability drive the levels of engagement as they vary from day to day and minute to minute. And so, this study used the three psychological conditions model of employee engagement by Kahn (1990) as the theoretical framework for engagement. In this study, the independent variable was principals' authentic leadership style and dependent variables were teachers' trust and engagement.

Review of Related Literature

Authentic Leadership Style

An authentic leadership style is usually understood as being true to oneself (Harter, 2002). The kind of leadership that can restore confidence come from individuals who are true to themselves, and whose transparency "positively transforms or develops associates into leaders themselves" (Luthans & Avolio, 2003). Luthans and Avolio (2003) define authentic leadership in organizations as "a process that draws from both positive psychological capacities and a highly developed organizational context, which results in both greater self-awareness and self-regulated positive behaviors on the part of leaders and associates, fostering positive self-development". Walumbwa *et al.* (2008) defined authentic leadership as "a pattern of leader behaviors that draws upon, and promotes both positive psychological capacities and a positive ethical climate to foster greater self-awareness, an internalized moral perspective, balanced processing of information and relational transparency on the part of leaders working with followers, to foster positive self-development".

Authentic leadership extends beyond the authenticity of the leader as a person to encompass authentic relations with followers and associates. Authentic leaders can develop commitment, satisfaction and follower involvement for continuously improving the work performance outcomes through the two main aspects (a) personal identification with the follower and (b) social identification with the organization (Kark & Shamir, 2002, as cited in Avolio *et al.*, 2004). Authentic leaders based on their passion, purpose, ethical and solid values, heart, relationships, and mind look forward to making differences, serving and empowering others (George, 2003). Moreover, authentic leaders are people "who are deeply aware of how they think and behave and are perceived by others as being aware of their own and others' values/moral perspectives, knowledge, and strengths; aware of the context in which they operate; and who are confident, hopeful, optimistic, resilient, and of high moral character" (Avolio, Luthans, & Walumbwa, 2004, as cited in Avolio & Gardner, 2005).

Authentic Leadership Theory

The ancient Greek philosopher Socrates attributed to the maxim “know you”. Today, more than 2,400 years after Socrates emphasized the importance of self-awareness and authenticity are critical aspects of leadership (Covelli & Mason, 2017). More than 2,400 years later, Chester Barnard made the first reference to authenticity in management and organizational literature (Kliuchnikov, 2011). The authentic capacity of a leader should be used as a measure of executive quality (Barnard, 1983, as cited in Kliuchnikov, 2011).

Authentic leadership is a form of leadership that originated from positive psychology theory (Avolio & Gardner, 2005). Moreover, the authentic leadership model provides a framework for creating a fair and caring climate in the workplace and helping leaders provide a supportive and ethical leadership style with positive results. The leadership traits that create this trusting and caring environment include self-awareness and self-regulation. This authentic leadership framework provides a developmental process for followers within the organization (Gardner *et al.*, 2005), and is a strategy for leaders to assist followers in finding meaning and purpose in their lives and workplace (Avolio & Gardner, 2005).

According to George (2003), the five dimensions of authentic leadership include passion, values, relationships, self-discipline, and heart. Authentic leaders embody the following characteristics: (1) understanding their purpose, (2) practicing solid values, (3) establishing connected relationships, (4) demonstrating self-discipline and (5) leading with the heart. Authentic leaders lead with their hearts and learn from their own and other people's experiences but strive to be authentic with their values and convictions. Therefore, authentic leaders do not have any fixed skills, styles or traits.

Besides, Avolio and Gardner (2005) claimed that authentic leadership is changeable and emerges from a developmental perspective. It can be developed and fostered by learning from a leader. Walumbwa *et al.* (2008) created a model of authentic leadership, which is widely used (Northouse, 2013). It included four different but related components: Self-awareness, Relational Transparency, Balanced Processing, and Internalized Moral Perspective.

- ***Self-awareness***

The notion of self-awareness has evolved from the writings of Harter (2002) who started analyzing one’s behaviors that can help to determine one’s true self. He describes an authentic person as one who knows their core values and beliefs, and whose behaviors are linear with these beliefs

Similarly, self-awareness is the core component of authentic leadership and in modeling authentic behaviors. Self-awareness is developed through the process of introspection and helps an authentic leader to understand and make meaning of the world. Self-awareness includes the degree of knowledge of one’s inherent contradictory aspects and the roles, which affect thoughts, feelings, and actions (Gardner *et al.*, 2005).

Besides, Northouse (2013) has described that the self-awareness component of authentic leadership as “a process in which individuals understand themselves, including their strengths and weaknesses, and the impact they have on others”. This description implies that as a process, self-awareness is not an end in itself; it is a lifelong process, especially as it is about an individual leader coming to terms with who he or she really is at that individual’s deepest level (Ladkin & Taylor, 2010).

- ***Relational Transparency***

Relational transparency refers to presenting one's authentic self (as opposed to a fake or distorted self) to others. Such behaviors promote trust through disclosures that involve openly sharing information and expressions of one's true thoughts and feelings while trying to minimize displays of inappropriate emotions (Kernis, 2003).

Leaders who display relational transparency do so to become relationally intimate with their followers. However, the authentic leader will display appropriate emotions and high levels of trustworthiness, openness, and willingness to share thoughts and feelings. Relational transparency is a crucial component in communicating values, identity, emotions, goals, and motives to followers. It is disclosing one's legitimate self in order to build trust along with closeness, promoting teamwork and co-operation (Gardner *et al.*, 2005).

- ***Balanced Processing***

Balanced processing refers to leaders who show that they objectively analyze all relevant data before coming to a decision. Such leaders also solicit views that challenge their deeply held positions. Balanced processing is not only important in making decisions that affect an organization, but also vital in getting a true evaluation of one's strengths and weaknesses. They exert that a leader with a fragile of low self-esteem may not be able to confront their personal shortcomings and may not expose themselves to their authentic self because of motivational bias (Gardner *et al.*, 2005).

The term balanced processing was originally called unbiased processing, but it was changed because it was theorized that people are inherently biased and process information incorrectly (Gardner *et al.*, 2005). This refers to the ability of an individual to analyze information objectively as well as exploring others' opinions before he or she makes decisions. According to Northouse (2013), "Balanced processing includes soliciting viewpoints from those who disagree with you and fully considering their positions before taking your own actions".

- ***Internalized Moral Perspective***

An internalized moral perspective was originally called the behavior/action component and was changed to reflect core ethical values. A leader with an internalized moral perspective displays behaviors that are guided by internal moral standards and values rather than by external pressures (Gardner *et al.*, 2005).

Besides, Gardner *et al.* (2005) defined that self-regulation is the exertion of self-control through (a) the setting of internal standards, which can be existing standards or newly formulated ones, (b) the evaluation of discrepancies between these standards and actual or potential outcomes, and (c) the identification of intended actions for resolving the discrepancies. An internalized moral perspective is the process of self-regularity conducted by the person utilize his or her internal moral standards and values to direct their behaviors instead of allowing external pressure to handle of control them (Chan, Hannah & Gardner, 2005).

Trust

Trust is defined as "the willingness of a party to be vulnerable to the actions of another party based on the expectation that the other party will perform a particular action important to the trustor, irrespective of the ability to monitor or control that party" (Mayer, Davis, & Schoorman, 1995). Hasel and Grover (2017) defined trust as a "willingness to be vulnerable to another party with the understanding that the other party will look out for one's interests". Higher levels of trust are related to leader effectiveness and higher levels of organizational citizenship behavior, morale, and performance. Trust in followers is important for creating a trusting climate and a culture that encourages worker productivity. Trust is a critical construct for leaders who want to create and maintain a healthy workforce (Chughtai, Byrne & Flood, 2014). Tschannen-Moran and Hoy (2000) defined trust as "one's party willingness to be vulnerable to another party based on the confidence that the latter party is benevolent, reliable, competent, honest, and open". Trust is critical for all levels of an organization and trust fosters productivity for everyone in an organization (Tschannen-Moran & Hoy, 2000). Trust can be viewed concerning any number of reference groups such as the principal or the school organization. The faculty can trust a variety of referent groups, including the principal, colleagues, and the school organization itself (Hoy & Kupersmith, 1985).

Components of Trust

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- ***Trust in Principal***

The faculty trust in the principal is defined as the confidence of the faculty members "that the principal will keep his/her word and will act in the best interests of their colleagues". The degree of trust teachers feel for the principal is influenced by supportive leadership on the part of the principal (Tschannen-Moran & Hoy, 1998).

The principal can promote trust by actively encouraging her or his teachers to voice their frustrations honestly and to criticize the principal's own decisions (Tschannen-Moran & Hoy, 2000). Trust in the principal is predicted to have direct and indirect benefits for both individual and organizational performance in schools. Teacher effort and performance are maximized through trust in the principal and assists in focusing collective energy on what is important (Forsyth et al., 2011).

- ***Trust in Colleagues***

Faculty trust in colleagues is defined constitutively as "the faculty believes that teachers can depend on one another in difficult situations; teachers can rely on the integrity of their colleagues" (Tschannen-Moran & Hoy, 1998). Teachers who do not possess the necessary skills required for success will not be trusted by their colleagues. Among teachers, a sense of benevolence or caring has been shown to lay a foundation of trust (Tschannen-Moran & Hoy, 2000). The ability to create more genuine forms of collaboration between the principal and teachers, between teacher colleagues, and between parents and the school may be an additional benefit for schools (Tschannen-Moran, 2001). According to Tschannen-Moran (2004), "trust is important because it serves as both a glue and a lubricant in the organizational life: as glue, trust binds organizational participants to one another, and as a lubricant, trust greases the machinery of an organization".

- ***Trust in School***

In definitions of trust in the school context, trust involves the willingness to be vulnerable and to take risks. Trust emerges as the lubricant for strengthening relationships among teachers, students, administrators, and parents. In schools, there is a high level of interdependence between different partied – teachers, principals, students, parents – who must rely on and cooperate with one another to achieve tasks (Forsyth *et al.*, 2011).

Trust is a central theme in the literature on school improvement and effectiveness. Trust is regarded as a key element for school improvement efforts. In schools with high-trust environments, there was a shared commitment to advance the interests of children, teachers engaged in risk-taking and innovative practices in their classroom, and they demonstrated a willingness and commitment to go beyond their regular role requirements to improve student learning (Bryk & Schneider, 2002). In addition to school improvement efforts, trust is vital for the reforms taking place in schools, such as changes in instructional practice and school government structures (Tschannen-Moran & Hoy, 2000).

In conclusion, each of these three varieties of trust suggests an expectancy that the trusted party is reliable and can be counted on to act in the best interests of the faculty. Each is also a collective property; the party doing the trusting is the faculty as a whole; hence, trust is a collective variable.

Engagement

Harter, Schmidt and Hayes (2002) defined engagement as “the involvement and satisfaction of the individuals in an organization as well as their enthusiasm for their job”. Engagement is referred to as a positive, fulfilling, work-related state of mind that is characterized by vigor, dedication, and absorption (Maslach, Schaufeli, & Leiter, 2001). Shuck and Wollard (2010) defined as “the process of positively motivating employees cognitively, emotionally, and behaviorally toward fulfilling organizational outcomes”. Lockwood (2007) defines employee engagement as “the extent to which employees commit to something or someone in their organization, how hard they work, and how long they stay as a result of that commitment”.

In an education setting, engaged teachers can be defined as teachers “who feel energetic and dedicated, and who are absorbed by their work” (Bakker, Schaufeli, Leiter, & Taris, 2008). This means that “engaged teachers or engaged employees work hard (vigour), are involved (dedicated), and feel happily engrossed (absorbed) in their work”. They also (1) often experience positive emotions, including happiness, joy, and enthusiasm; (2) experience better psychological and physical health; (3) create their own job and personal resources (e.g., support from others); and (4) transfer their engagement to others” (Bakker *et al.,* 2008).

Teacher engagement is related to job resources in the school, such as supervision, support and social atmosphere. Students’ appreciation of teachers’ efforts is also considered one of the job resources that support teachers’ emotional engagement. Emotionally engaged teachers experience positive emotions, such as arousal, activation, happiness, energy and enthusiasm (Bakker & Bal, 2010). Besides, Klassen, Yerdelen and Durksen (2013) asserted that teachers should be cognitively, emotionally and socially engaged in their work. Social engagement includes having good relationships with colleagues and students. This is very important to motivate students. Teacher engagement influences teacher-student interaction and the relationship between teachers and students may influence teacher engagement too.

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Kahn's Model of Employee Engagement

Kahn (1990) defined employee engagement as "the harnessing of organization members' selves to their work roles; in engagement, people employ and express themselves physically, cognitively, and emotionally during role performances". Disengagement is defined as "the uncoupling of selves from work roles; in disengagement, people withdraw and defend themselves physically, cognitively, or emotionally during role performances".

Kahn (1990) defined engagement in terms of physical behavior, cognitive behavior, and emotion. Engagement behavior is formed by perceptions of themselves and their role in the workplace and varies based on these perceptions. The perceptions of meaning, safety, and availability drive the levels of engagement as they vary from day to day and minute to minute.

- **Psychological Meaningfulness**

Psychological meaningfulness refers to the individual's self-investment in-role performance, which enhances a positive sense of self-return. Psychological meaningfulness can be seen as a feeling that one is receiving a return on investments of one's self in a currency of physical, cognitive, or emotional energy (Kahn, 1990).

- **Psychological Safety**

Psychological safety refers to the way one can employ oneself without the "fear of negative consequences to self-image, status, or career". Safety was defined as the ability to show one's self "without fear or negative consequences to self-image, status, or career". When conditions were unclear, inconsistent, unpredictable, or threatening, personal engagement was deemed too risky or unsafe (Kahn, 1990).

- **Psychological Availability**

Psychological availability refers to the "sense of having the physical, emotional, or psychological resources to personally engage at a particular moment". This can refer to physical energy, levels of emotional energy, or being "up for it" (Kahn, 1990).

Methodology

This study focused on the exploration of the relationships among principals' authentic leadership style and teachers' trust and engagement at selected Basic Education High Schools in Mandalay. Quantitative research method was used in this study. Data were collected by using questionnaires. The first portion of the survey instrument collected demographic data. The second portion of the survey instrument used the "*Authentic Leadership Questionnaire (ALQ)*" developed by Walumbwa *et al.* (2008) to collect data on principals' authentic leadership style. The third portion of the survey instrument used "*Workplace Trust Survey (WTS)*" developed by Ferres and Travaglione (2003, as cited in Bird et al., 2009) to collect data on teachers' trust. The fourth part of the instrument collected data on teachers' engagement by using the "*Gallup Organization's Q12 Survey*" developed by Buckingham and Coffman (1999, as cited in Bird *et al.*, 2009). The participants of the quantitative study were 315 teachers at different levels from 6 selected high schools in Mandalay. After collecting data, in order to analyze quantitative data, descriptive statistics such as means and standard deviations, and Pearson-product moment correlation coefficient were computed by using SPSS software.

Research Findings

Quantitative Research Findings

Table 1. Means and Standard Deviations for Dimensions of Principals' Authentic Leadership Style Perceived by Teachers at Selected Basic Education High Schools

Schools		SA	RT	BP	IMP	PALS
All Schools (N=315)	Mean	**3.41**	**3.09**	**3.26**	**3.77**	**3.38**
	SD	0.867	0.847	0.939	0.832	0.732

Note: 1.00 – 1.49=Never, 1.50 – 2.49=Rarely, 2.50 – 3.49=Sometimes,
3.50 – 4.49=Often, 4.50 – 5.00=Almost Always,
SA=Self-awareness, RT=Relational Transparency,
BP=Balanced Processing, IMP=Internalized Moral Perspective,
PALS=Principals' Authentic Leadership Style

Table 1 shows that the dimensions of "Internalized Moral Perspective" had the highest mean value (3.77), followed, in descending order, by "Self-awareness" (3.41), "Balanced Processing" (3.26), and "Relational Transparency" (3.09) according to teachers' ratings. Based on the perceptions of teachers, the dimension of "Internalized Moral Perspective" was the highest and "Relational Transparency" was the lowest among the dimensions of principals' authentic leadership style. In conclusion, principals from selected high schools sometimes practice authentic leadership style based on teachers' perceptions.

Table 2. Means and Standard Deviations for Dimensions of Teachers' Trust Perceived by Teachers themselves at Selected Basic Education High Schools

Schools		Trust in Principal	Trust in Colleagues	Trust in School	Teachers' Trust
All Schools (N = 315)	Mean	**3.84**	**3.89**	**3.81**	**3.84**
	SD	0.601	0.442	0.488	0.468

Note: 1.00-2.33 = low level, 2.34-3.67 = moderate level, 3.68-5.00 = high level,

Table 2 shows that the dimension of "Trust in Colleagues" (3.89) had the highest mean value, followed, in descending order, by "Trust in Principal" (3.84) and "Trust in School" (3.81) according to teachers' ratings. Based on the perceptions of teachers, the dimension of "Trust in Colleagues" was the highest and "Trust in School" was the lowest among the dimensions of teachers' trust. In conclusion, teachers from selected high schools had high levels of trust based on their perceptions.

Table 3. Means and Standard Deviations for Dimensions of Teachers' Engagement Perceived by Teachers themselves at Selected Basic Education High Schools

Schools		Psychological Meaningfulness	Psychological Safety	Psychological Availability	Teachers' Engagement
All Schools (N = 315)	Mean	**3.78**	**3.82**	**3.70**	**3.77**
	SD	0.465	0.578	0.527	0.467

Note: 1.00-2.33 = low level, 2.34-3.67 = moderate level, 3.68-5.00 = high level,

Table 3 shows that the dimensions of "Psychological Safety" (3.82) had the highest mean value, followed, in descending order, by "Psychological Meaningfulness" (3.78) and "Psychological Availability" (3.70) according to teachers' ratings. Based on the perceptions of teachers, the dimension of "Psychological Safety" was the highest and "Psychological Availability" was the lowest among the dimensions of teachers' engagement. In conclusion, teachers from selected high schools had high levels of engagement based on their perceptions.

Table 4. Relationship between Principals' Authentic Leadership Style and Teachers' Trust at Selected Basic Education High Schools

Variables	Principals' Authentic Leadership Style	Teachers' Trust
Principals' Authentic Leadership Style	1	.589**
Teachers' Trust	.589**	1

Note: ** Correlation is significant at the 0.01 level (2-tailed).

In Table 4, the overall principals' authentic leadership style and overall teachers' trust displayed coefficient at r=.589, p<0.01, that there was a positive and moderate correlation between principals' authentic leadership style and teachers' trust at selected Basic Education High Schools.

Table 5. Relationship between Principals' Authentic Leadership Style and Teachers' Engagement at Selected Basic Education High Schools

Variables	Principals' Authentic Leadership Style	Teachers' Engagement
Principals' Authentic Leadership Style	1	.524**
Teachers' Engagement	.524**	1

Note: ** Correlation is significant at the 0.01 level (2-tailed).

According to Table 5, the overall principals' authentic leadership style and overall teachers' engagement displayed coefficient at r=.524, p<0.01, that there was a positive and moderate correlation between principals' authentic leadership style and teachers' engagement at selected Basic Education High Schools.

Table 6 Relationship between Teachers' Trust and Engagement at Selected Basic Education High Schools

Variables	Teachers' Trust	Teachers' Engagement
Teachers' Trust	1	.524**
Teachers' Engagement	.524**	1

Note: ** Correlation is significant at the 0.01 level (2-tailed).

According to Table 6, the overall teachers' trust and overall teachers' engagement displayed coefficient at r=.762, p<0.01, that there was a positive and high correlation between teachers' trust and teachers' engagement at selected Basic Education High Schools.

Open-ended Responses

Teachers from all selected high schools were asked to respond to three open-ended questions at the end of questionnaires for teachers. Firstly, teachers were asked to describe their opinions about "Does your principal give authentic leadership to teachers in performing school activities? If your answer is "yes", please describe your principal's behaviors. Among teacher participants, 246 teachers (78.09%) responded to this question and 69 teachers (21.91%) did not respond to this question. Out of 246 teachers,

- 65 (26.42%) teachers responded that the leadership of the principal is authentic. But no more reasons are present.
- 63 (25.61%) teachers expressed that their principals openly share their feelings with the teachers and deal with them in a family-friendly way.
- 55 (22.36%) teachers responded that their principals act as an exemplary role in their school activities and they do as much as they help to solve school problems.
- 39 (15.85%) teachers expressed that their principals do not have a bias to the teachers and treat the teachers fairly and equally in performing the school activities.
- Ten (4.06%) teachers responded that their principals decide upon meeting with the teachers before making any decisions regarding school activities.
- Seven teachers (2.85%) responded that they can't decide whether their principal's leadership is authentic or not.
- Seven teachers (2.85%) responded that their principal's leadership is inauthentic because their principals have bias according to the teachers' positions.

The second question is to express "Do you believe in your principal and colleagues? Why?" Regarding this question, 68 (21.59%) teachers did not respond to this question and 247 (78.41%) teachers responded to this question. Out of 247 teachers,

- 65 (26.32%) teachers expressed that they believe in their principals and colleagues. But no more reasons are present.
- 62 (25.1%) teachers reported that they believe in their principals and colleagues because they are treated like family members by them and they perform openly and collaboratively with one another to achieve school goals.
- 59 (23.89%) teachers expressed that they believe in their principals and colleagues because they are supported by them if problems arise.
- 27 (10.93%) teachers expressed that they believe in their principals and colleagues because they are appreciated for their good performance by them.
- 16 (6.48%) teachers responded that they believe in their principals and colleagues because they are committed to doing the quality of work.
- Twelve (4.86%) teachers responded that they can't decide.
- Five (2.02%) teachers responded that they don't believe their principals and colleagues because they are not supported by them when they have problems and only one (0.4%) teacher responded that I believe in my colleagues and I don't believe in my principal because my principal does not keep his/her words.

The last question is that "Do you engage in your school activities? Which types of factors enforce you to engage in school activities?" Regarding this question, 61 (19.37%) teachers did not respond to this question and 254 (80.63%) teachers responded to this question. Out of 254 teachers,

- 65 (25.59%) teachers responded that they engage in their school activities as their conscientious mind enforces them to achieve school goals and to improve their pupils.
- 52 (20.47%) teachers answered that they engage in school campus cleaning and agriculture activities as well as other school activities to flourish their schools.
- 51 (20.08%) teachers responded that they engage in their school activities. But no more reasons are present.
- 46 (18.11%) teachers expressed that they engage in their school activities as they want to be a dutiful person in performing school activities.
- 27 (10.63%) teachers reported that they engage in their school activities as they want to perform collaboratively and actively with their colleagues.
- 13 (5.11%) teachers responded that they engage in their school activities as they have materials and equipment which need to do work actually.

Conclusion and Discussion

Research question (1) explored the principals' authentic leadership style perceived by teachers. According to the findings of this study, principals from selected high schools sometimes practiced authentic leadership style according to the ratings of teachers. Research question (2) explored the levels of teachers' trust perceived by teachers themselves at selected Basic Education High Schools in Mandalay. According to the perceptions of teachers, it was found that teachers from selected high schools had a high level of trust. Research question (3) explored the levels of teachers' engagement perceived by teachers themselves at selected Basic Education High Schools in Mandalay. According to the perceptions of teachers, it was found that teachers from selected high schools had a high level of engagement. Research question (4) analyzed the relationship between principals' authentic leadership style and teachers' trust at selected Basic Education High Schools in Mandalay. Based on the research findings, principals' authentic leadership style was positively and moderately correlated with teachers' trust (r=.589, p<0.01). These findings can be concluded that principals who practice authentic leadership style received the trust of teachers. So, the more the principals practice an authentic leadership style, the more they may receive the trust of the teachers. Research question (5) investigated the relationship between principals' authentic leadership style and teachers' engagement at selected Basic Education High Schools in Mandalay. Based on the research findings, principals' authentic leadership style and teachers' engagement were positively and moderately correlated (r=.524, p<0.01). These findings can be concluded that principals who practice authentic leadership style motivated teachers to engage in school activities. Therefore, the more the principals practice an authentic leadership style, the more they may motivate teachers to engage in school activities. Research question (6) found out the relationship between teachers' trust and engagement at selected Basic Education High Schools in Mandalay. Based on the research findings, teachers' trust and engagement were positively and highly correlated (r=.762, p<0.01). These findings can be concluded that the teachers who highly believed in their principals, colleagues, and schools actively involved in school activities. Therefore, the more the teachers believe in their principals, colleagues, and schools, the more they may actively engage in their school activities.

The quantitative findings showed that principals' authentic leadership style was significantly related to teachers' trust and engagement. These findings indicated that an authentic leadership style was an important leadership style to earn the trust of the teachers in performing school activities. Moreover, when the teachers had trust in their school organizations, they strongly involved in their school activities. Therefore, the more the principals exercise authentic leadership, the more they will gain the trust of teachers. And then, the more the teachers believe in their principals, the more they will actively engage in their school activities.

But the principals could not always review their strengths and weaknesses as they are too busy in performing school activities. When they treat with teachers, they could not always open about their personal feelings as they are leaders. Besides, they could not ask the teachers for advice when they are doing what they are assigned to do by the superintendent and then, although they do what is right, others may disagree with them. So, the principals could not always practice authentic leadership because of these reasons. Although principals sometimes practiced authentic leadership, the teachers had high levels of trust and engagement. This is because the conscientious mind of teachers enforces them to improve their schools and their children and to carry out their duties to be dutiful persons. So, teachers had trust in their schools to improve their students and their schools, and then they actively engaged in school activities.

Acknowledgements

We would like to acknowledge our respectful gratitude to Dr. Myat Myat Thaw (Rector, Sagaing University of Education), Dr. Zin Nwe Than (Professor and Head of Department of Educational Theory and Management, Sagaing University of Education), Dr. Myint Myint San (Assistant Director of District Education Officer) and Daw Swe Swe Nwe Htun (Associate Professor and Head of Department of English) for their help, valuable expertise, support, constructive suggestions and critics towards the completion of this work. Finally, we are intended to all people who supported to complete this study.

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J. Myanmar Acad. Arts Sci. 2023 **Vol. XXI. No.6**

PROCESS SKILLS IN LEARNING PHYSICS THROUGH THE USE OF CONTEXTUALIZED INSTRUCTION*

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Abstract

The main purpose of this study is to investigate how utilizing contextualized instruction could enhance science process skills acquisition in learning physics. The research design adopted was one of the quasi-experimental designs, nonequivalent control group design. The research instruments were pretest, posttest, materials including unit plans, lesson plans and contextualized workbook, questionnaires. By using the simple random sampling method, four basic education high schools from Yangon Region were selected. Data were analyzed by using analysis of covariance, Pearson's product moment correlation and multiple regression analysis. The findings of physics achievement on science process skills showed that experimental groups who received the contextualized instruction were significantly higher than the control groups who did not. There was a strong relationship between students' physics achievement on science process skills and their attitudes towards contextualized instruction. The stronger the students' attitudes towards contextualized instruction were established, the higher the physics achievement on science process skills. The predicting factors for physics achievement on science process skills were basic process skills, interpersonal skills and integrated process skills. Therefore, the research findings proved that the use of contextualized instruction had a positive impact on the acquisition of science process skills in high school physics teaching and learning.

Keywords: Science Process Skills, Physics, Contextualized Instruction, Acquisition, Instructional Design

Introduction

In the 21st century, scientific literacy has become a major aim of science education. The goal of all science education is to develop scientifically literate and personally concerned citizens who are able to think and act rationally. Scientific literacy is the capacity to use scientific knowledge, to identify questions and to draw evidence-based calculations in order to understand and help make decisions about the natural world and the changes made to it through human activity (The Organization for Economic Co-operation and Development [OECD], 2003). If the students cannot interpret the physical, chemical or biological actions happened in their environment, it means science education could not reach one of the most important goals which is 'science for all'. To become scientifically literate, four dimensions of science, namely, conceptual knowledge of science, science process, application of science and nature of science, must be understood by the students. These dimensions are involved in understanding science. Gallaugher (2007) stated that understanding cannot be transmitted from the teacher to the students. Students must construct their own understanding from experience. Therefore, learning with understanding requires that students make sense of ideas and experiences and connect them with other, related ideas and experiences that form students' prior knowledge. To apply knowledge also requires that students see the connection between the knowledge and its application. Therefore, this study attempts to successfully implement contextualized instruction which aims to enhance the acquisition of students' science process skills in learning physics.

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* Best Paper Award Winning Paper in Curriculum and Methodology (2022)

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Purposes of the Study

The main purpose of this study is to investigate how utilizing contextualized instruction could enhance science process skills acquisition in learning physics. The specific objectives are as follows.

1. To investigate the use of contextualized instruction that can enhance the acquisition of students' science process skills in learning high school physics.
2. To explore the attitudes of students concerned with contextualized instruction.
3. To make suggestions and recommendations based on the research results for the improvement of teaching and learning physics.

Research Questions

1. Are there any significant differences in acquisition of science process skills of the students who received contextualized instruction and those who did not?
2. Are there any significant relationships between students' physics achievement on science process skills and their attitudes towards contextualized instruction?
3. Do students' attitudes towards contextualized instruction predict physics achievement on science process skills?

Scope of the Research

1. This study is geographically restricted to Yangon Region.
2. Grade Ten physics students and teachers from the selected schools during the academic year 2019-2020 are participated in this study.
3. It is limited only four chapters from Grade Ten physics textbook prescribed by the Basic Education Curriculum, Syllabus and Textbook Committee, 2019.

Definitions of the Key Terms

The definitions of the key terms are presented as follows.

Science Process Skills: The term science process skills refer to a set of broadly transferable abilities appropriate to many science disciplines and reflective of the behaviour of scientists (Padilla, 1990).

Physics: Physics is defined as the scientific study of matter and energy and the relationships between them, including the study of forces, heat, light, sound, electricity and the structure of atoms (Hornby, 2015).

Contextualized Instruction: Contextualized instruction is a way to introduce content using a variety of active learning techniques designed to help students connect what they already know to what they are expected to learn, and to construct new knowledge from the analysis and synthesis of the learning process (Hudson & Whisler, 2007).

Acquisition: Acquisition is the learning or developing of a skill, habit or quality (Hornby, 2015).

Instructional Design: Instructional design is defined as the systematic and reflective process of translating principles of learning and instruction into plans for instructional materials, activities, information resources, and evaluation (Smith & Ragan, 1990).

Statement of the Problem

It is rare that Myanmar students in schools or college comprehend the science content they have studied, and it is even rarer that they can apply the science they know effectively in contexts that are different from those in which it has been learned. Most have forgotten the facts that have been learned in schools, and they have not added to that knowledge in the interim. In other words, the knowledge of science that has been learned in school does not affect how students are able to interact with the world of daily experience. Although the students have a strong factual base in science, but they have not integrated that knowledge in a way that makes sense to them or enables them to use it effectively. According to Gallagher (2007), it is textbook knowledge but it lacks the synthesis required to achieve understanding and application.

However, educational achievement cannot truly be attained through traditions and practices such as rote-learning, teacher-centered approaches, and so on (Hallinger, 1998). All schools in Myanmar use the same curriculum. The syllabus for Grade Ten Physics focuses on Mechanics, Heat, Wave and Sound, Optics, Electricity and Magnetism. Analysis of the study content of physics in high school shows that syllabi are quite dense and overloaded with many topics. At the end of the lessons, the teachers can only give problems to solve and homework assignments. Therefore, the teachers do not have enough time to provide the students with the contextualized practical activities. As a result, the quality of physics teaching, in particular, its practical, experimental component, dramatically decreased. Methodology Department (2017) investigated how physics is taught in basic education high schools in Myanmar. According to the results from this investigation, physics teachers in Myanmar mostly used teacher-centered approach in their physics teaching. This is also highlighted that the quality of physics teaching become purely theoretical with almost no practical work involved.

Collette and Chiappetta (1989) stated that science instruction becomes more relevant to students when it is taught within the context of the everyday life along with which takes place in the science laboratory. Therefore, to provide meaningful learning for students, physics course content must include practical as well as theoretical ideas. For physics instruction, it is needed to focus on students' interests, common events, inventions and social problems. As a result, students could see the usefulness of physics and become more interested in science and technology. Over the years, students' achievements of physics in Myanmar secondary schools have been decreased. This is due to the fact that these students fail to see the inter-dependent relationship that exists between the academic contents of physics subjects offered in school and their applicability in real life. Consequently, there is low transfer of what is learned in the school to the real-world. This is the gap that this study is construed to fill. Therefore, this research emphasizes the experiencing contextualized activities for the students. On the other hand, deviating from the traditional mode of instruction, contextualized instruction highlights a change in the instructional pattern (Stuart & Henry, 2002, as cited in Panek, 2012). Contextualized instruction is student-centered and encourages student learning through observation, connection and authentic instead of factual memorization.

Review of Related Literature

Fundamental Factors of Contextualized Instruction: To gain success in applying contextualized instruction in learning physics, there are seven components of contextualized instruction that are useful (Wijarwadi, 2008). They are constructivism, inquiry, questioning, learning community, modeling, reflection and authentic assessments.

Constructivism: Constructivist theory rests on the assumption that knowledge is constructed by students as they attempt to make sense of their experiences (Driscoll, 2005). Therefore, learners are not empty vessels waiting to be filled, but rather active organisms seeking meaning.

Inquiry: Inquiry is a cycling process of observing, questioning, investigating, analyzing and concluding. It is the core component in contextualized instruction. In contextualized instruction, inquiry also refers to the activities of students in which they develop knowledge and understanding of scientific ideas, as well as an understanding of how scientists study the natural world.

Questioning: In contextualized instruction, questioning is seen as teacher's activity to motivate, provide, and assess thinking ability of students. The process of questioning in contextualized instruction can be created between teacher to the students, students to teacher and students to students.

Learning Community: Learning community can be used as a successful teaching strategy in which small groups, each with students with different levels of ability, use a variety of learning activities to improve their understanding of a subject. Each member of the group is responsible for learning, but also for helping others learn.

Modeling: In contextualized instruction, both teacher and students are required to be the models at the classroom activities. Modeling can take the form of something that can be imitated by the students.

Reflection: In contextualized instruction, students and teacher review and respond the events, activities and experiences. Thus, both teacher and students are required to record what they have learnt, felt and appeared new ideas.

Authentic Assessment: Contextualized instruction is intended to build knowledge or skill in meaningful ways by engaging students in real life, or authentic context. Therefore, in contextualized instruction, authentic assessment is used to describe the real competence of students to subject matter. Authentic assessment aims at evaluating students' ability in real world context. It is a kind of effective assessment since it is not only done at the period, but it also integrated together with teaching and learning activities. The main factor of learning physics is that students learn through inquiry process so that they can study in good spirit and comfortable conditions. Students will learn from what they have done and get experience from it. In this way, students' conceptual understanding and science process skills can be developed.

Science Process Skills in Physics: The curriculum project, Science – A Process Approach (SAPA), has classified the science process skills into two types – Basic and Integrated. The basic (simpler) process skills provide a foundation for learning the integrated (more complex) skills. Basic process skills apply specifically to foundational cognitive functioning especially in the elementary grades. In addition, these skills also form the backbone of the more advanced problem-solving skills (Brotherton & Preece, 1995). Integrated process skills are immediate skills that are used in problem-solving. Integrated skills include skills such as identifying variables, constructing tables of data and graphs, describing relationships between variables, acquiring and processing data, analyzing investigations, constructing hypotheses, operationally defining variables, designing investigations and experimenting. The integrated processes are more appropriate for students at students four and above. Science process skills are cognitive and psychomotor skills employed in problem solving. Science process skills can be acquired and developed through science practical activities. Thus, both basic and integrated science process skills which are relevant and appropriate for high school physics are applied in this study.

Background Teaching Models: There are four background teaching models that supposed the proposed instructional design of contextualized instruction. They are Glaser's basic teaching model, Khin Zaw's multimodal model, Landa's algorithmic model and Roth's conceptual change instructional model. In this study, contextualized instruction is provided through the use of proposed instructional design. The following table shows the conceptual framework for this study.

Table 1 Conceptual Framework

Science Process Skills	Contextualized Instruction	Learning Procedure
Observing	Contextualization	1. Orientating Exchange of Knowledge
Measuring		2. Contextualizing Prior Knowledge
Classifying		3. Exposing Cognitive Conflict
Identifying Variables		
Formulating Hypotheses	De-Contextualization	4. Performing Cognitive Apprenticeship
Designing Investigations		
Interpreting Data		5. Experiencing Contextualized Activities
Inferring		
Graphing Skills	Re-Contextualization	6. Reconciling Contextualized Knowledge
Predicting		7. Applying Contextualized Knowledge
Communicating		8. Reflecting on Contextualized Knowledge

Figure 1. shows the instructional design for contextualized instruction.

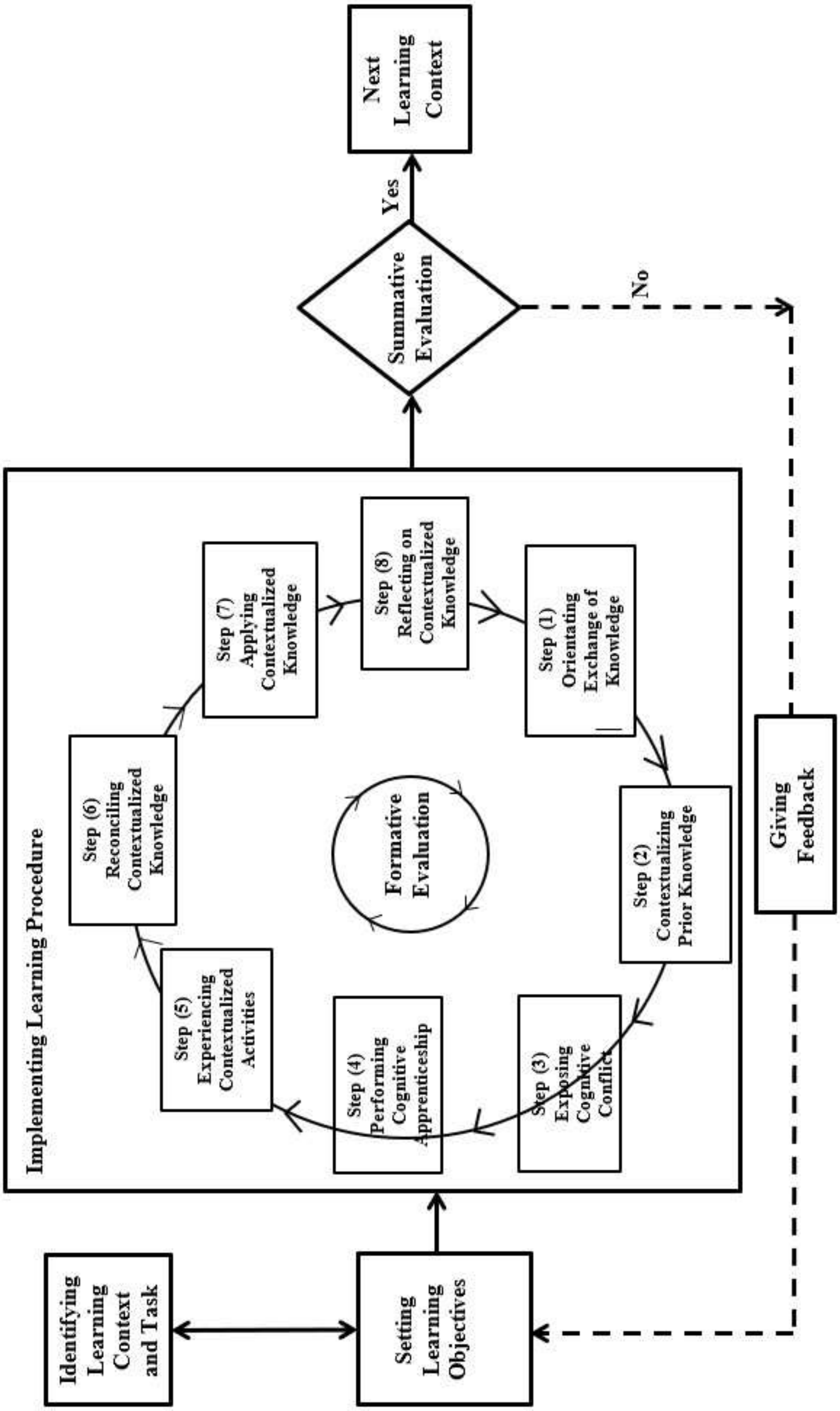

Figure 1 Instructional Design for Contextualized Instruction

Methods

Research Design. The research design used in this study was one of the quasi-experimental designs, nonequivalent control group design.

Population and Sample Size. The population and sample size of the study are depicted in Table 2.

Table 2 Population and Sample Size

Region	District	Township	Name of School	No. of Population	No. of Sample
Yangon	East	South Okkalapa	No. (1) Basic Education High School, South Okkalapa	205	105
	West	Hlaing	No. (1) Basic Education High School, Hlaing	172	101
	South	Dala	No. (1) Basic Education High School, Dala	310	115
	North	Mingaladon	No. (12) Basic Education High School (Branch), Mingaladon	100	100
Total				**787**	**421**

Instruments. The research instruments were pretest, materials including sample unit plans, lesson plans based on the instructional design for contextualized instruction, posttest and questionnaires.

Analysis of Data. The Statistical Package for the Social Sciences (SPSS) Version 22 was used to analyze the data. The data were analyzed by using one-way analysis of covariance, Pearson's product moment correlation and multiple regression analysis.

Findings

Research Findings of Physics Achievement on Science Process Skills

In an attempt to answer the first research question, one-way ANCOVA was used to determine the significance of contextualized instruction between the experimental and control groups on the acquisition of science process skills. Based on the results of the pretest, the comparison of pretest mean scores on the science process skills in the four selected schools is displayed in Table 3.

Table 3 Results of Pretest Scores on Science Process Skills in Four Schools

School	Group	N	M	SD	MD	*F*	*p*
S1	Experimental	53	20.21	3.57	1.82	6.61	.012*
	Control	52	18.29	4.07			
S2	Experimental	50	19.48	3.86	−.56	.615	.435 (ns)
	Control	51	20.04	3.27			
S3	Experimental	57	19.46	3.78	.16	.047	.828 (ns)
	Control	58	19.29	4.23			
S4	Experimental	50	19.50	3.44	.18	.058	.810 (ns)
	Control	**50**	**19.32**	**4.01**			

Note. S1 = No. (1) Basic Education High School, South Okkalapa; S2 = No. (1) Basic Education High School, Hlaing; S3 = No. (1) Basic Education High School, Dala; S4 = No. (12) Basic Education High School (Branch), Mingaladon., ns = not significant. **p* < .05.

The ANCOVA results from the Table 3 showed that no significant difference was found between the pretest mean scores of the experimental and control groups except in S1. Therefore, the students from the experimental and control groups could be assumed to have had approximately the same science process skills prior to the intervention. Based on the ANCOVA results of pretest scores on science process skills in four schools, the graphical illustration for the comparison of pretest mean scores on science process skills is presented in Figure 2.

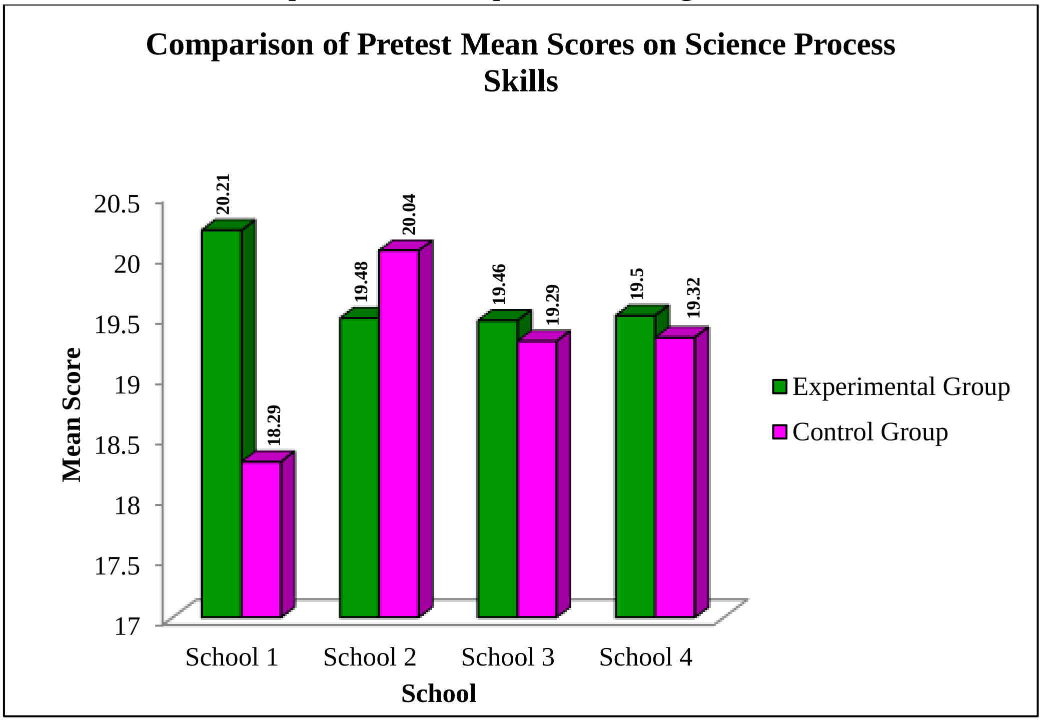

Figure 2 Comparison of Pretest Mean Scores on Science Process Skills in Four Schools

Quantitative Findings for the Posttest Scores on Science Process Skills

According to the quasi-experimental design, the two intact groups from each school were selected as the experimental group who received contextualized instruction and the control group who did not. Gay and Mill (2016) stated that for controlling variables, use of ANCOVA is basically equivalent to matching groups on the variable or variables to be controlled. Therefore, in this study, to analyze the data from posttest on science process skills, one-way ANCOVA was used.

The following table shows the analysis of covariance results for posttest scores on science process skills in four schools.

Table 4 Analysis of Covariance (ANCOVA) Results for Posttest Scores on Science Process Skills in Four Schools

School	Group	N	M	SD	MD	*F*	*p*
S1	Experimental	53	30.38	6.24	11.55	105.02	.000***
	Control	52	18.83	5.10			
S2	Experimental	50	35.50	6.27	7.17	31.05	.000***
	Control	51	28.33	6.47			
S3	Experimental	57	35.14	6.16	15.30	211.57	.000***
	Control	58	19.84	5.03			
S4	Experimental	50	30.16	3.85	7.12	52.11	.000***
	Control	50	23.04	5.77			

Note. S1 = No. (1) Basic Education High School, South Okkalapa; S2 = No. (1) Basic Education High School, Hlaing; S3 = No. (1) Basic Education High School, Dala; S4 = No. (12) Basic Education High School (Branch), Mingaladon, ***p < .001.

When pretest scores on science process skills was considered as a covariate, it was found that there were significant differences between the experimental and control groups for the posttest scores on science process skills at (p = .001) level. Therefore, it can be interpreted that the use of contextualized instruction significantly enhanced the students' ability to conducting the physics experiment, handling of data, computation of results and reporting the physics experiment. Based on the one-way ANCOVA results of posttest scores on science process skills in the four schools, the graphical illustration for the comparison of posttest mean scores on science process skills in four schools is presented in Figure 3.

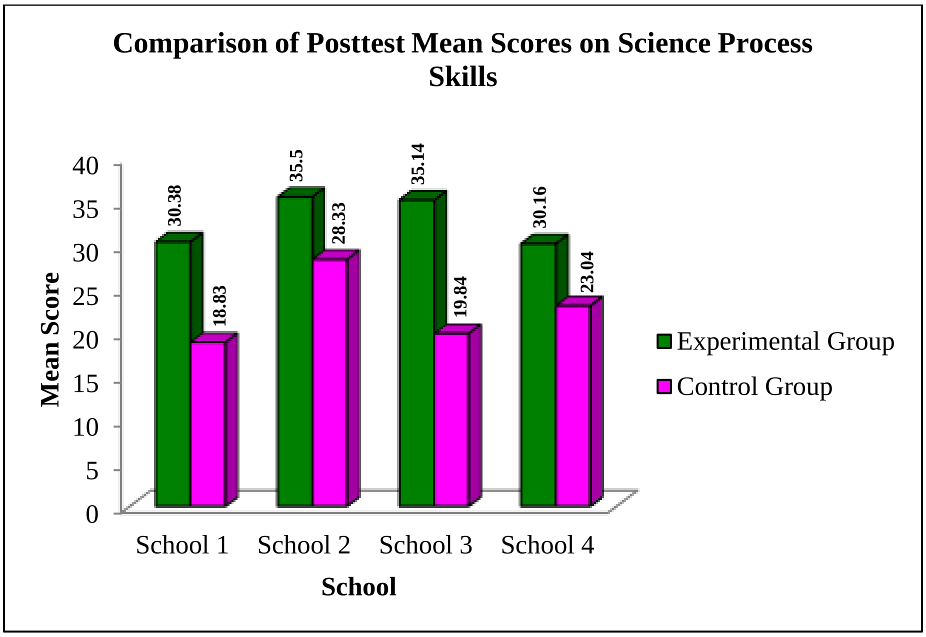

Figure 3 Comparison of Posttest Mean Scores on Science Process Skills in Four Schools

Relationship between Students' Physics Achievement on Science Process Skills and Students' Attitudes towards Contextualized Instruction: In an attempt to answer the second research question, Pearson product-moment correlation was used. The correlation between physics achievement on science process skills and three variables from students' attitudes towards contextualized instuction are shown in Table 5.

Table 5 Correlation between Physics Achievement on Science Process Skills and Students' Attitudes towards Contextualized Instruction

Variables	Physics Achievement on Science Process Skills	Basic Process Skills	Interpersonal Skills	Integrated Process Skills
Physics Achievement on Science Process Skills	1	.770**	.757**	.747**
Basic Process Skills		1	.754**	.754**
Interpersonal Skills			1	.750**
Integrated Process Skills				1

Note. ** Correlation is significant at the 0.01 level (2 – tailed).

From the Table 5, it can be seen that physics achievement on science process skills was significantly correlated with the students' attitudes towards contextualized instruction: basic process skills (r = .770**, $p < .01$), interpersonal skills (r = .757**, $p < .01$) and integrated process skills (r = .747**, $p < .01$). According to the strength of correlation stated by Gay, Mills and Airasian (2012), a strong statistically significant correlation was found between physics achievement on science process skills and the students' attitudes towards contextualized instruction. Therefore, it can be interpreted that students who possessed the interpersonal skills, basic process skills and integrated process skills through contextualized instruction tended to have the best physics achievement on science process skills.

Regression Analysis of Predictions of Students' Attitudes towards Contextualized Instruction for Physics Achievement on Science Process Skills: In an attempt to answer the third research question, multiple regression analysis was used to see what impact multiple variables have on an outcome. For the predictions, continuos predictor variables are basic process skills, interpersonal skills and integrated process skills towards contextualized instruction and a continuous criterion variable is physics achievement on science process skills. Table 6 shows the results of the regression findings for predictions of students' attitudes towards contextualized instruction for physics achievement on science process skills.

Table 6 Regression Analysis Summary for the Variables from Students' Attitudes towards Contextualized Instruction Predicting Physics Achievement on Science Process Skills

Variables	B	β	t	R	R^2	Adj R^2	F
Physics Achievement on Science Process Skills	8.371		2.650***	.830	.689	.684	152.128***
Predictor Variables							
Basic Process Skills	1.418	.348	5.299***				
Interpersonal Skills	1.274	.299	4.592***				
Integrated Process Skills	.808	.261	3.998***				

Note. Constant = Dependent variable: Physics Achievement on Science Process Skills, ***$p < .001$.

The summary table shows that the multiple correlation coefficient (R), using all the predictors simultaneously is .830 (R^2= .689) and the adjusted R^2 is .684. It means that 68.4% of the variance in physics achievement on science process skills can be predicted from basic process skills, interpersonal skills and integrated process skills towards contextualized instruction. In regression analysis summary, beta column (β) indicated that the best predictor was basic process skills (β = .348***, p < .001). Then, the second predictor was interpersonal skills (β = .299***, p < .001) and the last predictor was integrated process skills (β = .261***, p < .05).

Based on these regression findings, the regression equation can be defined as follows:

PA = 8.371+ .1.418 X1 + 1.274 X2 + .808 X3

Where: PA = Physics Achievement on Science Process Skills

X1 = Basic Process Skills

X2 = Interpersonal Skills

X3 = Integrated Process Skills

The multiple regression model for predicting students' attitudes towards contextualized instruction for physics achievement on science process skills obtained from applying regression analysis was shown in Figure 4.

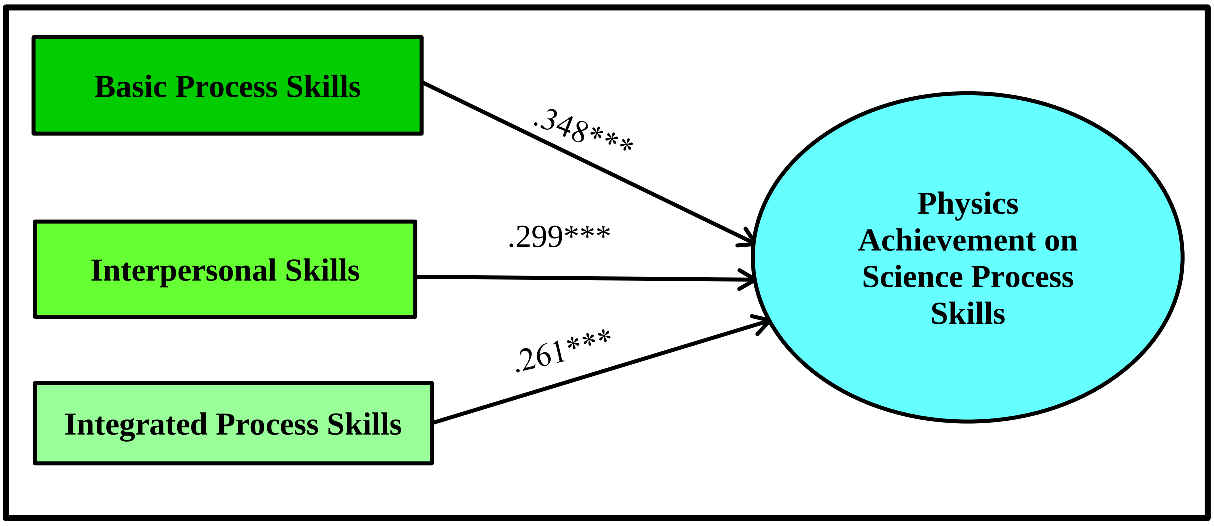

Figure 4 Multiple Regression Model of Predicting Students' Attitudes towards Contextualized Instruction for Physics Achievement on Science Process Skills

Discussion

In assessing science process skills, the pretest scores revealed that there was no significant difference between the experimental and control groups in all selected schools. When pretest scores on science process skills were considered as a covariate, the results of the one-way analysis of covariance (ANCOVA) for posttest scores showed that the experimental groups performed significantly higher than the control groups in the acquisition of science process skills. Therefore, it can be interpreted that the use of contextualized instruction had a significant effect on students' achievement in science process skills. This finding is in agreement with the study conducted by Kurnianingsih (2017) that science process skills in science learning through contextual approach with model of learning cycle gained an average of good category. This is also supported by the study conducted by Pesman (2012) that the contextual approach in physics education can provide the students with problem solving skills, scientific process skills or scientific literacy. Therefore, these research results were consistent with the results of current research on assessing science process skills.

Regarding the results from the Pearson-product moment correlation, a statistically significant relationship was found between the dimensions of students' attitudes towards the contextualized instruction and physics achievement on science process skills. In examining the predicting factors of students' attitudes towards contextualized instruction, the best predictor was basic process skills, the second predictor was interpersonal skills and the last predictor was integrated process skills. As students are interested and preferred in basic process skills, their interpersonal skills and integrated process skills will be gradually improved. Therefore, it can be concluded that the application of contextualized instruction had a positive impact on the acquisition of students' science process skills in teaching and learning physics.

Suggestions

In physics teaching, the teachers have to teach to be able to draw illustration diagrams, labeling the diagrams precisely. It is mainly concerned psychomotor domain or skills of learners. So, this competency has to be practiced frequently. The teachers have to teach the meaning of physics concepts, definitions, laws, theory and principles including discoverers. It is essential to practice in solving problems themselves by thinking the learned material critically. In addition, the physics subject is a learning which explains the natural phenomenon in a simple way and it tries to connect between facts found in that phenomenon. Therefore, it is suggested that the physics teacher should make the students realize that the process in physics is not only learning about the academic process but also to comprehend the environment.

Generally, the high school students are between the ages of 11 to 15 years. Students at this level of development are at the formal operations stage as according to Piaget (1966). Students at this level are capable to perform logical operations wisely through firmly based on a limited learning experience. Besides, they are connected with hypothetical problems and are able to think logically. With respect to the development of high school students, therefore, it is suggested that teachers should apply a variety of learning strategies to ensure that the students' science process skills are developed effectively.

As pointed out by Ministry of Education (MOE, 2016), the practical component of the high school physics curriculum complements the theoretical component. As such it is an essential and integral part of the whole curriculum and is equally important. Therefore, it is suggested that students' learning physics should be promoted through a variety of activities such as experiments not only in physics laboratory but also in the classrooms. As teachers, it is needed to give students the specific instructions for laboratory session, guidelines to report the physics experiments. In addition, students' laboratory report should be graded. Tekbiyik (2010) pointed out in his study that contextualized materials increased students' learning and affected students' attitudes positively. Most of the students perceived that conducting assessment and instruction using contextualized workbooks and worksheets for each lessons promotes their thinking skills and science process skills. Therefore, it is suggested that students should be provided with contextualized materials to learn abstract concepts and eliminate misconceptions in physics.

In addition, according to the results from the quantitative study, there were significant differences in science process skills in physics between high school students who receive contextualized instruction and those who do not. Therefore, it is suggested that a physics teacher should use contextualized instruction to overcome the problems related physics in the classrooms and to develop higher-order thinking skills and science process skills.

Recommendations

In this study, contextualizing the learnt content and the context introduced earlier in the lesson enabled the students to evaluate their prior conceptions regarding a given physics phenomenon. The self-reflections enhanced students' reasoning skills, including science process skills and problem solving. To this end, it is recommended that the physics teachers encourage their students to make self-reflections through evaluation of previously learnt physics ideas, theory, laws and principles and at the end of the instruction.

The results of the study revealed that students will be achieving more if they are taught with contextualized instruction rather than formal instruction. The limitation of the study is that the research administered to Grade Ten students on the content areas of describing motion, forces, work and energy from Mechanics module and heat, temperature, measurement of heat from Heat module. Therefore, it is recommended that further research should be carried out by using wide content area of physics such as, light, waves and optics, electricity, and modern physics.

Since sample schools in this study were randomly selected from Yangon Region, it is recommended that further replication of this study with larger class sizes, classes operating during the same academic year and classes at other basic education high schools would yield results more generalizable to the typical high school course. This study showed the enhancement of acquisition of students' science process skills through the use of contextualized instruction. However, there are also some other methodologies which show the effectiveness on students' achievement in conceptual understanding, problem solving and science process skills. Therefore, it is recommended that contextualized instruction should be investigated and compared with other methodologies for further studies and researches.

To sum up, in building a modern developed nation, science education is also essential for Myanmar. Physics lies at the heart of science education. Therefore, physics teaching methodology should be given as a major task of science education. It is highly recommended to conduct further research in physics teaching methodology for the improvement of science education in Myanmar.

Conclusion

Based on the results of the research that has been done, it can be concluded that the application of the contextualized instruction can improve students' science process skills. Students become more active in thinking and communicating in learning activities because students directly observe, plan experiments, conduct experiments to produce products that support the process of solving a problem. Students become aware of the whole material learned because students form their own knowledge, certainly not separated from the teacher's guidance as a facilitator of learning activities.

Regarding the data obtained through statistical computation, it is obvious that the application of contextualized instruction is useful to help the students to get better physics achievement on science process skills. Therefore, the research findings highlighted that the contextualized instruction is an effective instruction for teachers and students to develop physics achievement particularly science process skills in teaching and learning physics in Myanmar.

Acknowledgements

Firstly, I would like to express my sincere appreciation to Dr. Kay Thwe Hlaing (Rector, Yangon University of Education), Dr. Pyone Pyone Aung (Pro-Rector, Yangon University of Education), Dr. May Myat Thu (Pro-Rector, Yangon University of Education), Dr. Khin Khin Oo (Pro-Rector, Yangon University of Education) and Dr. Nyo Nyo Lwin (Pro-Rector, Yangon University of Education) for the administrative support and permission. Secondly, I am profoundly grateful to Dr. Khin Mar Khine (Professor and Head of Department of Curriculum and Methodology, Yangon University of Education) for her valuable suggestions, and support throughout this study. Thirdly, I would like to render my heartfelt gratitude to my supervisor, Dr. Thida Wai (Professor, Department of Curriculum and Methodology, Sagaing University of Education) and my co-supervisor, Dr. Swe Swe Nyunt (Professor, Department of Curriculum and Methodology, Yangon University of Education) for their precious suggestions, guidance and support during this study.

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သင်ပြြနည်းဌာန၊ (၂၀၁၇)။ အခြေခံပညာ ဆရာ၊ ဆရာမများ၏ ဘာသာရပ်အသီးသီးအား လက်ရှိသင်ကြားပို့ချပေးနေမှု အခြေအနေကို လေ့လာဆန်းစစ်ခြင်း။ ရန်ကုန်မြို့၊ ရန်ကုန်ပညာရေးတက္ကသိုလ်။

J. Myanmar Acad. Arts Sci. 2023 **Vol. XXI. No.6**

AN INVESTIGATION INTO THE TEACHER EDUCATORS' PEDAGOGICAL KNOWLEDGE OF TECHNOLOGY INTEGRATION

Nyein Thet Swe[1] and Aye Su Myat[2]

Abstract

The major purpose of this research is to investigate teacher educators' pedagogical knowledge of technology integration. The specific purposes of this research are to compare teacher educators' pedagogical knowledge of technology integration with four dimensions, to investigate teacher educators' pedagogical knowledge of technology integration by total teaching experiences, and to investigate teacher educators' pedagogical knowledge of technology integration by educational experiences. Total of (127) teacher educators were selected from three Education Degree Colleges in Yangon Region. A descriptive (survey) research design was used. As an instrument, questionnaire was comprised of (40) items; (10) items in each dimension. A descriptive statistics and independent samples *t* test were applied to analyze quantitative data. According to research findings, technological pedagogical content knowledge of teacher educators is the highest and technological knowledge is the lowest among the four dimensions of pedagogical knowledge of technology integration. There were no significant differences in pedagogical knowledge of technology integration between the two groups by the total teaching experiences and by the educational experiences. Thus, it is hoped that this study will partially support the improvement of teacher educators' pedagogical knowledge of technology integration. It was suggested that the teacher education program should provide enough technological training and facilities and opportunities for teacher educators.

Keywords: Technological Knowledge, Pedagogical Knowledge, Technological Pedagogical Knowledge, Technological Pedagogical Content Knowledge, Technology Integration

Introduction

Education is the process of facilitating learning, or the acquisition of knowledge, skills, values, morals, beliefs and habits. It helps people become better citizens, gets a better-paid job, and shows the difference between good and bad. It polishes a person's mind, human personality, reinforces thoughts and strengthens character and behaviors toward others. Education will implement both teacher and learner in the teaching and learning process of education.

Teacher should adopt a fun method and technology-based learning method to teach students instead of a lecture method. Teacher can combine appropriate methods, techniques and technologies based on student needs to enrich the teaching and learning process. The use of technology as an instructional tool is strongly recommended by many professional organizations. Organizers should educate teachers the technological activities via educational programs (Brush, Glazewski, Rutowski, Berg, Stromfors, Hernandez Van-Nest & Sutton, 2003).

Purposes of the Study

The main purpose of this study is to investigate teacher educators' pedagogical knowledge of technology integration.

The specific objectives of this study are as follows.

1. To compare teacher educators' pedagogical knowledge of technology integration with four dimensions

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2. To explore the significant differences in teacher educators' technological knowledge, pedagogical knowledge, technological pedagogical knowledge and technological pedagogical content knowledge by total teaching experiences and educational experiences

3. To make suggestions and recommendations based on research findings

Research Questions

The research questions of this study are as follows.

1. To what extent do the teacher educators possess technological knowledge, pedagogical knowledge, technological pedagogical knowledge, and technological pedagogical content knowledge?
2. Which one is the highest and which one is the lowest among the four dimensions of teacher educators' pedagogical knowledge of technology integration?
3. Are there any significant differences in teacher educators' pedagogical knowledge of technology integration by total teaching experiences?
4. Are there any significant differences in teacher educators' pedagogical knowledge of technology integration by educational experiences?

Scope

Three Education Degree Colleges were selected from Yangon Region. It involved (127) teacher educators of Education Degree Colleges in the 2021-2022 Academic Year. A questionnaire for investigating the teacher educators' pedagogical knowledge of technology integration was used as the instrument. This questionnaire was based on four dimensions among seven dimensions of the studies conducted by Mishra and Koehler (2008) conceptualized the TPACK framework. Four major dimensions are (a) technological knowledge, (b) pedagogical knowledge, (c) technological pedagogical knowledge, and (d) technological pedagogical content knowledge.

Definition of Key Terms

Technological Knowledge: Technological knowledge refers to the knowledge about various technologies, ranging from low-tech technologies such as pencil and paper to digital technologies such as the Internet, digital video, interactive whiteboards, and software programs (Mishra & Koehler, 2008).

Pedagogical Knowledge: Pedagogical knowledge refers to the methods and processes of teaching and includes knowledge in classroom management, assessment, lesson plan development, and student learning (Mishra & Koehler, 2008).

Technological Pedagogical Knowledge: Technological pedagogical knowledge refers to the knowledge of how various technologies can be used in teaching, and to understanding that using technology may change the way teachers teach (Mishra & Koehler, 2008).

Technological Pedagogical Content Knowledge: Technological pedagogical content knowledge refers to the knowledge required by teachers for integrating technology into their teaching in any content area. Teachers have an intuitive understanding of the complex interplay between the three basic components (technological knowledge, pedagogical knowledge, and content knowledge) of knowledge by teaching content using appropriate pedagogical methods and technologies (Mishra & Koehler, 2008).

Technology Integration: Technology integration is the use of technology tools in general content areas in education to allow students to apply computer and technology skills to learning and problem-solving (Christensen, 2019).

Significance of the Study

Some researchers have emphasized on the difference between knowing technologies and knowing how to effectively technologies for teaching. The Technological Pedagogical and Content Knowledge (TPACK) framework is a promising way forward for successfully integrating technology throughout curriculum planning while finding a model for incorporating technology into the curriculum. According to TPACK, technology is not merely a new item added into the curriculum. It provides the special kind of teacher knowledge which is required for effectively using technology for teaching.

In this study, the TPACK framework is used to develop a survey for measuring teachers' knowledge of technology integration. This study will observe the area of integrating technology into the implementation of a curriculum and expand the discussion of TPACK as a framework and as an instrument for measuring technology integration. The TPACK framework has proven beneficial in the areas of elementary, secondary, and undergraduate in-service education. This study will also provide teacher educators with possible educational technology and content-based uses of those tools and resources. Regarding this research, teacher educators may be provided with the proper use of educational technologies, tools and resources at schools. Consequently, it may also support assessing teacher educators' knowledge in the area of technology integration.

Review of Related Literature

Technology Integration from Behaviorist Perspective

Behaviorism is a theory of animal and human learning that only focus on observable behaviors and discounts mental activities. Behavior theorists define learning as nothing more than the acquisition of new behavior (Mills, 2006).

An integrated learning system, computer-based tutoring system, drill-practice program and assessment software are some of the technologies designed based on behaviorist learning theory. Integrated learning system and computer assisted instruction have been readily adopted in many schools as they closely match the traditional routine of classroom life (Onyegegbu, 2007).

Integration technology from behaviorist perspective allows computers to:

1. incorporate different kinds of materials,
2. incorporate different kinds of exercises,
3. monitor each student's progress,
4. provide feedback that is immediate and geared to the student's response, and
5. set up the instruction so that the student can start and stop whenever they like.

Technology integration from this perspective is commonly used to increase student motivation. Such integration of technology was mainly related to its usage to employ computers as presentation tools providing additional resources and engaging visuals to enhance lessons, motivate students and promote belief.

Educational Technology

Educational technology helps in providing efficiency to the task of teaching and learning. To make teaching-learning more effective and efficient, teachers need to understand the role of educational technology. Educational technology has two main areas. The first area refers to the use of audio-visual aids. The second area is concerned with educational psychology, philosophies, learning theories, etc.

Teachers need to have sufficient knowledge of educational technology to be able to take advantages of modern technology. Educational technology is a systematic approach to designing and evaluating learning and teaching methods and methodologies and to the application and exploitation of media and the current knowledge of communication techniques in education, both formal and informal (Okojie, Olinzock, & Okojie-Boulder, 2005).

Relationship between Technology in Education and Pedagogy

The process of exploring the relationship between technology in education and pedagogy will encourage critical thinking on the part of teachers as they practice technology integration. The role of technology in education can only be determined if teachers who implement technology at the classroom level are involved in technology decision-making because teachers have the responsibility of a facilitating instruction. It is important for teachers to recognize that a relationship exists between technology in education and pedagogical decision-making. Therefore, effort should be made to link technology for instruction to all levels of pedagogical processes and activities.

Constructs of TPACK Framework

Technological Pedagogical and Content Knowledge (TPACK) was introduced to the educational research field as a conceptual framework for understanding teacher knowledge that is required for technology integration (Mishra & Koehler, 2008).

TPACK framework provides a critical perspective with which to view technology integration in classroom settings. Mishra and Koehler (2008) conceptualized the TPACK framework consists of seven components. Definitions for each component are as follows.

1. Technological Knowledge (TK) means knowledge about different technologies, including both low-tech and high-tech technologies.
2. Pedagogical Knowledge (PK) means knowledge of teaching methods.
3. Content Knowledge (CK) means knowledge about the actual subject matter to be taught.
4. Technological Content Knowledge (TCK) means knowledge of how technology can create new representations for subject content.
5. Technological Pedagogical Knowledge (TPK) means knowledge of using technology to implement different teaching methods.
6. Pedagogical Content Knowledge (PCK) means knowledge of teaching methods with respect to subject matter content.
7. Technological Pedagogical Content Knowledge (TPCK) means knowledge of using technology to implement teaching methods for different types of subject matter content.

These seven components characterize the different types of knowledge teachers need for technology integration (See Figure 1).

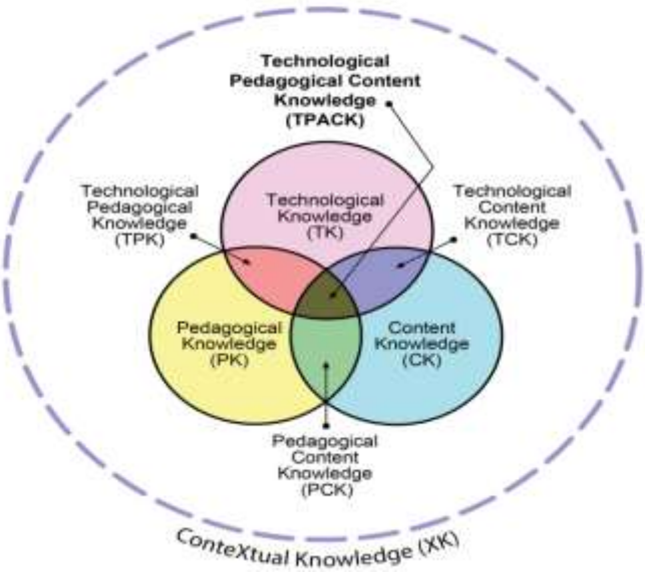

Figure 1. Technological Pedagogical and Content Knowledge Framework

Source: From Schmidt, Baran, Thompson, Mishra, Koehler, & Shin (2009), p. 125.

Among these seven constructions, four components were used in this study. These four components are _

1. Technological Knowledge
2. Pedagogical Knowledge
3. Technological Pedagogical Knowledge
4. Technological Pedagogical Content Knowledge

TPACK framework focuses on designing and evaluating teacher knowledge. TPACK is a useful frame for thinking about what knowledge teachers must have to integrate technology into teaching and how they might develop this knowledge.

Technological Knowledge (TK)

The technological knowledge strand guides teachers to develop learning activities that support students to develop specialist knowledge of what they will need to design and develop outcomes. Technological knowledge involves a working understanding of technical and operational language, an understanding of common technological equipment and related software, a grasp of basic scientific and mathematical principles on which technology rests, and an understanding of the history of technology and its impacts on society. It also includes the use of technology to learn, discover, analyze, test, and comprehend ideas.

Pedagogical Knowledge (PK)

The pedagogical knowledge base of teachers includes all the required cognitive knowledge for creating effective teaching and learning environments.

The main components of the various models of general pedagogical knowledge are as follows.

Knowledge of classroom management. It means knowledge of maximizing the quantity of instructional time, handling classroom events, teaching at a steady pace, and maintaining clear direction in lessons.

Knowledge of teaching methods. It means knowledge of having a command of various teaching methods, knowing when and how to apply each method.

Knowledge of classroom assessment. It means knowledge of different forms and purposes of formative and summative assessments, knowledge of how different frames of reference (e.g., social, individual, criterion-based) impact students' motivation.

Structure. It means knowledge of structuring of learning objectives and the lesson process, lesson planning and evaluation.

Adaptively. It means knowledge of dealing with heterogeneous learning groups in the classroom (Shulman, 1987).

Technological Pedagogical Knowledge (TPK)

Technological pedagogical knowledge is an understanding of how teaching and learning can change when particular technologies are used in particular ways. This includes knowing the pedagogical affordances and constraints of a range of technological tools as they relate to disciplinarily and developmentally appropriate pedagogical designs and strategies. To build technological pedagogical knowledge, a deeper understanding of the constraints and affordances of technologies and the disciplinary contexts within which the function is needed.

Technological Pedagogical Content Knowledge (TPCK)

Technological pedagogical content knowledge is an understanding that emerges from interactions among content, pedagogy, and technology knowledge. TPCK is the basis of effective teaching with technology, requiring an understanding of the representation of concepts using technologies; pedagogical techniques. By simultaneously integrating knowledge of technology, pedagogy and content, expert teachers bring TPCK into play any time they teach. Each situation presented to teachers is a unique combination of these three factors. This is the kind of deep, flexible, pragmatic, and nuanced understanding of teaching with technology in considering TPCK as a professional knowledge construct.

Levels of Teachers' Technological Pedagogical and Content Knowledge

Niess, Sadri, and Lee (2007) proposed a development model for TPACK. In this model, there are five steps, namely: (a) recognizing, (b) accepting, (c) adapting, (d) exploring, and (e) advancing.

Recognizing (knowledge). At this level, teachers are able to use the technology and recognize the alignment of the technology with particular content. Teachers rarely think about incorporating the technology, and only consider the technology as a low level for learning the content.

Accepting (persuasion). Teachers form a favourable or unfavourable attitude towards teaching and learning subject matter with technology. Teachers at this level practice with the technology but do not consistently think about how the technology might support teaching.

Adapting (decision). Teachers engage in activities that lead to a choice to adopt or reject teaching and learning the content with technology. Teachers manage the activities through the use of prepared worksheets that guide learners toward the intended ideas.

Exploring (implementation). Teachers actively integrate teaching and learning of subject matter with technology. Teachers investigate different ways of teaching the content and are willing to demonstrate new ways of thinking about concepts with technology. They are more apt to allow learners to explore with technology.

Advancing (confirmation). Teachers evaluate the results of the decision to integrate teaching and learning topics with spreadsheets. Teachers willingly consider using the technology in a variety of ways in building content concepts and ideas. They incorporate technology in learner assessment of the content.

Previous Related Research

Hosseini and Kamal (2012) conducted a study that aims to develop an instrument to aid investigators and educators in measuring and researching the knowledge of teachers for the integration of technology in teaching. Based on a review of the literature, the technological pedagogical and content knowledge (TPACK) framework was selected as the lens for examining technology integration and a new questionnaire was built upon the work of Schmidt and colleagues. This study was carried out through descriptive survey. The participants of this survey contained (275) in-service teachers in Islamic Azad University, South Tehran Branch enrolled in five different fields in the academic year of 2010-2011.

The sample of the study was selected using a stratified sampling method. Fifty five participants were randomly selected from each group to form the sample of (275) participants. The TPACK instrument contained (53) close-ended Likert-scale questions, for indicating TPACK knowledge and its components. These (53) items were allocated to seven categories corresponding to the components of TPACK. TPACK questionnaire provided strong support for measuring teachers' pedagogical knowledge of integration of technology in teaching. The findings expressed no significant difference of the TPACK questionnaire service teachers' pedagogical knowledge of integration of technology in teaching.

Research Method

The quantitative research method was used in this study.

Research Design

The research design for this study is a descriptive (survey) research design.

Subjects

The participants were selected from three Education Degree Colleges in Yangon Region. Since the population was less than (1000), the whole population was selected for this study. There were (127) teacher educators in this study.

Instrument

As the instrument, the questionnaire for an investigation into the teacher educators' pedagogical knowledge of technology integration was based on the studies constructed by Mishra and Kohler (2008). This research questionnaire was modified to suit the purposes of the study. It includes (40) items, (10) items in each dimension. Each item in the questionnaire was measured with True or False statement.

Procedure

First of all, the relevant literature concerning the research was explored. Secondly, in order to get the required data, an instrument was constructed. The pilot study was held at the Yangon University of Education. For the internal consistency reliability, Cronbach's alpha coefficient was used. The reliability coefficient of the questionnaire was (0.724). And then, the main study was conducted at Hlegu Education Degree College, Thingangyun Education Degree College, and Yankin Education Degree College.

Analysis of Data

In order to know the mean and standard deviation for the teacher educators' pedagogical knowledge of technology integration, descriptive statistics were used. Independent samples *t* test was used to explore the significant difference between two groups of teacher educators by experience.

Research Findings

The collected data were analyzed in order to get accurate results and make appropriate interpretations. The findings and interpretations of the results are presented.

Findings of Teacher Educators' Pedagogical Knowledge of Technology Integration

According to the teacher educators' responses, the mean score of teacher educators' pedagogical knowledge of technology integration is presented in Table 1.

Table 1 Mean Score of Teacher Educators' Pedagogical Knowledge of Technology Integration

Overall Dimension	*N*	Mean	Standard Deviation	Minimum	Maximum
Pedagogical Knowledge of Technology Integration	127	35.03	5.31	13	40

For the overall dimension, the mean value of pedagogical knowledge of technology integration was (35.03) and the standard deviation was (5.31). Teacher educators with scores less than (29.72) were identified as a low-level group. And teacher educators with scores between (29.72) and (40.34) without exception were identified as a moderate-level group. Teacher educators with score greater than (40.34) were identified as a high-level group. The three groups of teacher educators are presented in Table 2.

Table 2 Levels of Teacher Educators' Pedagogical Knowledge of Technology Integration

Level	Score	Number of Teacher	Percentage (%)
Low	$x < 29.72$	16	13%
Moderate	$29.72 \le x \le 40.34$	96	75%
High	$x > 40.34$	15	12%
TOTAL		**127**	**100%**

According to the data presented in Table 2, (12%) of teacher educators were at a high level of pedagogical knowledge of technology integration and (75%) of teacher educators were at a moderate level of pedagogical knowledge of technology integration. But (13%) of teacher educators were at a low level of pedagogical knowledge of technology integration.

Findings of Descriptive Statistics of Teacher Educators' Pedagogical Knowledge of Technology Integration in Each Dimension

In order to determine the mean scores and standard deviations of teacher educators' pedagogical knowledge of technology integration in each dimension, descriptive statistics were used. The results are described in Table 3.

Table 3 Comparison of Mean Scores of Teacher Educators' Pedagogical Knowledge of Technology Integration in each Dimension

Dimension	*N*	Mean	Standard Deviation	Minimum	Maximum
TK	127	8.55	1.33	3	10
PK	127	8.82	1.00	6	10
TPK	127	8.80	1.30	4	10
TPCK	127	8.86	1.68	0	10

Note. TK = Technological Knowledge; PK = Pedagogical Knowledge; TPK = Technological Pedagogical Knowledge; TPCK = Technological Pedagogical Content Knowledge.

Table 3 shows that the comparison of mean scores of teacher educators' pedagogical knowledge of technology integration in each dimension. The mean score of technological knowledge was the lowest. And that of technological pedagogical content knowledge was the highest among the four dimensions.

Findings of Teacher Educators' Pedagogical Knowledge of Technology Integration by Total Teaching Experiences

The independent samples *t* test was used to find whether teacher educators' pedagogical knowledge of technology integration differs between two groups by total teaching experiences: under (18) years and (18) years and over.

Table 4 *t* Values for Teacher Educators' Pedagogical Knowledge of Technology Integration by Total Teaching Experiences

Knowledge	Group	*N*	*M*	*SD*	*MD*	*t*	*df*	Sig.
TK	(18) years and over	59	8.64	1.26	0.17	0.73	125	0.46 (ns)
	Under (18) years	68	8.47	1.39				
PK	(18) years and over	59	8.86	1.07	0.08	0.48	125	0.64 (ns)
	Under (18) years	68	8.78	0.94				
TPK	(18) years and over	59	8.75	1.43	-0.10	-4.55	125	0.65 (ns)
	Under (18) years	68	8.85	1.19				
TPCK	(18) years and over	59	9.07	1.19	0.39	1.32	125	0.19 (ns)
	Under (18) years	68	8.68	1.99				
TOTAL	(18) years and over	59	35.32	3.63	0.54	0.86	125	0.39 (ns)
	Under (18) years	68	34.78	3.50				

Note. TK = Technological Knowledge; PK = Pedagogical Knowledge; TPK = Technological Pedagogical Knowledge; TPCK = Technological Pedagogical Content Knowledge; ns = not significant.

According to Table 4, it was found that there were no significant differences between the two groups in terms of total teaching experiences: one group with under (18) years and the other group with (18) years and over. All teacher educators either with lower teaching experiences or higher teaching experiences had nearly the same pedagogical knowledge of technology integration.

Findings of Teacher Educators' Pedagogical Knowledge of Technology Integration by Educational Experiences

The independent samples *t* test was used to find whether teacher educators' pedagogical knowledge of technology integration differs between two groups by educational experiences: under (11) years and (11) years and over.

Table 5 *t* Values for Teacher Educators' Pedagogical Knowledge of Technology Integration by Educational Experiences

Knowledge	Group	*N*	*M*	*SD*	*MD*	*t*	*df*	Sig.
TK	(11) years and over	60	8.63	1.26	0.15	0.66	125	0.5 (ns)
	Under (11) years	67	8.48	1.39				
PK	(11) years and over	60	8.73	1.06	-0.17	-0.91	125	0.37 (ns)
	Under (11) years	67	8.90	0.96				
TPK	(11) years and over	60	8.68	1.32	-0.23	-0.98	125	0.33 (ns)
	Under (11) years	67	8.91	1.29				
TPCK	(11) years and over	60	9.15	1.10	0.55	1.93	125	0.06 (ns)
	Under (11) years	67	8.60	2.03				
TOTAL	(11) years and over	60	35.20	3.65	0.32	0.50	125	0.62 (ns)
	Under (11) years	67	34.88	3.48				

Note. TK = Technological Knowledge; PK = Pedagogical Knowledge; TPK = Technological Pedagogical Knowledge; TPCK = Technological Pedagogical Content Knowledge; ns = not significant.

According to Table 5, it was found that there were no significant differences between the two groups in terms of educational experiences: one group with under (11) years and the other group with (11) years and over. Teacher educators who had (11) years and over (11) years of educational experience had approximately the same pedagogical knowledge of technology integration as that of teacher educators who had under (11) years of educational experience. There were no significant differences in technological knowledge, pedagogical knowledge, technological pedagogical knowledge, technological pedagogical content knowledge and overall pedagogical knowledge of technology integration between the two groups.

Discussion

According to research findings, most of the teacher educators from three selected education degree colleges were at a moderate level of pedagogical knowledge of technology integration. By comparing the mean scores of teacher educators' pedagogical knowledge of technology integration by four dimensions, it was found that the mean score of technological knowledge was the lowest level and that of technological pedagogical content knowledge was the highest among the four dimensions. There were no significant differences between the mean scores of the two groups in terms of total teaching experiences: one group with under (18) years and the other group with (18) years and over. There were no significant differences between the mean scores of the two groups in terms of educational experiences: one group with under (11) years and the other group with (11) years and over.

This study revealed that teacher educators from three education degree colleges in Yangon Region possessed technological knowledge, pedagogical knowledge, technological pedagogical knowledge, and technological pedagogical content knowledge focusing on technological resources to teach effectively in the teaching-learning process. The research findings were also consistent with the findings of the related research by Hosseini and Kamal (2012). It can be expressed from these findings that teacher educators possessed the required knowledge of technology integration in teaching.

Suggestions

Based on research findings, five suggestions were made for teacher educators. First of all, teacher educators should be encouraged to view technology integration from a wider perspective and be reflective in their teaching when they use technology to facilitate instruction. Another one, technology integration should be considered as part of the process of instructional preparation. Next, instructional technology should be identified at the planning stage just as the learners' readiness is accessed, lesson objectives are identified, methods of presenting are established, and evaluation strategies are determined.

Next, every teacher needs to enhance the implementation of technology integration on going desired outcomes. Finally, a strong focus should be placed on instructional planning and implementation strategies as a way to provide key assistance for teacher educators.

Recommendations

The essence of this research is to provide insight into how teachers can improve their use of technology to support instruction. This study supports ideas with the fact that must the use of technology enhance the student learning experience. The implementation of combination technology and contents area also creates pathways for differentiated instruction to meet the unique needs of students as individual learners within a broader classroom climate.

This study only investigated pedagogical knowledge for technology integration of teacher educators from three education degree colleges in the Yangon Region. Therefore, teacher educators from other Education Degree Colleges are recommended to study. Further research should include teacher educators in other regions and states, high school teachers, middle school teachers and primary school teachers.

Conclusion

The rapid growth in information and communication technologies has brought amazing changes in the 21st century, as well as affected the demands of modern societies. Quality of education directly depends upon the quality of teachers. By knowing technological integration in teaching, the teachers can support not only to improve the achievement of the learners but also to know the learners' innate ability and creativity. Through technology-based teaching, teachers can enhance learners' thinking skills about the problem, search the ways to solve the problems, and solve the problems in the most effective ways in collaboration.

This study supported teachers to know the vital role of technological pedagogical knowledge (TPK) to integrate technology successfully into instruction. And then, it is highlighted that TPK characteristics played the most significant role in successful planning and implementation. If the teacher lacks these foundational understandings, they will have a negative impact on lesson implementation in practice. The technological pedagogical and content knowledge (TPACK) framework offered educators and researchers a way to evaluate and present practical suggestions to develop the teachers' knowledge and skills which are needed for integrating technology into teaching.

Acknowledgements

First of all, we would like to express our respectful gratitude to Dr. Kay Thwe Hlaing (Rector, Yangon University of Education), Dr. May Myat Thu (Pro-Reactor, Yangon University of Education), Dr. Khin Khin Oo (Pro-Reactor, Yangon University of Education), and Dr. Nyo Nyo Lwin (Pro-Reactor, Yangon University of Education) for their administrative support that helps in the smooth preparation of this study. We would like to express our heartfelt gratitude to Dr. Khin Mar Khine (Professor and Head, Curriculum and Methodology Department, Yangon University of Education) for the permission and suggestions that fulfill our desire for small-scale research on the Preliminary Course of Education.

Finally, our special thanks are due to all teacher educators who participated actively in our study and to all persons who supported us in different ways.

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DEVELOPING A SCIENCE PROCESS SKILLS MODEL IN THE TEACHING OF HIGH SCHOOL CHEMISTRY

Chit Su Wai[1] and Kyi Swe[2]

Abstract

The major purpose of this research is to investigate the effectiveness of the proposed science process skills model in the teaching of high school chemistry. The research design adopted in this study was an explanatory sequential (QUAN $\longrightarrow$ qual) design, one of the mixed methods research designs. The research design for the quantitative study is the nonequivalent control group design, one of the quasi-experimental designs. The participants were Grade Ten students selected from BEHS, Hlegu, No. (4) BEHS Thanlyin, BEHS, Pyalo, and No. (1) BEHS Thayet. For this study, Grade Ten students were selected from each school by random sampling method. These students were assigned into two groups: experimental and control. The two groups were administered a pretest to examine the entry behavior on chemistry basic knowledge. Then, the experimental group was treated with the proposed science process skills model and the control group was taught with formal instruction. After that, a posttest was administered to two groups. As data analysis, a one-way analysis of covariance (One-Way ANCOVA) was used for the quantitative research study. Data collected from interviews were analyzed by thematic analysis for the qualitative research study. Four teachers who taught in the experimental groups and (16) students from the experimental groups were interviewed. The results indicated that the chemistry achievement of students who received instruction by the proposed science process skills model was significantly higher than that of students who did not receive it. Qualitative data supported the findings from the quantitative study. Research findings proved that the proposed science process skills model had a positive contribution to teaching chemistry at the high school level.

Keywords: Science, Chemistry, Basic science process skills, Integrated science process skills, Achievement, Science process skills model

Introduction

In the 21st century, knowledge alone is not enough to prepare students to thrive in the world. Thus, to be effective, learning should include the acquisition of core academic content and higher-order thinking skills. The pedagogy should involve creating, working with others, analyzing, presenting, and sharing both the learning experience and the learned concept. According to Dr. Khin Zaw (2001, a), modern pedagogy must discover ways and means of controlling cognitive activities in the WHOLE aspect and not only by the resulting output.

The students can learn not only conceptual understanding but also procedural understanding. Thus, learning by doing is the central idea of chemistry subject. Chemistry contributes to a large extent in the development and growth of a nation. Myanmar, a developing country, needs many talented chemists. Innovative ideas and thought can emerge through the procedural knowledge of chemistry subject because chemistry is considered an experimental science. The purpose of science education is to empower people to utilize exploratory procedural skills. Science process skills have a great impact on personal, social, and other aspects of an individual's life. So, teaching integrated with the science process skills tends to not only get conceptual knowledge but also get procedural knowledge.

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Purposes of the Study

The main purpose of this study is to investigate the effectiveness of the science process skills model in chemistry teaching at the high school level. The specific objectives are as follows:

- To develop a proposed teaching model based on science process skills that can enhance students' achievement
- To investigate the effectiveness of the science process skills model in high school chemistry teaching
- To study the attitudes of teachers and students relating to the science process skills model
- To give suggestions based on the data obtained for improving the teaching of chemistry at the high school level

Research Questions

- What are the effects of the science process skills model in the teaching of high school chemistry?
- Are there significant differences between the achievements in learning chemistry of students who received instruction using the science process skills model and those who did not receive it?
- What are the attitudes of teachers and students towards using the science process skills model?

Scope of the Study

The scope of the study is as follows:

- This study is geographically restricted to Yangon Region and Magway Region.
- This study is limited to the selected chapter of Chapter 3: The Electronic Structures of Atoms and Periodic Table, Chapter 4: The Quantities of Substances: Chemical Calculations, Chapter 5: Non-metals: Oxygen, Carbon, and Halogens, and Chapter 6: Acids, Bases, and Salts from Grade Ten chemistry textbook and is conducted in four sample schools in Yangon Region and Magway Region.
- Participants in this study are (201) Grade Ten students from the selected schools within the school year (2020-2021).

Definition of Key Terms

Science: Science is the study of knowing about the universe through data collected by observation and controlled experimentation (Carin & Sund, 1989).

Chemistry: Chemistry may be defined as the branch of science which is concerned with the study of the composition, properties, and structure of matter and the ways in which substances can change from one form to another or react with one another (Ray, 2007).

Basic Science Process Skills: Basic Science process skills contain skills including observation, classifying, measuring, and calculation, using space / time relationships, communicating, inferring, and predicting (Dahsah, Seetee, & Lamainil, 2017).

Integrated Science Process Skills: Integrated science process skills contain skills including formulating hypotheses, defining operationally, identifying, and controlling variables, experimenting, interpreting data, and making inferences (Martin et al., 2005).

Achievement: Achievement is the quality and quantity of a student's work (Webster, 1993).

Science Process Skills Model (Operational Definition): The science process skills model is a teaching model with the integration of both basic science process skills and integrated science process skills to shape the effective teaching-learning process.

Review of Related Literature

Philosophical Foundations

The proposed science process skills model was based on cognitivism and constructivism. Cognitivism uses the metaphor of the mind as a computer because a computer performs the function of information processing and this information can lead to certain outcomes. Changes in behavior are observed as indications of what is occurring in the learner's head. According to the cognitivist perspective, knowledge is approached as schema constructions, and learning is viewed as a change in the learner's schemata or the reconstruction of experience from pre-learning.

Constructivism sees learning as a dynamic and social *process* in which learners actively construct meaning from their experiences in connection with their existing ideas. According to the constructivist perspective, everyone's individual experience makes their learning unique to them. Constructivism is a principle of how people can acquire information best. Young minds create their own understanding and knowledge with respect to their experiences and reflections (Rule & Lassila, 2005). With this perspective, learners are intellectually generative individuals with the capacity to pose questions, solve problems and construct theories and knowledge rather than empty vessels waiting to be filled.

Piaget's Cognitive Development Theory

Kagan (1994) indicates that Jean Piaget's theory of intellectual development is based on the following three assumptions: the main source of a child's knowledge is an activity and by engaging in activities, a child is likely to learn something and gain knowledge about that activity; the major function of knowledge is adaptation.

Piaget's four stages of development are (i) the sensorimotor stage which starts at birth to eighteen months; (ii) the preoperational stage which begins at eighteen months through six and one-half years; (iii) the concrete operational stage which begins at six and one-half years through eleven or twelve years; and (iv) the formal operational stage which starts at eleven years through to adulthood.

Piaget also observed that there are rapid and critical changes in the thinking capabilities of the children as they will have at the stage of the concrete and formal operational level of thinking. Thus, both learning and thinking involve the participation of the learner. The learners must be active. At this formal operational level, the child can carry out classifications of activities, arrange data, generalize, abstract from their experiences, and formulate hypotheses from the results of their observation.

Vygotsky's Sociocultural Theory

Learning occurs in the zone of proximal development. In this zone, the students can perform a task under some guidance and solve the problem independently. Vygotsky's concept of the zone of proximal development is based on the idea that development is defined both by what a child can do independently and by what the child can do when assisted by an adult or a more competent peer. Vygotsky focused on the interaction between people and the sociocultural context in which they act and share experiences.

According to Vygotsky, for the curriculum to be developmentally appropriate, the teacher must plan activities that encompass not only what children can do on their own but what they can learn with the help of others (Karpov & Haywood, 1998, cited in Eggen & Kauchak, 1999). Vygotsky's theory promotes learning contexts in which students play an active role in learning. Roles of the teacher and students are shifted and the teacher should facilitate students in constructing the meaning of knowledge. Thus, learning becomes a reciprocal experience for the student and teacher. When classroom activities are organized, the teachers can plan instruction that can provide practice, cooperative learning activities and scaffolding.

Kolb's Experiential Learning Theory

Kolb (1984) asserted that learning is the process whereby knowledge is created through the transformation of experience. Knowledge results from the combination of grasping the concepts and transforming the experience. Kolb's experiential learning theory presents a cyclic model of learning, consisting of four stages: concrete experience, reflective observation, abstract conceptualization, and active experimentation.

Concrete Experience (CE): At this stage, learners encounter an experience. The experience can be either a completely new experience or a reimagined existing experience that has already happened. The main key to learning stands in active involvement.

Reflective Observation (RO): After engaging in an experience, learners should step back to reflect on the task or activity. At this stage in the learning cycle, the learner has the opportunity to ask questions from observing facts and discuss the experience with others.

Abstract Conceptualization (AC): Reflective observation heads to abstract conceptualization. In this stage of abstract conceptualization, learners generate abstract ideas or alter their existing concepts based on the reflections that arose from the previous stage. Learners move from reflexive observation to abstract conceptualization when they begin to classify concepts and form conclusions from the events that occurred.

Active Experimentation (AE): After the stage of abstract conceptualization, the last stage of the cycle is active experimentation. At this stage, learners apply their new ideas to real-life situations. This allows them to innovate if there are any changes in the next occurrence of the experience. As such, this stage allows learners to create and test out their new ideas and lessons gathered from past experiences.

Science Process Skills

Since the 19th century, science process skills have played a fundamental role in learners' future skills in the science and technology-related workplace. According to Tobin and Capie **(**1980**)**, 'processes' are intellectual skills that students use in the classroom as they collect and interpret data. Students interact with things in their environment in a scientific manner using science process skills. The science processes are thinking processes that can be applied to any set of problems. The more these process skills are developed, the more learning through their self-activity can be developed.

Science process skills deal with the activities of processes and manipulation of information. Science process skills imply cognitive activity of creating meaning and structure from new information and experiences. Besides, science process skills enable science learners to develop a deeper scientific understanding and stimulate the use of essential scientific data or facts in resolving problems. These skills are the aspect of science learning. Using science process skills is an important indicator of the transfer of knowledge which is necessary for problem-solving for functional living.

Classification of Science Process Skills

The classification of science process skills, according to the American Association for the Advancement of Science (AAAS, 2010), needs to be considered. The curriculum project, Science - A Process Approach (SAPA), has classified the science process skills into two types – basic and integrated. The basic (simpler) process skills provide a foundation for learning the integrated (more complex) process skills. These skills should be assimilated and mastered for a science learner to be grounded on scientific concepts.

Basic process skills are interdependent, implying that more than one of these skills may be displayed and applied in any single activity (Funk et al., 1979, cited in Rambuda & Fraser, 2004). The science process skills include the basic skills like observing, inferring, measuring, communicating, classifying, and predicting (Burchfield & Gifford, 1995). The teacher has a central role to play in encouraging the progression of these basic process skills. The basic science process skills are the basis for learning science.

Integrated process skills are the offshoots of basic process skills. The integrated process skills such as controlling variables, defining operationally, formulating a hypothesis, interpreting data, and experimenting will help to manipulate knowledge in different forms. Scientific thinking is likely to happen on the attainment of integrated process skills.

Description of Proposed Science Process Skills Model

The proposed science process skills model can be described as three instructional phases. They are (1) pre active phase, (2) interactive phase, and (3) post active phase. The different steps operating the process are called the phases of teaching. The first phase in the proposed teaching model is about the planning process, the second phase is for implementing process and the third is assessment. The three main teaching-learning procedures will be briefly described as follows:

Phase (I) Pre active Phase

Pre active phase is the planning and preparation for the process of teaching and learning. There are three steps in this phase. They are (1) orientation of content with intended learning outcomes, (2) assembling appropriate instructional resources and selecting instructional strategies, and (3) engaging prior knowledge. The three steps are connected in a linear process flow. This phase is based on Glaser's basic teaching model, Gerlach and Ely model, Talyzina's cognitivo-cybernetic model, and Ned Flander's interaction analysis model.

Phase (II) Interactive Phase

This phase is implementing the learning process for students. It is especially only for science process skills. This phase includes nine small steps. Among these, seven steps are associated with each other, and the process among these steps is reversible. Two steps are associated in the form of a concept map. Based on the nature of the topic, some science process skills in small steps will be alternatively used. This phase is based on Glaser's basic teaching model, Talyzina's cognitivo-cybernetic model, computer-based model, Ned Flander's interaction analysis model, and Dr. Khin Zaw's multimodal model.

Phase (III) Post active Phase

The post active phase includes drawing conclusions and then, in this phase, the students must show their acquired knowledge. This phase consists of two steps. They are (i) assessment and (ii) feedback. This phase is also based on Glaser's basic teaching model, Gerlach and Ely model, Talyzina's cognitivo-cybernetic model, and the computer-based model.

Method and Procedure

The research design for this study was an explanatory sequential (QUAN $\longrightarrow$ qual) research design, one of the mixed methods designs. Therefore, quantitative, and qualitative methodologies were used in this study. For the quantitative research methodology, the adopted design was a nonequivalent control group design, one of the quasi-experimental designs. All participants in this study were Grade Ten students and high school teachers. This study was conducted in Yangon Region and Magway Region. Two districts from these regions were randomly chosen. One township from each selected district was also randomly selected. One high school from each township was selected. Participants in this study were selected by random sampling and they were randomly assigned to the experimental group and control group. The experimental group received instruction on the proposed science process skills model and the control group received formal instruction. The achievements of experimental and control groups were analyzed by one-way analysis of covariance (One-Way ANCOVA). The participants for qualitative research were selected by the purposive sampling method. Thus, four students and one high school from each experimental group were selected as participants for the qualitative research methodology. The data collected from interview questions were analyzed by thematic analysis.

Instruments

The instruments used for this study were pretest, posttest, and semistructured interview questions. The instruments were constructed according to the advice and guidance of the supervisor. In order to get validation, the instruments were distributed to nine experts. A pilot study was conducted with (30) Grade Ten students at Basic Education High School, InnTaing in Hlegu Township. After the pilot study, the reliability of the instruments was determined by the value of Cronbach’s Alpha coefficient. Pretest was .70 and posttest was .76. A pretest was used to measure the entry behavior of the students. A posttest was used to measure the students’ chemistry achievements after treatment by using the science process skills model. The posttest question was constructed based on Bloom’s taxonomy of cognitive domain (knowledge level, comprehension level, application level, analysis level, synthesis level, and evaluation level). Test items were constructed based on Chapter 3, Chapter 4, Chapter 5, and Chapter 6 from the Grade Ten chemistry textbook. The allocated time for pretest and posttest was (90) minutes, and the given marks were (54). The test items had choice question items. An interview was conducted to obtain in-depth information on the attitudes of teachers and students who were selected from experimental groups of each selected school. Semistructured interview questions were based on basic process skills and attitudes toward science of Maranan (2017). Semistructured interview questions for teachers consisted of (14) items and semistructured interview questions for students consisted of (15) items.

Results

For quantitative research findings, data were recorded and analyzed systematically. According to the selected quantitative research design, the data from the pretest question were analyzed by using the one-way analysis of covariance (One-Way ANCOVA) to compare the differences between the experimental and the control groups. Pallant (2013) described that ANCOVA is used when the research study has been unable to randomly assign the participants to the different groups but instead has had to use existing groups.

Table 1 Analysis of Covariance (ANCOVA) Results on the Pretest Question

School	Group	N	M	SD	MD	*F*	*df*	Sig. (2-tailed)
School 1	Experimental	22	15.18	2.46	4.34	26.57	39	.000***
	Control	19	10.84	2.93				
School 2	Experimental	29	14.86	4.77	5.49	31.71	57	.000***
	Control	30	9.37	2.34				
School 3	Experimental	28	20.50	2.83	8.89	124	49	.000***
	Control	23	11.61	2.84				
School 4	Experimental	28	16.93	4.18	3.25	10.48	48	.002**
	Control	22	13.68	2.42				

Note. School 1 = BEHS, Hlegu, School 2 = BEHS (4) Thanlyin, School 3 = BEHS, Pyalo, School 4 = BEHS (1) Thayet
***p < .001, **p < .01

The results showed that there was a significant difference between the entry behavior of experimental groups and control groups in each school. It can be interpreted that there were initial differences between experimental groups and control groups (See Table 1). Therefore, the data from posttest questions were analyzed by using a one-way analysis of covariance (One-Way ANCOVA).

Table 2 Analysis of Covariance (ANCOVA) Results on the Posttest Question

School	Group	N	M	SD	MD	*F*	*df*	Sig. (2-tailed)
School 1	Experimental	22	24.76	3.41	4.69	17.41	38	.000***
	Control	19	20.07	2.93				
School 2	Experimental	29	25.03	3.40	8.95	30.80	56	.000***
	Control	30	16.08	6.09				
School 3	Experimental	28	27.63	3.41	8.59	30.97	48	.000***
	Control	23	19.04	2.93				
School 4	Experimental	28	26.65	2.66	6.43	66.43	47	.000***
	Control	**22**	**20.22**	**2.66**				

Note. ***p < .001

The results showed that there was a significant difference between the chemistry achievement of experimental groups and control groups in the four selected schools. It can be interpreted that the proposed science process skills model has a significant effect on the students' chemistry achievements (See Table 2). According to the results, the comparison of mean scores on chemistry achievement is described in Figure 1.

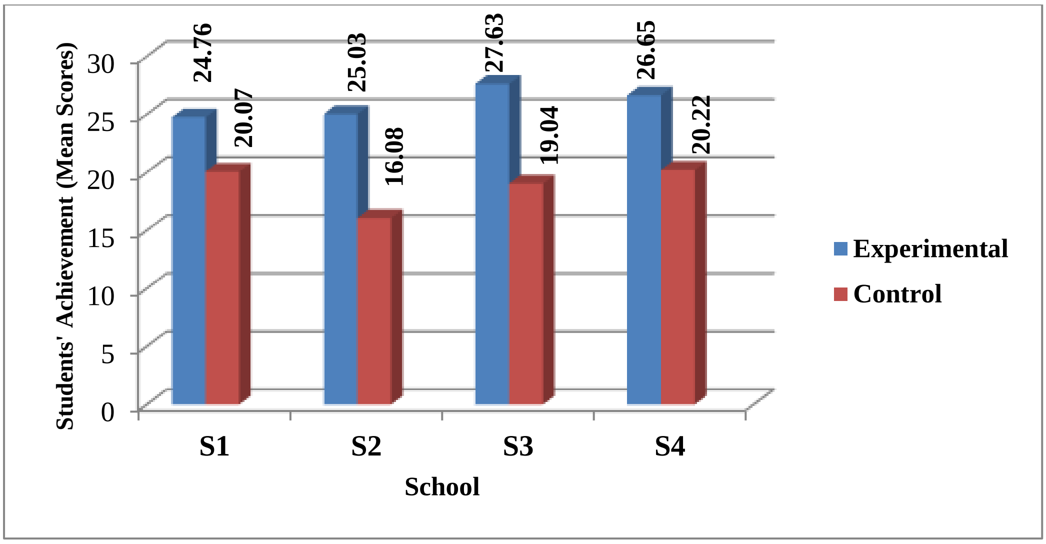

Figure 1. The Comparison of Mean Scores on Chemistry Achievement

Table 3 Summary of One-Way ANCOVA Results on Chemistry Achievement of Students in School 1, School 2, School 3, and School 4

School	Test of Between-Subject Effects					Unadjusted Mean		Adjusted Mean	
	Source	*df*	*F*	Sig. (2-tailed)	Partial Eta Squared	EG	CG	EG	CG
School 1	Pretest	1	14.01	.001	.27	26.00	18.03	24.76	20.07
	Group	1	17.41	.000***	.31				
	Error	38							
School 2	Pretest	1	0.74	.395	.01	25.45	15.67	25.03	16.08
	Group	1	30.79	.000***	.36				
	Error	56							
School 3	Pretest	1	15.40	.000	.17	29.95	16.22	27.63	19.04
	Group	1	30.97	.000***	.20				
	Error	48							
School 4	Pretest	1	6.94	.011	.01	27.04	19.73	26.65	20.22
	Group	1	66.43	.000***	.56				
	Error	47							

Note. EG = Experimental Group, CG = Control Group
***p < .001

According to the unadjusted means, there were significant differences between posttest scores of experimental groups and control groups without considering the extraneous variables on these scores. After adjusting the pretest scores, there were significant differences between posttest scores of experimental groups and control groups according to the adjusted mean (24.76, 20.07) and F (1, 38) = 17.41, p = .000 in S1 and the adjusted mean (25.03, 16.08) and F (1, 56) = 30.79, p = .000 in S2, the adjusted mean (27.63, 19.04) and F (1, 48) = 30.97, p = .000 in S3, and the adjusted mean (26.65, 20.22) and F (1, 47) = 66.43, p = .000 in S4. According to the partial eta squared values, there was no significant relationship between pretest scores and posttest scores in the selected schools. Moreover, the partial eta squared values of .31 in S1, .36 in S2, .20 in S3, and .56 in S4 showed the medium effect of the proposed science process skills model on students' achievement. Therefore, the results showed that the use of science process skills had a significant effect on the posttest scores of Grade Ten students in each school (See Table 3).

For qualitative research findings, the data collected from interview questions for teachers and students were analyzed by thematic analysis. According to the results, all the teaching and learning steps in the science process skills model are effective in teaching chemistry. Moreover, practicable and observable teaching aids can promote students' learning. Although group work is well for students' learning, group work activity can be a crisis during the Covid-19 pandemic. Assessment of learning helps teachers to be able to assess learning objectives and students to be able to reflect on their achievements. Based on the data analysis, the emerging themes from the teachers' interviews can be interpreted as follows.

***Well preparation**:* Well preparation can create conducive teaching and learning process.

Collaboration: The teachers divide students into groups and motivated them to discuss the lessons. It tends to raise students' collaboration.

Necessities: Basic knowledge about science process skills supports good implementations of the science process skills model. Moreover, fulfilling basic requirements can provide a successful teaching-learning process.

Promoting learning: The words such as "effective," "ease," and "appropriateness" show that the implementation of science process skills in the classroom can promote students learning.

***Challenges**:* Language barriers, insufficient time, and individual differences were some difficulties for teachers. Although the implementation of the science process skills model was effective, the teachers had some difficulties in implementation.

According to the research findings on the students' interviews, students got opportunities to observe, inquire and think about the lessons. Knowledge sharing with other members promoted the students' learning. The students participated actively in discussions, group work, predicting activity, observing the lessons, and inquiring about difficult lessons. Based on the thematic analysis, the following emerged themes can be interpreted.

Individual Differences: Some students recognize the teaching steps but some did not. It is because of their attention and intellectual level.

Responsibility for Learning: The students worked in groups and discussed with other members. They also shared knowledge with other students and they actively participated. Decisions together with other members support power-sharing to participate.

Challenges: The students faced some language difficulties, studying with unknown words, and meeting with the new curriculum. They also feared recalling and answering questions at the start of the lessons.

***Effectiveness*:** The students understood lessons more than before when they were taught with the use of the science process skills model. They got learning opportunities. They got the facilitation of the teacher in a successful teaching and learning process. Thus, the use of the science process skills model is effective for meaningful learning.

Discussion

According to the comparison of mean scores on posttest questions for all the selected schools, the finding showed that there were significant differences between experimental groups and control groups. This result pointed out that the proposed science process skills model had a significant effect on the chemistry achievement of the students. The science process skills model gives fruitful effects on chemistry at the high school level. This result is consistent with the findings of the study of Abungu, Okere, and Wechanga (2014). They found that the science process skills teaching approach had a significant effect on students' achievement in chemistry.

According to the students' interviews, all students liked the use of the science process skills model in the teaching of high school chemistry. Data from students' interviews were analyzed by thematic analysis. Based on the results, focusing on the main concept, measuring, and experimenting makes lesson contents easy to understand. Practical work turns abstract concepts into concrete concepts. Practical work and experiments are necessary for Myanmar learners because observable facts can help students to absorb abstract concepts. The themes emerging from the responses of students are individual differences, responsibility for learning, challenges, and effectiveness. This study is consistent with Suryanti, Ibrahim, and Lede (2018) who found that the student's interest and positive attitudes toward have increased when the process skills approach is used.

According to the results of the teachers' interviews, all teachers from the experimental groups have many teaching experiences and they all agreed that the teaching and learning steps in the science process skills model are effective in teaching chemistry. Based on the thematic analysis, the five themes emerging from the responses of teachers' interviews are well preparation, collaboration, necessities, promoting learning, and challenges. The teachers also asserted that the science process skills model was effective for productive learning. This result agreed with the findings of Gultepe (2016) that the science process skills have a positive effect on the teaching of science and class activities with science process skills promote conceptual learning.

Suggestions

With respect to the research findings, the following suggestions should be considered for the use of the science process skills model to be more effective in teaching chemistry.

Suggestions for Teachers: The teacher should collect and prepare teaching resources such as observable flashcards, pictures, and other visual materials. The teacher should facilitate the difficulties and challenges of students when learning with the science process skills. The teacher should understand the processing function of the human brain and cybernetic function. Finally, the teacher should manage time to create an effective teaching-learning process.

Suggestions for Students: The students should ask for unfamiliar and unknown words. The students should have adaptive thinking in order to pull out innovative ideas.

Suggestions for School Administrators: The school administrators should realize the teaching-learning situation and working atmosphere. They should support the teaching resources which will be useful in the teaching-learning process.

Recommendations

Some recommendations for further study are as follows:

- In this study, sample schools were randomly selected from Yangon Region and Magway Region. Thus, further research studies should be carried out in the rest of the States and Regions by using different participants for replication.
- In this study, the content areas were limited to Grade Ten chemistry textbook. So, further study should be carried out for the other content areas at the high school level.

- In this study, the proposed science process skills model was developed for the high school level. Further research should be carried out for various school levels such as primary school level and middle school level.

Conclusion

This study indicated that the implementation of the science process skills model in the teaching of high school chemistry encourages students' collaboration and promotes students' learning. Thus, it can be regarded that the proposed science process skills model has a positive impact on chemistry achievement.

Teaching higher-order thinking skills is at the center of the educational aspect. Classroom teaching should be related to everyday experience. Inconsistent with the changing world, innovative teaching must be combined into everyday classroom teaching. Without taping the students' knowledge, the teacher should teach a more coherent and thoughtful understanding of the concept. Indeed today, outside the classroom, the student may be in a richer informational environment than he is inside the conventional classroom (Khin Zaw, 2001, b).

The present study provided a better approach for teachers in the teaching of high school chemistry. But the teachers should increase their knowledge about the science process skills to keep students engaged and motivated during the learning process. It consists of the teaching steps relating to the science process skills. The role of science process skills is important to develop higher-order thinking skills and practical skills. These process skills should be prepared to adapt to the sophisticated environment designed by 21st century skills. Meanwhile, it is concluded that the use of the proposed science process skills model in the chemistry subject is effective for teachers and students.

Acknowledgements

We would like to express our respectful gratitude to Dr. Kay Thwe Hlaing, Rector, and Dr. May Myat Thu, Dr. Khin Khin Oo, and Dr. Nyo Nyo Lwin, Pro-Rectors, Yangon University of Education who allowed us to do this research. Then, we would like to express our respectful gratitude to Dr. Khin Mar Khine, Professor and Head, Curriculum and Methodology Department, Yangon University of Education for her invaluable guidance, support, and suggestions throughout the study.

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J. Myanmar Acad. Arts Sci. 2023 **Vol. XXI. No.6**

DEVELOPING A METACOGNITIVE TEACHING MODEL FOR PROBLEM SOLVING IN MIDDLE SCHOOL MATHEMATICS

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Abstract

The main purpose of this study is to investigate the effectiveness of the metacognitive teaching model for teaching mathematics at the middle school level in Myanmar. In this study, a mix-methods (QUAN $\longrightarrow$ qual) design was adopted. Quasi-Experimental design was adopted to collect the quantitative data and case study design was applied to collect the qualitative data. It was started in the first week of November 2021 and ended in the second week of January 2022. The study was geographically restricted to Yangon Region and a total of (258) Grade six students participated. A pretest, a posttest, a metacognitive skills inventory questionnaire, and an observation checklist were used as the research instruments. The pretest and posttest data were analyzed through one-way ANCOVA and it was found that there were significant differences in the mathematics achievement on posttest between the experimental and control groups in all selected schools. Students' responses to the metacognitive skills inventory questionnaire were analyzed through Wilcoxon Signed Rank Test and the results showed that there were significant differences in metacognitive skills of experimental group students before and after the treatment. Students' problem solving behaviors were analyzed through the think-aloud protocol analysis method and it was found that almost all students exhibited both cognitive and metacognitive behavior. Additionally, qualitative findings supported the quantitative findings. Therefore, the research findings proved that the proposed metacognitive teaching model has a positive contribution to teaching problem solving at the middle school level in Myanmar.

Keywords: Metacognition, Teaching Model, Problem Solving, Achievement in Mathematics, Metacognitive Skills.

Introduction

In today's world, the exponential growth of technology expects such kinds of individuals who can apply mathematical knowledge to solve ill-defined problems. Since the 1980s, the studies conducted on mathematical problem solving have emphasized if students are capable of monitoring their thinking process while solving problems and the term metacognition has been recognized as a key factor in problem solving (Ken, Clements, & Ellerton, 1996).

Purposes of the Study

The main purpose of this study is to investigate the effectiveness of the metacognitive teaching model for teaching mathematics at the middle school level in Myanmar.

The specific objectives of the study are as follows:

1. To study the effects of the metacognitive teaching model on the achievement of students in mathematics.
2. To investigate the effects of the metacognitive teaching model on the metacognitive skills of students concerning mathematical problem solving.
3. To explore the problem solving behaviors of students while solving mathematics problems.

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Research Questions

1. Is there a significant difference in the achievement of mathematics between students who receive the metacognitive teaching and those who do not receive it?
2. Is there a significant difference in the metacognitive skills of the experimental groups concerning mathematical problem solving before and after the treatment?
3. Which behaviors do students exhibit while solving mathematics problems?

Scope of the Study

This study is geographically limited to Yangon Region. Participants in this study are Grade six students from the selected schools in (2021-2022) Academic Year. The duration of the treatment period is limited to eight weeks timeframe. The lesson contents are limited to six content areas prescribed in Grade six mathematics textbook volume I and II.

Definition of Key Terms

Metacognition. Metacognition refers to thinking about thinking, and its main function is to plan, direct, control, examine, and evaluate all cognitive thinking processes; covering critical and creative thinking; to make appropriate decisions to solve a problem (Sang, 2003).

Teaching model. A teaching model is an overall plan or pattern to learn specific kinds of knowledge, attitudes, and skills. It has a theoretical basis or philosophy behind it and encompasses specific teaching steps designed to accomplish desired educational outcomes (Joyce & Weil, 1972, cited in Arends, 2007).

Problem solving. Problem solving is a multiple steps process where the problem solver must find relationships between the past experience (schema) and the problem at hand and then guide thinking directed towards the successful solution of a problem (Mayer, 1980).

Achievement in mathematics. Achievement in mathematics refers to the student's scores on the posttest which is developed based on the five process skills of mathematics described by the National Council of Teachers of Mathematics (NCTM) in April 2000.

Metacognitive skills. Metacognitive skills refer to concrete metacognitive activities that occur at the onset of task performance (orientation), during task performance (planning, monitoring, evaluation), and at the end of task performance (reflection and elaboration) (Steal, Veenman, Deelen, & Haenen, 2010).

Statement of the Problem

One of the problems encountered by Myanmar students while doing problem solving is that they focus on getting the answer and if the answer is right, they do not check, evaluate, and reflect on the whole process and move to the next problem. Sometimes, if the answer is right by chance and the steps of the solution are wrong, that will lead to underachievement. Another problem stated by Hardman, Stoff, Aung, and Elliott (2014) is the guided co-construction of knowledge in which a teacher guides students' cognition and creates opportunities for collaborative learning to promote critical thinking and problem solving skills is rarely observed in mathematics classrooms.

Significance of the Study

Research findings point out that teaching problem solving through metacognition promotes students to be self-directed learners who are self-reliant to seek the solution to any kind of problem (Zimmerman, 2000). Metacognition and problem solving are interconnected and teaching problem solving through metacognition results in better achievement in problem solving. However, there is no practice in Myanmar to confirm the theory and advocate the previous research findings. Therefore, mathematics education in Myanmar needs a new contribution that considers metacognition such as planning how to approach a given learning task, monitoring the progress, evaluating the result, and reflecting on the completion of the whole task for developing students' achievement and metacognitive skills in mathematical problem solving.

Review of Related Literature

Philosophical (Theoretical) Considerations

Progressivism places more emphasis on the process of learning than on the result. Mathematical problem solving involves reflection in action and reflection on action and these two concepts are closely related to metacognition (Schon, 1983). Cognitivism views that metacognition and problem solving are interrelated and these are the complex higher-order thinking in the human learning process. Metacognitive knowledge about problems and strategies, and the skills of planning, monitoring, and evaluation are essential for successful problem solving (Gredler, 2001). Constructivism also views learners as self-regulated and active participants in their learning (Churchill et al., 2013). Self-regulation also requires metacognitive mediators such as planning, monitoring, and evaluating (Schunk, 2012).

Psychological Considerations

Gestalt theorists pointed out that the process of problem solving is based on the whole and the part relationship. They described that mathematics teachers should encourage both reproductive and productive thinking in the mathematics classroom with the caution of giving ready-made steps (Katona, 1940, cited in Moslehpour, 1995). Bruner (1964, cited in Gredler, 2001) said that mathematical problem solving will be more effective and simpler by using symbols to represent abstract concepts and think-aloud strategy can be used effectively in teaching students what and how to think about mathematical problem solving.

According to Piaget's developmental stages, Grade six students fall into the formal operation stage and metacognition begins to develop during this stage and further in life (Flavell, 1977, cited in Tarricone, 2011). Besides, Vygotsky (1978) pointed out that students should be able to control their cognition with the help of inner speech, through the process of internalization. To reach this stage, they have to experience first the stage of egocentric speech. Additionally, Bandura (1977, cited in Gredler, 2001) also stated that cognitive modeling is one of the best strategies for demonstrating how to regulate cognition in mathematical problem solving and fosters the development of metacognition.

Conceptualization of Metacognition

The term metacognition appeared around 1975 in the work of cognitive psychologist John Flavell. Metacognition is a form of cognition, a second-order thinking process that involves active control over cognitive processes (Devine, 1993). Flavell (1796, cited in Desoete, 2008) described three major facets of metacognition, namely, metacognitive knowledge, metacognitive experience, and metacognitive skills. Metacognitive knowledge is knowledge, awareness, and a deeper understanding of one's cognitive processes and products (Flavell, 1976, cited in Desoete, 2008). Metacognitive experience is the conscious reactions and self-judgments regarding personal performance before, during, and after task execution (Rosenzweig, Krawec, & Montague, 2011). Metacognitive skills refer to the authentic procedures and strategies used during task execution to monitor and control one's cognition (Rosenzweig et al., 2011). Four important metacognitive skills for mathematical problem solving are (i) prediction, (ii) planning, (iii) monitoring, and (iv) evaluation skills (Desoete, 2008).

Prediction (orientation) is the skill that enables students to think about the learning objectives, proper learning characteristics, available time, and difficulty of a task. Planning skill makes students think in advance about how, when, and why to obtain their purpose through a sequence of sub-goals leading to the main goal of the problem. In mathematical problem solving, planning involves analyzing the problems, retrieving relevant domain-specific knowledge and skills, exploring the strategies, and arranging the problem solving steps. Monitoring is the self-regulated control of the thinking process during the solution process. Evaluation skill can be defined as the reflection that takes place after an event has finished (Brown, 1987, cited in Desoete, 2008). Evaluation skills enable students to assess their performance, compare their task performance with others, and discover errors within the problem solving process.

Metacognitive knowledge and experiences are constantly interrelated and metacognitive skills control and monitor the cognitive processes. Thus, mathematical problem solving should be taught through metacognition to facilitate students' learning and develop thinking skills.

Theoretical Perspectives on Mathematical Problem Solving

Metacognitive skills in problem solving refer to the knowledge and processes used to guide the thinking directed towards the successful solution of the problem (McCormic, 2003). Metacognitive skills help students to define the problem, select an appropriate solution strategy, monitor the effectiveness of the solution strategy, and identify and overcome obstacles to solving the problem (Davidson & Sternberg, 1998, cited in McCormic, 2003).

According to Mayer (1998), successful problem solving depends on three components: (i) skills, (ii) meta-skills, and (iii) will. In these three components, metacognition in the form of meta-skill is central in problem solving because it monitors and controls the other components. Wilson, Fernadez, and Hadway (1993) described that problem solving involves exploration, pattern finding, and mathematical thinking with consideration about teaching how to think as opposed to what to think or what to do.

Problem solving in mathematics is helpful in the proper development of one's mental power. No matter what types of problems are submitted, students who are effective problem solvers identify the problem, plan the strategy, ask themselves whether they are doing makes sense or not, adjust their problem solving strategies when necessary, and look back to reflect on the reasonableness of their solution and their approaches.

Components of the Proposed Metacognitive Teaching Model

The proposed model is based on theoretical concepts of the information processing model, basic teaching model, psychological cybernetic model, algorithmic model, heuristic/plan generating model, multiplicity model, and multi-modal model. Additionally, the components of Brown's model, general problem solving model, Polya's problem solving model, and IDEAL problem solving model were taken into consideration.

The proposed model is composed of six components (see Figure1). The explanations of each component are presented as follows.

(i) Stimulating/Eliciting domain specific knowledge. Domain specific knowledge is information that leads action to complete specific tasks. Thus, task-relevant prior knowledge to the student is elicited at the beginning of the lesson.

(ii) Informing learning outcomes. In the second stage, learning outcomes are informed to students to provide a set of shared expectations between the teacher and the students.

(iii) Presenting the problem. In the third stage, a word problem from the prescribed textbook is presented to all students. This stage includes reading aloud, silent reading, and verbalization of the parts of the problem statement.

(iv) Solving the problem through explicit modeling/think-aloud. This component is based on social cognitive theory and involves four stages: (i) identifying, (ii) planning, (iii) implementing, and (iv) evaluating. In each stage of the solution process, the teacher has to do explicit modeling through think-aloud. Five kinds of metacognitive questions: comprehension question, connection question, strategic question, checking question, and reflection question are used to demonstrate what is going on in the teacher's head and how to monitor and control the thinking process while solving the problem.

(v) Consolidating in collaborative setting. In this stage, students are formed into heterogeneous learning group and they have to solve the problems by taking the role of thinker and listener. The thinkers have to explain their reasoning through verbalizing, while the listeners have to listen, record, ask questions, and make sure what the thinkers say. A set of metacognitive question cards are delivered to each group to help students to be aware of and monitor the problem solving phases.

(vi) Evaluating performance and transferring learning. In this stage, students have to solve the problem independently. They have to do think-aloud about all the steps to monitor and control their thinking process. Next, they have to do reflective writing.

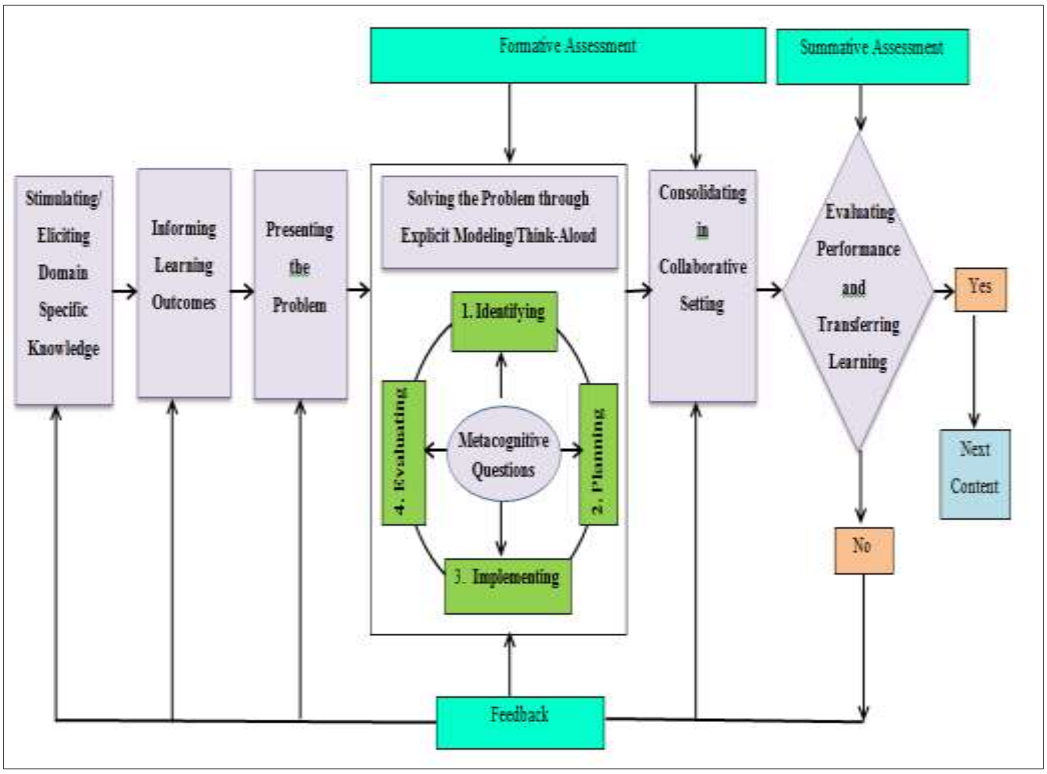

Figure 1 Proposed Metacognitive Teaching Model for Problem Solving in Middle School mathematics

Research Method

The explanatory sequential (QUAN $\rightarrow$ qual), one of the basic mixed methods designs was adopted in this study.

Quantitative Research Method

Research design. The quasi-experimental research design was adopted for the quantitative study. The nonequivalent control group pretest/posttest design was adopted to explore the answer to the research question (1) and the single group pretest/posttest design was adopted to answer the research question (2).

Subject. Table 1 shows the sample size of the quantitative study.

Table 1 Population and Sample Size for Quantitative Study

No.	District	Township	School	Population	Sample	Group	No. of Student
1	East	Yankin	Practicing Middel School Yankin (S1)	67	62	EG	31
						CG	31
2	West	Mayangone	No. (5) BEHS, Mayangone (S2)	129	58	EG	29
						CG	29
3	South	Thanlin	No. (2) EEHS, Thanlyin (S3)	79	72	EG	36
						CG	36
4	North	Mingaladon	No. (4) BEMS, Mingaladon (S4)	144	66	EG	33
						CG	33
			Total	**419**	**258**		**258**

Note. BEHS = Basic Education High School; BEMS = Basic Education Middle School;
EG = Experimental Group; CG = Control group.

Instruments. The main instruments to collect the data for the quantitative study are a pretest, a posttest, and a metacognitive skills inventory questionnaire.

Pretest. It was constructed based on Grade five mathematics. There are (30) multiple-choice items and the total score is (30) marks, and time allocation is (45) minutes.

Posttest. It was developed based on Grade six mathematics textbook volumes I and II. Test items were developed according to the five process skills of mathematics. The test consists of two sections. Section A consists of ten multiple-choice items and section B consists of four short answer questions (word problems). Time allocation is (1:00) hour, and the total score is (30) marks.

Metacognitive skills inventory questionnaire. The questionnaire is five points Likert scale. Items are categorized into four subscales: (i) identifying, (ii) planning, (iii) monitoring, and (iv) evaluation. There are eight items for each subscale, and a total of (32) items are included in the questionnaire.

Qualitative Research Method

Research design. The instrumental case study (observation) was adopted to get the evidence to support the quantitative results.

Subject. In each school, depending on the result of the pretest scores, experimental group students were assigned to groups A, B, and C. In each group, a student was elicited by using random purposive sampling. Thus, a total of (12) students participated in the observation.

Instrument. The main instrument for the qualitative study is the observation checklist.

An observation checklist. It was developed by adapting the framework for cognitive and metacognitive problem solving behavior (Artzt & Armour-Thoms, 1992). It includes (30) observed behaviors: (3) cognitive and (22) metacognitive behaviors. The presence or absence of each behavior is recorded once at every (3) minute intervals and the total length of time for observation is (30) minutes.

Teaching-Learning Materials

A total of (38) lesson plans were developed based on the four chapters from Grade six mathematics volume I and two chapters from mathematics volume II.

Study Procedure

This study was started in the first week of November 2021 and ended in the second week of January 2022. The duration of the study was taken about eleven weeks.

The pilot study. The pilot study was conducted with (25) Grade six students from No. (2) Basic Education Middle School, Yankin. During the pilot study, students were taught problem solving through the stages of the proposed model. They were administered the pretest, posttest, and metacognitive skills inventory questionnaire. The internal consistency of the pretest was 0.737, the posttest was 0.752, and the metacognitive skills inventory questionnaire was 0.894 respectively.

The main study. The main study was started in the first week of November 2021 and ended in the second week of January 2022.

Quantitative study. Before starting the treatment period, the two intact groups from each selected sample school were randomly assigned as experimental and control groups. Then, a pretest was administered to both groups. Next, the metacognitive skills inventory questionnaire was administered only to experimental groups. The duration of treatment was taken about eight weeks and a total of (30) hours of treatment periods were taken during eight weeks.

During the treatment period, both groups were taught the same lesson contents by the same mathematics teachers. The instructional difference between the two groups was the experimental groups were taught problem solving through the metacognitive teaching model and the control groups were taught problem solving through the formal problem solving instructional procedure. About three weeks before the end of the study period, experimental groups were administered the metacognitive skills inventory questionnaire. After the treatment period, the two intact groups were sat on a posttest.

Qualitative study. About two weeks before the end of the study period, observation was conducted. To observe and record the cognitive and metacognitive problem solving behaviors, each student was scheduled for an individual session in a quiet setting. They were facilitated to explore rich verbal data about reasoning during problem solving. During each of the three-minute intervals, the problem solving behaviors of each student was observed and video recorded.

Data analysis. The pretest and posttest data were analyzed through one-way ANCOVA, and students' responses to the metacognitive skills inventory questionnaire were analyzed through Wilcoxon Signed Rank Test. The data got from observation were analyzed through think-aloud protocol analysis.

Research Findings

Quantitative Research Findings

(i) Findings of Grade Six Students' Mathematics Basic Knowledge on Pretest

Table 2 shows the findings for mathematics basic knowledge of Grade six students.

Table 2 Results for Pretest Scores of Mathematics Basic Knowledge

School	Group	*N*	*M*	*SD*	*MD*	*F*	*p*
S1	Experimental	31	17.96	3.18	1.13	1.06	.306 (ns)
	Control	31	16.83	5.19			
S2	Experimental	29	16.48	4.09	2.83	7.53	.008**
	Control	29	13.65	3.74			
S3	Experimental	36	16.30	3.35	3.47	19.61	.000***
	Control	36	12.83	3.29			
S4	Experimental	33	16.69	3.61	2.00	4.94	.029*
	Control	33	14.69	3.65			

Note. ns = not significant, *p<.05, **p<.01, ***p<.001.

The results in Table 2 show that there were significant differences in entry behavior between the two groups in S2, S3, and S4. There was no significant difference in entry behavior between the two groups in S1.

(ii) Findings of Grade Six Students' Mathematics Achievement on Posttest

Table 3 shows the findings for Grade six students' mathematics achievement on posttest.

Table 3 One-way ANCOVA and Descriptive Statistics Results for Posttest Score

School	Tests of Between-Subjects Effects					Observed Mean		Adjusted Mean	
	Source	*df*	*F*	*p*	$\eta 2$	EG	CG	EG	CG
S1	Pretest	1	2.10	.152(ns)	.034	20.59	15.29	20.49	15.39
	Group	1	24.10	.000***	.300				
	Error	59							
S2	Pretest	1	1.04	.312(ns)	.019	19.50	13.84	19.36	14.01
	Group	1	28.80	.000***	.344				
	Error	55							
S3	Pretest	1	11.73	.001**	.145	17.43	12.29	16.85	12.86
	Group	1	31.22	.000***	.312				
	Error	69							
S4	Pretest	1	13.08	.001**	.172	20.50	13.66	20.08	14.08
	Group	1	49.36	.000***	.440				
	Error	63							

Note. ns = not significant, **p <.01,***p <.001

The results in Table 3 show that there were significant differences between the two groups in all selected schools. Although there were significant relationships between the pretest scores (covariate) and the posttest in S3 and S4, the adjusted mean scores support that the control groups' mean scores were lower than the experimental groups. Therefore, the proposed model has a better achievement in mathematics than the formal problem solving instruction.

(iii) Findings of Grade Six Students' Metacognitive Skills on Problem Solving

Table 4 describes the comparison of the descriptive statistic results for experimental group students' responses to each item in the metacognitive skills inventory questionnaire before and after the treatment. Total of (129) students responded to the questionnaire.

Table 4 Descriptive Statistics Results for Experimental Group Students' Responses on Metacognitive Skills Inventory Questionnaire

Identifying		Before		After	
No.	**Statement**	**M**	**SD**	**M**	**SD**
1	Read aloud the problem statements	3.14	1.06	4.28	0.84
2	Read the problem statements silently	2.92	1.10	4.11	0.88
3	Underline the key words	2.77	0.99	4.02	0.84
4	Explore the kind of the problem	3.42	1.09	4.13	0.85
5	Think in advance the problem difficulty	3.48	1.25	3.90	0.89
6	Decompose the problem statements	2.48	1.00	3.85	0.87
7	Notice the presence or absence of information	3.06	1.00	3.87	0.82
8	Differentiate the relevant and irrelevant information	2.66	0.85	3.66	0.78
Planning		**Before**		**After**	
No.	**Statement**	**M**	**SD**	**M**	**SD**
9	Take time to design an action plan	3.31	1.19	3.98	0.85
10	Collect the relevant materials and equipment	2.86	1.06	3.82	0.83
11	Analyze the similarities and differences	3.53	1.12	4.33	0.85
12	Reflect on concepts, theorems, and laws	3.08	1.06	3.97	0.78
13	Take time to select the relevant strategy	3.14	1.13	3.82	0.87
14	Arrange the sequence of steps	2.62	1.03	3.80	0.85
15	Explore the solution of the problem	3.04	0.99	3.88	0.87
16	Check the accuracy of the planning steps	2.89	0.88	4.10	0.80
Monitoring		**Before**		**After**	
No.	**Statement**	**M**	**SD**	**M**	**SD**
17	Engage coherent and well-structured calculation	3.82	1.99	4.41	0.82
18	Keep track of what is going on	2.73	0.95	3.88	0.82
19	Make sure the operations in each step	3.63	1.14	4.31	0.78
20	Examine if any computation step are left or not	3.47	1.09	4.13	0.76

21	Monitor the ongoing problem solving process	3.17	1.14	3.87	0.84
22	Change the strategy if it does not work out	2.82	1.31	3.86	0.83
23	Work slowly in difficult numerical calculations	3.48	1.14	4.11	0.88
24	Aware of the mistakes while solving the problem	3.23	1.02	4.16	0.81
Evaluating		**Before**		**After**	
No.	**Statement**	**M**	**SD**	**M**	**SD**
25	Check the answer and the units	3.66	1.22	4.46	0.77
26	Check the numbers copied from the given problem	3.35	1.09	4.37	0.74
27	Look back the accuracy of the computation steps	3.06	1.01	4.20	0.83
28	Reflect on how the solution was done	2.95	1.12	3.86	0.76
29	Find alternate ways to get the solution	2.30	1.05	3.48	0.75
30	Re-examine the answer and nature of problem	2.84	0.88	4.02	0.88
31	Reflect on what went well and what did not go well	2.76	0.90	3.93	0.76
32	Decide how to change weak points	2.88	0.93	4.22	0.77

According to the results of the descriptive statistics described in Table 4, it was found that the mean scores of each item before the treatment were increased to after the treatment.

Table 5 describes the findings of the experimental group students' responses to the metacognitive skills inventory questionnaire before and after the treatment.

Table 5 Wilcoxon Signed Rank Test Results for Experimental Group Students' Responses on Metacognitive Skills Inventory Questionnaire

School	Pair	*N*	*M*	*SD*	*Md*	*z*	*P*	*r*
S1	Before	31	93.67	12.96	96	-4.86	.000***	.87
	After	31	121.16	10.23	121			
S2	Before	29	93.82	18.42	89	-4.71	.000***	.87
	After	29	135.55	13.46	137			
S3	Before	36	108.86	13.18	108	-5.23	.000***	.87
	After	36	129.19	13.95	132			
S4	Before	33	96.72	13.12	97	-5.01	.000***	.87
	After	33	130.06	14.73	128			

Note. ***p <.001.

The results in Table 5 point out that there were significant differences in the experimental group students' responses to the metacognitive skills inventory questionnaire before and after the treatment.

Qualitative Research Findings

(i) Findings of Observation on Problem Solving Behaviors of Student

Table 6 shows the problem solving behaviors of (12) students during an individual session of (30) minutes of observation.

Table 6 The Overall Structure of the Problem Solving Behaviors of Students

No.	Point to Observe	S1 A1 %	S2 A2 %	S3 A3 %	S4 A4 %	S1 B1 %	S2 B2 %	S3 B3 %	S4 B4 %	S1 C1 %	S2 C2 %	S3 C3 %	S4 C4 %
Reading the Problem													
1	Read Aloud (C)	20	60	20	40	20	30	60	40	30	20	30	30
2	Read Silent (C)	20	20	20	40	20	40	10	20	20	40	30	20
3	Underline (C)	10	20	20	10	20	20	10	20	20	10	10	20
Understanding the Problem													
4	Explore Type (M)	10	10	10	20	20	-	10	10	10	-	10	30
5	Paraphrase (M)	20	20	30	20	20	20	20	10	20	20	20	20
6	Drawing (M)	20	20	20	20	20	20	20	20	10	20	10	20
Analyzing the Problem													
7	Write (M)	30	40	20	20	20	20	30	30	10	30	30	20
8	Check Given (M)	-	20	20	10	-	10	10	20	-	10	20	-
9	Explore Similar (M)	10	20	30	20	30	30	-	30	20	-	10	20
10	Analyze (M)	10	20	20	20	20	-	-	10	10	-	20	20
Planning													
11	Explore Concept (M)	20	20	20	30	40	30	10	30	10	10	20	20
12	Select Strategy (M)	30	20	20	20	20	10	20	30	-	20	10	10
13	Collect Tools (M)	-	10	10	20	10	10	30	20	20	20	10	-
14	Arrange Steps (M)	50	20	-	10	20	10	-	20	-	10	-	-
15	Draft Calculation (M)	40	40	20	20	20	20	30	30	30	30	30	30
16	Check Plan (M)	-	-	-	-	-	-	-	-	-	-	-	-
Implementing													
17	Do Calculation (C)	20	40	30	20	40	30	30	30	30	30	50	40
18	Slow and Steady (M)	30	50	60	30	60	50	30	40	60	50	50	20
19	Verbalize Operations (M)	30	40	10	20	-	30	40	40	10	20	-	20
20	Check Symbols (M)	-	-	-	-	-	-	-	-	-	-	-	-
21	Check Steps (M)	10	30	20	30	10	40	20	20	-	10	30	20
22	Aware Mistake (M)	10	-	10	20	20	10	10	30	10	20	10	20
23	Revise (M)	10	-	10	20	20	10	20	10	10	20	20	20
24	Change Strategy (M)	-	-	10	-	-	-	10	-	10	-	-	10
Verifying													
25	Write Answer (C)	20	30	20	20	20	30	30	30	30	30	40	20
26	Check Answer & Unit (C)	20	20	20	20	20	20	20	10	10	20	20	20
27	Check Number (C)	-	20	20	10	10	10	10	10	20	10	20	20

28	Check Process (C)	20	20	20	20	20	10	20	10	20	10	20	10
29	Reexamine Answer (M)	20	20	-	-	20	10	20	-	30	10	-	-
30	Explore Strategies (M)	-	-	-	-	-	-	-	-	-	-	-	-

Note. C = Cognitive behavior, M = Metacognitive Behavior; A1, A2, A3, and A4 = Group A students; B1, B2, B3, and B4 = Group B students; C1, C2, C3, and C4 = Group C students

(ii) Findings on Cognitive and Metacognitive Problem Solving Behaviors of Students

Table 7 describes the summary of cognitive and metacognitive problem solving behaviors exhibited by (12) students during an individual session of (30) minutes of observation.

Table 7 Summary of Cognitive and Metacognitive Problem Solving Behaviors

No.	Student	Cognitive	(%)	Metacognitive	(%)	Total	(%)
1	A1	7/8	88	16/22	73	23/30	77
2	A2	8/8	100	16/22	73	24/30	80
3	A3	8/8	100	17/22	77	25/30	83
4	A4	8/8	100	17/22	77	25/30	83
Total/Average		31/32	97	66/88	75	97/120	81
No.	**Student**	**Cognitive**	**(%)**	**Metacognitive**	**(%)**	**Total**	**(%)**
5	B1	8/8	100	16/22	73	24/30	80
6	B2	8/8	100	16/22	73	24/30	80
7	B3	8/8	100	16/22	73	24/30	80
8	B4	8/8	100	17/22	77	25/30	83
Total/Average		32/32	100	65/88	74	97/120	81
No.	**Student**	**Cognitive**	**(%)**	**Metacognitive**	**(%)**	Total	**(%)**
9	C1	8/8	100	15/22	68	23/30	77
10	C2	8/8	100	15/22	68	23/30	77
11	C3	8/8	100	15/22	68	23/30	77
12	C4	8/8	100	15/22	68	23/30	77
Total/Average		32/32	100	60/88	68	92/120	77

(iii) Findings on Think-Aloud Protocol Analysis

The video recordings of problem solving behaviors of (12) students during individual sessions of (30) minutes observations were analyzed through think-aloud protocol analysis and the summary of the findings is presented as follows. According to the think-aloud protocol analysis, students exhibited:

- (100%) of behaviors under the category for reading the problem;
- (34) out of (36), (94%) of behaviors under the category for understanding the problem;
- (39) out of (48), (81%) of behaviors under the category for analyzing the problem;
- (52) out of (72), (72%) of behaviors under this category for planning;
- (71) out of (96), (74%) of behaviors under the category for implementing the problem;

- (54) out of (72), (75%) of behaviors under the category for verifying.
- Overall, (4) out of (22), (18.18%) metacognitive behaviors: check plan, check symbols, change strategy, and explore strategies were not observed apparently.

Discussion

According to one-way ANCOVA results on posttest scores, there were significant differences in the mathematics achievement on posttest between the two groups in each selected school. In addition, Wilcoxon Signed Rank Test results revealed that there were significant differences in the metacognitive skills before and after the treatment in each selected school. The results support the finding of Mullick-Martinez (2020) who found that students who were taught problem solving through metacognitive strategies have improvement both in mathematics achievement and metacognitive awareness. In addition, these findings are consistent with Teong (2000) who revealed that metacognitive training results in a greater improvement in mathematical word problem solving of the experimental group than that of the control group. These findings advocate Kendir and Sahin (2013) who found metacognitive strategies result in a significant difference in the metacognitive skills of students.

Almost all students in each group exhibited both cognitive and metacognitive behaviors in each category. Exceptionally, (4) out of (30) behaviors: check plan, check symbols, change strategy, and explore strategies were not observed apparently in most students. This finding is consistent with Ericsson and Simon (1993) who reminded that thoughts in normal form can proceed much more rapidly than speech. When a series of thoughts occurs rapidly, it is impossible for an individual to directly verbalize each and every thought in that series and these are vocalized as inner speech. Thus, it can be interpreted that they could perform these behaviors rapidly and some of their verbalizations seem to correspond to merely vocalizing as inner speech.

Suggestions

In mathematics, problem solving is the heart of the subject and it helps students to tackle the problems in their lives with confidence. Mathematics teachers should be familiar with metacognitive strategies and should train their students to develop metacognitive skills: identifying, planning, monitoring, and evaluating through teaching problem solving. In mathematics, the heuristic strategies support to the development of metacognition (Biggs & Telfer, 1987). Heuristics are often discussed in mathematics education at the secondary level, rather than at the primary level (MoE, 2019). Therefore, mathematics teachers at the middle school level should be familiar with heuristic strategies. Students should be engaged to assess reflective writings through self-assessment and peer-assessment. Metacognition could develop through social interaction. Thus, teachers should create different interaction patterns while teaching problem solving. In the present study, randomly assigned to the individual student to experimental and control groups was difficult in real context and a quasi-experimental design was adopted. Thus, a true experimental study should be conducted to generalize the present findings. More research studies are also needed to study the development of metacognitive skills across different age groups and/or the correlation between metacognitive skills and achievement.

Conclusion

According to the findings, the proposed metacognitive teaching model has supported the students' achievement in mathematics, and has provided the enhancement of the metacognitive skills of students concerning problem solving. Therefore, it can be concluded that this study could provide a reasonable solution for solving the underachievement problem of students in mathematics due to the lack of control and monitoring of what they are doing. Hopefully, the present study could contribute to some extent to the improvement of teaching mathematical problem solving at the middle school level in Myanmar.

Acknowledgements

First and foremost, we would like to express our respectful gratitude to Dr. Khin Zaw (Rector, Yangon University of Education) and Dr, Htoo Htoo Aung (Retired Pro-Rector, Yangon University of Education) for their professional guidance and constructive criticism. We would like to express our deepest appreciation to Dr. Kay Thwe Hlaing (Rector, Yangon University of Education) for permitting to conduct the study. We would like to express our genuine gratitude to Dr. Khin Aye Myint, Daw Aye Aye Kywe, and Dr. Myo Win (Retired Professors, Curriculum and Methodology Department, Yangon University of Education) for their pedagogical advice, constructive suggestions, and extensive knowledge. We also express our deep and sincere gratitude to Dr. Khin Mar Khine (Professor and Head, Curriculum and Methodology Department, Yangon University of Education) for giving precise timely instructions and management.

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J. Myanmar Acad. Arts Sci. 2023 **Vol. XXI. No.6**

AN INVESTIGATION INTO THE IMPACT OF THE INTEGRATED COLLABORATIVE CONCEPT MAPPING MODEL IN TEACHING PHYSICS

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Abstract

The main purpose of this study is to investigate the impact of using the proposed model based on the integration of collaborative learning techniques and concept mapping in teaching Physics. In this research, embedded design, one of the mixed-method designs was adopted. A quasi-experimental design was used as a quantitative study and a case study design was used as a qualitative study. Instruments like pretest, posttest, questionnaires, self-assessment forms, lesson plans prepared with the proposed model, and worksheets were used as the quantitative instrument. An observation checklist and semi-structured interview questions were used as qualitative instruments. A random sampling method was used to choose four high schools from Yangon Region. The purposive sampling method was applied for collecting qualitative data. Quantitative findings by ANCOVA showed that the Physics achievements of students who were taught with the integrated collaborative concept mapping model were higher than the students who did not receive it. Attitudes questionnaires results by the Wilcoxon Signed Rank Test showed that positive attitudes changes were found by comparing before and post results. Friedman Test results of self-assessment forms showed that the students who participated in experimental groups have improvements in all 5 Cs like collaboration, communication, critical thinking and problem solving, creativity and innovation, and citizenship across three-time points. Qualitative findings revealed that the students and teachers from experimental groups preferred this model, actively participated in the intervention periods, and are willing to apply an integrated collaborative concept mapping model in their teaching process. All the results proved that the integrated collaborative concept mapping model was supportive in teaching Physics concepts included in the new curriculum which aims to acquire soft skills along with teaching subject knowledge.

Keywords: Learning, Collaborative Learning, Concept, Concept Mapping, Collaborative Learning Techniques

Introduction

Education is a purposeful activity to facilitate learning to acquire knowledge, skills, values beliefs, responsibility, and habits. Preparing learners for the world of work is the important goal of education in today world. According to Khin Zaw (2001), the aims of education may be summed up under three aspects: to help the child to develop his personality; to relate himself to the society in which he lives, and to be an active and creative force in society. Education allows individuals to improve their lives, become successful members of their communities, and actively contribute to national development (National Education Strategic Plan (NESP), 2016-2021). Ideally, science teaches students how to think, learn, solve problems and make informed decisions. Physics is a part of science that deals with describing the interactions of energy, matter, space, and time and it is especially interested in which fundamental mechanisms underlie every phenomenon. One of the aims of teaching Physics in secondary schools is to acquire a systematic body of physical knowledge and develop an understanding of Physics's concepts, principles, and applications. By understanding the concepts and principles, then one can further education in Physics (Maera, 2016). Today's knowledge work is done collaboratively in teams. Concept mapping encourages collaboration among users constructing the maps. In light of the importance of collaboration in teaching and learning situations for the new education curriculum, the study of the impact of integrated collaborative concept mapping should be extended to secondary high school students in Myanmar.

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Purposes of the Study

The main purpose of the study is to investigate into the impact of the integrated collaborative concept mapping model in teaching Physics.

The specific objectives are as follows:

(1) To develop a model based on the integration of collaborative learning techniques and concept mapping
(2) To investigate the impact of using the model based on the integration of collaborative learning techniques and concept mapping on students' achievement in Physics
(3) To compare the attitudes of students towards Physics teaching through collaborative learning techniques and concept mapping
(4) To examine the attitudes of teachers towards using the proposed model in teaching Physics
(5) To explore the students' acquired soft skills along with teaching Physics concepts

Research Hypotheses

1. There is a significant difference in achievement scores between Grade 10 students who are instructed by using the model based on collaborative learning techniques and concept mapping and who are not received it.
2. There is a significant difference in the attitudes of students towards learning Physics who are instructed by using the model based on collaborative learning techniques and concept mapping before and after the intervention.
3. There is a significant difference in the attitudes of teachers towards using the model based on collaborative learning techniques and concept mapping before and after using this model.
4. There are significant changes in the students' acquired soft skills after teaching Physics with the proposed model.

Scope of the study

- This study is geographically restricted to the Yangon region.
- Participants in this study are Grade Ten students from the selected high schools.
- This study is limited to the content areas of forces, pressure, work, and energy from the Grade Ten Physics textbook prescribed by the Basic Education Curriculum, Syllabus, and Textbook Committee, 2020-2021.

Definition of Key Terms

Learning: Learning is a process that leads to change, which occurs as a result of experienced and increases the potential for improved performance and future learning (Ambrose, Bridges, DiPietro, Lovett, & Norman (2010).

Collaborative Learning: Collaborative learning is an umbrella term for a variety of educational approaches involving a joint intellectual effort by students, or students and teachers together. Usually, students are working in groups of two or more, mutually searching for understanding, solutions, or meanings, or creating a product (Smith & MacGregor, 1992).

Concept: A concept may be thought of as a mental framework of an event or an object. Any event or object is a concept because it has some identifiable properties or ideas associated with it (NCERT, 2013).

Concept Mapping: Concept mapping is a technique that visually represents relationships among ideas (Novak & Gowin, 1984, cited in Collette & Chiappetta, 1989).

Collaborative Learning Techniques (Operational Definition): Collaborative learning techniques are the techniques used for general learning activities such as discussion, reciprocal teaching, problem-solving, information organizing, and collaborative writing.

Statement of the Problem

The importance of Physics teaching and how teachers teach in their classrooms are being recognized as key importance in many ways. One main feature in the study of Physics is the development of concepts. However, conceptual understanding will be greatly hindered when the instruction in Physics focuses on drilling a standard problem in a fixed order, the sign is learned instead of the concept and a gap is produced between scientific practice and science as a subject of formal nature (Dayal et al., 2007, cited in Khan & Din, 2014).

Collaboration is currently an important notion in the implementation new education system in Myanmar. Currently, most teachers have been confused and concerned about the concept between cooperation and collaboration until they have been trained on how to teach the new curriculum during the 2020 summer vacation. According to Wiersema (2001), “Collaboration is more than co-operation. Co-operation is a technique to finish a certain product together: the faster, the better; the less work for each, the better. Collaboration refers to the whole process of learning, to students teaching each other, students teaching the teacher, and of course the teacher teaching the students too” (cited in Iborra, Garcia, Margalef, & Perez, 2010). Concept maps can support eliciting core ideas and connections and can make possible clusters or hierarchies visible. Implementation of concept maps can shift the epistemological authority from the teacher to the student, reduce the emphasis on right and wrong answers, and create visual entry points for learners of varying abilities. Taking into account the above signs of collaborative learning remarks and concepts maps remarks, this study was conducted by integrating the collaborative learning techniques and concept map creation steps in teaching Physics concepts.

Review of Related Literature

Philosophical Foundations: Collaborative learning techniques and creating concept mapping are child-centered teaching and active learning process. Progressivism, constructivism, and social constructivism are deeply taken into account in this study. The progressives believe that learning should be an active process and that students should do much more than receive information passively. Experience and experiment are two keywords for the progressives (Kneller,1971, cited in Hessong & Weeks, 1991).

According to constructivism, individuals create or construct their new understandings or knowledge through the interaction of what they already know and beliefs and the ideas, events, and activities with which they come in contact. Knowledge is acquired through involvement with content instead of imitation or repetition. Learning activities are created by active engagement, inquiry, problem solving, and collaboration with others (Siddiqui, 2008).

According to the social constructivists, learning is self-governed, problem-based, and collaborative. Learning is considered to be an interactive activity between what is known and what is to be learned. Individual development derives from social interactions. Individuals construct knowledge in transactions with the environment, and in the process, both the individual and the environment are changed. Meaningful learning occurs when individuals are engaged in social activities such as interaction and collaboration.

Learning Theories: Piaget's cognitive learning theory, Vygotsky's socio-cultural learning theory, Ausubel's meaningful learning theory, and information processing theory are also taken into account in developing the integrated collaborative concept mapping model. According to Piaget, the teachers will benefit when they understand at what levels their students are functioning. All students in a class should not be expected to operate at the same level (Wadsworth, 1996, cited in Schunk, 2012). Teachers can try to ascertain levels and gear their teaching accordingly. The students in grade ten fit with the formal operational stage. Students from Grade Ten can do mathematical calculations, think creatively, use abstract reasoning, and imagine the outcome of particular actions, and thus concept maps can be used as the proper tool for teaching concepts in Physics.

Vygotsky discusses the development of conceptual thinking, logical memory, and self-regulated attention. Helping students acquire cognitive mediators (e.g., signs, symbols) through the social environment involves the concept of instructional scaffolding. Reciprocal teaching comprises social interaction and scaffolding as students gradually develop skills. An important application area is peer collaboration, which reflects the notion of collective activity. Social interaction leads to more advanced cognitive development in the area of academic achievement. Providing opportunities for children to interact with others forces them to think and communicate about their thought.

From the point of view of Ausubel's theory, for meaningful learning to occur, three requirements must be met. First, the material to be learned must itself have potential meaning. Secondly, the learner must possess relevant concepts and propositions that can serve to anchor the new learning and assimilate new ideas. Thirdly, the learner must choose to relate the new information to his/her cognitive structure in a non-verbatim, substantive fashion. If any of these three elements are lacking, meaningful learning cannot occur, at least in the initial stages of a given learning sequence.

Background Teaching Models: The proposed new model was developed based on Dick and Carey's model for the systematic design of instruction, Glaser's Basic Teaching Model, Ned Flanders Model of Interaction Analysis, Neocybernetic Psychology-Based Model of Talyzina, and Khin Zaw's Model of Multimodal. Moreover, for teaching problem solving, Dewey's Problem-Solving Model is used in developing the proposed model.

The proposed model, an integrated collaborative concept mapping model, is intended to contribute to Physics teaching by dealing with teaching concepts and solving problems to be a more active learning process and more meaningful. This model consists of three main components. They are planning, instructional maneuver phases, and evaluation. In planning, selecting learning contents, identifying instructional goals and learning objectives, preparing relevant test items, assigning instructional techniques, and preparing instructional materials are included. In instructional maneuver phases, the preliminary phase such as recalling prior knowledge, linking new knowledge (Pre), grouping; expounding phase such as expounding the theory/concept, linking new knowledge (During), identifying the focus problem; exploration phase such as guiding for constructing concept maps, approaching drawing maps, group problem solving is involved. And the last phase, the closure phase is composed of summarizing the concepts/ solutions. The final step of the model is the evaluation in which formative assessment (pre-instruction), summative assessment (post instruction), and feedback processes are included (See Figure 1).

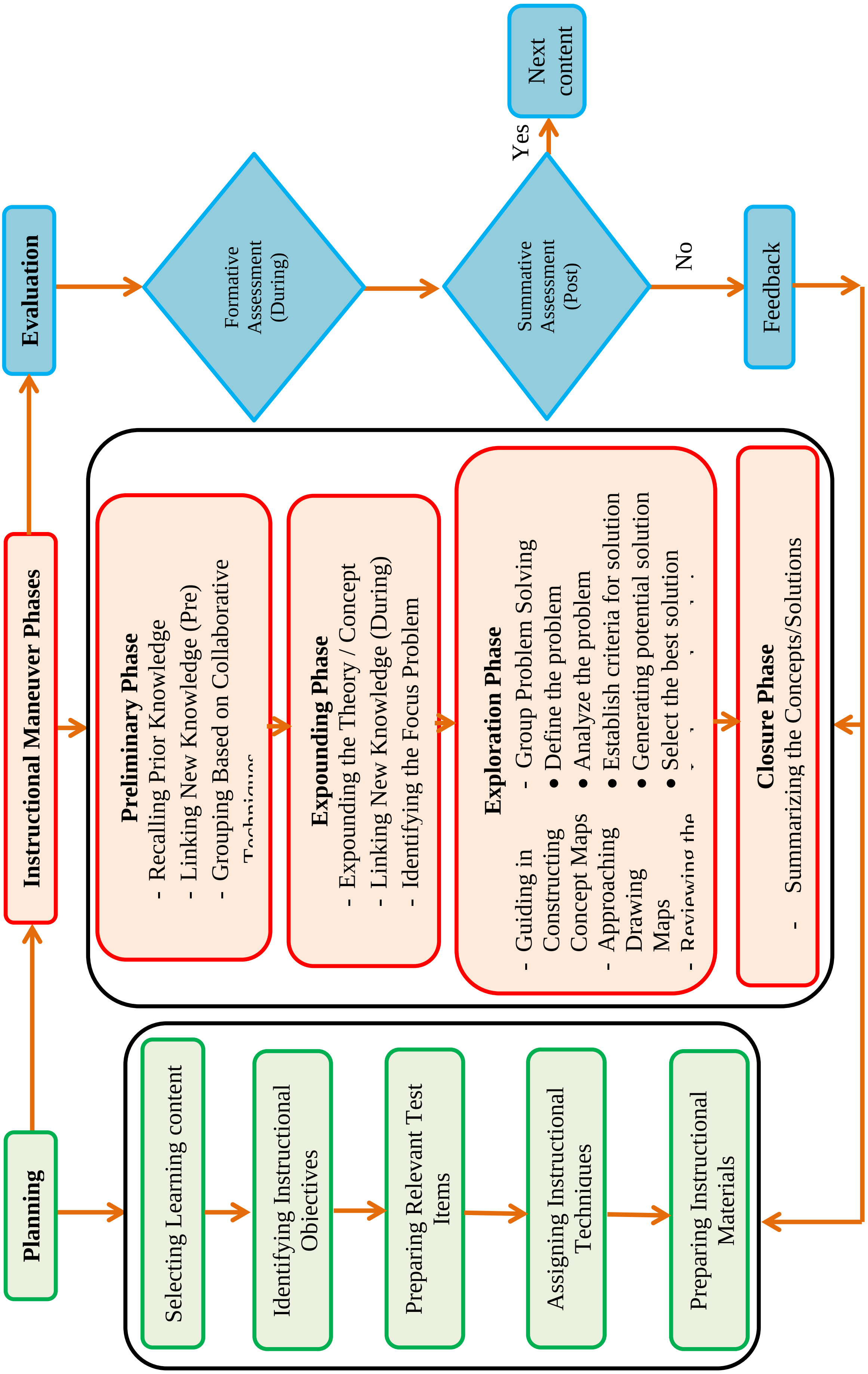
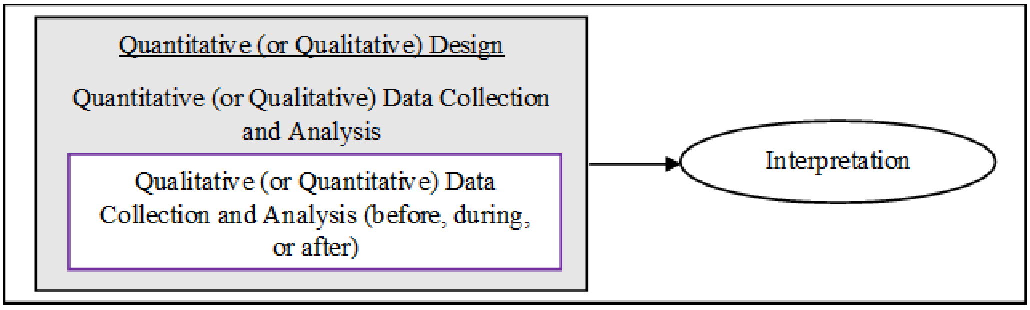


Figure 1 An Integrated Collaborative Concept Mapping Model

Methods

Research Design: In this study, one of the mixed-method research designs, the embedded design was used in which the qualitative method was embedded in quantitative research. Quantitative data was primary and qualitative data was secondary data to support the findings of quantitative results (See Figure 2).



Source: From Creswell and Plano Clark (2011), p. 111.

Figure 2 The Embedded Design

Quantitative Research Design: As the experimental research design, one of the quasi-experimental designs: a nonequivalent control group design was chosen. Population and sample size are described in Table 1.

Table 1 Population and Sample Size for Quantitative Research

Region	District	Township	School	No. of Population	No. of Sample		Group
Yangon	East	North Okkalapa	No. (3) BEHS	125	50	25	Experimental Group
						25	Control Group
	West	Bahan	No. (2) BEHS	183	42	21	Experimental Group
						21	Control Group
	South	Thanlyin	No. (2) BEHS	102	44	22	Experimental Group
						22	Control Group
	North	Mingaladon	No. (1) BEHS	230	64	32	Experimental Group
						32	Control Group
	Total			640	200	100	Experimental Group
						100	Control Group

Note. BEHS = Basic Education High School

Instruments

Pretest, posttest, self-assessment form, and questionnaires were used as quantitative research instruments, and semi-structured interview questions and observation checklists were used as qualitative research instruments.

Procedure

The model was developed and required instruments and lesson plans were prepared first. After taking validation, a pilot study was conducted. Qualitative data were collected before intervention by interviewing and administering questionnaires to both the students and teachers. After that, the intervention was followed. During the intervention, observation checklists and self-assessment forms were used. Finally, a posttest was administered to both groups. Then interviewing process was conducted again.

Data Analysis

Statistical Package for the Social Science (SPSS) was mainly used to generate descriptive statistics to compare the achievement results of students from both groups. One-way Analysis of Covariance (ANCOVA) was used to analyze the quantitative data, Wilcoxon Signed Ranks Test was used to know the differences between before and after intervention dealing with the attitude changes concerning the implemented model. And Friedman Test was also used to show the improvements of soft skills which are compared among three times points and thematic analysis was used for qualitative data.

Findings

In this research, two parts of research findings were presented systematically. The first one is quantitative findings and the second one is qualitative findings.

Quantitative Research Findings: One-way analysis of covariance (ANCOVA) to reveal the results for hypothesis H1: there is a significant difference in achievement scores between Grade Ten students who are instructed by using the model based on collaborative learning techniques and concept mapping and who are not received it. The following table 2 described the initial results in four schools.

Table 2 Analysis of Covariance (ANCOVA) Results of Pretest Scores on Initial Ability in Four Schools

School	Group	N	M	SD	MD	*F*	*p*	Partial Eta Squared
S1	Experimental	25	33.08	3.43	- 4.00	9.603	.003**	.16
	Control	25	37.08	5.46				
S2	Experimental	21	26.57	7.16	2.24	1.245	.271(ns)	.03
	Control	21	24.33	5.76				
S3	Experimental	22	27.68	8.09	-12.37	36.258	.000***	.46
	Control	22	40.05	5.21				
S4	Experimental	32	32.88	2.11	3.10	8.915	.004**	.12
	Control	32	29.78	5.47				

Note. S1 = No. (3) Basic Education High School, North Okkalapa, S 2 = No. (2) Basic Education High School, Bahan, S 3 = No. (2) Basic Education High School, Thanlyin,

S 4 = No. (1) Basic Education High School, Mingaladon, ns = not significant, $^{***}p < .001$. $^{**}p < .01$.

There were significant differences between the initial knowledge of experimental groups and control groups in school 1, school 3, and school 4. According to the result of school 2, there was no significant difference between the two groups.

The post-test results on Physics achievement in four schools are presented in Table 3.

Table 3 Analysis of Covariance (ANCOVA) Results of Posttest Scores on Physics Achievement in Four Schools

School	Group	N	Unadjusted M	Adjusted M	MD	*F*	*p*	Partial Eta Squared
S1	Experimental	25	24.00	24.61	4.78	21.23	.000***	.150
	Control	25	20.44	19.83				
S2	Experimental	21	29.48	29.05	11.24	15.40	.000***	.070
	Control	21	17.38	17.81				
S3	Experimental	22	24.95	26.67	14.06	25.91	.000***	.075
	Control	22	14.32	12.61				
S4	Experimental	32	27.00	26.68	14.92	223.02	.000***	.053
	Control	32	11.44	11.76				

Note. $^{***}p < .001$.

In four schools, after adjusting for pre-intervention scores (pretest scores) as covariate, there were significant differences between the two groups on post-intervention scores (posttest scores) on Physics achievement according to the adjusted mean scores for school 1 (24.61,19.83) and F (1,47) = 21.23, p =.000, for school 2 (29.05,17.81) and F (1,39) = 15.40, p =.000, for school 3 (26.67,12.61) and F (1,41) = 25.91, p =.000, and for school 4 (26.68,11.76) and F (1,61) = 223.02, p =.000. There were no significant relationships between the pretest scores and posttest scores, as indicated by a partial eta squared values of .15 for school 1, .07 for school 2, .075 for school 3, and .053 for school 4. According to Cohen's (1988) guidelines (cited in Cohen, Manion & Morrison, 2018), the value .15 is a large effect size, the value .07 is a medium effect size, and .05 is a small effect size.

From the above data, it can be interpreted that the two groups from each school were not the same on the dependent variable because their mean scores showed the fact that the experimental groups have better achievement on the Physics achievement test than the control groups. Therefore, it can be assumed that the students of experimental groups gained a significant effect due to the utilization of an integrated collaborative concept mapping model in teaching Physics. In other words, it can be interpreted that the experimental treatment or the implemented model has a significant positive effect on Grade Ten Students' Physics learning.

Findings of Wilcoxon Signed Rank Test for Students' Attitudes Questionnaires

In using Wilcoxon Signed Rank Test, the z value and the associated significance levels presented as Asymp. Sig. (2-tailed) need to be checked. If the significance level is equal to or less than .05, the difference between the two scores is statistically significant (Pallant, 2010) (See Table 4).

Table 4 Wilcoxon Signed Rank Test Results for Students' Attitudes

School	No. of Participant	Component	Before Md	After Md	z	Asymp. Sig(2-tailed) *p*	*r*
S1	25	AP	46	59	-3.217	.001**	.45
		ACLT	54	62	-2.755	.006**	.38
		ACM	50	60	-3.609	.000***	.51
S2	21	AP	51	58	-3.340	.001**	.51
		ACLT	56	60	-2.368	.018*	.36
		ACM	49	60	-3.981	.000***	.61
S3	22	AP	55	59	-2.243	.025*	.33
		ACLT	58	64	-2.634	.008**	.39
		ACM	53	60	-3.738	.000***	.56
S4	32	AP	51	55	-3.071	.002**	.38
		ACLT	59	63	-1.822	.068(ns)	.22
		ACM	48	58	-4.509	.000***	.56
All four schools	100	AP	52	58	-6.001	.000***	.42
		ACLT	58	62	-4.758	.000***	.33
		ACM	50	60	-7.914	.000***	.55

Note. AP = attitudes towards Physics, ACLT= attitudes towards collaborative learning techniques, ACM= attitudes towards creating concept maps, Md = Median, ns= not significant, $^{***}p < .001$. $^{**}p < .01$. $^{*}p < .05$.

In all four schools as the overall results, Wilcoxon Signed Rank Test revealed a significant difference dealing with attitudes towards Physics, collaborative learning techniques, and creating concept maps between before intervention (Time 1) and after intervention (Time 2), z = -6.001, 4.758, - 7.914, p = .000, .000, .000 (p = <.000), with medium and large effect size (r= .42, .33, .55). The median score on the attitudes towards Physics increased from before intervention (Md = 52) to after intervention (Md = 58). The median score on the attitudes towards collaborative learning techniques increased from before intervention (Md = 58) to after intervention (Md = 62). The median score on the attitudes towards creating concept maps increased from before intervention (Md = 50) to after intervention (Md = 60). It can be interpreted that the positive attitudes dealing with the three components increase after the intervention and there was a significant difference in the attitudes of students towards learning Physics who were instructed by using the model based on collaborative learning techniques and concept mapping before and after intervention in all four schools.

Friedman Test Results for Self-Assessment Form Linking to 5 Cs

The assessment form contains five components for 5 Cs and is administered to the participants at least three times (the first week of the intervention, in the middle of the intervention, and at the end of the intervention). According to Pallant (2010), in analyzing these data, one sample of participants, measured on the same scale or measured at three different time periods is required. Therefore, the collected data were analyzed by using Friedman Test. In analyzing these data, Asymp. Sig. level, median, and mean rank are required to compare the results. Comparing mean rank is the main fact in deciding whether there is an improvement or not dealing with the testing area causes of the treatment. If the mean ranks are increasing, it can be interpreted that there is an improvement (See Table 5).

Table 5 Friedman Test Results of Self-Assessments on 5 Cs in Overall Schools

School	No. of Student	5 Cs	Mean Rank			Md (Median)			*df*	*Chi-Square* X^2	*p*
			B	D	A	B	D	A			
All four schools	100	C1	1.67	1.88	2.46	18	19	20	2	37.358	$.000^{***}$
		C2	1.59	1.86	2.56	17	18	20	2	57.926	$.000^{***}$
		C3	1.73	1.83	2.45	16	17	19	2	34.381	$.000^{***}$
		C4	1.50	1.96	2.55	16	18	20	2	62.695	$.000^{***}$
		C5	1.72	1.96	2.32	19	19	20	2	20.494	$.000^{***}$

Note. C1 = Collaboration, C2 = Communication, C3 = Critical Thinking and Problem Solving, C4 = Creativity and Innovation, C5 = Citizenship, B = Before, D = During, A = After, $^{***}p < .001$.

The expressed data can be interpreted that there is a change in skills dealing with 5 Cs across three time periods. Comparing the Mean Ranks for the three sets of scores, it appears that there were improvements in all 5 Cs over time in all participants. It can be interpreted that applying an integrated collaborative concept mapping model in teaching physics let the students improve their soft skills along with learning deep Physics concepts.

Qualitative Research Findings: Based on the research design, qualitative data was collected first because the qualitative phase of the study is intended to provide data to support or supplement the quantitative data from the experimental design. In this design, semi-structured interviews and observation (during) were conducted before intervention and after the intervention. The validity of the qualitative results can be enhanced by the quantitative results. Thematic analysis for both interview and observation data are described as the following.

Findings of Students' Interview: Thematic analysis results for students/teachers' interview responses are expressed in tabulated forms.

Table 6 Display Data for Students' Interview Responses

No.	Main Theme	Sub Theme	Response	Before (%)	After (%)
1	Attitudes on Physics Learning	Reasons of learning	- Interested in Physics/calculation - As a subject/including in curriculum - Support for further learning	44 34 9	53 9 19
		Like/ Dislike	- Like - Dislike	78 22	91 9
		Usefulness for self	- Useless - No answer (Silence) - Usefulness	6 16 78	3 0 97
		Teaching methods	- Formal teaching - Proposed model	100 0	0 100
		Effectiveness for daily life	- Not accept the assumption - Accept assumptions	25 75	16 94
		Extra learning	- No - Yes (Google / YouTube)	66 34	13 87
2	Attitudes towards Collaborative Learning Techniques	Learning style	- Individual learning - Group learning	6 94	3 97
		Understanding	- No answer (Silence) - Unknown exactly - 4 or 5 per group work together - Cooperation - Sharing knowledge - Collaboration (work by group)	16 31 31 3 13 6	0 3 6 0 3 88
		Enjoying	- Dislike - Like	16 84	0 100
		Assigning Groups	- Group by teacher - Group by wish	81 19	100 78
		Kinds of a well-organized group	- Academic (good, fair, poor) - Unity/ active / negotiation/ social - 4/5/6 per group (members) - Good intelligence - No answer (Silence) - Responsibility	25 31 31 6 6 0	31 34 0 0 0 34
		Assigning Tasks	- Assign tasks for individual - Solve by the strength of unity	91 9	0 100
		Motivation	- Help each other	100	100
		Assessment	- Assess by teacher - Assess by peer - Not assess	100 81 19	0 100 0
		Benefits	- Friendships, Social interaction skills, Communication skills	100	100
3	Attitudes on Creating Concept Maps	Experience	- Learnt before (accept) - Learnt before (not accept)	0 100	100 0
		Interest	- Uninteresting - Interesting	6 94	0 100
		Usefulness	- No answer (Silence) - Identify misconceptions	63 38	0 100
		Benefits / Drawbacks	- No answer (Silence) - Benefits	41 59	0 100

Table 7 Display Data for Teachers' Interview Responses

No.	Main Theme	Sub Theme	Response	Before (%)	After (%)
1	Understanding Collaborative Learning Techniques	Collaboration	- Exchange ideas/knowledge	50	100
		An effective learning group	- Academic (good, fair, poor) - Competition groups - Heterogeneous groups	25 25 25	100 0 0
		Causes	- Competitions - Cooperation - Sharing knowledge - Negotiation	25 25 25 25	100 0 0 0
		Consideration facts	- Individual ability, Fair groups - Heterogeneous, Intelligence	75 0	100 0
		Difficulties	- Time-consuming	100	100
		Ways of grouping	- School Council Teams - Rows - Heterogeneous groups - Randomly	25 50 25 0	0 0 0 100
2	Assessment	Participation	- Active participation - Check around the group	50 50	100 0
		Exchanged strategies	- Explaining again but coach - Asking easy questions	100 0	100 0
		Improvements	- Assess by looks	100	100
3	Expected Outcomes	Skills	- Observation / Social skills	100	100
		Feelings	- Good if time enough	100	100

Table 8 Results of Classroom Observation Checklists for Teachers

Phase	Observed Factor	Frequency	%
Preliminary Phase	1. Begins class on time.	74	77.0
	2. Review prior class concepts.		81.9
	3. Appears well-prepared for class.		79.2
	4. Related today's lesson to previous.		83.8
	5. Provided clear directions for grouping.		83.8
Average %			**81.1**
Expounding Phase	1. Used good examples to clarify points.	74	77.0
	2. Provided group tasks.		78.4
	3. Related new ideas to familiar concepts.		79.7
	4. Explained major/ minor points with clarity.		84.3
	5. Defined unfamiliar terms, concepts, and principles.		81.9
	6. Emphasized important points.		85.7
	7. Responded appropriately to non-engaged students.		81.9
	8. Effectively managed time.		81.6
	9. Identify the focus concept or problems.		84.1
	10. Explicitly states relationships.		85.9
Average %			**82.1**
Exploration Phase	1. Monitor every group's activity all the time.	74	81.4
	2. Actively encouraged student questions.		83.8
	3. Treats class members equitably.		83.2
	4. Encourages mutual respect among students.		83.8
	5. Provides enough time for reviewing the maps.		81.9
	6. Allows sufficient time for completion.		84.6
	7. Provides enough time for problem-solving.		85.7
Average %			**83.5**
Closure Phase	1. Summarize the concepts together with all the students.	74	81.9
	2. Evaluate the concepts maps or solutions.		82.2
	3. Deliver the evaluation test questions.		84.9
Average %			**83.0**

Table 9 Results of Classroom Observation Checklists for Students

Main Theme	Observed Factor	Frequency	%
Collaboration	Focused on team activities.	74	80.81
	Stay in the group until the activities finish.		85.41
	Demonstrate good self-control.		81.89
	Ask useful questions to deepen the study.		81.89
	Share information that they collected.		81.62
	Share personal views.		81.08
	Well prepared for group activities.		85.95
	Explain ideas with clarity and appropriate concepts.		76.76
	Give helpful feedback.		75.14
	Accept useful feedback.		75.14
Average %			**80.59**
During Learning	Listen attentively.	74	92.97
	Answer actively.		81.62
	Asks misunderstanding facts at once.		84.05
	Accept assigning group works.		96.76
	Pay attention to other's sharing ideas.		81.89
	Average %		**87.46**
Creating Concept Maps	Well prepare to create a concept map.	74	78.92
	Record the facts systematically.		78.92
	Accept others' useful and helpful opinion.		79.19
	Conduct interestingly.		82.43
	Explain the created concept map clearly.		84.86
Average %			**80.86**

Summaries of the research findings are as follows:

1. According to the quantitative results, the experimental groups scored significantly higher than the control groups on achievement scores.
2. According to the qualitative results, there were significant differences in the attitudes of students towards learning Physics who were in experimental groups before and after the intervention. Their attitudes changed positively.
3. According to the responses of teachers, there were slightly changes in the attitudes towards using the proposed model before and after the intervention.
4. According to the Fried man test results, there were significant changes in the students' acquired soft skills after intervention in all schools.
5. According to the results of thematic analysis for observation and interview, the students who participated as experimental group members actively participated in the intervention periods

Discussion

On the overall Physics achievement, there were significant differences in initial knowledge of Physics for the pretest between the control and experimental groups. Based on the overall results, showed that the control groups had more initial background knowledge of Physics than the experimental groups. But the results of the one-way analysis of covariance (ANCOVA) for posttest scores conversed with the initial results. The ANCOVA results showed that the students from the experimental groups performed better than those who participated in the control groups in overall achievement in Physics. Therefore, it can be interpreted that the use of the proposed model, An

Integrated Collaborative Concept Mapping Model, significantly improves the students' achievement in Physics causes of increasing their conceptual understanding. This result is in line with the study of Doris (2018) that the students who taught with the concept mapping mode of instruction performed significantly better than those taught with conventional modes. This study recommended that teachers should imbibe the concept mapping method in the teaching of Physics to enhance students' comprehension and identification of relationships that exist between concepts and creativity.

Significant improvement was found in the students' attitudes towards Physics when interviewing 32 students who were selected purposively from the experimental groups. The percentage results indicated that the Integrated Collaborative Concept Mapping Model performed better in positive attitude changes. This study is in line with the result obtained from the study of the effect of concept mapping on attitude and achievement in a Physics course conducted by Karakuyu (2010) that expressed that the experimental group students were observed to have a tendency of more positive attitude than the control group students.

Wilcoxon Signed Rank Test for students' attitudes questionnaires revealed significant differences dealing with attitudes towards Physics, collaborative learning, and creating concept maps between before intervention (Time 1) and after intervention (Time 2) in school 1, school 2, school 3, and school 4. But no significant difference was found in attitudes towards collaborative learning in school 4.

Friedman Test results showed that the improvement was found in all the collaboration skills, communication skills, critical thinking and problem-solving skills, creativity and innovation skills, and citizenship. There were statistically significant differences in self-assessment scores across the three-time points. It can be interpreted that Integrated Collaborative Concept Mapping Model enhances students' soft skills.

Moreover, using the integrated collaborative concept mapping model in teaching Physics can enhance students' positive attitudes towards Physics learning. Thus, it can be said that the second research hypothesis was accepted by these findings.

The interviewee teachers agreed that the Integrated Collaborative Concept Mapping utilizing is more valuable for them if they have time enough. In the current situation, they have insufficient time to implement this model completely in their teaching. Nevertheless, from the finding of the teachers' interviews, it can be interpreted that this integrated collaborative concept mapping model is effective in teaching Physics. The results of observation showed the implementation percentage of the Integrated Collaborative Concept Mapping Model. The results showed that 80% were successful in implementing this model. Causes of their hardworking manner to implement this teaching process, the expected results were obtained. Therefore, it can be interpreted that teachers' attitudes towards the proposed model changed over time properly when comparing before and after the intervention.

Suggestions

Suggestions for Physics Teachers: Teachers should exactly know what collaboration is, how to use it, and the usefulness of concept map creation in their teaching. They should know the grouping nature in using collaboration. Teachers could review each group's performance to monitor participation and progress and intervene when the need arises. Moreover, the teacher should explain the purpose and usefulness of a task before students carry out the task. This arouses the learners' interest.

Suggestions for Physics Students: All the students should be suggested that collaborative concept mapping is not a boring technique, and is capable of systematically study with it by giving proper time, a deep understanding of Physics concepts and the expected achievement in Physics can be acquired.

Suggestions for School Administrators: In other countries, concept map creation is studied with computers. In this research, although the students performed the creation of concept maps with paper and pencil, they all proved that it is very beneficial for them. Therefore, if it is possible, the required computers should be supported for each school.

Recommendations

1. According to the obtained results of this current research, it is claimed that teaching Physics concepts with the Integrated Collaborative Concept Mapping Model can enhance the students' achievement in Physics along with a deep understanding of the concepts. Moreover, applying this model with formal procedures can prepare the students to explore and develop their own abilities to work collaboratively, communicate effectively and convince others with their own ideas and critical thinking and problem-solving skills. Furthermore, it can improve the students' positive attitudes concerning learning Physics because it lets them acquire a deep understanding of the concept taught in the classroom.
2. For further implementation of concept mapping in the future and to enhance the enthusiasm of teachers in giving Physics courses; intensive training for the teachers is highly recommended to implement concept mapping not only in Physics but also in other disciples.
3. In this study sample schools were randomly selected from Yangon Region. Further research should be carried out for the rest states and regions for replication.
4. This study was conducted for only three chapters from Physics Textbook (2020-2021). Further research should be carried out for the whole syllabus.
5. Some of the collaborative learning techniques were used in the present study. Further studies should be carried out by other collaborative learning techniques.

Conclusion

The Ministry of Education (MOE) is committed to improving the basic education curriculum to make it more relevant to the lives of students by focusing on 21^{st} -century skills, soft skills (including personal development and employability skills), and higher-order thinking skills. According to the obtained results from this study, the use of the integrated collaborative concept mapping model is more supportive than formal instruction which was emphasizing the teacher-centered approach to teaching Physics concepts at the secondary high school level. Friedman Test results showed that the improvement was found in all the collaboration skills, communication skills, critical thinking and problem-solving skills, creativity and innovation skills, and citizenship. Thus, the integrated collaborative concept mapping model can enhance students' soft skills.

To sum up, the Physics teacher should avoid emphasizing the teacher-centered (giving explanation, questioning and answering, as well as doing homework) which do not provide opportunities for students to develop creativity and critical thinking. Emphasizing the learner-centered (letting students use the power of reason to enable a way of what to think and how their thinking processes are, through the learning methods of collaborative concept mapping, discovery, discussion, experimentation, and other methods) should be favored in the current 21^{st}-century classroom. Collaborative concept mapping is an active learning strategy that moves the students beyond rote memorization to critical thinking and is meaningful learning in the classroom both for teachers and students.

Acknowledgments

We would like to express our sincere appreciation to Dr. Kay Thwe Hlaing (Rector, Yangon University of Education), Dr. May Myat Thu (Pro-Rector, Yangon University of Education), Dr. Khin Khin Oo (Pro-Rector, Yangon University of Education) and Dr. Nyo Nyo Lwin (Pro-Rector, Yangon University of Education) for the administrative support and permission. And then, we would like to thank all participants in this study.

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J. Myanmar Acad. Arts Sci. 2023 **Vol. XXI. No.6**

AN INVESTIGATION INTO THE TEACHERS' PERCEPTION OF TECHNOLOGY INTEGRATION IN TEACHING MATHEMATICS

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Abstract

The present study investigated the teachers' perception of technology integration in teaching mathematics. Quantitative research method was used in this study. Questionnaire survey was conducted to investigate the teachers' perception of technology integration in teaching mathematics. The participants were randomly selected from Yangon Region. A total of 185 (JAT 112 and SAT 73) mathematics teachers from the selected schools were participated in this study. A questionnaire was used as research instrument. The required data for this study were collected and analyzed by descriptive analysis. Both middle and high school mathematics teachers have moderate level perception on all dimensions: technology-based teaching and learning, the effectiveness of technology integration for students' learning, and technology integration in learning mathematics. Research findings pointed out that both middle and high school teachers have good perception on technology integration in teaching mathematics.

Keywords: Perception, Technology, Educational Technology, Technology Integration, Integrating Educational Technology

Introduction

Improving the quality and proficiency of technology integration in teaching mathematics is essential to achieve national learning standard. Nowadays, in Myanmar, there are ten programs that are being implemented in the basic education sub-sector under the Thirty-Year Long-Term Education Development Plan. Among those, to improve the quality of basic education, to improve access to teaching-learning and communication technology leading towards e-education and to produce all-round developed citizens must always be kept in mind by all teachers and hence they have to try to achieve the objectives. Technology will make teachers and students more knowledgeable on ever changing environment thus a possibility of shaping their perceptions and application with modernize globalization.

Importance of the Study

In the 21st century, the term 'technology' is an important issue in many fields in Myanmar including education. This is because technology has become the knowledge transfer highway in most countries. Nowadays technology integration has gone through innovations and transformed the societies that has totally changed the way people think, work and live (Grabe, 2007). Schools need to prepare students to live in a knowledge society and consider technology integration in their curriculum implementation.

In Myanmar, education reform has been implemented to meet the needs and demands of the continuously changing world. There was a paradigm shift in teaching methods from teacher centered approach to learner centered approach with the help of technology integration in teaching mathematics. During implementation stage of the education reform, all stakeholders of the schools namely teachers, principals and community members need to realize the importance of change and innovation in education and to collaborate for achieving the educational goals successfully.

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Purposes of the Study

The purposes of this study are as follows.

1. To study mathematics teachers' perception on technology-based teaching and learning
2. To explore mathematics teachers' perception on the effectiveness of technology integration in teaching mathematics
3. To give suggestions for enhancing mathematics teaching and learning through technology integration in teaching mathematics

Research Questions

This study aims to answer the following research questions.

1. To what extent do mathematics teachers have perception on technology-based teaching and learning?
2. To what extent do mathematics teachers have perception on the effectiveness of technology integration for students' learning?
3. To what extent do mathematics teachers have perception on technology integration in learning mathematics?
4. To what extent do mathematics teachers have perception on technology integration in teaching mathematics?

Scope of the Study

The present study is geographically restricted to East District in Yangon Region. Participants in this study are 112 middle and 73 high school mathematics teachers from the selected schools within the academic year (2021-2022). Teachers' perception of technology integration was measured in only four dimensions: (i) teacher's perception on technology-based teaching and learning, (ii) teacher's perception on the effectiveness of technology integration for students' learning, (iii) teacher's perception on technology integration in learning mathematics, and (iv) teacher's perception on technology integration in teaching mathematics.

Definition of Key Terms

The key terms used in this study are presented as follows.

Perception: The word 'perception' refers to the processes that allow extracting information from the patterns of energy that impinge on the sense organs (Rogers, 2017).

Technology: Technology is commonly thought of in terms of gadgets, instruments, machines, and devices but is not a collection of machines and devices, and a way of acting (Muffoletto, 1994).

Educational Technology: Educational technology implies the use of all educational resources-men and materials, methods and techniques, means and media in an integrated and systematic manner for optimizing learning (Roblyer & Edwards, 2000).

Technology Integration: Technology integration refers to the use of technology-based resources and practices in school and classroom activities (Ogle et al., 2002).

Integrating Educational Technology: Integrating educational technology refers to the process of determining which technology-based tools and which methods for implementing them are appropriate for given situations and problems (Roblyer & Edwards, 2000).

Review of Related Literature

Educational Technology is the combined use of computer hardware, software and educational theory and practice to facilitate learning. In addition to practical educational experience, educational technology is based on theoretical knowledge from various disciplines such as communication, education, psychology, sociology, artificial intelligence and computer science. It encompasses several domains including learning theory, computer-based training, online learning and e-learning where mobile technologies are used. Educational Technology will be employed in the spread of useful information, the training and retraining of teachers, to improve the quality, sharpen perception of art and culture, inculcate abiding values, etc., both in the formal and non-formal sections (Mohanty, 2007).

Education requires media support which is related to the curriculum as well as enrichment. Curriculum-based education also requires materials which the teacher can draw upon in the course of this teaching. This could be provided in the form of charts, slides, transparencies, etc. Video technology offers considerable potential for improving the quality of education especially at higher levels (Mohanty, 2007).

There are a large number of new methods and media constitute educational technology. But there is no proper co-ordination and articulation in their use. That is why, no satisfactory results are achieved by such a wide range of materials due to lack of a systematic planning and organization. With the advance of science and technology, there are new learning aids which have revolutionized the learning process in particular and education as a whole. In modern society with its emphasis on mass education and successful citizenship training, the requirement is for efficient learning. Education has now become an assembly-line like mass production factories. A nation can prosper if its education can be made effective. Education can be made efficient, if it uses modern technology.

The material used as medium of instruction may be categorized into three groups: audio, visual and audio-visual (See Table 1).

Table 1 Categories of Educational Media

Audio Aids	Visual Aids	Audio-Visual Aids
Radio	Pictures	TV
Tape-Recorder	Chart	Computer
Lingua Phone	Models	CCTV
Microphone	Maps	Video-Tape
Loudspeakers	Still Movie Projector	VCR
Sound Distribution System	OHP	Teleconferencing
Language Laboratory	Slide Projector	Movie Projector
Tape and Disk Recording	Black Board	LCD Projector
	Flannel Board	
	Display Board	
	Epidiascope	

Source: From Pachauri, Kumar and Rana (2011).

Research Method

Research Design

Quantitative research method was used in this study. Questionnaire survey was conducted to investigate the teachers' perception of technology integration in teaching mathematics.

Sampling

In this study, 185 mathematics teachers (JAT 112 and SAT 73) from the selected schools were participated.

Instrument

The present study included three types of teachers' perception on technology integration in teaching mathematics. To investigate mathematics teachers' perception on technology integration in teaching mathematics, inventory developed by Thomas and Hong's teacher integration of technology into mathematics learning (2012) was used in this study. Inventory on the teachers' perception on technology integration in teaching mathematics consists of 36 items. There are three subscales and 12 items in each subscale. All the items in inventory on the teachers' perception on technology integration in teaching mathematics are scored by five points Likert scale (5=strongly agree, 4= agree, 3=unsure, 2=disagree, 1=strongly disagree).

Procedure

After modifying the instrument, a pilot testing was carried out with all middle and high school mathematics teachers from five Basic Education High Schools, South Dagon, Yangon Region with 20 middle school mathematics teachers and 20 high school mathematics teachers. Based on the results of pilot study, the necessary changes were made and reliability coefficient of the instrument, internal consistency (Cronbach's Alpha) was calculated. The internal consistency (Cronbach's Alpha) was 0.725. Therefore, the questionnaire was suitable to use.

Then, it was conducted in Yangon Region in which there are four districts and thus one district was selected and seven townships from the selected district were chosen by using simple random sampling method. Therefore, 38 high schools were included in this study. The modified questionnaire was distributed to all participants from all selected sample schools with the help of the headmaster or headmistress of those schools in November, 2021. After collecting the data, they were entered into the computer data file.

Data Analysis

The data were analyzed by using descriptive statistics (mean, standard deviation and percentage).

Research Findings

Findings of Middle School Mathematics Teachers' Perception of Technology-based Teaching and Learning

According to the responses, the mean score of middle school mathematics teachers' perception of technology-based teaching and learning is presented in the Table 2.

Table 2 Mean of Middle School Mathematics Teachers' Perception of Technology-based Teaching and Learning

No.	Dimension	N	Mean Score	Standard Deviation	Minimum	Maximum
1	Technology - based teaching and learning	112	45.53	3.76	26	56

In order to find out the levels of teachers' perception on technology-based teaching and learning, it is necessary to examine the percentage of 112 middle school mathematics teachers who have low, moderate and high perception on technology-based teaching and learning. Therefore, a descriptive statistics (percentage) was used. All the participants were classified into three groups (low, moderate and high) based on the mean and standard deviation.

Table 3 Percentage of Levels of Middle School Mathematics Teachers' Perception of Technology-based Teaching and Learning

Level of Perception	Score	No. of Teacher	Percentage
Low	$x < 41.77$	9	8
Moderate	$41.77 \leq x \leq 49.29$	88	79
High	$x > 49.29$	15	13
Total		**112**	**100**

In order to present the levels of middle school mathematics teachers' perception on technology-based teaching and learning, the percentage of various groups are presented in Table 3.

Findings of High School Mathematics Teachers' Perception of Technology-based Teaching and Learning

According to the teachers' responses, the mean score of high school mathematics teachers' perception of technology-based teaching and learning is presented in the Table 4.

Table 4 Mean of High School Mathematics Teachers' Perception of Technology-based Teaching and Learning

No.	Dimension	N	Mean Score	Standard Deviation	Minimum	Maximum
1	Technology-based teaching and learning	73	45.49	3.99	32	56

In order to find out the levels of teachers' perception on technology-based teaching and learning, it is necessary to examine the percentage of 73 high school mathematics teachers who have low, moderate and high perception on technology-based teaching and learning. Therefore, a descriptive statistic (percentage) was used. All the participants were classified into three groups (low, moderate and high) based on the mean and standard deviation.

Table 5 Percentage of Levels of High School Mathematics Teachers' Perception of Technology-based Teaching and Learning

Level of Perception	Score	No. of Teacher	Percentage
Low	x < 41.50	3	4
Moderate	41.50 ≤ x ≤ 49.48	61	84
High	x > 49.48	9	12
Total		**73**	**100**

In order to present the levels of high school mathematics teachers' perception on technology-based teaching and learning, the percentage of various groups are presented in Table 5.

Findings of Middle School Mathematics Teachers' Perception of the Effectiveness of Technology Integration for Students' Learning

According to the middle school mathematics teachers' responses, the mean score of middle school mathematics teachers' perception of the effectiveness of technology integration for students' learning is presented in the Table 6.

Table 6 Mean of Middle School Mathematics Teachers' Perception of the Effectiveness of Technology Integration for Students' Learning

No.	Dimension	N	Mean Score	Standard Deviation	Minimum	Maximum
1	Effectiveness of technology integration for students' learning	112	48.99	3.96	38	60

In order to find out the levels of teachers' perception on the effectiveness of technology integration for students' learning, it is necessary to examine the percentage of 112 middle school mathematics teachers who have low, moderate and high perception on the effectiveness of technology integration for students' learning. Therefore, a descriptive statistics (percentage) was used. All the participants were classified into three groups (low, moderate and high) based on the mean and standard deviation.

Table 7 Percentage of Levels of Middle School Mathematics Teachers' Perception of the Effectiveness of Technology Integration for Students' Learning

Level of Perception	Score	No. of Teacher	Percentage
Low	x < 45.03	6	5
Moderate	45.03 ≤ x ≤ 52.95	85	76
High	x > 52.95	21	19
Total		**112**	**100**

In order to present the levels of middle school mathematics teachers' perception on the effectiveness of technology integration for students' learning, the percentage of various groups are presented in Table 7.

Findings of High School Mathematics Teachers' Perception of the Effectiveness of Technology Integration for Students' Learning

According to the high school mathematics teachers' responses, the mean score of high school mathematics teachers' perception of the effectiveness of technology integration for students' learning is presented in the Table 8.

Table 8 Mean of High School Mathematics Teachers' Perception of the Effectiveness of Technology Integration for Students' Learning

No.	Dimension	N	Mean Score	Standard Deviation	Minimum	Maximum
1	Effectiveness of technology integration for students' learning	73	48.11	4.04	30	60

In order to find out the levels of teachers' perception on the effectiveness of technology integration for students' learning, it is necessary to examine the percentage of 73 high school mathematics teachers who have low, moderate and high perception on the effectiveness of technology integration for students' learning. Therefore, a descriptive statistics (percentage) was used. All the participants were classified into three groups (low, moderate and high) based on the mean and standard deviation.

Table 9 Percentage of Levels of High School Mathematics Teachers' Perception of the Effectiveness of Technology Integration for Students' Learning

Level of Perception	Score	No. of Teacher	Percentage
Low	$x < 44.07$	4	5
Moderate	$44.07 \leq x \leq 52.15$	61	84
High	$x > 52.15$	8	11
Total		**73**	**100**

In order to present the levels of high school mathematics teachers' perception on the effectiveness of technology integration for students' learning, the percentage of various groups are presented in Table 9.

Findings of Middle School Mathematics Teachers' Perception of Technology Integration in Learning Mathematics

According to the responses, the mean score of middle school mathematics teachers' perception of technology integration in learning mathematics is presented in the Table 10.

Table 10 Mean of Middle School Mathematics Teachers' Perception of Technology Integration in Learning Mathematics

No.	Dimension	N	Mean Score	Standard Deviation	Minimum	Maximum
1	Technology integration in learning mathematics	112	47.97	4.39	36	60

In order to find out the levels of teachers' perception on technology integration in learning mathematics, it is necessary to examine the percentage of 112 middle school mathematics teachers who have low, moderate and high perception on technology integration in teaching mathematics. Therefore, a descriptive statistics (percentage) was used. All the participants were classified into three groups (low, moderate and high) based on the mean and standard deviation.

Table 11 Percentage of Levels of Middle School Mathematics Teachers' Perception of Technology Integration in Learning Mathematics

Level of Perception	Score	No. of Teacher	Percentage
Low	$x < 43.58$	13	12
Moderate	$43.58 \leq x \leq 52.36$	83	74
High	$x > 52.36$	16	14
Total		**112**	**100**

In order to present the levels of middle school mathematics teachers' perception on technology integration in learning mathematics, the percentage of various groups are presented in Table 11.

Findings of High School Mathematics Teachers' Perception of Technology Integration in Learning Mathematics

According to the responses, the mean score of high school mathematics teachers' perception of technology integration in learning mathematics was presented in the Table 12.

Table 12 Mean of High School Mathematics Teachers' Perception of Technology Integration in Learning Mathematics

No.	Dimension	N	Mean Score	Standard Deviation	Minimum	Maximum
1	Technology integration in learning mathematics	73	47.51	4.43	29	60

In order to find out the levels of teachers' perception on technology integration in learning mathematics, it is necessary to examine the percentage of 73 high school mathematics teachers who have low, moderate and high perception on technology integration in teaching mathematics. Therefore, a descriptive statistics (percentage) was used. All the participants were classified into three groups (low, moderate and high) based on the mean and standard deviation.

Table 13 Percentage of Levels of High School Mathematics Teachers' Perception of Technology Integration in Learning Mathematics

Level of Perception	Score	No. of Teacher	Percentage
Low	$x < 43.08$	4	6
Moderate	$43.08 \leq x \leq 51.94$	60	82
High	$x > 51.94$	9	12
Total		**73**	**100**

In order to present the levels of high school mathematics teachers' perception on technology integration in learning mathematics, the percentage of various groups are presented in Table 13.

Findings of Middle School Mathematics Teachers' Perception of Technology Integration in Teaching Mathematics

According to the responses, the mean score of middle school mathematics teachers' perception of technology integration in teaching mathematics is presented in the Table 14.

Table 14 Mean of Middle School Mathematics Teachers' Perception of Technology Integration in Teaching Mathematics

No.	Dimension	N	Mean Score	Standard Deviation	Minimum	Maximum
1	Technology integration in teaching mathematics	112	183.37	12.01	134	219

In order to find out the levels of teachers' perception on technology integration in teaching mathematics, it is necessary to examine the percentage of 112 middle school mathematics teachers who have low, moderate and high teachers' perception on technology integration in teaching mathematics. Therefore, a descriptive statistics (percentage) was used. All the participants were classified into three groups (low, moderate and high) based on the mean and standard deviation.

Table 15 Percentage of Levels of Middle School Mathematics Teachers' Perception of Technology Integration in Teaching Mathematics

Level of Perception	Score	No. of Teacher	Percentage
Low	$x < 171.36$	10	9
Moderate	$171.36 \leq x \leq 195.38$	86	77
High	$x > 195.38$	16	14
Total		112	100

In order to present the levels of middle school mathematics teachers' perception on technology integration in teaching mathematics, the percentage of each group are presented in Table 15.

Findings of High School Mathematics Teachers' Perception of Technology Integration in Teaching Mathematics

According to the responses, the mean score of high school mathematics teachers' perception of technology integration in teaching mathematics is presented in the Table 16.

Table 16 Mean of High School Mathematics Teachers' Perception of Technology Integration in Teaching Mathematics

No.	Dimension	N	Mean Score	Standard Deviation	Minimum	Maximum
1	Technology integration in teaching mathematics	73	183.34	13.25	128	228

In order to find out the levels of teachers' perception on technology integration in teaching mathematics, it is necessary to examine the percentage of 73 high school mathematics teachers who have low, moderate and high teachers' perception on technology integration in teaching mathematics. Therefore, a descriptive statistics (percentage) was used. All the participants were classified into three groups (low, moderate and high) based on the mean and standard deviation.

Table 17 Percentage of Levels of High School Mathematics Teachers' Perception of Technology Integration in Teaching Mathematics

Level of Perception	Score	No. of Teacher	Percentage
Low	$x < 170.09$	4	6
Moderate	$170.09 \leq x \leq 196.59$	62	85
High	$x > 196.59$	7	9
Total		**73**	**100**

In order to present the levels of high school mathematics teachers' perception on technology integration in teaching mathematics, the percentage of each group are presented in Table 17.

Discussion

In order to find out the teachers' perception of technology integration in teaching mathematics, three dimensions were investigated. They are teachers' perception on technology-based teaching and learning, effectiveness of technology integration for students' learning, and technology integration in learning mathematics

According to the results of teachers' perception on technology-based teaching and learning, 8% of middle school mathematics teachers have low level of perception, 79% have moderate level and 13% have high level respectively. Hence, 4% of high school mathematics teachers have low level of perception on technology-based teaching and learning, 84% have moderate level and 12% have high level respectively. So, it can be interpreted that both most of middle and high school mathematics teachers have satisfactorily perception on technology-based teaching and learning.

The results of teachers' perception on the effectiveness of technology integration for students' learning show that 5% of middle school mathematics teachers have low level of perception, 76% have moderate level and 19% have high level respectively. Hence, 5% of high school mathematics teachers have low level of perception on effectiveness of technology integration for students' learning, 84% have moderate level and 11% have high level respectively. So, it can also be interpreted that both most of middle and high school mathematics teachers have satisfactorily perception on effectiveness of technology integration for students' learning.

According to the results of teachers' perception on technology integration in learning mathematics, 12% of middle school mathematics teachers have low level of perception, 74% have moderate level and 14% have high level respectively. Hence, 6% of high school mathematics teachers have low level of perception on technology integration in learning mathematics, 82% have moderate level and 12% have high level respectively. So, it can also be interpreted that both most of middle and high school mathematics teachers have satisfactorily perception on technology integration in learning mathematics.

The results of teachers' perception on technology integration in teaching mathematics show that 9% of middle school mathematics teachers have low level of perception, 77% have moderate level and 14% have high level respectively. Hence, 6% of high school mathematics teachers have low level of perception on the use of technology in mathematics classroom, 85% have moderate level and 9% have high level respectively. So, it can also be interpreted that both most of middle and high school mathematics teachers have satisfactorily perception on technology integration in teaching mathematics.

Suggestions

There were some limitations in this research. The samples schools were selected from Yangon Region. So, the selected survey area was a limitation. That is because small sample size was participated in this study. If the sample size is large, the results obtained from the data were more generalized and representative to the whole population.

Developing technology integration in teaching mathematics is a major factor in holistic development of mathematics education but not all complete for holistic development of mathematics teachers. For further research, an investigation into the teachers' technology integration in teaching mathematics is needed to be extended with other variables and other levels of teachers.

The suggestions for enhancing the teachers' perception of technology integration in teaching are given in the following.

- The government, administrators and stakeholders should encourage teachers to promote positive reinforcements and perceptions in technology.
- It should permit to study the use of technology in the modernize countries.
- It should hold technological shows and competitions in schools.
- It should try to encourage for knowing the effectiveness of technology to all teachers.

Conclusion

According to Benning, Linsell and Ingram (2018), technology is essential in the 21st century education. New education technology brings to the classroom environment in accordance with four major areas. First, the addition of technology into the classroom can help transform the classroom experience from a classic teacher-centered one into a student-centered experience with students taking a more active role in learning. In a student-centered classroom, the teacher becomes more of a guide as the students engage with and tackle the day's lesson. Technology integration in the classroom can give a carefully selected blend of instructional technologies with face-to-face communication.

Second, technology provides teachers and students with access to a variety of educational resources that inspire creativity, critical thinking, communication and collaboration. It promotes inclusion and the development of digital literacy skills. It extends learning beyond the text and beyond the classroom walls. It ultimately exposes students and teachers to new online global communities. Technology integration in teaching promotes a global awareness which is an essential component in the 21st century education.

Third, through the use of instructional technology, differentiated instruction can be made much easier to different levels of students in the classroom. It can become more of a reality with differentiated instruction, students are provided an education that is personalized and that meets them where they are developmentally. More students are able to benefit from this type of instruction. The use of technology also provides students access to very rich learning materials outside of the classroom.

Finally, it is paramount that while in school, students' use tools that will best prepare them for their future academic and professional experiences. This includes a blend of new tech and old tech. Integrating technology into the classroom provides students with a set of skills to navigate through the variety of online tools today. It also provides teachers opportunities to educate students on digital citizenship and the new challenges to academic integrity. Successful integration requires time, customization, experimentation, and support. While there are many schools successfully integrating technology into their classrooms, there are an even larger number of schools that are faced with obstacles impeding this process.

Above four major reasons for the effectiveness of teaching and learning, today's mathematics teachers should bring new educational technology into their classrooms. It should be perceived importance role of education technology in education and technology integration in the classroom are essential for the 21st century mathematics classrooms. Moreover, the quality of mathematics will pave way for the much-needed pursuit in science and technology at the higher level in this changing world. Technology provides additional opportunities for learners to see and interact with mathematical concepts.

Acknowledgements

We would like to express our deepest gratitude to the following individuals who extended their invaluable support for the completion of this study. Firstly, we would like to render our respectful gratitude to Dr. Kay Thwe Hlaing (Rector, Yangon University of Education), Dr. May Myat Thu (Pro-Rector, Yangon University of Education), Dr. Khin Khin Oo (Pro-Rector, Yangon University of Education) and Dr. Nyo Nyo Lwin (Pro-Rector, Yangon University of Education) for their permission to carry out this study. We would like to offer sincerest appreciation to Dr. Khin Mar Khine (Professor/Head of Department of Curriculum and Methodology, Yangon University of Education) for her invaluable suggestions, encouragement and kind help.

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A STUDY OF TEACHER EDUCATORS' PERCEPTIONS AND TENSION TOWARDS PRACTICUM PRACTICE

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Abstract

The main purpose of this study is to investigate the level of teacher educators' perceptions and tension towards practicum practice. The research design for this study is descriptive research design. In this study, (150) teacher educators are randomly selected from Yankin, Thingangyun, Pathein, and Myaungmya Education Degree Colleges. A questionnaire with (60) items was used as an instrument. The questionnaire on five-point Likert-Scale was developed; strongly disagree, disagree, undecided, agree, and strongly agree. In order to describe the level of teacher educators' perceptions and tension towards practicum practice, mean, standard deviation, frequency, and percentage were used. Pearson product-moment correlation was used to find out the relationship between teacher educators' perceptions and tension towards practicum practice. The results showed that there was a negative correlation ($r = -.410$) between teacher educators' perceptions and tension towards practicum practice and there was a significant difference at 0.01 level (2-tailed). This indicated that teacher educators who have high positive perceptions towards practicum practice attain less tension towards practicum practice.

Keywords: Teacher Educator, Perception, Tension, Practicum, Teaching Practice

Introduction

The quality of education mainly depends on the teachers' qualifications, competency and level of professional development. In Myanmar society, education is traditionally valued as a key determinant for social mobility and it is widely recognised as a critical building block for nation building, national unity and sustainable development.

When considering educational reform in any country, in particular, a developing country such as Myanmar, several key points as to the importance of teacher training can be taken from the literature. Firstly, it is important for all teachers to be updated with current trends in teaching (Steadman, 2008). Secondly, teachers will be well-equipped and better qualified to provide their students the necessary skills and knowledge needed for their future career (Supriatna, 2015). Lastly, teachers in the primary and secondary schools should be trained in how to teach their students using different student-centered methodologies and teaching strategies to send competent students to university (Simon, 2013).

Statement of the Problem

Shulman (1986) stated that teaching has been described as a combination of an art, a craft and a science. In order to prepare pre-service teachers to teach effectively in 21st century classrooms, teacher education program should aim to develop the knowledge, skills and attributes of pre-service teachers.

In the introduction of practicum in teacher education, student teachers can understand the socio-cultural, political and economic factors and also first-hand experience. It is a critically important part of initial teacher education. Practicum experiences among pre-service teachers are often described as the most important part of teacher education program.

Thus, to attain the aim of the practicum practices in teaching program, teacher educators need to know and believe how important practicum practices in teacher training courses are. Furthermore, teacher educators should be well-prepared to face and overcome the tension towards practicum practices. Therefore, by considering these problems, the perceptions and tension encountered by teacher educators in Education Degree Colleges in Myanmar are intended to assess.

Purposes of the Study

The main purpose of this study is to study teacher educators' perceptions and tension towards practicum practice. The specific objectives are as follows:

- to investigate the level of teacher educators' perceptions towards practicum practice
- to describe the level of teacher educators' tension towards practicum practice
- to find out the relationship between teacher educators' perceptions and tension towards practicum practice

Research Questions

This study is set out to answer the following research questions:

Q1. To what extent do the teacher educators perceive the roles of practicum practice?

Q2. To what extent do the teacher educators encounter tension towards practicum practice?

Q3. Is there a relationship between teacher educators' perceptions and tension towards practicum practice?

Scope of the Study

This study is geographically restricted to Education Degree Colleges (EDCs) in Yangon and Ayewarwaddy Regions. Participants in this study are (150) teacher educators from Yankin EDC, Thingangyun EDC, Pathein EDC, and Myaungmya EDC in 2021-2022 Academic Year. Sample participants are chosen by using simple random sampling method. To investigate teacher educators' perceptions in terms of pedagogical skills, professional skills, and assessment, the questionnaire of Qazi, Rawat and Thomas (2012), Aminudin (2012), and Joughin (2009) are used. To explore the tension encountered by teacher educators in practicum practice, dimensions of Berry (2007) are used.

Definition of Key Terms

Teacher Educator: A teacher educator is someone who teaches at a teacher education institution or supports students' field work in schools, and contributes substantially to the development of students towards becoming component teachers (Koster, 2002).

Perception: Perception refers to the beliefs or views of practicum stakeholders about the relevance of practicum program (Araya, 2013).

Tension: Tension is the feelings of internal turmoil that many teacher educators experience in their teaching about teaching as they find themselves pulled in different directions by competing concerns, and the difficulties for teacher educators in learning to recognize and manage these opposing forces **(**Berry, 2007).

Practicum: Practicum refers to a site where student teachers practice the art of teaching in real school context with student teachers assigned to one teacher and class for specific block of time (Zeichner, 1996).

Teaching Practice: Teaching practice represents the range of experiences to which student teachers are exposed when they work in classrooms and schools (Marais & Meier, 2004).

Review of Related Literature

The practicum was framed by theories of Jean Piaget's constructivist learning theory and Kolb's experiential learning theory. Piaget's cognitive constructivism described that learning is active process where learners construct their personal meaning through experiences. Learners build on their previous experiences in learning process and information is presented by the teacher. Learning by doing means that teachers have to provide hands-on experiences for students (Piaget, 1970).

Kolb (2015) described that knowledge is created through the transformation of experience. Knowledge results from the combination of grasping and transforming experience. Experiential learning theory provides holistic model of adult development, which are consistent with what people know about how they learn, grow and develop. Experiential learning is a particular form of learning from life experience; often contrasted it with lecture and classroom learning.

Qazi, Rawat and Thomas (2012) stated that practicum is relevant to enhance student teacher pedagogical or teaching skills and to prepare for the realities of classroom teaching through developing skills in them as lesson planning, preparation of subject relevant teaching aids and worksheets and classroom management skills. In order to attain the purpose of practicum, teacher educators need to take part in supervising, guiding, and assessing student teachers in practice teaching.

Teachers' professional development experiences allow to realise the changes taking place in the education system. Teacher educators' perceptions of what makes an effective professional development are influenced by several factors. One of the most significant factors to the effectiveness of any teachers' professional development is the strong focus on learning (Guskey, 2000).

To measure to what extent student teachers are competent and to help student teachers to reflect on their own practice and support their development, high quality assessment is crucial. Joughin (2009) identified three functions of assessment that predominate in higher education settings, such as supporting the process of learning, judging students' achievement in relation to course requirements, and maintaining the standards of the profession. Each of these functions is critical in the assessment of practicum.

Berry (2007) stressed that educating student teachers is never predictable and can never be fully controlled, and therefore requires substantial knowledge, experience, and understanding to do the right thing at the right moment. Teaching student teachers requires specific knowledge in specific situations. Teacher educators are confronted tensions with their development of pedagogical skill in teacher education. Berry (2007) conducted a systematic research on this topic and distinguished six main tensions as mentioned.

(1) Telling and growth

- between informing and creating opportunities to reflect and self-direct
- between acknowledging student teachers' needs and concerns and challenging them to grow

(2) Confidence and uncertainty

- between making explicit the complexities of teaching and helping student teachers feel confident to progress
- between exposing weakness as a teacher educator and maintaining student teachers' confidence in the teacher educator as a leader

(3) Action and intent

- between working towards a particular ideal and jeoparadising that ideal by the approach chosen to attain it

(4) Safety and challenge

- between a constructive learning experience and an uncomfortable learning experience

(5) Valuing and reconstructing experience

- between helping students recognise the authority of their experience and helping them to see that there is more to teaching than simply acquiring experience

(6) Planning and being responsive

- between planning for learning and responding to learning opportunities

Research Method

Research Design

The research design for this study is descriptive research design.

Population and Sample

Table 1 shows the sample size in the selected Colleges.

Table 1 Sample Size

No.	Region	District	Education Degree College	Number of Participant
1	Yangon	East	Yankin EDC	45
2	Yangon	East	Thingangyun EDC	30
3	Ayeyarwaddy	Pathein	Pathein EDC	50
4	Ayeyarwaddy	Myaungmya	Myaungmya EDC	25
	Total			**150**

Instrument

The main data gathering tool for the study was a set of questionnaire which was concerned with six dimensions namely: pedagogical skills; professional skills; assessment; safety and challenge; valuing and reconstructing experience; and planning and being responsive for teacher educators' perceptions and tension towards practicum practice.

Procedure

Firstly, the literature related to the research was studied. Then, a descriptive research design was selected. A questionnaire for teacher educators' perceptions and tension towards practicum practice was developed. In order to establish the reliability of the questionnaire, a pilot test was administered. After all, the data were collected and analyzed by using the Statistical Package for the Social Science (SPSS 22).

Data Analysis

In order to examine teacher educators' perceptions and tensions towards practicum practice, mean, standard deviation, frequency, and percentage were used. Pearson product-moment correlation (*r*) was used to find the relationship between teacher educators' perceptions and tension towards practicum practice.

Research Findings

This section presents the findings of the research based on the collected data. It includes three parts: the findings of teacher educators' perceptions towards practicum practice; the findings of teacher educators' tension towards practicum practice; and the findings of relationship between teacher educators' perceptions and tension towards practicum practice.

Findings of Teacher Educators' Perceptions towards Practicum Practice

In order to find out teacher educators' perceptions towards practicum practice from Yankin, Thingangyun, Pathein and Myaungmya Education Degree Colleges (EDCs), a questionnaire was used with three dimensions.

Findings of Teacher Educators' Perceptions in terms of Pedagogical Skills

In order to find out teacher educators' perception in terms of pedagogical skills, (10) items were used. The average mean score and standard deviation by all the participants were (43.62) and (3.57) respectively. The scores for pedagogical skills ranged from (31) to (50) (see Table 2).

Table 2 Means of Teacher Educators' Perceptions in terms of Pedagogical Skills in the Selected Education Degree Colleges

Education Degree College	No. of Participant	Mean	St. Deviation	Minimum	Maximum
Yankin EDC	45	44.24	3.93	37	50
Thingangyun EDC	30	42.93	2.84	40	50
Pathein EDC	50	43.98	3.43	38	50
Myaungmya EDC	25	42.60	3.79	31	48
Total/Average	**150**	**43.62**	**3.57**	**31**	**50**

Of the total number of participants, 24% of teacher educators were at low level, 60% of teacher educators were at moderate level and 16% of teacher educators were at high level. The percentage of various groups was presented in Table 3.

Table 3 Percentage of Levels of Teacher Educators' Perceptions in terms of Pedagogical Skills

Level of Pedagogical Skill	Score	No. of Teacher	Percentage (%)
Low	$x < 40.05$	37	24%
Moderate	$40.05 \le x \le 47.19$	89	60%
High	$x > 47.19$	24	16%
Total		150	100%

Findings of Teacher Educators' Perceptions in terms of Professional Skills

In order to find out teacher educators' perception in terms of professional skills, (10) items were used. The average mean score and standard deviation by all the participants were (42.34) and (3.98) respectively. The scores for professional skills ranged from (32) to (50) (see Table 4).

Table 4 Means of Teacher Educators' Perceptions in terms of Professional Skills in the Selected Education Degree Colleges

Education Degree College	No. of Participant	Mean	St. Deviation	Minimum	Maximum
Yankin EDC	45	42.91	4.45	34	50
Thingangyun EDC	30	42.10	3.18	35	49
Pathein EDC	50	42.38	4.19	33	50
Myaungmya EDC	25	41.52	3.53	32	48
Total/Average	**150**	**42.34**	**3.98**	**32**	**50**

Of the total number of participants, 11% of teacher educators were at low level, 72% of teacher educators were at moderate level and 17% of teacher educators were at high level. The percentage of various groups was presented in Table 5.

Table 5 Percentage of Levels of Teacher Educators' Perceptions in terms of Professional Skills

Level of Professional Skill	Score	No. of Teacher	Percentage (%)
Low	$x < 38.36$	17	11%
Moderate	$38.36 \leq x \leq 46.32$	107	72%
High	$x > 46.32$	26	17%
Total		**150**	**100%**

Findings of Teacher Educators' Perceptions in terms of Assessment

In order to find out teacher educators' perceptions in terms of assessment, (10) items were used. The average mean score and standard deviation by all the participants were (42.81) and (3.99) respectively. The score for assessment ranged from (32) to (50) (see Table 6).

Table 6 Means of Teacher Educators' Perceptions in terms of Assessment in the Selected Education Degree Colleges

Education Degree College	No. of Participant	Mean	St. Deviation	Minimum	Maximum
Yankin EDC	45	43.49	4.26	36	50
Thingangyun EDC	30	41.67	3.39	32	49
Pathein EDC	50	43.08	3.95	36	50
Myaungmya EDC	25	42.44	4.17	32	50
Total/Average	**150**	**42.81**	**3.99**	**32**	**50**

Of the total number of participants, 8% of teacher educators were at low level, 68% of teacher educators were at moderate level and 24% of teacher educators were at high level. The percentage of various groups was presented in Table 7.

Table 7 Percentage of Levels of Teacher Educators' Perceptions in terms of Assessment

Level of Assessment	Score	No. of Teacher	Percentage (%)
Low	$x < 38.82$	11	8%
Moderate	$38.82 \leq x \leq 46.80$	103	68%
High	$x > 46.80$	36	24%
Total		150	100%

Overall Findings of Teacher Educators' Perceptions towards Practicum Practice

According to the participants' response, the mean score of teacher educators' perceptions towards practicum practice was presented (see Table 8).

Table 8 Mean of Teacher Educators' Perceptions towards Practicum Practice

Dimension	*N*	Mean	St. Deviation	Minimum	Maximum
Perceptions	150	128.77	10.56	95	150

According to the results in Table 9, most of the teacher educators in Education Degree Colleges possessed a moderate level in perceptions towards practicum practice.

Table 9 Percentage of Levels of Teacher Educators' Perceptions towards Practicum Practice

Level of Teacher Educators' Perception	Score	No. of Teacher	Percentage (%)
Low	$x < 118.21$	17	11%
Moderate	$118.21 \leq x \leq 139.33$	101	68%
High	$x > 139.33$	32	21%
Total		150	100%

Findings of Teacher Educators' Tension towards Practicum Practice

In order to find out teacher educators' tension towards practicum practice from Yankin, Thingangyun, Pathein and Myaungmya Education Degree Colleges, a questionnaire of three dimensions: safety and challenge, valuing and reconstructing experience, and planning and being responsive was used.

Findings of Teacher Educators' Tension in terms of Safety and Challenge

In order to find out teacher educators' tension in terms of safety and challenge, (10) items were used. The average mean score and standard deviation by all the participants were (27.79) and (6.97) respectively. The scores for safety and challenge ranged from (12) to (47) (see Table 10).

Table 10 Means of Teacher Educators' Tension in terms of Safety and Challenge in the Selected Education Degree Colleges

Education Degree College	No. of Participant	Mean	St. Deviation	Minimum	Maximum
Yankin EDC	45	27.24	7.20	12	40
Thingangyun EDC	30	26.27	6.72	20	40
Pathein EDC	50	28.50	7.12	18	47
Myaungmya EDC	25	29.16	6.49	16	40
Total/Average	**150**	**27.79**	**6.97**	**12**	**47**

Of the total number of participants, 18% of teacher educators were at low level, 61% of teacher educators were at moderate level and 21% of teacher educators were at high level. The percentage of various groups was presented in Table 11.

Table 11 Percentage of Levels of Teacher Educators' Tension in terms of Safety and Challenge

Level of Safety and Challenge	Score	No. of Teacher	Percentage (%)
Low	$x < 20.82$	27	18%
Moderate	$20.82 \leq x \leq 34.76$	92	61%
High	$x > 34.76$	31	21%
Total		150	100%

Findings of Teacher Educators' Tension in terms of Valuing and Reconstructing Experience

In order to find out teacher educators' tension in terms of valuing and reconstructing experience, (10) items were used. The average mean score and standard deviation by all the participants were (23.37) and (6.23) respectively. The scores for valuing and reconstructing experience ranged from (10) to (44) (see Table 12).

Table 12 Means of Teacher Educators' Tension in terms of Valuing and Reconstructing Experience in the Selected Education Degree Colleges

Education Degree College	No. of Participant	Mean	St. Deviation	Minimum	Maximum
Yankin EDC	45	22.31	7.29	10	40
Thingangyun EDC	30	22.47	5.93	12	40
Pathein EDC	50	24.84	5.89	15	44
Myaungmya EDC	25	23.40	4.74	13	33
Total/Average	**150**	**23.37**	**6.23**	**10**	**44**

Of the total number of participants, 13% of teacher educators were at low level, 70% of teacher educators were at moderate level and 17% of teacher educators were at high level. The percentage of various groups was presented in Table 13.

Table 13 Percentage of Levels of Teacher Educators' Tension in terms of Valuing and Reconstructing Experience

Level of Valuing and Reconstructing Experience	Score	No. of Teacher	Percentage (%)
Low	x < 17.14	20	13%
Moderate	17.14 ≤ x ≤ 29.60	105	70%
High	x > 29.60	25	17%
Total		150	100%

Findings of Teacher Educators' Tension in terms of Planning and Being Responsive

In order to find out teacher educators' tension in terms of planning and being responsive, (10) items were used. The average mean score and standard deviation by all the participants were (23.64) and (6.49) respectively. The scores for planning and being responsive ranged from (10) to (42) (see Table 14).

Table 14 Means of Teacher Educators' Tension in terms of Planning and Being Responsive in the Selected Education Degree Colleges

Education Degree College	No. of Participant	Mean	St. Deviation	Minimum	Maximum
Yankin EDC	45	22.29	7.97	10	40
Thingangyun EDC	30	23.03	5.64	15	40
Pathein EDC	50	25.00	5.98	14	42
Myaungmya EDC	25	24.08	5.09	13	35
Total/Average	**150**	**23.64**	**6.49**	**10**	**42**

Of the total number of participants, (14%) of teacher educators were at low level, (73%) of teacher educators were at moderate level and (13%) of teacher educators were at high level. The percentage of various groups was presented in Table 15.

Table 15 Percentage of Levels of Teacher Educators' Tension in terms of Planning and Being Responsive

Level of Planning and Being Responsive	Score	No. of Teacher	Percentage (%)
Low	x < 17.15	21	14%
Moderate	17.15 ≤ x ≤ 30.13	110	73%
High	x > 30.13	19	13%
Total		150	100%

Overall Findings of Teacher Educators' Tension towards Practicum Practice

According to the participants' response, the mean score of teacher educators' tension towards practicum practice was presented (see Table 16).

Table 16 Mean of Teacher Educators' Tension towards Practicum Practice

Dimension	N	Mean	St. Deviation	Minimum	Maximum
Tension	150	74.79	18.25	32	133

In order to assess the levels of teacher educators' tension, the percentage of various groups was presented in Table 17. According to the results, most of the teacher educators in Education Degree Colleges were moderate level in tension towards practicum practice.

Table 17 Percentage of Levels of Teacher Educators' Tension towards Practicum Practice

Level of Tension	Score	No. of Teacher	Percentage (%)
Low	$x < 56.54$	21	14%
Moderate	$56.54 \le x \le 93.04$	106	70%
High	$x > 93.04$	23	16%
Total		150	100%

Relationship between Teacher Educators' Perceptions and Tension towards Practicum Practice

Pearson product-moment correlation was used to find out the relationship between teacher educators' perceptions and tension towards practicum practice. The following table represents the relationship.

Table 18 Relationship between Teacher Educators' Perceptions and Tension towards Practicum Practice

Variable		Perceptions	Tension
Perceptions	Pearson Correlation	1	–.410**
	Sig. (2-tailed)		.000
	N	150	150
Tension	Pearson Correlation	–.410**	1
	Sig. (2-tailed)	.000	
	N	150	150

Note. Correlation is significant at the 0.01 level (2- tailed).

According to Table 18, there is a relationship (r = –.410) between teacher educators' perceptions and tension towards practicum practice and significant at 0.01 level (2-tailed). This result shows that there is a moderate relation between teacher educators' perception and tension towards practicum practice. Moreover, these results show that the direction of correlation was negative. This means that if teacher educators' perception is high in one, they are low in tension towards practicum practice.

Discussion

The main purpose of the study is to study teacher educators' perceptions and tension towards practicum practice. This study also aimed to find the relationship between the teacher educators' perceptions and tension towards practicum practice.

Overall findings of teacher educators' perceptions towards practicum practice are also presented in this study. In the study, perceptions of 11% of teacher educators were at low level, 68% of teacher educators were at moderate level and 21% of teacher educators were at high level. Therefore, most of the teacher educators had not only no strongest perceptions but also average perceptions toward practicum practice.

Overall findings of teacher educators' tension towards practicum practice are also described in this study. In the research findings, tension of 14% teacher educators were at low level, 70% of teacher educators were at moderate level, and 16% of teacher educators were at high level in tension towards practicum practice. To sum up, most of the teacher educators' tension towards practicum practice were at moderate level.

The result of the Pearson product moment correlation showed that there was a significant correlation between teacher educators' perceptions and tension towards practicum practice. There was a significant correlation (−.410) as a whole so the direction of correlation is negative. Therefore, it was found that teacher educators' perceptions towards practicum practice were negatively correlated to teacher educators' tension towards practicum practice. The summary of the research findings indicated that when the teacher educators' perceptions level rise, the teacher educators' tension level is low.

Suggestions

There are some subsequent suggestions for the teacher educators' perceptions and tension towards practicum practice. In order to meet the purpose of practicum program, teacher educators should adequately support student teachers to prepare for the world of work having the required qualifications. Student teachers need to be provided feedback timely in lesson planning, classroom practice teaching, and guide how to select and apply instructional methods in the class. This finding identified that the professional skills are important to ensure high quality teaching. Teachers should take their teaching experience to do lesson study before practice teaching, the ability to communicate and to engage students, their sensitivity to teach various groups, the ability to create a safe and stimulating learning environment in the classroom, and the ability to motivate students and to support reflection.

Conclusion

Based on the study, there is a relationship between teacher educators' perceptions and tension towards practicum. The more positive perceptions of teacher educators in practicum practice have, the less tension of teacher educators in practicum practice have. It is hoped that the study will give many concepts and suggestions with implementing practicum practice and could help the Ministry of Education to acknowledge the perceptions and tension of teacher educators in implementing practicum practice.

Acknowledgements

We would like to express respectful gratitude to Dr. Kay Thwe Hlaing (Rector, Yangon University of Education), Dr. May Myat Thu (Pro-Rector, Yangon University of Education), Dr. Khin Khin Oo (Pro-Rector, Yangon University of Education), and Dr. Nyo Nyo Lwin (Pro-Rector, Yangon University of Education) for their kind administrative support in completion of this study. Special thanks go to Dr. Khin Mar Khine (Professor and Head, Department of Curriculum and Methodology, Yangon University of Education) for her good advice and support. Heartfelt thanks for a piece of advice to all of the teachers in Yangon University of Education and all people who participated in the study.

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J. Myanmar Acad. Arts Sci. 2023 **Vol. XXI. No.6**

A STUDY OF TEACHERS' PERCEPTION OF THE IMPORTANCE OF TEACHING CIVIC EDUCATION AT HIGH SCHOOL LEVEL

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Abstract

This study's primary purpose is to explore teachers' perception of the importance of teaching civic education at high school level. Two hundred high school social studies teacher participants from sixty-five schools in four townships participated in this study. The questionnaire was based on Boadu's "Teachers' perception on the importance of teaching civic education" (2013). This questionnaire contains 32 items, each with a five-point Likert Scale. The results pointed out that the total mean and standard deviation of teachers' perception were 125.18 and 11.79 respectively. It can be said that 80% of teachers perceive moderately good perception, 8% of teachers have bad perception and 12% of teachers have good perception. Therefore, it can be said that most social studies teachers in this study have a moderately good perception in teaching civic education at the high school level. The mean of teachers' perception on the characteristics of a good citizen is highest, whereas the mean of teachers' perception on the difficulties students faced in learning civic education is lowest. Moreover, there is a positive relationship among four dimensions of teachers' perception of the importance of teaching civic education at the high school level. Therefore, most social studies teachers have a good perception in teaching civic education at the high school level.

Keywords: Civic Education, Civic Knowledge, Civic Skill, Civic Disposition, Perception

Introduction

Education is a unique tool for bringing about change and development in economic growth. Moreover, it enables individuals to develop and fulfill aspirations and aims at achieving social, economic, and political progress by developing their abilities and talents. Therefore, acquiring knowledge and skills has become essential for an informed, efficient and responsible citizen. Civic education empowers young people to be well- informed, active citizens and allows them to change the world around them.

Teachers need to consider how best to prepare students with the knowledge, skills, attitudes, and behaviors to be informed, engaged, and caring twenty-first century citizens. Teachers play an essential role when it comes to the implementation of civics along with civic education. It is crucial to scientifically gauge teachers' views on civic education because their perception will determine their commitment to teaching the course. Thus, it is important to study the teachers' perception of the importance of teaching civic education.

Purposes of the Study

The main purpose of this study is to study the teachers' perception of the importance of teaching civic education at the high school level.

The specific objectives of this study are as follows:

1. To examine the levels of teachers' knowledge on the term civic education
2. To explore the teachers' perception on the characteristics of a good citizen
3. To investigate the teachers' perception of the importance of introducing civic education to the students

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4. To find out the teachers' perception on the difficulties students faced in learning civic education
5. To compare the teachers' perception of the importance of teaching civic education in terms of four dimensions
6. To find out the relationship among four dimensions of teachers' perception of the importance of teaching civic education
7. To make suggestions to improve the teaching of civic education based on the study

Research Questions

This study is intended to answer the following research questions:

1. To what extent do teachers perceive the importance of teaching civic education to high school students?
2. On what levels are the teachers' knowledge on the term civic education?
3. How do the teachers perceive the characteristics of a good citizen?
4. To what extent do teachers perceive the importance of introducing civic education to high school students?
5. What is the perception of teachers on the difficulties students faced in learning civic education?
6. Which perception is the highest and which perception is the lowest in four dimensions of teachers' perception of the importance of teaching civic education at high school level?
7. Is there any relationship among four dimensions of teachers' perception of the importance of teaching civic education at high school level?

Scope of the Study

The following points indicate the scope of the study.

1. This study is geographically restricted to Ayeyarwady Region.
2. Participants in this study are high school social studies teachers from the selected sample schools during the academic year (2021-2022).
3. This study is limited to four categories of the perception of teachers on teaching civic education: teachers' knowledge on the term civic education, teachers' perception on the characteristics of a good citizen, teachers' perception of the importance of introducing civic education to the students and difficulties of students faced in learning civic education.

Definition of Key Terms

Civic Education

Civic education means the acquisition of knowledge of the basic democratic institutions and regulations in a narrow sense and the acquisition of competencies that enables participation and democratic action in a broader sense. Nowadays, it includes social learning and political socialization (Oesterreich, 2003).

Civic Knowledge

Civic knowledge refers to citizens' understanding of the working of the political systems and their political civic rights and responsibilities (Carpini & Keeter, 2008).

Civic Skill

Civic skill is developed from civic knowledge which primarily aims at attaining useful and meaningful knowledge to solve problems in the life of society and nation (Branson, 1998).

Civic Disposition

Civic disposition refers to the traits of civic virtues and public character which contribute to the maintenance and improvement of democratic society (Branson, 2004).

Perception

Perception is an individual's or group's unique way of viewing a phenomenon that involves the processing of stimuli and incorporates memories and experiences in the process of understanding (McDonalds, 2012).

Review of Related Literature

Concepts of Civic Education

Cogan (1998) described civic education as the contribution of education to the development of the good characteristics of being a citizen. Another scholar described it as the process of teaching society's rules, institutions, and organizations, and the role of citizens in the well-functioning of society (Reimers, 1997). Civic training does not only occur at school as a subject in the classroom but also parental and home influences and experiences outside the class contribute to students' learning. Civic education can also exist in the form of a wide range of formal, informal, and non-formal training.

From country to country, the practice of civic education varies and most countries do not treat it as a separate school subject. Civic education mostly has been locally contextualized and taught as an element of subjects such as geography, history, social studies, and moral and religious values (Kalidjernih, 2005). Civic education is constructed by cultural norms, political priorities, social expectations, national economic development aspirations, geopolitical contexts, and historical antecedents (Kennedy, 2004). Therefore, the conceptions of citizenship and civic education vary among countries and democratic traditions. These various perspectives on citizenship have significantly varying implications for a curriculum of civic education (Westheimer & Kahne, 2004).

Introducing Civic Education in School

Osler and Starkey (2004) identified four key principles and ten key concepts for teaching citizenship in multicultural democracies.

Four Key Principles

The key principles mentioned by Osler and Starkey (2004) are:

(a) Students should learn about the complex relationships between unity and diversity in their local communities, the nation, and the world.

(b) Students should learn about how people in their community, nation, and region are increasingly dependent upon other people around the world and are connected to the economic, political, cultural, environmental, and technological changes taking place across the planet.

(c) The teaching of human rights should underpin citizenship education courses and programs in multicultural nation-states.

(d) Students should be taught knowledge about democracy and democratic institutions as well as be provided opportunities in which they can practice democracy.

Ten Key Concepts

The key concepts stated by Osler and Starkey (2004) are:

(a) Democracy

The emphasis is on democracy as a way of living together as well as a means of government. Democracy is acknowledged as a fragile concept and one which needs to be reinforced through education.

(**b) Diversity**

Diversity addresses the wide range of cultural, ethnic, linguistic, and religious variation that exists within and across groups within multicultural nation-states. Diversity variables also include class, sexual orientation, and abilities/disabilities. International migration is the major reason for increasing diversity at the beginning of the twenty-first century.

(c) Globalization

Globalization has a number of both positive and negative features. For example, on the one hand, it may give new access to freedom and democracy. On the others, many feel threatened by cultural hegemony. Globalization processes undermine less commonly spoken languages.

(d) Sustainable Development

This is the kind of social and economic development that meets the needs of present generations without undermining the ability of future generations to meet their needs.

(e) Empire, Imperialism, Power

An examination of these concepts allows students to consider inequity between nations and to further consider how relationships between nations can be effectively, democratically, and equitably managed.

(f) Prejudice, Discrimination, Racism

Racism, prejudice, and discrimination act as barriers to democracy. To protect democracy, students need to consider how they can effectively change such barriers.

(g) Migration

Historically, migration is an established feature of human behaviour. Students need to understand the movement of people through voluntary migration, as well as the movement of refugees and asylum seekers, as a result of conflict, terror, or persecution.

(h) Identity/Diversity

Students need to understand how identities are fluid and not fixed and how they can be asserted or ascribed. Genuinely multicultural societies need to be inclusive of all citizens.

(i) Multiple Perspectives

Enabling students to understand multiple perspectives on events is essential to citizenship education.

(j) Patriotism and Cosmopolitanism

Patriotism implies a pride in one's country. Critical patriotism involves examining national structures and cultures and a readiness to address injustices and inequalities. Critical reflection is most easily achieved through a study of other contexts and cultures. Cosmopolitanism is openness to those beyond one's community, locality, religion, ethnicity, and or nationality.

Learners are expected to engage with this considerable body of knowledge even though usually only one or two hours a week are allocated to citizenship education (Osler & Starkey, 2004).

Enhancing Civic Education in the School Curriculum

According to Osler and Starkey (2004), civic education is uniquely placed to:

(a) help young people and adults be better prepared to exercise the rights and responsibilities stipulated in international human rights instruments and national constitutions

(b) help them acquire the skills required for active participation in the public arena and civil society as responsible and critical citizens.

(c) increase interest in educational change, stimulate bottom-up innovation and grassroots initiatives of practitioners and students

(d) encourage a holistic approach to education by including non-formal and informal learning in education policies

(e) establish productive partnerships with NGOs to encourage understanding of the inter-relationship of local and national as well as global and international perspectives.

Civic Education at High School Level in Myanmar

Education is fundamental to the development of human beings and has been viewed as a fundamental human right. Worldwide, education is viewed as a prominent factor that helps in shaping the future of individuals. In Myanmar, there has been tremendous effort for reform of the education and learner-centered approaches have been introduced but challenges such as large class size, limited materials and so on. Civic education policy prioritized teaching of moral education and values of discipline, obedience and loyalty in Myanmar. Currently, from the (2018-19 AY), high school level in Myanmar is implementing the new civic education subject with the following formulated objectives. The objectives of teaching civic education are as follows:

(1) To become good citizens with good morals

(2) To respect the value of human rights and follow the responsibilities of a citizen

(3) To respect the rules and law, and follow by itself, and

(4) To learn to behave with values not only as a citizen but also as a citizen of the world.

New moral and civic subject is based on the consideration of the curriculum framework aims to establish a global society who are capable of facing the challenges of the twenty-first century. Civic education subject refers to its four learning values as Social Ethics, Rights and Responsibility, Discipline and Peaceful Living. In addition, four learning areas are described as related to self, related to others, related to group or society and related to nature and universe. The teaching learning strategies or approaches used in the text will be supported students to make own decision what is right or wrong, and why does it so. Learning activities in some lessons are supported students to improve critical thinking skill and judgment on what they should do or not in their daily life situation (Basic Education Curriculum and Textbook Committee, 2020).

Research Method

Research Design

The research design for this study is a descriptive research design, in which this study emphasizes studying the teachers' perception of the importance of teaching civic education at the high school level.

Instrument

In this study, the questionnaire for studying the teachers' perception of the importance of teaching civic education was used as the instrument. The items in the questionnaire for this study are designed by the adaptation of "Teachers' perception on the importance of teaching civic education" developed by Boadu (2013). This research questionnaire was modified by the researcher to suit the purposes of the study with the advice and guidance of the supervisor. In particular, care was taken to ensure that each item was appropriate for the culture and context of Myanmar. It was constructed based on the four major dimensions. There were 32 five-point Likert-scale items to examine the teachers' perception of the importance of teaching civic education.

Dimension 1: teachers' knowledge on the term civic education (8 items, No. 1 to No. 8)

Dimension 2: teachers' perception on the characteristics of a good citizen (8 items, No. 9 to No. 16)

Dimension 3: teachers' perception of the importance of introducing civic education to the students (8 items, No. 17 to No. 24)

Dimension 4: teachers' perception on the difficulties of students faced in learning civic education (8 items, No. 25 to No. 32)

Each item in the questionnaire was described by five responses: (strongly disagree = 1, disagree = 2, undecided = 3, agree = 4 and strongly agree = 5). After preparation, the questionnaire was reviewed by expert teachers from the Department of Curriculum and Methodology, Yangon University of Education. According to the pilot study, some items were adapted under the guidance of the supervisor and experienced teachers.

Population and Sample Size

This study is geographically restricted to Ayeyarwady Region. Using a simple random sampling method, two districts (Pathein and Maubin) were selected from six districts and four townships (Pathein, Kangyidaunt, Maubin, and Nyaungdon) were chosen from the selected districts. A total number of (200) social studies teachers from sixty-five schools in four townships participated in this study.

Data Analysis

Descriptive statistics (mean, standard deviation, and percentage) were used to analyze the collected data. The data were analyzed by using Statistical Package for the Social Science (SPSS 20).

Research Findings

This study is designed to find out the teachers' perception of the importance of teaching civic education at the high school level from four selected townships in the Ayeyarwady Region. It includes three parts. The first part is concerned with the findings of teachers' perception of the importance of teaching civic education at the high school level. The second part is concerned with the comparison of the mean score of teachers' perception of the importance of teaching civic education at the high school level in terms of four dimensions. The third part is concerned with the relationships among teachers' perception of the importance of teaching civic education at the high school level.

Table 1 Total Mean Value and Standard Deviation of Teachers' Perception of the Importance of Teaching Civic Education at High School Level

Dimension	No. of Teacher	Mean	Standard Deviation	Minimum	Maximum
ITCE	200	125.18	11.79	38	155

Note. ITCE = Importance of Teaching Civic Education

The average mean scores and standard deviation were 125.18 and 11.79 respectively (see Table 1). Thus, based on these results, teachers with scores less than 113.39 were identified as a low group. Teachers with scores between 113.39 and 136.97 without exception were considered as a moderate group. Then, teachers with scores greater than 136.97 were identified as a high group (see Table 2).

Table 2 Percentage of Levels of Teachers' Perception of the Importance of Teaching Civic Education at High School Level

Level of ITCE	Score	No. of Teacher	Percentage (%)
Low	$x < 113.39$	17	8%
Moderate	$113.39 \leq x \leq 136.97$	159	80%
High	$x > 136.97$	24	12%
Total		200	100%

According to Table 2, it can be said that most of the social studies teachers in this study have moderately good perception in teaching civic education.

Table 3 Mean of Teachers' Knowledge on the Term Civic Education

Dimension	No. of Teacher	Mean	Standard Deviation	Minimum	Maximum
Knowledge	200	32.41	3.78	13	40

The average mean scores and standard deviation were 32.41 and 3.78 respectively (see Table 3). If the average mean score was below 28.63, it would be defined as a low group. If the average mean score was between 28.63 and 36.19 without exception, it would be defined as a moderate group. If the average mean score was higher than 36.19, it would be defined as a high group (see Table 4).

Table 4 Percentage of Levels of Teachers' Knowledge on the Term Civic Education

Level of Knowledge	Score	No. of Teacher	Percentage (%)
Low	$x < 28.63$	17	8.5%
Moderate	$28.63 \leq x \leq 36.19$	156	78%
High	$x > 36.19$	27	13.5%
Total		**200**	**100%**

According to Table 4**,** among the 200 participants, 156 participants have a moderate level of knowledge on the term civic education.

Table 5 Mean of Teachers' Perception on the Characteristics of a Good Citizen

Dimension	No. of Teacher	Mean	Standard Deviation	Minimum	Maximum
Good Citizen	200	33.10	3.23	8	40

When the mean and standard deviation were calculated, 33.10 and 3.23 were obtained (see Table 5). Based on these results, teachers with scores less than 29.87 were identified as a low group. Teachers with scores between 29.87 and 36.33 without exception were considered as a moderate group. And then, teachers with scores greater than 36.33 were identified as a high group.

Table 6 Percentage of Teachers' Perception on the Characteristics of a Good Citizen

Level of Good Citizen	Score	No. of Teacher	Percentage (%)
Low	$x < 29.87$	8	4%
Moderate	$29.87 \leq x \leq 36.33$	168	84%
High	$x > 36.33$	24	12%
Total		**200**	**100%**

According to Table 6, most of the social studies teachers know moderately the characteristics of a good citizen.

Table 7 Mean of Teachers' Perception of the Importance of Introducing Civic Education to the Students

Dimension	No. of Teacher	Mean	Standard Deviation	Minimum	Maximum
Importance	200	31.91	3.70	9	40

The mean score and standard deviation were 31.91 and 3.70 respectively (see Table 7). If the mean score was below 28.21, it would be defined as a low group. If the mean score was between 28.21 and 35.61 without exception, it would be defined as a moderate group. If the mean score was higher than 35.61, it would be defined as a high group.

Table 8 Percentage of Teachers' Perception of the Importance of Introducing Civic Education to the Students

Level of Importance	Score	No. of Teacher	Percentage (%)
Low	$x < 28.21$	30	15%
Moderate	$28.21 \leq x \leq 35.61$	144	72%
High	$x > 35.61$	26	13%
Total		**200**	**100%**

According to Table 8, it could be interpreted that most of the social studies teachers perceive teaching civic education as moderately important.

Table 9 Mean of Teachers' Perception on the Difficulties of Students Faced in Learning Civic Education

Dimension	No. of Teacher	Mean	Standard Deviation	Minimum	Maximum
Difficulties	200	27.76	5.15	8	37

The mean score and standard deviation were 27.76 and 5.15 respectively (see Table 9). If the mean score was below 22.61, it would be defined as a low group. If the mean score was between 22.61 and 32.91 without exception, it would be defined as a moderate group. If the mean score was higher than 32.91, it would be defined as a high group.

Table 10 Percentage of the Difficulties of Students Faced in Learning Civic Education

Level of Difficulties	Score	No. of Teacher	Percentage (%)
Low	$x < 22.61$	26	13%
Moderate	$22.61 \leq x \leq 32.91$	154	77%
High	$x > 32.91$	20	10%
Total		200	100%

According to Table 10, most of the social studies teachers in this study think that students have moderate difficulties in learning civic education.

Table 11 Mean of Teachers' Perception of the Importance of Teaching Civic Education at High School Level

Dimension	No. of Teacher	Mean	Standard Deviation	Minimum	Maximum
Knowledge	200	32.41	3.78	13	40
Good Citizen	200	**33.10**	3.23	8	40
Importance	200	31.91	3.70	9	40
Difficulties	200	**27.76**	5.15	8	37

According to Table 11, it can be said that the mean score of teachers' perception on the characteristics of a good citizen is highest among four dimensions of teachers' perception of the importance of teaching civic education. Moreover, the mean score of teachers' perception on the difficulties students faced in learning civic education is the lowest among them.

Table 12 Relationship among Teachers' Perception of the Importance of Teaching Civic Education at High School Level

Variable		Knowledge	Good Citizen	Importance	Difficulties
Knowledge	Pearson *(r)*	1	$.573^{**}$	$.736^{**}$	$.261^{**}$
	Sig. (2-tailed)		.000	.000	.000
Good Citizen	Pearson *(r)*		1	$.668^{**}$	$.164^{*}$
	Sig. (2-tailed)			.000	.020
Importance	Pearson *(r)*			1	$.201^{**}$
	Sig. (2-tailed)				.004
Difficulties	Pearson *(r)*				1
	Sig. (2-tailed)				

Note. ** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

According to Table 12, there is a moderate relationship between teachers' knowledge on the term civic education and teachers' perception on the characteristics of a good citizen. There is a high relation among teachers' knowledge on the term civic education and teachers' perception on the characteristics of a good citizen and teachers' perception of the importance of introducing civic education to the students. There is a low relation among teachers' perception on the difficulties students faced in learning civic education and others' perception. Moreover, these results show that the direction of correlation was positive.

Discussion

The main purpose of this study is to explore the perception of teachers of the importance of teaching civic education at the high school level. After studying the responses of all teachers, the results showed that the total mean and standard deviation of teachers' perception were 125.18 and 11.79 respectively. According to the result, it can be said that 80% of teachers perceive moderately good perception, 8% of teachers response weakly and 12% of teachers have good perception in teaching civic education at high school level. These results show greater consistency with the findings of (Adeyemi, 2019) who found that teachers have a moderately good perception in teaching civic education.

According to the descriptive statistics, the mean scores of teachers' perception of the importance of teaching civic education at the high school level were 32.41, 33.10, 31.91, and 27.76 respectively. The mean score of teachers' perception on the characteristics of a good citizen is the highest among them. This finding is consistent with the study of Lee and Fotus (2005) who found that most of the teachers emphasized the students to become right and dutiful citizens of their country. According to this result, it could be said that teachers can prepare students to become good citizens of the country. The mean score of teachers' perception on the difficulties students faced in learning civic education is the lowest among them. It could be said that students can face a little difficulty in learning civic education with the help of teachers.

Moreover, according to the result, there was a positive relationship with each other. This means that if the level of teachers' knowledge on the term civic education was high, the teachers' perception on the characteristics of a good citizen can also be good, or if the level of teachers' knowledge on the term civic education was low, the teachers' perception on the characteristics of a good citizen can also be poor. It can be concluded that most of the social studies teachers have a moderately good perception in teaching civic education at high school level.

Suggestions

Some suggestions for the teaching of civic education are presented as follows. Civic education can provide students to be informed and active citizens. To achieve this, teaching and learning should be participative, interactive, and thought-provoking. In order to cultivate a commitment to civic participation and to become active members of vibrant communities, students need regular opportunities to engage in civic learning activities from the preschool to the college.

Civic education also requires a school environment of openness to debate and discussion. Teachers should encourage students to build on the knowledge, understanding, and skills that they develop through active citizenship in schools by providing them with further opportunities for active involvement and participation in communities beyond school. Teachers play a great role in teaching civic issues in educational institution. According to the results of the study, most of the social studies teachers have a moderately good perception in teaching civic education. To effectively implement a civic education program, teachers must have the sound knowledge, pedagogical skills, and dispositions. Therefore, teachers should be provided with periodic professional development trainings for civic education to ensure quality teaching and these trainings should not be a one-time event; rather, they should be a sustained and continuous effort.

In conclusion, the teaching of civic education in school is important for the development of the country so all stakeholders (students, parents, teachers, administrators, programmers, and policymakers) should try to infuse civic education skills into all aspects of all educational organizations.

Conclusion

Civic education is a social science subject designed to teach the virtues of good citizenship. Civic education brings broad understanding and awareness of the students helping them to understand and know their values, duties, and rights in their society, community, or country at large. Therefore, teachers can use their expertise and knowledge to instruct students on key aspects of citizenship and government. Moreover, the function of teachers is to help students learn by imparting knowledge to them and by setting up a situation in which students can and will learn effectively.

It is hoped that the findings presented in this study will contribute to getting the improvement of teachers' perception on teaching civic education. Moreover, it will provide a foundation for future research. In terms of the static results, most of the teachers have a moderate level of knowledge on the term civic education. So, they can assist the students to expand their civic knowledge in learning civic education. Moreover, teachers know moderately the characteristics of a good citizen and it is also the highest among other perceptions. Therefore, they are able to help the learner to be a responsible citizen (respecting the law, the rights, and interests of others).

Moreover, most of the teachers perceive teaching civic education as moderately important. It can be said that they can effort their students to develop knowledge, skill, and disposition in teaching civic education. Again, teachers think that students have moderate difficulties in learning civic education. It can be interpreted that if they know the difficulties of students in learning, they can help them to overcome the difficulties in learning by using various kinds of teaching methods and instructional aids. In addition, there is a positive relationship among four dimensions of teachers' perception of the importance of teaching civic education at high school level. So, most of the social studies teachers have a good perception in teaching civic education at high school level.

To sum up, this study investigated the social studies teachers from high school level. As teaching civic education is important for all teachers, additional studies should be conducted with teachers from both primary and middle school levels. This study was conducted in Ayeyarwady Region. Future studies could be conducted in other geographical areas of Myanmar.

Acknowledgements

We would like to express our respectful thanks to Dr. Kay Thwe Hlaing (Rector, Yangon University of Education), Dr. May Myat Thu (Pro-Rector, Yangon University of Education), Dr. Khin Khin Oo (Pro-Rector, Yangon University of Education), and Dr. Nyo Nyo Lwin (Pro-Rector, Yangon University of Education) who allowed us to do this study. Then, we are deeply grateful to Dr. Khin Mar Khine (Professor and Head of Department of Curriculum and Methodology, Yangon University of Education) for her valuable guidance, excellent advice, and expert review to complete this study.

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J. Myanmar Acad. Arts Sci. 2023 **Vol. XXI. No.6**

THE RELATIONSHIP BETWEEN REFLECTIVE PRACTICES IN TEACHER EDUCATORS AND THEIR PROFESSIONAL DEVELOPMENT

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Abstract

The purpose of this study is to investigate the relationship between reflective practices in teacher educators and their professional development**.** Quantitative research method, descriptive survey design was used to find out reflective practices of teacher educators and their professional development. One hundred and fifty teacher educators from five Education Degree Colleges in four different Divisions and States in Myanmar were selected by using simple random sampling technique. Two instruments: questionnaire for reflective practices of teacher educators and questionnaire for attitude towards professional development were used to collect the required data. In addition, two open-ended questions and nine interview questions for each dimension of reflective practices and attitude towards professional development were also used. In the analysis of data, descriptive statistics (mean and standard deviation) were used to test reflective practices in teacher educators and attitudes toward their professional development and inferential statistics (one-way ANOVA) were also used to compare reflective practices in teacher educators and their attitudes towards professional development in terms of teaching experience. Pearson product-moment correlation was used to assess whether and to what extent there was a relationship between reflective practices of teacher educators and their professional development**.** The result showed that there was a positively high correlation between reflective practices of teacher educators and their attitudes towards professional development. It can be concluded that if the using levels of teacher educators' reflective practices are high, they more obviously develop their teaching professions.

Keywords: teacher educators, reflective practices, attitude, professional development

Introduction

The rapid changes and the nature of developing modern society have given rise to new challenges, yet renewed calls for further improvements. In this light, many have voiced the urge for educational reform of schools and teachers, so that they may become capable of facing the current challenges, and fulfill the first and foremost objective of education. Thus, teachers are essential in any education system. Teacher education plays a vital role in reforming and strengthening the education system of any country. The quality of education depends on the quality of teachers and teaching. Reflective practice has become a focus of interest and a powerful movement in teacher education (Gheith & Jaberi, 2018). It is also a professional requirement that they have to provide evidence of, usually in a journal or log. Reflection on learning and teaching is not a new thing- most teachers have probably always done it to some extent (Killen, 2016). Thus, it is a process that facilitates teaching, learning and understanding, and it plays a central role in teachers' professional development.

Professional development is a long-term process because teachers connect new experiences with previous knowledge. Professional development occurs in specific contexts which allow teachers to connect training experiences with those of real classroom experiences; it also helps teachers are regarded as active players to build new pedagogical theories and practices which doubtlessly aid them to become experts in the field, which highly improve performance (Gheith & Jaberi, 2018).

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Purposes

The main purpose of this study is to explore the relationship between teacher educators' reflective practices and their professional development.

The specific objectives are as follows:

- To investigate reflective practices in teacher educators in terms of teaching experience and teaching subjects.
- To find out attitudes of teacher educators towards professional development in terms of teaching experience.
- To give suggestions and recommendations for improving reflective practices based on the data obtained from this study.

Research Questions

1. Does the level of reflective practices in teacher educators differ in terms of teaching experience and teaching subjects?
2. To what extent do teacher educators commit to each dimension of reflective practices in terms of teaching experience?
3. What are the differences in attitudes towards professional development in terms of teaching experience?
4. What are the differences in all dimensions of attitudes towards professional development in terms of teaching experience?
5. To what extent is the significant relationship between reflective practices of teacher educators in terms of each of six dimensions and their professional development?
6. To what extent is there a relationship between reflective practices of teacher educators and their professional development?

Definition of Key Terms

Teacher educators: Teacher educators mean professional teachers who teach pedagogical and content knowledge to prospective teachers in the teaching profession.

Reflective Practices: Reflective Practices are constructive evaluative processes through which teachers may collect data and utilize feedback in reviewing and improving teaching. This enables teachers to review their previous knowledge and construct new knowledge based on previous experiences they have undergone (Gheith & Jaberi, 2018).

Attitude: Attitude refers to a set of emotions, beliefs, and behaviors toward a particular object, person, thing, or event (Cherry, 2021).

Professional Development: Professional Development is a process that teachers develop their knowledge, skills, and attitudes towards their teaching professions.

Scope

This study is geographically restricted to five Education Degree Colleges in four different Divisions and States in Myanmar. Research participants are (150) teacher educators from Mandalay Education Degree College, Meikhtila Education Degree College, Pakokku Education Degree College, Magway Education Degree College and Taungyi Education Degree College within the 2020-2021 Academic Year.

Review of Related Literature

For Dewey, a fundamental purpose of education is to help individuals acquire habits of reflection so they engage in intelligent action (Schon, 1987, cited in Bruster & Peterson, 2013). Schon proposed that in preparing professionals, educators must guide students in making decisions under conditions of uncertainty.

Reflective practice is a professional development strategy with roots in the constructivist paradigm. A learning strategy for professionals, the primary agenda of the reflective practice model is behavioral change. While reflective practice (Schon, 1987, cited in Osterman, 1998) focuses on improvement in dimensions of professional practice, constructivism aims more generally at the ability to apply knowledge. Neither constructivism nor reflective practices are methods of teaching; however, both have implications for teaching. Constructivism focuses on the important role that the teacher plays in supporting the learning process. Reflective practice expands on constructivism distinguishing between two types of cognitive activity: theories in use and espoused theories (Osterman, 1998). The reflective practice is an ongoing, dynamic process of thinking honestly, deeply and critically about all aspects of professional practice.

Reflective teachers have strong feelings of security and self-efficacy and can talk and write readily about their experiences and are more likely than non-reflective teachers to allow their students to learn by investigating and structuring things for themselves. A reflection is an important tool for helping teachers to move through a learning process that takes them from novice to expert. Professionals develop their expert knowledge through two separates, but relate, processes that he describes reflection-on-action and reflection-in-action (Killen, 2016).

Ur (1999, cited in Mathew et al., 2017) stated that the first and most important basis for professional progress is simply the teachers' reflection on daily classroom events. Personal progress through reflecting on one's activities and practices that happened in the class and thinking are focused in her study. Obviously, reflective teaching is a beneficial process in teacher professional development, both for pre-service and in-service teachers.

Research Method

The research design for the study was a descriptive research design, in which the researcher seeks to determine whether, and to what degree, a relationship exists between two variables (reflective practices and attitude towards professional development). The quantitative method was used to find out reflective practices of teacher educators and attitude towards their professional development.

Subjects

The required education degree colleges were selected by the use of a simple random sampling method to carry out the research. Table 1 presented the selected education degree colleges and sample size of the study.

Table 1 The Selected Education Degree Colleges and Sample Size

Name of Education Degree College	Sample Size
Mandalay	30
Meikhtila	30
Pakokku	30
Magway	30
Taungyi	30
Total	150

Instruments

In this study, a questionnaire for reflective practices and a questionnaire for attitude towards professional development were used as the instruments. The question items of reflective practice are based on six dimensions: (1) Creating a student-centered learning environment, (2) Creating a reflective classroom environment, (3) Appreciating criticism, (4) Self-evaluation, (5) Decision-making and Problem-solving and (6) Developing lifelong learning skills. This questionnaire was developed on a five-point Likert scale: never, seldom, sometimes, often and always. And then, the question items for attitude towards professional development are based on three dimensions: (1) Social Competency, (2) Professional Competency and (3) Pedagogic Competency. Moreover, this questionnaire for attitude towards professional development was developed: strongly disagree, disagree, undecided, agree and strongly agree on a five-point Likert scale. There are forty items in the questionnaire for reflective practices and thirty items in the questionnaire for attitudes towards professional development. In addition, two open-ended questions and nine interview questions for each dimension of reflective practices and attitude towards professional development were also used.

Procedure

In order to obtain the required data, the instruments were constructed under the guidance of the supervisor. After preparing the questionnaire, expert review was conducted by two expert teachers who have special knowledge in teacher education from the Department of Curriculum and Methodology, Sagaing University of Education. After that, the questionnaire was modified. The questionnaire was validated through the pilot testing on a non-sample group of (28) teacher educators from Sagaing Education Degree College. The internal consistency of the questionnaire for reflective practices was determined to be (0.834) and that of the questionnaire for attitude towards professional development was (0.897) using Cronbach's Alpha. According to Bonet and Wright (2014), the reliability values for both have excellent reliability. Then, the permission of principals was requested to distribute the instruments to all participants of five sample education degree colleges in November 2021. After three weeks, all the instruments were returned, and then the data were entered into a computer data file and analyzed by using the Statistical Package for the Social Science (SPSS 21).

Data Analysis

The data obtained were analyzed by using descriptive statistics (mean and standard deviation) and inferential statistics (one-way ANOVA and Pearson product-moment correlation) to examine reflective practices in teacher educators and attitudes toward their professional development. A one-way ANOVA was used to compare reflective practices in teacher educators and their attitudes towards professional development in terms of teaching experience. Pearson product-moment correlation was used to assess whether and to what extent there was a relationship between reflective practices of teacher educators and their professional development.

Findings

Analysis of Reflective Practices in Teacher Educators in terms of Teaching Experience

The research question **(1)** ***Does the level of reflective practices in teacher educators differ in terms of teaching experience and teaching subjects?***

To find out whether there is a significant difference in reflective practices in terms of teaching experience, a questionnaire on reflective practices for teacher educators was used. Therefore, a one-way ANOVA was used to examine the difference among teaching experiences (see Table 2).

Table 2 ANOVA Results of Reflective Practices in Teacher Educators in terms of Teaching Experience

	Sum of Squares	*df*	Mean Square	*F*	Sig.
Between Groups	2939.827	4	734.957		
Within Groups	31344.367	145	216.168	3.4	.011*
Total	34284.193	149			

Note*: *p<.05*

It was found that reflective practices in teacher educators differ in terms of teaching experience.

Table 3 Results of Multiple Comparisons for Reflective Practices in Teacher Educators by Teaching Experience

Experience (I)	Experience (J)	Mean Difference	Sig.
11 - 15 years	20 years and above	-11.200	.03*

Note. **p<.05*

According to Table 3, there was a significant difference between the teachers who have 11 - 15 years of teaching experience and the teachers who have 20 years and above of teaching experience at .05 level.

Table 4 Means and Standard Deviations of Reflective Practices of Teacher Educators in terms of Teaching Subject

Subject	Mean	N	SD
Education	164.46	24	16.387
Myanmar	166.33	15	18.050
English	159.63	16	12.473
Mathematics	170.65	26	15.305
Science	172.74	31	13.005
Social Studies	166.67	21	16.995
ICT	157.25	4	3.862
Co-Curricula	164.92	13	11.629

It was found that reflective practices of teachers who teach science subjects are the highest mean and that of teachers who teach ICT are the lowest mean (see Table 4). To see clearly, Figure 1 is illustrated.

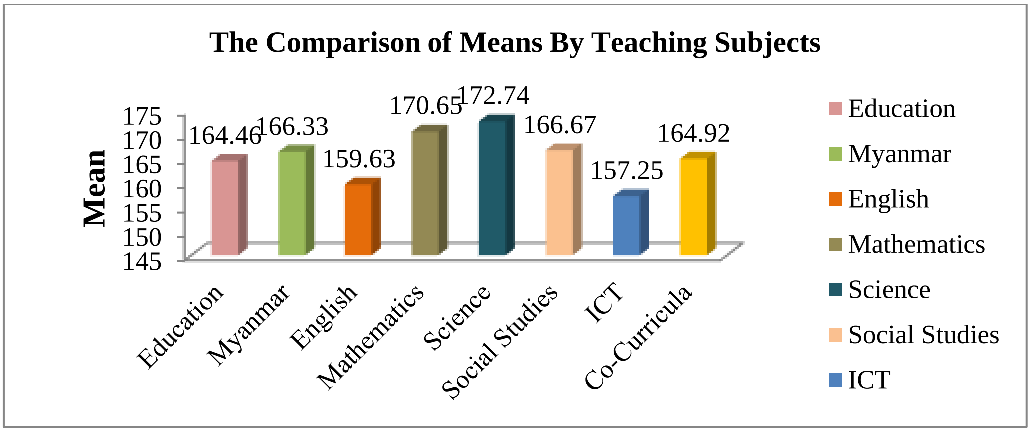

Figure 1 The Comparison of Means for Reflective Practices by teaching subjects

Table 5 ANOVA Results of Reflective Practices in Teacher Educators in terms of Teaching Subjects

	Sum of Squares	*df*	Mean Square	*F*	Sig.
Between Groups	2838.992	7	405.570	1.831	.086
Within Groups	31445.202	142	221.445		(ns)
Total	34284.193	149			

Note. ns = not significant

The result showed that reflective practices in teacher educators do not differ in terms of teaching subjects (see Table 5).

Analysis of Each Dimension of Reflective Practices in Teacher Educators in terms of Teaching Experience

The research question **(2)** ***To what extent do teacher educators commit to each dimension of reflective practices in terms of teaching experience?***

Table 6 illustrated the means of each dimension of reflective practices to see clearly.

Table 6 Means and Standard Deviations of Each Dimension in Reflective Practices of Teacher Educators in terms of Teaching Experience

		D1	D2	D3	D4	D5	D6	Total
0 - 5 Years	M	25.80	16.57	24.83	22.33	25.37	56.60	171.5
	SD	2.325	2.344	2.245	2.245	2.341	5.028	11.156
6 - 10 Years	M	25.73	17.20	23.70	21.63	25.53	53.57	167.37
	SD	2.348	1.919	4.103	4.103	2.529	5.354	14.995
11 - 15 Years	M	24.97	16.27	23.83	20.70	23.97	51.33	161.07
	SD	2.008	1.893	3.185	3.185	2.385	6.370	14.753
16 - 20 Years	M	25.80	16.87	23.30	20.37	24.37	52.47	163.17
	SD	2.427	1.634	2.693	2.693	2.205	5.661	13.028
20 Years and above	M	26.13	17.43	25.30	22.07	25.70	55.63	172.27
	SD	2.636	1.960	3.436	3.436	3.426	6.744	18.551

Note. D1= Creating a student-centered learning environment, D4= Self-evaluation
D2= Creating a reflective classroom environment, D5= Decision-making and Problem-solving
D3= Appreciating criticism, D6= Developing lifelong learning skills

According to Table 6, it can be found that the means of all teachers with respective teaching experiences are the lowest in creating a reflective classroom environment and the highest are in developing lifelong learning skills for all teachers. Teachers who have 11 - 15 years services are the lowest in using reflective practices. To see clearly, Figure 2 is illustrated.

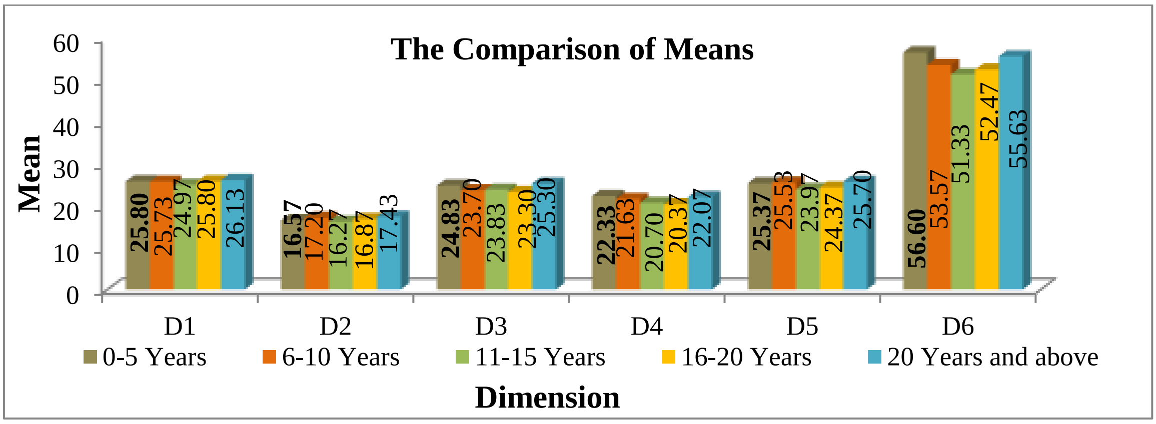

Figure 2 The Comparison of Means for each dimension of Reflective Practices by teaching experience

Note. D1= Creating a student-centered learning environment, D4= Self-evaluation
D2= Creating a reflective classroom environment, D5= Decision-making and Problem-solving
D3= Appreciating criticism, D6= Developing lifelong learning skills

Table 7 ANOVA Results of Each of Six Dimensions in Reflective Practices of Teacher Educators in terms of Teaching Experience

Dimension	Teaching Experience Group	Sum of Squares	*df*	Mean Square	*F*	Sig.
D1	Between Groups	22.373	4	5.593	1.006	.406
	Within Groups	805.900	145	5.558		
	Total	828.273	149			
D2	Between Groups	26.467	4	6.617	1.717	.149
	Within Groups	558.867	145	3.854		
	Total	585.333	149			
D3	Between Groups	84.160	4	21.040	2.060	.089
	Within Groups	1481.233	145	10.215		
	Total	1565.393	149			
D4	Between Groups	87.773	4	21.943	4.227	.003**
	Within Groups	752.767	145	5.191		
	Total	840.540	149			
D5	Between Groups	71.307	4	17.827	2.609	.038*
	Within Groups	990.667	145	6.832		
	Total	1061.973	149			
D6	Between Groups	571.373	4	142.843	4.151	.003**
	Within Groups	4989.667	145	34.411		
	Total	5561.040	149			

Note. D1= Creating a student-centered learning environment, D4= Self-evaluation
D2= Creating a reflective classroom environment, D5= Decision-making and Problem-solving
D3= Appreciating criticism, D6= Developing lifelong learning skills

Table 7 stated that there were no significant differences in three dimensions of reflective practices: creating a student-centered learning environment, creating a reflective classroom environment and appreciating criticism, in terms of teaching experience. In addition, it was also found that there were significant differences in terms of teaching experience in two dimensions of reflective practices: self-evaluation and developing lifelong learning skills at the .01 level. Moreover, the result showed that there was a significant difference in one dimension of reflective practices: decision-making and problem-solving in terms of teaching experiences at the .05 level. Therefore, according to the result of Table 7, it can be concluded that if teacher educators can more use these three dimensions of reflective practices: self-evaluation, decision-making and problem-solving and developing lifelong learning skills, their teaching profession will also improve.

Table 8 Results of Multiple Comparisons for Two Dimensions in Reflective Practices of Teacher Educators in terms of Teaching Experience

Dimension	Experience (I)	Experience (J)	Mean Difference	Sig.
D4	0 - 5 Years	11 - 15 Years	1.633*	.048*
		16 - 20 Years	-1.967*	.009**
	16 - 20 Years	20 Years and above	-1.700*	.035*
D6	0 - 5 Years	11 - 15 Years	5.267*	.006**
	11 - 15 Years	20 Years and above	-4.300*	.041*

Note. D4= Self-evaluation, D6= Developing lifelong learning skills, *p < .05, **p < .01.

According to Table 8, there was a significant difference between the teachers who have 0 - 5 years of teaching experience and the teachers who have 11 - 15 years of teaching experience at .05 level and the teachers who have 0 - 5 years of teaching experience significantly differ the teachers who have teaching experience have 16 - 20 years at .01 level in self-evaluation: one dimension of reflective practices. Moreover, in this dimension, the teachers who have 0 - 5 years and ones who have 20 years and above in teaching experience are different at .05 level. And then, in another dimension of reflective practices; developing lifelong learning skills, the teachers who have 0 - 5 years of teaching experience and who have 11 - 15 years are different at .01 level. Next, there was a significant difference between the teachers who have 11 - 15 years the teachers who have 20 years and above of teaching experience at .05 level.

Analysis of Attitudes towards Professional Development in terms of Teaching Experience

The research question **(3)** ***What are the differences in attitudes towards professional development in terms of teaching experience?***

In order to find out the differences in attitudes towards professional development in terms of teaching experience, a questionnaire on attitudes towards professional development for teacher educators was used. Thus, a one-way ANOVA was used to find out the differences in terms of teaching experience. It was found that there were no differences in attitudes towards professional development in terms of teaching experience (see Table 9).

Table 9 ANOVA Results of Attitudes towards Professional Development in terms of Teaching Experience

	Sum of Squares	*df*	Mean Square	*F*	Sig.
Between Groups	810.600	4	202.650	2.033	.093
Within Groups	14454.733	145	99.688		(ns)
Total	15265.333	149			

Note. ns = not significant

It can be interpreted that there was not a significant difference between different groups of teaching experience according to Table 9.

Analysis of Each Dimension of Attitudes towards Professional Development of Teacher Educators in terms of Teaching Experience

The research question **(4)** ***What are the differences in each dimension of attitudes towards professional development in terms of teaching experience?***

Table 10 Means and Standard Deviations for Each Dimension of Professional Development of Teacher Educators by teaching experience

		D1	D2	D3	Total
0 - 5 Years	M	39.77	56.50	34.43	130.70
	SD	3.126	4.249	2.622	9.158
6 - 10 Years	M	38.40	54.13	33.23	125.77
	SD	3.297	4.058	2.431	8.916
11 - 15 Years	M	38.20	54.20	33.20	125.60
	SD	3.377	4.080	2.469	9.000
16 - 20 Years	M	38.37	54.60	33.63	126.60
	SD	3.439	4.157	2.553	8.923
20 Years and above	M	39.60	56.43	34.63	130.67
	SD	4.065	5.811	3.672	130.67

Note. D1= Social Competency, D2= Professional Competency, D3= Pedagogic Competency

It was found that the highest mean for all teachers who have respective teaching experience levels is professional competency and the lowest mean is in pedagogic competency for all teachers. Teachers who have 11 - 15 years services are the lowest in implementing professional development (see Table 10). Based on the result of the means, Figure 3 is illustrated. It shows the comparison of the means for each dimension by teaching experience.

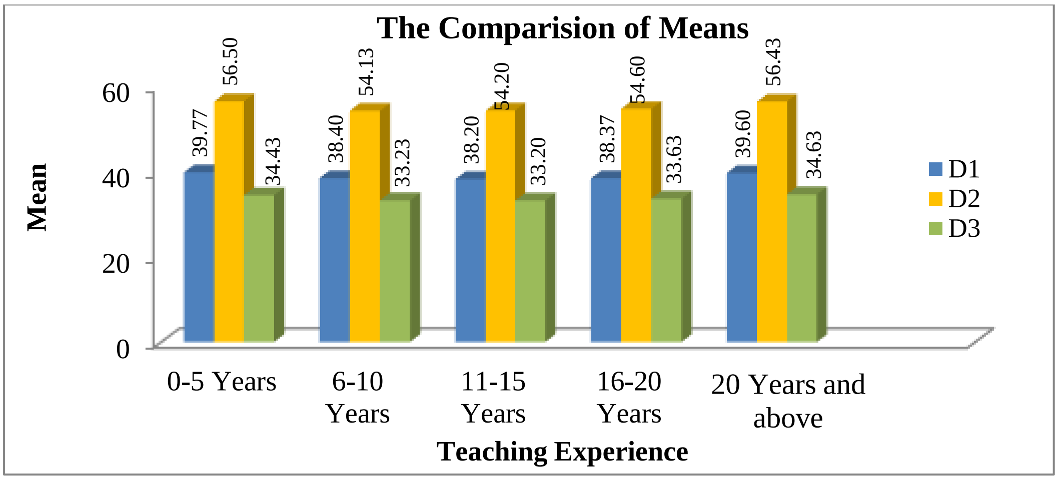

Figure 3 The Comparison of Means for each dimension of Professional Development by teaching experience

Note. D1= Social Competency, D2= Professional Competency, D3= Pedagogic Competency

To find out the differences in all dimensions of attitudes towards professional development by teaching experience, a one-way ANOVA was used. Then, the result showed that there were no significant differences in all dimensions of professional development; social competency, professional competency and pedagogic competency among teaching experiences.

Table 11 ***ANOVA Results of all dimensions of attitudes towards professional development in terms of teaching experience***

		Sum of Squares	*df*	Mean Square	*F*	Sig.
D1	Between Groups	67.800	4	16.950	1.403	.236
	Within Groups	1751.533	145	12.080		(ns)
	Total	1819.333	149			
D2	Between Groups	171.160	4	42.790	2.093	.085
	Within Groups	2964.333	145	20.444		(ns)
	Total	3135.493	149			
D3	Between Groups	54.027	4	13.507	1.737	.145
	Within Groups	1127.467	145	7.776		(ns)
	Total	1181.493	149			

Note. ns = not significant
D1= Social Competency, D2= Professional Competency, D3= Pedagogic Competency

According to Table 11, it can be interpreted that there were no significant differences in all dimensions of attitudes towards professional development by teaching experience. Thus, teacher educators' attitudes towards professional development are the same by teaching experience.

Relationship between Reflective Practices of Teacher Educators in terms of each of Six Dimensions and their Professional Development

The research question **(5)** ***To what extent is a significant relationship between reflective practices of teacher educators in terms of each of six dimensions and their professional development?***

In order to examine the relationship between six dimensions of reflective practices of teacher educators, Pearson product-moment correlation was used (see Table 12).

Table 12 ***Correlations between Teacher Educators' Reflective Practices in terms of Each of Six Dimensions and their Professional Development***

Correlations

			Professional Development
Six Dimensions of Teacher Educators' Reflective Practices	D1	Pearson Correlation	.413**
		Sig. (2-tailed)	.000
	D2	Pearson Correlation	.446**
		Sig. (2-tailed)	.000
	D3	Pearson Correlation	.387**
		Sig. (2-tailed)	.000
	D4	Pearson Correlation	.456**
		Sig. (2-tailed)	.000
	D5	Pearson Correlation	.519**
		Sig. (2-tailed)	.000
	D6	Pearson Correlation	.510**
		Sig. (2-tailed)	.000

Note. **. Correlation is significant at the 0.01 level (2-tailed),
D1= Creating a student-centered learning environment, D4= Self-evaluation
D2= Creating a reflective classroom environment, D5= Decision-making and Problem-solving
D3= Appreciating criticism, D6= Developing lifelong learning skills

The result revealed that six dimensions of teacher educators' reflective practices are positively related to their professional development. Moreover, according to Cohen (1988), four dimensions of teacher educators' reflective practices creating a student-centered learning environment, creating a reflective classroom environment, appreciating criticism and self-evaluation are moderately positive in correlation with their professional development. And then, two dimensions of teacher educators' reflective practices; decision-making and problem-solving and developing lifelong learning skills are highly positively related to their professional development. Therefore, according to the results, it can be concluded that if teacher educators focus on reflecting on their teaching process more and more, they develop and improve knowledge and skills of their profession.

Relationship between Reflective Practices of Teacher Educators and their Professional Development

The research question **(6)** ***To what extent is there a relationship between reflective practices of teacher educators and their professional development?***

To explore the relationship between reflective practices of teacher educators and their professional development, Pearson product-moment correlation was used. It was found that there was a significant correlation between reflective practices of teacher educators and their professional development at the .01 level (r = .573). The result shows that the direction of correlation was positive. This means that the more teacher educators do reflective practices, the more they develop professionally in their teaching. Table 13 shows the correlation between the reflective practices of teacher educators and their professional development. Thus, reflective practices are very important to develop their teaching profession.

Table 13 Correlation between Reflective Practices of Teacher Educators and their Professional Development

Correlations			
		Reflective Practices	Professional Development
Reflective Practices	Pearson Correlation	1	.573**
	Sig. (2-tailed)	-	.000
	N	150	150
Professional Development	Pearson Correlation	.573**	1
	Sig. (2-tailed)	.000	-
	N	150	150

**. Correlation is significant at the 0.01 level (2-tailed).

According to Cohen (1988), it can be interpreted that there was a positively high correlation between reflective practices of teacher educators and their attitudes towards professional development. Therefore, if the using levels of teacher educators' reflective practices are high, they more obviously develop their teaching professions.

Discussion and Suggestions

Discussion

The purpose of this study is to explore the relationship between reflective practices in teacher educators and attitudes towards their professional development. Teacher educators who more practice reflection on teaching develop their profession pedagogically and socially. By analyzing the statistical results, there were significant differences in reflective practices in terms of teaching experience. According to the interview question, teacher educators are obviously different in using reflective practices and they reflect on their teaching to various extents by teaching experience. Rayan (2013, cited in Gheith & Jaberi, 2018) asserted that reflective practices were significant by teaching experience. Therefore, the result of the present study is consistent with the result of Rayan (2013, cited in Gheith & Jaberi, 2018). Teachers with more experience are more likely to use reflective practices in their teaching, while teachers with little or no experience do not give the matter enough thought (Ostaz, 2011, cited in Gheith & Jaberi, 2018). Moreover, it was found that teachers who have 11 - 15 years of teaching experience and who have 20 years and above of teaching experience differ significantly at the .05 level. However, there were no significant differences in reflective practices in terms of teaching subjects. The result showed that reflective practices of teachers who teach science subjects are the highest mean and that of teachers who teach ICT are the lowest mean. By comparing the means of each dimension of reflective practices in terms of teaching experience, the means of all teachers with respective teaching experiences are the lowest in creating a reflective classroom environment and the highest are in developing lifelong learning skills for all teachers. In addition, teachers who have 11 - 15 years of teaching experience are the lowest in using reflective practices.

And then, in three dimensions of reflective practices; creating a student-centered learning environment, creating a reflective classroom environment and appreciating criticism, there were no significant differences in terms of teaching experience. There was a significant difference between the next three dimensions of reflective practices, self-evaluation; decision-making and problem-solving and developing lifelong learning skills by teaching experience. Moreover, in self-evaluation, teachers who have 0 - 5 years of teaching experience differ from teachers who have 11 - 15 years of teaching experience and 16 - 20 years of teaching experience. And also, teachers who have 16 - 20 years of teaching experience, who have 20 years and above of teaching experiences are different in this dimension. In developing lifelong learning skills, teachers who have 0 - 5 years of teaching experience differ from teachers who have 11 - 15 years of teaching experience and then it was found that teachers who have 20 years and above and teachers who have 11 - 15 years of teaching experiences are different at .05 level.

The results of the one-way ANOVA suggested that there were no significant differences in attitudes towards professional development by teaching experience. By teaching experience, most of the teacher educators in the selected education degree colleges involve professional development programs so that they have equal attitudes towards their professional development according to the interview question. Thus, it can be interpreted that teacher educators are not significantly different in attitude and interest in their teaching profession. When comparing means for each dimension of professional development of teacher educators by teaching experience, the highest means for all teachers with respective teaching experience levels are in professional competency and the lowest means are in pedagogic competency for all teachers. In addition, teachers who have 11 - 15 years of teaching experience are the lowest in implementing professional development.

According to the obtained data, there were no significant differences in each dimension of attitudes towards professional development by teaching experience. By interviewing, most teacher educators involve professional development programs so that they have equally attitudes towards their professional development and then they want to be competent some factors included professional development such as knowledge and skills about teaching, social skills and pedagogical skills. Thus, it can be interpreted that their attitudes and mindset on professional development are not significantly different.

The descriptive result indicated that there was a positive and significant correlation between reflective practices in teacher educators and their attitudes towards professional development. It is also suggested that statistical analysis showed reflective practices in teacher educators were high and positively correlated to their attitudes towards professional development with each other. This means that if teacher educators use frequently reflective practices in their teaching, they develop and improve their profession and be more effective in their teaching. The study of Gheith and Jaberi (2018) indicated that reflective practices in teacher educators positively and highly correlated to their attitudes towards professional development. It is quite assertive that teachers' attitudes direct their behaviors toward reflecting on teaching practices and improving performance. Therefore, the findings of this study are consistent with Gheith and Jaberi's study.

Based on the research findings, there was a positive and significant correlation between each dimension of reflective practices and attitudes towards professional development. The value of the correlation coefficient between overall reflective practices and attitudes towards professional development is (.573). So, all dimensions of reflective practices of teacher educators and their attitudes towards professional development correlated with each other. This means that if teacher educators do effectively these dimensions of reflective practices, they will know the merits and drawbacks of their teaching and then will get effective teaching strategies. Moreover, they will develop and improve the teaching profession. Thus, every teacher should use reflective practices effectively to develop their profession.

Suggestions

This study indicated that using reflective practices and practicing reflection on the teaching process are essential tools for developing the teaching profession and obtaining effective teaching. Therefore, every teacher should create a student-centered learning environment, create a reflective classroom environment, appreciate criticism, self-evaluate, use decision-making and problem-solving strategies and develop lifelong learning skills to some extent. By doing this, teachers will gain more social competency, pedagogical competency and professional competency for developing their teaching. If teachers use reflective practices to a little extent, they will have little competency in professional skills and then they would not develop in their profession perfectly. Teacher educators should always reflect on their own teaching by writing reflective journals themselves if possible. Whenever using reflective practices, the teacher should make the changes that improve and develop their teaching. And then, to develop the teaching profession, teachers should have reflective partnerships who serve as observers when they are teaching. Teachers gain insights and good or bad comments from their colleagues that improved their teaching. Like the students, they should be openly presented with the strengths and weaknesses of their teachers and the teaching style of their teachers not only by writing reflective journals but also by creating a reflective classroom environment. Teachers also should consider their students' presentations. Thus, all teacher educators should often use reflective practices as much as possible.

Conclusion

Reflective practices are essential tools for every teacher to develop in their profession. Every teacher should do a reflection on their teaching. By doing reflective practices, they improve their social skills, pedagogical competency and professional competency. At least, a teacher should reflect on teaching to some extent.

In this study, there was a positive significant correlation between all dimensions of teacher educators' reflective practices and their professional development. In addition, it was found that there was a positively high correlation between reflective practices of teacher educators and their professional development at the .01 level (r = .573).

To sum up, reflection is the key to being a successful teacher and it is a tool for teachers to improve their ability, think about their teaching and judge the quality of their teaching based on evidence. If a teacher practices reflection, he can more effectively encourage learners to reflect on, analyze, evaluate and improve their own learning (Habib, 2017). Thus, teachers should use always reflective practices in teaching all subjects. By using reflective practices in teacher education, prospective teachers can know how to use reflective practices and doing reflective practices can also develop the teaching profession. Reflective practices are now widely employed in the field of teacher education for their professional development. Reflective practices are very useful not only for teachers to improve their ability and teaching but also for learners to be effective in learning. Using reflective practices is one of the professional developments and all teachers need to use reflective practices to be proficient in their teaching. That is why reflective practices are essential in the field of education especially for teacher educators to improve their professional development.

Acknowledgments

We would like to express our special thanks to Dr. Myat Myat Thaw (Rector of Sagaing University of Education), Dr. Knin Hnin Yi (Pro-Rector of Sagaing University of Education) and Dr. San San Lwin (Pro-Rector of Sagaing University of Education) for their invaluable advice, tremendous assistance and necessary information for this study.

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J. Myanmar Acad. Arts Sci. 2023 **Vol. XXI. No.6**

AN ANALYTICAL STUDY OF DIFFICULTIES IN TEACHING SCIENCE AT THE HIGH SCHOOL LEVEL

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Abstract

The main purpose of the study is to investigate the analytical study of the difficulties in teaching science at the high school level. By using simple random sampling method, (160) among (248) science teachers in (43) Basic Education High Schools and (11) Basic Education High Schools (Branch) in the Mandalay region were selected as the sample. To be obtained the difficulties in teaching science at the high school level, a questionnaire consists of (56) items and is rated on five-point Likert scale with seven dimensions. The data obtained were analyzed by using descriptive statistics and inferential statistics such as the independent samples *t*-test and one-way ANOVA. Findings showed that 71% of participants had difficulties in teaching science at the high school level because they may have less experience and expertise in science teaching and their schools have not enough school facilities and teaching aids. According to the research findings, science teachers in high schools (branch) faced in the difficulties with science teaching methods and science assessment more than those in high schools in types of school. Moreover, science teachers in (0-5 years) faced in difficulties of science teachers and difficulties with science textbooks more than those in (6-10 years) and (11 years and above) in terms of teaching science experience. Therefore, in order to teach physics with great joy and success, the physics teacher should establish and maintain a respectful, supportive and safe teaching environment that is emotionally and physically conducive to teaching. Thus, it was clearly seen that this research would be a valuable work that produces a remarkable improvement in teaching science at the high school level in Myanmar.

Keywords: Science, Difficulty in Teaching, Teaching Difficulty in Science

Introduction

Science is all around ones. It is everywhere in their daily lives – all day, every day. From an early age, people interact with their environment, asking questions and seeking answers. This question and answer process lies in the heart of knowing and doing science. Furthermore, science teachers can provide the basic concepts needed to enhance the development of human society in the country. That is why training programs are designed to improve the efficiency of teaching. Also, teachers must keep abreast of modern development in teaching techniques (Singh, 1990).

Background of the Study

Background theories in science are taken both as proof and as disproof that theory choice is underdetermined by data. The proof is often thought to threaten the possibility of responsible scientific theory choice. Properly understood, it shows that scientific inference is fallible and contextual. This is compatible with the disproof, which shows that no theory choice can be timelessly or no contextually underdetermined. Philosophers had often replied to the disproof by focusing their attention on total sciences rather than theories. If empirically equivalent total sciences were at stake, then there would be no background against which they could be differentiated. Science is characterized by the systematic gathering of information through various forms of direct and indirect experimentation (Herr, 2018).

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Purposes of the Study

The main purpose of the study is to investigate the analytical study of difficulties in teaching science at the high school level. The objectives of the study are as follows:

- To investigate the difficulties faced by the teachers towards teaching science at the high school level.
- To explore the difficulties in teaching science at the high school level in types of school and in terms of teaching science experience.
- To give suggestions and recommendations to improve teaching science based on this study.

Research Questions

In accordance with the purposes of the study, the research questions are described as below.

1. What difficulties do teachers encounter in teaching science at the high school level?
2. Is there any difference in the difficulties of teachers in teaching science at the high school level types of school?
3. Is there any difference in the difficulties of teachers in teaching science at the high school level in terms of teaching science experience?

Definition of Key Terms

According to the title of an analytical study of difficulties in teaching science at the high school level, the definition of key terms describes as follows:

Science

Science is a methodical approach to studying the natural world (Niyungeko, 2020).

Difficulty in Teaching

Difficulty in Teaching is a situation where a teacher does not succeed and satisfy in teaching performance.

Teaching Difficulty in Science

Teaching Difficulty in Science is a situation where a teacher fails to grasp a concept or idea and to perform a teaching task in science.

Significance of the Study

Science focuses on the significance of chemistry to society by discussing a chemical product that has altered agriculture, food, health, medicine, transportation, electronics, technology, the household, environment, etc. And then, science focuses on the significance of physics to other fields of study by giving specific examples of how physics principles provide a richer understanding of music, computers, business, art, history, technology, sports, engineering, manufacturing, communications, economic, etc. Moreover, science focuses on the significance of biology to other fields of study by giving specific examples of botany, health, geology, biology, astronomy, literature, sports, etc. Science is very important in society. So, this is a heavy load on the science teachers to be difficult in their teaching (Herr, 2008). Of course, an emphasis of the study on investigating difficulties in teaching science would be useful for the teachers, students, curriculum developers, and educational researchers.

Review of Related Literature

Science is important subject and understanding of basic science concepts increases the content knowledge of the teachers and students. But for some teacher is facing difficulties to understand some science concepts. These concepts which are difficult to understand for the teachers show as follows:

Difficulties in Teaching Science

Teaching science in modern society shows a lack of efficiency, as well as the discrepancy between goals and the quantum and quality of students' knowledge. Teaching science in high schools in Myanmar is also inefficient. Then teaching is not oriented to content, whose adoption allows the student to cope in the same or similar situations, but the method of their application in an unfamiliar situation allows the student to solve the problem (Pedretti, 2005). These difficulties situations with teaching science at the high school level are as follows:

Difficulties of Science Teachers

Science teachers face various difficulties, which will surely affect their performance in their teachings. Teaching difficulties facing high school science teachers are the most problematic issues: science is a discipline that requires learners to employ a variety of methods of understanding and to translate from one to the other words, tables of numbers, graphs, equations, diagrams and maps (Abrar, 2017).

Difficulties with Science Students

The different ability levels of the students, levels of their understandings and teachers' workload, the want of modern teaching aids are the main difficulties for assessing the students. Therefore it is very difficult for teachers to give close observation to each and every student. It is difficult to involve students in group work as their ability varies and sometimes they are not interested to participate in the classroom.

Davis (2016) outlined that the ten of the most common classroom problems with the students when teaching science as production or investigation. They are as follows:

1. Students become overly dependent on the teacher.
2. Persistent use of thinking and problem solving.
3. Student is defiant, rowdy, or distracting of others.
4. Students "hijack lesson" _ the lesson does not go where you want it to.
5. Personalities clash.
6. Students are unclear what to do, or do the wrong thing.
7. Students are bored, inattentive, or unmotivated.
8. Strong student dominance.
9. Students are unprepared.
10. Tardiness.

Difficulties with Science Textbooks

Sometimes, the use of science textbooks in teaching at the high school level is to be difficult for students because of many contents, insufficient time by using effective methods and insufficient science teaching aids and the large size of the class. So, science textbooks will be difficult in teaching to science students as follows:

1. The content may not be at the right level.
2. The sequence of units is not appropriate in accordance with real work-related needs.
3. The activities, readings, visuals, etc., may be boring.
4. The timetable for completing the textbook or parts of it may be unrealistic.
5. The textbook does not take the students' background knowledge into account (Graves, 2000).

Difficulties with Teaching Aids

The role of pictures, models, pictorial magazines, projectors, tape-recorder, radio, film strips, computers and television cannot be minimized. Science teachers use a variety of teaching aids to make classroom activities interesting and interactive. A science teacher needs to be expert some equipment such as optimal teaching aids, or the audio-visuals that might increase the possibility of students to comprehend whatever that might be involved with to learn. Besides the textbook and associated workbooks, there are a wide variety of teaching aids available to the science teacher. One of the most commonly used teaching aids is the blackboard or whiteboard. Besides this, visual aids such as flashcards, postcards, and magazine photos are very useful (Kitao & Kitao, 1997).

Insufficient time of using resources and aids is one of the major problems in teaching and learning science. Without any sufficient aids, the students might feel difficulty in comprehending the given lesson. Teaching aids are needed a crucial component of working conditions. It is true that through classroom work, teachers tend to be satisfied to some extent. Some individuals, however, contend that such satisfaction appears to lack a background (Kitao & Kitao, 1997).

Difficulties with Science Teaching Methods

Teachers at high schools often face many difficulties in solving quantitative science tasks. The teachers face difficulties with teaching methods as follows:

1. in explaining the basic equations to be used in solving science problems,
2. in making summary notes on key topics and how to solve the science problems,
3. in performing laboratory-based problem solving with special reference to science,
4. in providing ample time and opportunity to solve the science problems during the process of teaching,
5. in giving enough homework and assignments from each topic,
6. in revising the key and fundamental topics in science skills, and
7. in providing organized tutorial on how to solve problems with easy way when a problem is to be solved (Mary, 2013).

Difficulties with Classroom Environment

Many high schools in Myanmar have no enough classrooms and teachers. The difficulties of large classes compounded by the shortage of teachers put a strain on the teachers' ability to provide quality science work to the learners because the teacher-learner ratio is not proportional.

Teachers face workload in the classroom. This has led to the difficulties of overcrowded classes and poor teaching performance since the teacher is overworked and provides students few question for easy marking. Both teachers and students identified large classes as a major difficulty to practice and assessment in science. Besides, the large number of students in the class and furniture setting also act as difficulties for assessing the students. Overcrowded classrooms prevent the teacher to deliver, to monitor teaching, mark and provide corrections at the right time. The class size accelerates to poor delivery of teachers, and failure of majority of students. The teacher becomes unable to assist each student when teaching in the classroom (Davis, 2016).

Difficulties with Science Assessment

Assessment is a term that refers to a thorough but constant appraisal, judgment and analysis of students' performance through meticulous collection of information. Evaluation is described as an overall but regular judgment and analysis of teaching, learning, as well as curriculum through systematic collection of data. In assessment, the focus is on specific point of language; but in evaluation, the emphasis is placed on overall aspects of science. Assessment looks at the individual science learners, but evaluation checks the whole science learning program. Assessment aims to inform the program evaluators of the results while evaluation seeks to report to the superior authorities. In assessment, success means how well students progressed and failure implies how poorly the teacher performed while success in evaluation indicates how effectively the program has been managed, failure is implicitly ascribed to the ineffectiveness of instruction (Hamidi, 2010).

Research Method

This study is an analytical study of the difficulties in teaching science at the high school level. It includes the population and sample size, research design, instrument and procedure.

Population and Sample Size

This study was conducted in Mandalay region. There are (43) Basic Education High Schools and (11) Basic Education Branch High Schools in Mandalay. All schools were taken to carry out this study. The sample was distributed to every Basic Education High School and every Basic Education High School (Branch). By using simple random sampling method, (160) science teachers among (248) science teachers who are teaching science (chemistry, physics and biology) were selected as the sample. Then the total numbers of the sample was (160) science teachers in Mandalay.

Research Design

This study was conducted by using survey method which is one of the descriptive research designs. Descriptive research involves collecting data in order to test the questions concerning the current status of the subject of the study (Gay, 1987).

Instrument

In this study, the major instrument used for data collection was a questionnaire. The survey questionnaire was used to investigate the difficulties in teaching science at the high school level.

This questionnaire was based on the questionnaire of Al- Qadomi (1996, cited in Razmjoo, & Mavaddat, 2016) and literatures of Mary (2013), Khatir (2015), Ertnosho (2013, cited in Zamani, & Ahangari, 2016). In the questionnaire, there are seven dimensions. Each dimension consists of eight items.

There are (56) items rated on five- point Likert- scale in the instrument. The questionnaires were delivered to five science teachers at each high school and three science teachers at each branch high school. The questionnaire was used five-point Likert- scale. The items were rated on five alternative options (1. Strongly Disagree, 2. Disagree, 3. Undecided, 4. Agree and 5. Strongly Agree) for each item. But Strongly Disagree and Disagree responses were assigned as a Disagree group. Undecided responses were assigned as an Undecided group. And Agree and Strongly Agree responses were assigned as an Agree group. And then there were three groups (Disagree, Undecided, Agree).To obtain the qualitative data from the responses of the participants about the difficulties in teaching science (Chemistry, Physics, Biology) at the high school level, four open-ended questions was used.

Instrument Validity

After preparing the questionnaire, the copies of the questionnaire were distributed to the five experienced teachers in the field of education in Sagaing University of Education. And then, the experienced teachers were requested to advise the questionnaire. Their opinions regarding the suitability of each item for exploring the difficulties in teaching science (Chemistry, Physics and Biology) at the high school level was accepted. Finally, the items were modified according to the experienced teachers' suggestions.

Pilot Testing

After validating the questionnaire, a pilot survey was conducted with (22) high school science (Chemistry, Physics and Biology) teachers at No (27), (29), (32) and (39) Basic Education High Schools and No. (20), (24) (25) and (29) Basic Education Branch High Schools in Pyigyitagon Township in Mandalay. According to the findings of the pilot test, internal consistency reliability of the questionnaire was determined by Cronbach's alpha. The value of Cronbach's alpha was (0.952).

Procedure

Firstly, the related literature was collected from several books, dissertations, journals and internet (various websites). Secondly, in order to get the required data, the instrument was constructed concerning with the difficulties in teaching science of high school science teachers. Then, the validity was determined by five experienced teachers in the field of Education. After getting validation, a pilot test was taken with twenty- two high school science teachers from four Basic Education High Schools and four Basic Education Branch High Schools in Pyigyitagon Township. For the internal consistency reliability, Cronbach's alpha coefficient was used. After the pilot study, the major survey was conducted. Finally, the obtained data was collected, analyzed and presented. After collecting the required data, data analysis was carried out. The data was analyzed by using descriptive statistics and inferential statistics such as independent samples *t*- test and one-way ANOVA.

Findings

This section is concerned with the findings and interpretations based on the data taken from the study. Data acquired from the present study were analyzed by computing mean, standard deviation, the percentages of science teachers' responses, the independent samples *t*-test and one-way ANOVA. Findings and results were investigated in the following section.

(1) Findings of the Teachers' Responses towards Difficulties in Teaching Science at the High School Level

These all dimensions deal with the responses of science teachers towards difficulties in teaching science at the high school level. It consists of 56 items. The responses of teachers towards all dimensions were analyzed by descriptive statistics. The responses of teachers for all items in the study are presented in the following table (see Table 1).

Table 1 Responses of Teachers towards Difficulties in Teaching Science at the High School Level

No.	Dimension	*N*	No. of Frequency in all Dimensions		
			Disagree	Undecided	Agree
1	Difficulties of Science Teachers	160	69	7	84
2	Difficulties with Science Students	160	36	11	113
3	Difficulties with Science Textbooks	160	45	10	105
4	Difficulties with Teaching Aids	160	26	8	126
5	Difficulties with Teaching Methods	160	28	8	124
6	Difficulties with Classroom Environment	160	26	7	127
7	Difficulties with Science Assessment	160	31	10	119
Total/Average		**160**	**37**	**9**	**114**

Likert-scales in all items were assigned as three groups. The strongly disagree and disagree responses were assigned as a group of disagree, undecided responses were assigned as a group of undecided and strongly agree and agree responses were also assigned as a group of agree. And then, these three groups were shown by percentages.

The percentages of high school science teachers' responses towards difficulties in teaching science were analyzed in Table 2.

Table 2 Percentages of Teachers' Responses towards Difficulties in Teaching Science at the High School Level

Teachers' responses	Frequency	Percentage (%)
Disagree	37	23
Undecided	9	6
Agree	114	71
Total	**160**	**100**

According to the findings, the responses of science teachers for (56) items on all dimensions are presented by pie chart (see Figure 1).

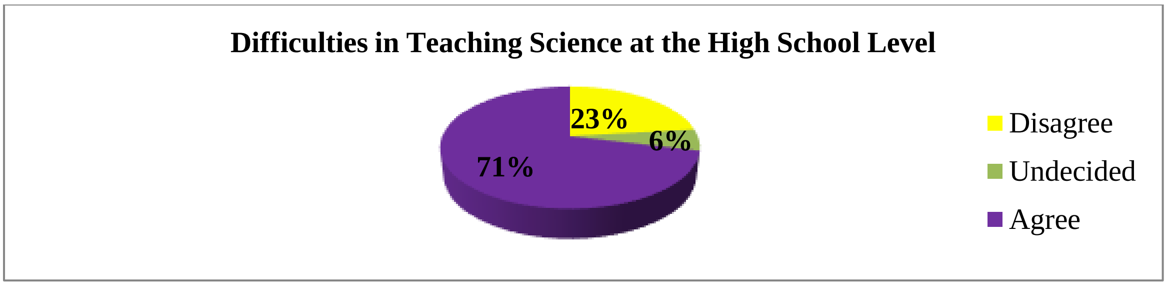

Figure 1. Percentages of teachers' responses towards difficulties in teaching science at the high school level

Table 2 and Figure 1 showed the percentages of teachers' responses towards difficulties in teaching science at the high school level. It means that (23 %) of science teachers marked on disagreed. So, (23%) of science teachers are not difficult in teaching science at the high school level. But (71%) of science teachers marked on agreed in teaching science at the high school level because they may have less experience and expertise in science and their schools have no enough school facilities and teaching aids. (6%) of science teachers are neither difficult nor easy because they marked on undecided.

(2) Findings for Descriptive Statistics of the Responses of Science Teachers towards Difficulties in Teaching Science at the High School Level

According to descriptive statistics of the responses, the results are as follows:

Table 3 Descriptive Statistics for the Responses of Science Teachers towards Difficulties in Teaching Science at the High School Level

Difficulties in Teaching Science	*N*	Minimum	Maximum	*M*	*SD*
Difficulties of Science Teachers	160	8	24	16.77	5.99
Difficulties with Science Students	160	8	24	19.89	4.46
Difficulties with Science Textbooks	160	8	24	19.01	4.94
Difficulties with Teaching Aids	160	8	24	21.00	4.52
Difficulties with Science Teaching Methods	160	8	24	20.81	3.99
Difficulties with Classroom Environment	160	8	24	21.03	3.99
Difficulties with Science Assessment	160	8	24	20.45	4.98
Total/Average	**160**	**8**	**24**	**19.85**	**4.70**

According to Table 3, "Mean $\pm$ 1 *SD*" was used to describe as high, moderate and low levels. In the Table (3), the average mean is (19.85) and average standard deviation is (4.70). If average mean is added to one standard deviation, the result is (24.55). If one standard deviation is subtracted from average mean, the result is (15.15). If the mean score is larger than (24.55), it is assigned as high difficulty. If the mean score is less than (15.15), it is assigned as low difficulty. But if it is between (24.55) and (15.15), it is assigned as moderate difficulty. According to Table 3, it means that science teachers face moderate difficulties concerning with difficulties of science teachers, difficulties with science students, difficulties with science textbooks, difficulties with teaching aids, difficulties with teaching methods, difficulties with classroom environment and difficulties with science assessment. The results can be clearly seen in the Figure 2.

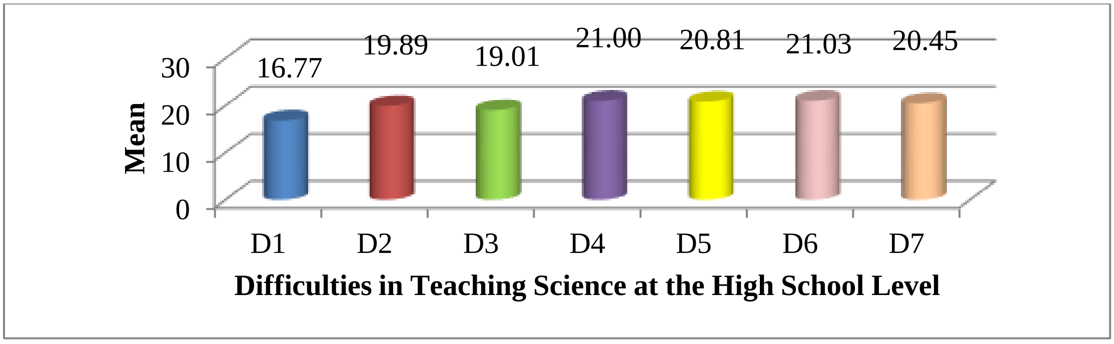

Figure 2. Difficulties in teaching science at the high school level

Note. D1 = Difficulties of Science Teachers
D2 = Difficulties with Science Students
D3 = Difficulties with Science Textbooks
D4 = Difficulties with Teaching Aids
D5 = Difficulties with Science Teaching Methods
D6 = Difficulties with Classroom Environment
D7 = Difficulties with Science Assessment

(3) Findings for Difficulties in Teaching Science at the High School Level in terms of types of School

According to the independent samples *t*- test, the results are as follows:

Table 4 The Results of t- test for Difficulties in Teaching Science at the High School Level in terms of types of School

Dimension	School	*N*	*M*	*SD*	*t*	*df*	*Sig.*
Difficulties of Science Teachers	BEHS	137	17.06	5.90	1.464	158	.145 *(ns)*
	BEHS(B)	23	15.09	6.41			
Difficulties with Science Students	BEHS	137	19.76	4.63	-.888	158	.376 *(ns)*
	BEHS(B)	23	20.65	3.30			
Difficulties with Science Textbooks	BEHS	137	18.85	4.93	-.952	158	.343 *(ns)*
	BEHS(B)	23	19.91	4.98			
Difficulties with Teaching Aids	BEHS	137	20.90	4.59	-.696	158	.487 *(ns)*
	BEHS(B)	23	21.61	4.12			
Difficulties with Science Teaching Methods	BEHS	137	20.59	4.12	-1.670	158	**.040***
	BEHS(B)	23	22.09	2.92			
Difficulties with Classroom Environment	BEHS	137	20.85	4.13	-1.376	158	.083 *(ns)*
	BEHS(B)	23	22.09	2.86			
Difficulties with Science Assessment	BEHS	137	20.17	5.07	-1.759	158	**.049***
	BEHS(B)	23	22.13	4.12			

Note. *$p < .05$ *ns* = not significant

According to Table 4, there were significant differences in the difficulties with teaching methods and science assessment in terms of types of school. The significant difference in the difficulties with teaching methods was at the (p = .040) level. And then, the significant difference in the difficulties with science assessment was at the (p = .049) level. So, science teachers in high schools (branch) faced difficulties with teaching methods and science assessment more than those in high schools. But, high schools (branch) find a little difference concerning science teachers, science students, science textbooks, teaching aids and classroom environment than those of high schools. Therefore, there were no significant differences in the difficulties of science teachers, with science students, science textbooks, teaching aids and classroom environment. It can be interpreted that high schools (branch) were more difficult than those of high schools because basic education high schools (branch) may have insufficient.

(4) Findings for Difficulties in Teaching Science at the High School Level in terms of Teaching Science Experience

According to one-way ANOVA, the results are as follows:

Table 5 ANOVA Results of Difficulties in Teaching Science at the High School Level in terms of Teaching Science Experience

Dimension		*SS*	*df*	*MS*	*F*	*Sig.*
Difficulties of Science Teachers	Between Groups	221.654	2	110.827	3.165	**.045***
	Within Groups	5498.246	157	35.021		
	Total	5719.9	159			
Difficulties with Science Students	Between Groups	41.117	2	20.559	1.034	.358 *(ns)*
	Within Groups	3122.858	157	19.891		
	Total	3163.975	159			
Difficulties with Science Textbooks	Between Groups	175.495	2	87.747	3.724	**.026***
	Within Groups	3699.499	157	23.564		
	Total	3874.994	159			
Difficulties with Teaching Aids	Between Groups	2.829	2	1.414	0.068	.934 *(ns)*
	Within Groups	3249.171	157	20.695		
	Total	3252	159			
Difficulties with Science Teaching Methods	Between Groups	60.138	2	30.069	1.903	.153 *(ns)*
	Within Groups	2480.856	157	15.802		
	Total	2540.994	159			
Difficulties with Classroom Environment	Between Groups	34.358	2	17.179	1.082	.341 *(ns)*
	Within Groups	2492.486	157	15.876		
	Total	2526.844	159			
Difficulties with Science Assessment	Between Groups	63.803	2	31.901	1.290	.278 *(ns)*
	Within Groups	3883.797	157	24.738		
	Total	3947.6	159			
Overall	Between Groups	1557.067	2	778.533	1.270	.284 *(ns)*
	Within Groups	96213.63	157	612.826		
	Total	97770.69	159			

Note. * $p < .05$ *ns* = not significant

The results of Table 5 indicated that there were significant differences in the difficulties of science teachers and difficulties with science textbooks at the high school level in terms of teaching science experience. The significant difference in the difficulties of science teachers was at the (p = .045) level. The significant difference in the difficulties with science textbooks was at the (p = .026) level. There were no significant differences in difficulties with science students, difficulties with teaching aids, difficulties with teaching methods, difficulties with the classroom environment and difficulties with science assessment. According to multiple comparisons of ANOVA, the results are presented in Table 6.

Table 6 Multiple Comparisons of ANOVA Results for Difficulties in Teaching Science at the High School Level in terms of Teaching Science Experience

Dimension	Experience		*MD*	*Sig.*
Difficulties of Science Teachers	0-5 years	6-10years	-2.038	.274 *(ns)*
		11 years and Above	-3.064*	**.034***
	6-10years	0-5 years	2.038	.274 *(ns)*
		11 years and Above	-1.026	.610 *(ns)*
	11 years and Above	0-5 years	3.064*	**.034***
		6-10years	1.026	.610 *(ns)*
Difficulties with Science Textbooks	0-5 years	6-10years	-2.694*	**.037***
		11 years and Above	-2.455*	**.040***
	6-10years	0-5 years	2.694*	**.037***
		11 years and Above	.239	.961 *(ns)*
	11 years and Above	0-5 years	2.455*	**.040***
		6-10years	-.239	.961 *(ns)*

Note. * p <.05 *ns* = not significant

According to Table 6, difficulties of science teachers and difficulties with science textbooks were significant differences in terms of teaching science experience. For teaching science experience if there was compared with (0-5 years) and (11 years and above), the significant difference was at the (p= .034) level in difficulties of science teachers. So, science teachers in (0-5 years) are more difficult than science teachers in (11 years and above). And then, if there was compared with (0-5 years) and (6-10 years), the significant difference was at the (p = .037) level in difficulties with science textbooks in terms of teaching science experience. Therefore, it was clearly seen that science teachers in teaching science experience (0-5 years) were more difficult than science teachers in (6-10 years). Moreover, if there was compared with (0-5 years) and (11 years and above), the significant difference was at the (p = .04) level in difficulties with science textbooks in terms of teaching science experience. It can be interpreted that science teachers in (0-5 years) were more difficult than science teachers in (6-10 years and 11 years and above) in terms of teaching science experience.

Findings on Open-ended Questions

To obtain relevant qualitative data for this study, open-ended questions were asked to high school teachers. According to four open-ended questions in the questionnaire,

- Science teachers are not sufficient in every high school and branch high school.
- Lab assistant teachers are not in every school.
- If specialized subjects are not appropriate, science teachers will be difficult in science teaching.
- To develop thinking and problem-solving skills, it is necessary to provide laboratory aids, video click, TV, computer and Over-head Projector
- Some teaching aids cannot get easier and some are expensive.
- Classrooms are overcrowded.

Summary of Findings

The results of research findings from (54) high schools were as follows:

- According to percentages, (23%) of science teachers are not difficult in teaching science at the high school level. But (71%) of science teachers in teaching science are difficult. Moreover, (6%) of science teachers are neither difficult nor easy.
- According to mean scores, science teachers face moderate difficulties concerning all dimensions in teaching science at the high school level.
- The results of *t*-test that there were significant differences in the difficulties with science methods and science assessment at the high school level in terms of types of school. It means that science teachers in high schools (branch) faced in difficulties with science methods and science assessment more than those in high schools in terms of types of school.
- There were significant differences in difficulties of science teachers and difficulties with science textbooks in terms of teaching science experience. It means that science teachers in (0-5 years) faced in the difficulties of science teachers and difficulties with science textbooks more than those in (6-10 years) and (11 years and above) in terms of teaching science experience.

Conclusion

This section is presented in three parts. The discussion of the research is presented in the first part. And the second part is suggestions and recommendations. Finally, the third part is the conclusion of the research.

Discussion

Nowadays, science has developed in globalization and scientific knowledge has increasingly become a universal demand. Besides, it is one of the compulsory subjects at the schools. Some teachers (little experience), the goals and method of teaching science and lack of students' interests and capabilities in science affect to be difficult in teaching science. Therefore, this study was conducted to investigate difficulties in teaching science at the high school level. The total number of (160) at (43) high schools and (11) branch high schools science teachers from six townships in Mandalay were conducted.

At first, according to the results of descriptive statistics, it was found that the highest percentage in the overall dimension was (71%) at an agree group, the second was (23%) at a disagree group and the last was (6%) at an undecided group. It means that high school science teachers face difficulties in teaching science at the high school level. The finding of this study was consistent with the results of Razmjoo and Mavaddat (2016) which indicated that most secondary science teachers are not up-to-date, competent and experienced. The constraint of time to teach the lessons and lack of teaching materials make difficult for teachers to apply teaching methods in the class.

Moreover, the skills of students in English are very weak. So, science subjects written by English were coming to be afraid to students. Khatir (2015) said that most students in the class today are less interest in science learning, less their science background knowledge and they learn science for passing their exams rather than the pleasure of thinking and problem solving. Moreover, the skills of students in thinking and problem solving are very weak.

Continuously, according to the results of *t*- test, there were significant differences in the difficulties with teaching methods and difficulties with science assessment. Science teachers in branch high schools faced difficulties in teaching science more than those in high schools because most branch high schools are not sufficient such as aids, classrooms, teachers, etc. And insufficient facilities in the classroom and overcrowded classrooms are difficult for effective teaching. Mary (2013) stated that the essential school facilities such as instructional materials are in short supply. Therefore, these problems affect the effectiveness and efficiency of teachers' teaching performance in schools.

However, it may be more difficult in branch high school science teachers than the high school science teachers because they are novices and thus they have no experience with high school science textbooks and teaching methods. Amin and Rahimi (2018) in their study stated that novice science teachers experienced job-related challenges such as workplace stress, workload, time management, content, curriculum, textbook knowledge, teaching subject matter, students and instructional strategies.

Finally, according to one-way ANOVA, it was found that there were statistically significant differences in the difficulties of science teachers and difficulties with science textbooks. Kamau (2013) said that a less experienced teacher encounters a wide range of problems ranging from classroom management to knowing learners' need and identifying instructional strategies. Besides, they are less effective than those who were more experienced.

Suggestions and Recommendations

According to the results of the present study, most of science teachers face difficulties in teaching science at the high school. These difficulties make poor teaching performance for teachers. If the difficulties of high school science teachers can reduce, their performance will be good. Based on the results of the study, the following suggestions and recommendations were made:

- It needs to promote the students' interests and thinking skills.
- The classrooms should not be overcrowded and adequate teaching aids should be supplied for the schools.
- High school science teachers should be provided in-service training courses and teaching development programs in order to keep in touch with new teaching methods and strategies.
- High school science teachers should have an adequate working environment and condition, including the high technology, resources and facilities essential for effective teaching, in addition to real protection in terms of occupational health and safety.

- Moreover, Practical and experimental works and field study should be included in the assessment system if students want to improve thinking and problem solving skills. And students will be the most interesting on science.
- Further studies are needed to determine whether there is a similarity or a difference between chemistry, physics and biology teachers or textbooks.

This study consisted of only seven dimensions in difficulties of teaching science at the high school level. Further studies should be conducted with many other dimensions such as difficulties in professional development, difficulties with school administrators, difficulties with the curriculum, difficulties in the nature of work, etc. regarding difficulties in teaching science at the high school level.

Conclusion

Science is central in developing countries. An adequate understanding of the nature of science and scientific inquiry is the main instructional purpose of science education. Additionally, with a solid foundation in science, the students are able to appreciate the intrinsic beauty and quantitative nature of scientific phenomena and to develop an understanding of the practical applications of science to a wide variety of fields such as engineering, medicine, economics, production and other scientific and technological fields. This study will be an important source of information for science teachers. That is, it will provide valuable information for science teachers about how they can effectively teach science, how they deal with the students of the different abilities and how they facilitate the teaching difficulties of the science teachers. In the same way, through this study, science teachers can grasp at the teaching difficulties to generate the new brilliant generations and scientists. If science teachers face the difficulties in their teaching, it will make poor teaching performance and ineffective teaching process. Ignoring teachers' difficulties may have negative consequences. According to the findings, it can be concluded that science teachers in high schools (branch) are facing more difficulty in teaching than those in high schools. This study showed a way to recognize the difficulties of high school science teachers. It may also be helpful in solving the difficulties and problems that high school science teachers faced. Also, the results of the study may be a highlight for policymakers, administrators and teacher educators to reduce the obstacles of the high school science teachers' difficulties. Moreover, it is hoped that this study may provide a basis for further studies.

Acknowledgements

We would like to express our respectful gratitude to Dr. Myat Myat Thaw (Rector, Sagaing University of Education) who allowed us to do this study. Then, we would like to offer our respectful gratitude to Dr. Khin Hnin Yee (Pro-rector, Sagaing University of Education), and Dr. San San Lwin (Pro-rector, Sagaing University of Education) for their professional guidance. We are very grateful to Dr. Wai Wai Oo (Professor & Head of Department, Department of Curriculum and Methodology, Sagaing University of Education) for her precious advice and assistance, great kindness, warm encouragement, invaluable supervision and suggestions in conducting this study.

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J. Myanmar Acad. Arts Sci. 2023 **Vol. XXI. No.6**

THE RELATIONSHIP BETWEEN TEACHER EDUCATORS' TECHNOLOGICAL KNOWLEDGE AND THEIR SELF-EFFICACY IN EDUCATION DEGREE COLLEGES

Htay Hnin Yu[1] and Khaing Khaing Lwin[2]

Abstract

The purpose of this study is to investigate the relationship between technological knowledge and self-efficacy of teacher educators in selected Education Degree Colleges. In this study, the samples were (200) teacher educators from four Education Degree Colleges in Magway and Mandalay Regions. The Technological Pedagogical Content Knowledge (TPACK) developed by Ismail Sahin (2011) was used to measure teacher educators' technological knowledge. It comprised four dimensions: knowledge of technology, technological content knowledge, technological pedagogical knowledge, and technological pedagogical content knowledge. The second instrument was the Technology Proficiency Self-Assessment (TPSA C-21) developed by Christensen and Knezek, (2017) to investigate the self-efficacy of teacher educators. It had six scales: Email, WWW, Integrated Applications, Teaching with Technology, Teaching with Emerging Technologies, and Emerging Technologies Skills. Descriptive statistics was firstly used. In the technological knowledge of teacher educators, the mean of knowledge of technology was higher than that of other dimensions. In self-efficacy, the means of emerging technology skills was larger than that of other scales. According to the ANOVA results, there was a significant difference in technological knowledge and self-efficacy between teacher educators with 6-10 years of teaching experience and those with 11 years and above teaching experience. And the result of the Pearson-product moment correlation revealed that there was a significant and highly positive correlation between technological knowledge and the self-efficacy of teacher educators ($r = .876$, $p<.01$). According to simple linear regression, it can be predicted that 77% of teacher educators’ self-efficacy can be predicted from their technological knowledge. Therefore this study indicated that the more technological knowledge teacher educators have the higher self-efficacy in their teaching-learning situation.

Keywords: Technological Knowledge, Self-efficacy, Technology Self-efficacy, Teacher Self-efficacy

Introduction

Today, the world is changing at the pace of amazing and these changes hit with the responsibility to bring up the innovations and reforms in education. So, teacher educators should own the technological knowledge to upgrade teaching-learning situations. The instructional process is the face-to-face teaching-learning process through tests, books, and documents at schools, education degree colleges, and universities. Nowadays, educational reforms have taken place in schools and education degree colleges, and it is needed new strategies to teach teacher educators to solve education issues effectively. Therefore, teacher educators need to train to have the technological knowledge to create the teaching-learning process and give logical solutions to real-life problems.

Statement of the Problem

Educational technology consists of all modern media, methods, and materials, and it is needed to use in a well-integrated manner. The more the use of technology in teacher education programs is, the higher the thinking skills of teacher educators on how to use technology. Empowering teachers to integrate technology into teaching and learning can improve instructional practice and better engage students. Mishne (2012) found that a relationship exists between

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teachers' self-efficacy and teacher technological knowledge to assist the development of a conceptual framework for encouraging and empowering teacher educators to use technology in the classroom. Teacher educators must have a chance to enhance technological knowledge on how to create and apply new information to their respective subjects. Thus, it is needed to find out the relationship between teacher educators' technological knowledge and their self-efficacy in Education Degree Colleges.

Purposes of the Study

The main purpose of this study is to find out the relationship between teacher educators' technological knowledge and their self-efficacy in the selected Education Degree Colleges. Specific objectives of this study are as follows:

1. To study the extent of technological knowledge and self-efficacy of teacher educators in the selected Education Degree Colleges
2. To investigate any differences in technological knowledge and self-efficacy of teacher educators according to teaching experiences in the selected Education Degree Colleges
3. To find out the relationship between teacher educators' technological knowledge and their self-efficacy in the selected Education Degree Colleges, and
4. To give suggestions on the application of technological knowledge and their self-efficacy.

Research Questions

The research questions of this study are as follows:

1. To what extent do the teacher educators have technological knowledge in the selected Education Degree Colleges?
2. How does teacher educators' technological knowledge differ according to their teaching experiences in the selected Education Degree Colleges?
3. To what extent do teachers educators have self-efficacy in the selected Education Degree Colleges?
4. How does teacher educators' self-efficacy differ according to their teaching experiences in the selected Education Degree Colleges?
5. How does teacher educators' technological knowledge related to their self-efficacy in the selected Education Degree Colleges?

Definition of Key Terms

This study is guided by the following definition of key terms.

Technological Knowledge: Technology knowledge refers to the knowledge about various technologies, ranging from low-tech technologies such as pencil and paper to digital technologies such as the Internet, digital video, interactive whiteboards, and software programs (Schmidt, Baran, Thompson, Mishra, Koehler & Shin, 2009).

Self-efficacy: Self-efficacy is the belief that people have that they can be successful in any given task (Bandura, 1997).

Technology Self-efficacy*:* This concept is the belief individuals have in their abilities to successfully perform a technologically sophisticated new task (Laver, George, Ratcliffe & Crotty, 2012).

Teacher Self-efficacy

Teacher self-efficacy is defined as a judgment of one's own capabilities to bring about desired outcomes of student engagement and learning, even when students are difficult or unmotivated (Hoy & Spero, 2005).

Scope of the Study

The following points indicate the scope of the study.

1. This study is to investigate the teacher educators' technological knowledge and their self-efficacy in terms of teaching experiences in the selected Education Degree Colleges.
2. All teacher educators from Education Degree Colleges in Magway and Mandalay regions participated in this study.

Significance of the Study

The vast development of science and technology has happened in a short period. Various changes have occurred in the area of technology development and society's use of technology in daily life and the workplace. Therefore, in many classrooms, technological knowledge is a significant challenge for educators. Thus, technological knowledge is the important thing to explore the teacher educators' influence on how pre-service teachers can prepare for technology integration in education. The higher the technological knowledge of teacher educators, the higher their self-efficacy among teacher educators. That is why there is a relationship between teacher educators' technological knowledge and their self-efficacy. This study points out that teachers' self-efficacy may increase in how to apply technology to teaching situations if they have technological knowledge. In addition, understanding the relationship between technological knowledge and self-efficacy will facilitate the design of more effective teacher education programs. Thus, teacher educators need to have high technological knowledge. This study has the power to inform educational stakeholders about the ways to enhance the overall experience of educational technology for teacher educators.

Review of Related Literature

This study uses Piaget's (1952), Dewey's (1922) constructivism theories, and Bandura's social cognitivism (2012) in analyzing teacher educators' self-efficacy relating to 21st-century technology used to maximize student-teacher learning. This study presents a detailed analysis of the two theories to examine how the self-efficacy of teacher educators might help the incorporation of 21st-century technology in the classroom.

In this study, technological knowledge with the four components is used. In order to investigate technological knowledge supported by the education degree college, the TPACK framework developed by Ismail Sahin (2011) is used. The theoretical foundation of self-efficacy has six scales that measure teachers' confidence in integrating 21^{st}-century technology tools in the classroom. In order to investigate self-efficacy supported by the education degree college, the TPSA C-21 Framework developed by Ropp (1999) is used.

TPACK Framework of Technological Knowledge

- *Knowledge of Technology*: is the third main area of knowledge (use of computers, peripherals, software). It refers to the technological competence of the student teachers, and their degree of familiarization with the use of computer environments for the design of educational activities (Angeli & Valanides, 2014).

- *Technological Content Knowledge*: refers to the knowledge of how technology can create new representations for specific content (Schmidt et al., 2009).
- *Technological Pedagogical Knowledge*: refers to the knowledge of how various technologies can be used in teaching, and to understanding that using technology may change the way teachers teach (Schmidt et al., 2009).
- *Technological Pedagogical Content Knowledge*: refers to the knowledge required by teachers for integrating technology into their teaching in any content area (Schmidt et al., 2009).

TPSA C-21 Framework for Self-efficacy

- *Electronic mail (e-mail)*: is a cost-effective and accessible communications tool. E-mail can integrate into a variety of classroom and independent learning situations (Hasset, Spuches, & Webster, 1995).
- *World Wide Web*: is a system of interlinked hypertext documents accessed via the Internet (Choudhury, 2014). One major feature of the World Wide Web that makes it valuable to educators is the fact that it functions as a huge database of information and resources: lesson plans, video clips, sound clips, photographs, and games that are readily available to the teacher who knows how to find them.
- *Integrated Applications*: can be defined as the usage of technology functioning as an integral or mediated tool to accomplish specific teaching or learning activities to meet certain instructional objectives. One way in which they could do this is by using readily available tools like spreadsheets. It is possible to manipulate the data using simple commands, create charts and graphs, reorganize the data in alphabetical or numeric order and work with the data using formulas (Lengen & Lenge, 2006).
- *Teaching with Technology*: motivates students to work independently whereas the student is more motivated to return to learning and working because modern technical equipment is widely available at any given moment (Lazar, 2015).
- *Teaching with Emerging Technologies*: In the emerging technology of education, one-to-one computing technology, sometimes abbreviated as "1:1" refers to academic institutions, such as schools or colleges that allow each enrolled student to use an electronic device in order to access the Internet, digital course materials, and digital textbooks (Bebell & Kay, 2010).
- *Emerging Technologies Skills*: The integration of emerging technologies in the teaching and learning process increases the interest of learners, and the quality of outcome in the educational process. Cloud Computing Technology is the use of computing resources (hardware and software) that are delivered as a service over a network (typically the Internet) (Oludipe, Fatoki, Yekini & Aigbokhan, 2014).

Research Method

Research Design

Descriptive research design was used to collect the required data in this study.

Procedure

Before field testing the instrument with a sample of teacher educators, validity for instruments was determined by the expert judgments. After getting the validity of these instruments, a pilot study was conducted. A sample of one Education College in Yankin Township was selected for pilot study.

The preliminary instrument was field tested with all teacher educators from that Education Degree College. In order to measure the reliability of the instrument, the Pearson product-moment correlation method was used for internal consistency reliability. The average coefficient of correlation for teacher educators' technological knowledge and their self-efficacy got high-reliability scores of 0.94 and 0.88. After taking permission from the responsible person, the questionnaires were distributed to four selected Education Degree Colleges located in Magway and Mandalay regions from 11th December 2021 to 25th December 2021 and collected after lasting 10 days. Data collected were listed by each education degree college. Based on the results of responses, this study was conducted in order to explore the technological knowledge of teacher educators and their self-efficacy.

Instruments

Data were collected from teacher educators of four selected education degree colleges by using the questionnaire. The questionnaire including two parts was developed by the researcher based on the related literature. In the first part of the questionnaire, 30 items that explored the technological knowledge of teacher educators were included and each item was rated on a five-point Likert scale ranging from strongly disagree (1) to strongly agree (5). In the second part of the questionnaire, there were 30 items, which examined the teacher educators' self-efficacy and each item was rated on a five-point Likert scale ranging from strongly disagree (1) to strongly agree (5).

Population and Sample Size

The target population of this study was all teacher educators from four selected education degree colleges situated in Mandalay and Magway Townships. The samples were (200) teacher educators from four Education Degree Colleges in Magway and Mandalay Regions.

Data Analysis

Descriptive statistics such as mean and standard deviation were calculated for teacher educators' technological knowledge and their self-efficacy by using SPSS. In order to compare the technological knowledge and self-efficacy of teacher educators, the one-way analysis of variance (ANOVA) was conducted in terms of teaching experiences. Then, to be more specific, Post Hoc Multiple Comparison tests were used. Moreover, the Pearson product-moment correlation was used to investigate the relationship between technological knowledge and the self-efficacy of teacher educators. Data analysis and findings for this study will be thoroughly discussed in the next chapter.

Research Findings

Table 1 Descriptive Statistics of Teacher Educators' Technological Knowledge

Dimension	*N*	Minimum	Maximum	*M*	*SD*
Knowledge of Technology	200	18	75	50.49	11.18
Technological Pedagogical Knowledge	200	5	25	16.86	3.99
Technological Content Knowledge	200	5	25	16.09	3.80
Technological Pedagogical Content Knowledge	200	5	25	17.12	3.70

Table 1 described the means of teacher educators' technological knowledge in all selected education degree colleges.

Table 2 Means of Teacher Educators' Technological Knowledge in the Selected Education Degree Colleges

Dimension	EDC 1 (*n*=70)	EDC 2 (*n*=39)	EDC 3 (*n*=39)	EDC 4 (*n*=52)
Knowledge of Technology	51.51	48.85	51.15	49.85
Technological Pedagogical Knowledge	17.20	16.54	17.18	16.40
Technological Content Knowledge	16.33	15.72	16.08	16.06
Technological Pedagogical Content Knowledge	17.17	17.31	17.31	16.75
Average	**25.55**	**24.61**	**25.43**	**24.77**

Table 2 described the means of teacher educators' technological knowledge in all selected education degree colleges. The means of overall technological knowledge were (25.55) in EDC 1, (24.61) in EDC 2, (25.43) in EDC 3, and (24.77) in EDC 4, respectively.

Table 3 Descriptive Statistics of Teacher Educators' Self-efficacy

Dimension	*N*	Minimum	Maximum	*M*	*SD*
Email	200	5	25	17.73	4.22
World Wide Web	200	3	15	11.21	2.41
Integrated Applications	200	4	20	12.03	3.54
Teaching with Technology	200	6	30	19.82	4.79
Teaching with Emerging Technologies	200	6	30	19.72	4.60
Emerging Technology Skills	200	6	30	20.15	5.03

According to Table 3, the lowest mean was (11.21), and the highest mean was (20.15) respective in self-efficacy. It was found that teacher educators' self-efficacy on World Wide Web had the lowest mean values; teacher educators' self-efficacy in emerging technology skills had the highest mean values. It could be said that teacher educators have more self-efficacy in emerging technology skills than other scales.

Table 4 Means of Teacher Educators' Self-efficacy in the Selected Education Degree Colleges

Dimension	EDC 1 (*n*=70)	EDC 2 (*n*=39)	EDC 3 (*n*=39)	EDC 4 (*n*=52)
Email	17.90	17.36	17.85	17.71
World Wide Web	11.51	11.26	10.97	10.92
Integrated Applications	11.90	11.56	12.59	12.12
Teaching with Technology	20.09	19.23	20.15	19.67
Teaching with Emerging Technologies	20.14	19.59	19.10	19.71
Emerging Technology Skills	20.39	20.74	20.18	19.35
Average	**16.99**	**16.62**	**16.81**	**16.58**

Table 4 described the means of teacher educators' self-efficacy in all selected education degree colleges. The means of self-efficacy scales were (16.99) in EDC 1, (16.62) in EDC 2, (16.81) in EDC 3, and (16.58) in EDC 4, respectively.

Table 5 Means and Standard Deviations of Teacher Educators' Technological Knowledge in terms of Teaching Experiences

Variable	Teaching Experience	*N*	*M*	*SD*	Minimum	Maximum
Technological Knowledge	0-5 years	48	101.63	22.84	50	150
	6-10 years	38	108.39	22.09	33	146
	11years and above	114	97.49	19.47	44	135
	Overall	200	100.56	21.13	33	150

According to Table 5, the means of teacher educators' technological knowledge in terms of teaching experiences such as (0-5 years), (6-10 years), and (11 years and above) were 101.63, 108.39, and 97.49 respectively. The means of teacher educators' technological knowledge in teaching experiences 11 years and above teaching experience was the lowest, and 6-10 years of teaching experience was the highest.

In order to find out whether there were significant differences in teacher educators' technological knowledge according to teaching experiences, or not, one-way ANOVA was calculated (see Table 6). According to Table 6, a significant difference was among teaching experiences of teacher educators, $F\ (2,197) = 3.99$, $p<.05$. There was a significant difference in teacher educators' technological knowledge according to teaching experiences.

Table 6 ANOVA Results of Teacher Educators' Technological Knowledge in terms of Teaching Experience

Factor	Technological Knowledge	*SS*	*Df*	*MS*	*F*	*Sig.*
Teaching Experience	Between Groups	3460.575	2	1730.287	3.99	.02
	Within Groups	85436.820	197	433.689		
	Total	88897.395	199			

Post Hoc Comparisons (Tukey) were calculated to determine the technological knowledge of teacher educators according to the teaching experiences to be more specific. According to the result of Table 7, there was a significant difference in teacher educators' technological knowledge between the 6-10 years teaching experience of teacher educators and 11 years and above teaching experience of teacher educators. But there were no significant differences in technological knowledge between 0-5 years and 6-10 years by teaching experience of teacher educators as 0-5 years and 11years and above by teaching experience of teacher educators. So it can be concluded that the teacher educator's technological knowledge of 6-10 years of teaching experience was higher than 11 years and above teaching experience.

Table 7 Multiple Comparison for Teacher Educators' Technological Knowledge in terms of Teaching Experiences

(I) Teaching Experience	(J) Teaching Experience	Mean Difference (I-J)	Std. Error	*Sig.*
0-5 years	6-10 years	-6.770	4.522	.295
	11years and above	4.134	3.583	.482
6-10 years	0-5 years	6.770	4.522	.295
	11years and above	10.904*	3.901	.016
11years and above	0-5 years	-4.134	3.583	.482
	6-10 years	-10.904*	3.901	.016

Note. *The mean difference is significant at the 0.05 level.

According to Table 8, the means of teacher educators' self-efficacy in terms of teaching experiences were 18.55 (0-5 years), 22.30 (6-10 years), and 22.99 (11 years and above). The means of teacher educators' self-efficacy in 0-5 years of teaching experience was the lowest and 11 years and above of teaching experiences were the highest.

Table 8 Descriptive Statistics for Teacher Educators' Self-efficacy in terms of Teaching Experiences in the Selected Education Degree Colleges

Variable	Teaching Experience	*N*	*M*	*SD*	Minimum	Maximum
Self-efficacy	0 – 5 years	48	18.55	2.68	64	150
	6 – 10 years	38	22.30	3.62	54	145
	11years and above	114	22.99	2.15	39	149
	Overall	200	22.22	1.57	39	150

Again, in order to investigate whether there were significant differences in teacher educators' self-efficacy according to their teaching experiences or not, one-way ANOVA was calculated (see Table 9).

According to the result, there is a significant difference in self-efficacy among teaching experiences of teacher educators, F (2,197) = 4.11, p<.05. So, it was said that there was a significant difference in teacher educators' self-efficacy in terms of teaching experiences.

Table 9 ANOVA Results of Teacher Educators' Self-efficacy in terms of Teaching Experiences

Factor	Self-efficacy	*SS*	*Df*	*MS*	*F*	*Sig.*
Teaching Experiences	Between Groups	3931.695	2	1965.848	4.11	.018
	Within Groups	94285.500	197	478.607		
	Total	98217.195	199			

To investigate more specifically, Table 10 shows the result of the Post Hoc Comparisons (Tukey HSD) Test for teacher educators' self-efficacy differed in terms of teaching experience.

Table 10 ***Multiple Comparison for Teacher Educators' Self-efficacy in terms of Teaching Experiences***

Teaching Experience (I)	Teaching Experience (J)	Mean Difference (I-J)	Std. Error	*Sig.*
0-5 years	6-10 years	-2.794	4.750	.827
	11 years and above	7.531	3.764	.115
6-10 years	0-5 years	2.794	4.750	.827
	11 years and above	10.325*	4.098	.033
11 years and above	0-5 years	-7.531	3.764	.115
	6-10 years	-10.325*	4.098	.033

Note. *The mean difference is significant at the 0.05 level.

According to the result of Table 10, there was a significant difference in self-efficacy between the 6 to 10 years teaching experience of teacher educators and 11years and above teaching experience of teacher educators. But there were no significant differences in self-efficacy between 0-5 years and 6-10 years by teaching experience of teacher educators as 0-5 years and 11 years and above by teaching experience of teacher educators. So it can be concluded that the teacher educator's self-efficacy of 6-10 years teaching experience was higher than 11 years and above teaching experience.

Table 11 ***Relationship between Teacher Educators' Technological Knowledge and Their Self-efficacy in the Selected Education Degree Colleges***

		Technological Knowledge	Self-efficacy
Technological Knowledge	Pearson Correlation	1	.876**
	Sig. (2-tailed)		.000
	N	200	200
Self-efficacy	Pearson Correlation	.876**	1
	Sig. (2-tailed)	.000	
	N	200	200

Note. **. *Correlation is significant at the 0.01 level (2-tailed).*

According to Table 11, there is a significant positive correlation at the 0.01 level (r = .876). The level of correlation has three stages that are low correlation (r = below .35), moderate correlation (r = between .35 and .65), and high correlation (r = above .65). The result showed that teacher educators' technological knowledge was significantly and high positively related to their self-efficacy. It means that the more teacher educators have technological knowledge, the higher self-efficacy in their teaching-learning situation.

Table 12 Model Summary for Teacher Educators' Technological Knowledge and Their Self-efficacy

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.876[a]	.768	.767	10.725

Note. a. Predictors: (Constant), Technological Knowledge Total

According to Table 12, the simple linear regression coefficient (R) = .876 and adjusted R square was .768. It can be seen that 77% of teacher educators' self-efficacy can be predicted from their technological knowledge. In Table 13, the results can be seen to get more exact information.

Table 13 Results of Simple Linear Regression on Teacher Educators' Technological Knowledge and Their Self-efficacy

Coefficients[a]

Variables	Unstandardized Coefficient		Standardized Coefficient β	*t*	*Sig.*
	B	Std. Error			
Constant	8.023	3.696		2.171	.031
Technological Knowledge	.921	.036	.876	25.609	.000***

Note. a. Dependent Variable: Self-efficacy Total, ***p < .001

Table 13 showed the teacher educators' self-efficacy significantly predicted their technological knowledge. Therefore, the model can be described as the following equation.

Teacher Educators' Self-efficacy = 8.023+.921Technological Knowledge

Responses of Open-ended Questions

Teacher educators have applied the knowledge of technology in everyday life. They used to communicate with each other by email, instant messaging (message, messenger, Viber, Twitter, and so on), and social networks (Facebook, Telegram, and so on). Among them, using the social network for sharing information, comments, images, etc. is the highest use of technology in the daily life of teacher educators. Teacher educator has self-efficacy for Google search to use and apply their technological knowledge in the workplace or classroom. In this study, 77 out of 200 teacher educators used Google search daily in their teaching-learning situation. Therefore, they are confident in finding teaching materials through Google search. Moreover, 48 out of 200 teacher educators get news or information by using technology in their everyday life. And they are confident in applying their technological knowledge to get information. Almost all teacher educators rarely shop online especially (teaching materials, books, travels, sports, clothes, and household items) using technology in this study.

Discussion, Suggestions and Conclusion

Discussion

Analyses of quantitative data collected from the study were performed to answer the five research questions. **Research question one**, it was found that teacher educators possess a higher knowledge of technology than other dimensions: technological pedagogical knowledge, technological content knowledge, and technological pedagogical content knowledge. Moreover, the means of teacher educators' technological knowledge in all selected education degree colleges (EDCs) were (25.55) in EDC 1, (24.61) in EDC 2, (25.43) in EDC 3, and (24.77) in EDC 4 respectively. It can be assumed that teacher educators have high knowledge of technology in all Education Degree Colleges. Teacher educators are weak in applying knowledge of technology in their teaching-learning situation because their technological content knowledge was lower than the other knowledge.

Next, in **research question two**, the findings described that there were significant differences in technological knowledge in terms of teaching experiences. Teacher educators were categorized into three groups by teaching experiences. This study revealed that teacher educators' technological knowledge who had 6 to 10 years of teaching experience was higher than those who had 11 years of teaching experience and who had 0 to 5 years of teaching experience. It can be assumed that teacher educators with 11 years and above teaching experience perform many additional activities (management, decision making, other duties and responsibilities), involving less in applying technological content knowledge. Teacher educators who have 0 to 5 years of teaching experience need the experience to connect with content knowledge and technological knowledge in their teaching-learning environment.

Again, **research question three** was to find out the extent of teacher educators' self-efficacy. According to the results, it was found that the teacher educators have more self-efficacy in emerging technology skills scale than on other scales: email, World Wide Web, integrated application, teaching with technological, teaching with emerging technology. Furthermore, in all selected education degree colleges, it was found that teacher educators are more confident of their abilities to use technology, collaborate with others, who are distant, and teach in a one-to-one environment with students who have their own devices and save and retrieve files from a cloud-based environment.

Research question four, according to the results, there were significant differences in self-efficacy in terms of teaching experiences. Teacher educators were categorized into three groups by teaching experiences. This study revealed that teacher educators who had 6 to 10 years of teaching experience were higher than 11 years and above teaching experience in their self-efficacy and who had 0 to 5 years of teaching experience. It is assumed that teacher educators of 11 years and above teaching experience perform many additional activities (management, decision making, other duties and responsibilities), and they involve less in applying technological content knowledge. The less they have technological knowledge, the less self-efficacy they have. Teacher educators who have 0 to 5 years of teaching experience have not got much or little teaching experience so their self-efficacy also decreases in their teaching-learning situation.

Research question five investigated the relationship between technological knowledge and self-efficacy at four selected education degree colleges. As the result of the Pearson-product moment correlation, it was shown that the directions of correlations were positive and there were very high significant correlations between teacher educators' technological knowledge and their self-efficacy. More specifically, the study can be reported that teacher educators with higher self-efficacy, more increased technological knowledge, and who have more teaching experience would integrate the technology into their classrooms more. If teacher educators got opportunities for integrating technology into the teaching-learning situation, they would increase more technological knowledge. Therefore, it is concluded that teacher educators increase technological knowledge and high self-efficacy in their teaching-learning situations.

Suggestions

Teacher educators are expected to improve and apply technological knowledge in their teaching-learning situation. Specifically, Education Degree College is the place where cultivate and train student teachers to become qualified teachers. As a result, teacher educators themselves must be equipped with a modernized teaching approach including technological knowledge. Therefore, Education Degree Colleges should provide the opportunities to promote teacher educators' technological knowledge and strengthen their effectiveness in their profession.

According to the results of this study, teacher educators should try to understand the accomplishment of their lesson objectives. Only then, their teaching is more integrated with technological knowledge and content knowledge. Besides, technological knowledge is applied in the teaching-learning process more effectively. The Ministry of Education should provide the required accessories and technological tools available within the 21st century to promote technological skills.

Conclusion

Self-efficacy can have an important effect on the quality of teaching and it can influence student achievement. Teacher educators should make an effort to increase their self-efficacy through the use of technological knowledge. A relationship exists between teachers' self-efficacy and teacher technological knowledge to assist in the development of a conceptual framework for encouraging and empowering teacher educators to use technology in the classroom (Mishne, 2012). Similarly, teacher educators should be trained through workshops and intensive ICT courses to improve their technological knowledge. To sum up, the outcome of this study suggests effective means for teacher education programs, skilled developers, and administrators.

In this study, the sample education degree colleges were selected in two regions. This research was a one-moment-in-time study. Therefore, it would be more beneficial to have a longitudinal study. Moreover, further research should be done to include other universities and schools. This study is conducted using only a quantitative approach. Therefore follow-up interviews should be undertaken to get the qualitative data for further research. Additional future research may include student interviews, asking them to share their experiences with technology in the classroom and their opinions on their teachers' technology integration.

Acknowledgements

We would like to especially acknowledge Dr. Myat Myat Thaw (Rector, Sagaing University of Education) who allowed us to do this study. Then, we are very grateful to Dr. Khin Hnin Yee (Pro-rector, Sagaing University of Education), and Dr. San San Lwin (Pro-rector, Sagaing University of Education) for their valuable expertise, professional guidance, and continuous encouragement and coaching which have enabled us to carry out this research up to this rightful conclusion. We would like to offer our respectful gratitude to Dr. Wai Wai Oo (Professor and Head, Department of Curriculum and Methodology, Sagaing University of Education) for her valuable comments and necessary editing for this paper. Most importantly, we also want to express our thanks to all participants in our study. We are indebted to all those who provided us with insightful suggestions. Finally, we are grateful to our beloved parents who give us opportunities to learn a valuable education.

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J. Myanmar Acad. Arts Sci. 2023 **Vol. XXI. No.6**

AN INVESTIGATION INTO TEACHER EDUCATORS' TECHNOLOGICAL PEDAGOGICAL CONTENT KNOWLEDGE ON THEIR SELF-EFFICACY

Aye Myat Mon[1] and Wai Wai Oo[2]

Abstract

This study aimed to investigate teacher educators' technological pedagogical content knowledge on their self-efficacy. A sample of (160) teacher educators in five Education Degree Colleges were selected by using simple random sampling. The instruments for teacher educators' technological pedagogical content knowledge with (35) Likert scale items and the instrument for teacher educators' self-efficacy with (30) Likert scale items were applied. Survey method was employed to determine teacher educators' technological pedagogical content knowledge and their self-efficacy. The quantitative data were analyzed by using the Statistical Package for Social Science (SPSS). In order to examine the teacher educators' levels of technological pedagogical content knowledge and self-efficacy, descriptive statistics (mean and standard deviation) were used. The inferential statistics such as one-way analysis of variance (ANOVA) and Post Hoc test were used to compare teacher educators' technological pedagogical content knowledge and self-efficacy in terms of designation and teaching experience. Pearson-product movement correlation test was used to investigate the relationship between technological pedagogical content knowledge (TPACK) and self-efficacy. The findings pointed out that the teacher educators applied lower technological knowledge than pedagogical content knowledge in their teaching and learning and they had lower self-efficacy in adapting to individual student needs. The result showed that there was a positive relationship between teacher educators' technological pedagogical content knowledge and their self-efficacy at ($r = .677$, $p = .000$). Finally, this study revealed that the more the teachers have technological pedagogical content knowledge, the more they get higher self-efficacy.

Keywords: Technological Pedagogical Content Knowledge, Teacher Educators, Teacher Self-Efficacy

Introduction

Today, the technological pedagogical content knowledge (TPACK) competencies are needed for teacher-educators because they facilitate the prospective teachers to become techno-pedagogues. Technological pedagogical content knowledge provides teacher educators and teachers with a framework that guides them to achieve meaningful and authentic integration of technology into the classroom. Self-efficacy in a teaching context refers to the teachers' realization of their own capabilities and skills to bring about changes in learners' achievement in a positive way. In addition, highly self-efficacious teachers are more open to new ideas, have a greater commitment to teaching, and are more willing to adopt better teaching methods, and can significantly motivate the adoption of new technologies (Tschannen-Moran & Hoy, 2001).

Thus, teacher educators must have integrated knowledge from different domains including knowledge of student thinking, learning and effective teaching strategies, knowledge of the subject matter, and knowledge of technology for effective teaching that will be able to increase their self-efficacy (Bahriah & Yunita, 2019).

Purposes

The main purpose of this study is to investigate teacher educators' technological pedagogical content knowledge on their self-efficacy.

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The specific objectives are as follows:

- To examine the level of teacher educators' technological pedagogical content knowledge in terms of teaching experience and designation.
- To explore teacher educators' self-efficacy in terms of teaching experience and designation.
- To find out the relationship between teacher self-efficacy and technological pedagogical content knowledge.
- To give suggestions and recommendations based on the results of the study.

Research Questions

Based on the objectives, the research questions were described as follows:

- What are the differences between teacher educators' technological pedagogical and content knowledge in terms of designation and teaching experience?
- How do teacher educators differ on self-efficacy in terms of designation and teaching experience?
- What is the relationship between teacher educators' technological pedagogical content knowledge and self-efficacy?

Scope of the Research

The following points indicate the scope of the study.

- The research was conducted in five Education Degree Colleges out of twenty-five Education Degree Colleges in Myanmar.
- The number of participants in this study was (160) teacher educators from Mandalay, Magway, Meiktila, Pakokku Education Degree College and Taungyi Education Degree Colleges.

Definition of Key Terms

In this study, the definition of key terms are described as follows:

Technological Pedagogical Content Knowledge

Technological pedagogical content knowledge (TPACK) is the integration of knowledge between technology, pedagogy, and subject content which helps teachers to understand how the application can improve pedagogical practice and deeper understanding of subject content and curriculum (Mishra & Koehler, 2008).

Teacher Educators

Teacher educators are defined as people who provide instruction or who give guidance and support to student teachers and who thus render a substantial contribution to the development of students into competent teachers (Celik, 2011).

Teacher Self-efficacy

Teacher self-efficacy is teachers' confidence in their ability to promote students' learning (Hoy, 2000, cited in Ball, 2010).

Review of Related Literature

Conceptual Framework of Technological Pedagogical Content Knowledge

The technological pedagogical content knowledge (TPACK) framework was built by Shulman in 1986. This framework described pedagogical content knowledge to explain how teachers' understanding of educational technologies and pedagogical content knowledge interact with one another to produce effective teaching with technology. Shulman's PCK framework was developed by Mishra and Koehler in 2006 as the TPACK framework. The TPACK framework was constructed with three main elements namely; content knowledge, pedagogical knowledge, and technological knowledge. When these three main elements are integrated, new bodies of knowledge and professional practice become pedagogical content knowledge, technological content knowledge, technological pedagogical knowledge, and technological pedagogical content knowledge.

According to Mishra and Koehler (2006), there are seven components in TPACK framework namely; technological knowledge (TK), pedagogical knowledge (PK), content knowledge (CK), technological content knowledge (TCK), technological pedagogical knowledge (TPK), pedagogical content knowledge (PCK), and technological pedagogical content knowledge (TPACK).

Teacher Self-Efficacy

Teacher self-efficacy is vital for student success in the classroom. Teachers must have a strong judgment of their capabilities and their ability to plan, implement, motivate, and execute student achievement. Teachers must feel motivated to rise to the challenge of teaching.

According to Skaalvik and Skaalvik (2010), there are six components of teacher self-efficacy, self-efficacy in instruction, self-efficacy in adapting education to individual students' needs self-efficacy in motivating students, self-efficacy in keeping discipline, self-efficacy in cooperating with colleagues and parents, self-efficacy in coping with changes and challenges.

Research Method

Subjects

A sample of (160) teacher educators were selected in Mandalay Education Degree College, Magway Education Degree College, Meiktila Education Degree College, Pakokku Education Degree College, and Taungyi Education Degree College by using the simple random sampling method.

Design

In this paper, survey method one of descriptive research designs was used.

Instruments

The instrument for teacher educators' technological pedagogical content knowledge with (35) Likert scale items was constructed based on the questionnaires (Kazul & Erten, 2014) and the instrument for teacher educators' self-efficacy with (30) Likert scale items was constructed based on (Skaalvik & Skaalvik, 2010).

Procedure

Firstly, a pilot test was held with thirty teacher educators at Sagaing Education Degree College in October 2021. Based on the findings of the pilot test, the internal consistency reliability of the questionnaires was determined by Cronbach's Alpha (.832 and .857) respectively. After pilot testing, the major survey was conducted in November 2021.

Data Analysis

The Statistical Package for the Social Science (SPSS) was used to analyze the quantitative data. The data were analyzed by using descriptive statistics, one-way analysis of variance (ANOVA), Post Hoc test and Pearson-product movement correlation test.

Findings

Descriptive Statistics of Teacher Educators' Technological Pedagogical and Content Knowledge on each Dimension

Table 1 Mean and Standard Deviation of Teacher Educators' Technological Pedagogical and Content Knowledge

Dimension	*N*	*M*	*SD*
D1	160	17.00	3.391
D2	160	19.86	1.886
D3	160	19.46	2.160
D4	160	18.59	2.496
D5	160	20.08	1.780
D6	160	18.85	2.842
D7	160	18.89	2.495

Note. D1 = Technological Knowledge
D2 = Pedagogical Knowledge
D3 = Content Knowledge
D4 = Technological Content Knowledge
D5 = Pedagogical Content Knowledge
D6 = Technological Pedagogical Knowledge
D7 = Technological Pedagogical Content Knowledge

Based on the results, the mean of pedagogical content knowledge was the highest (20.08) and technological knowledge had the lowest mean (17.00) (see Table 1). To see obviously, the level of means for each dimension was illustrated in Figure 1.

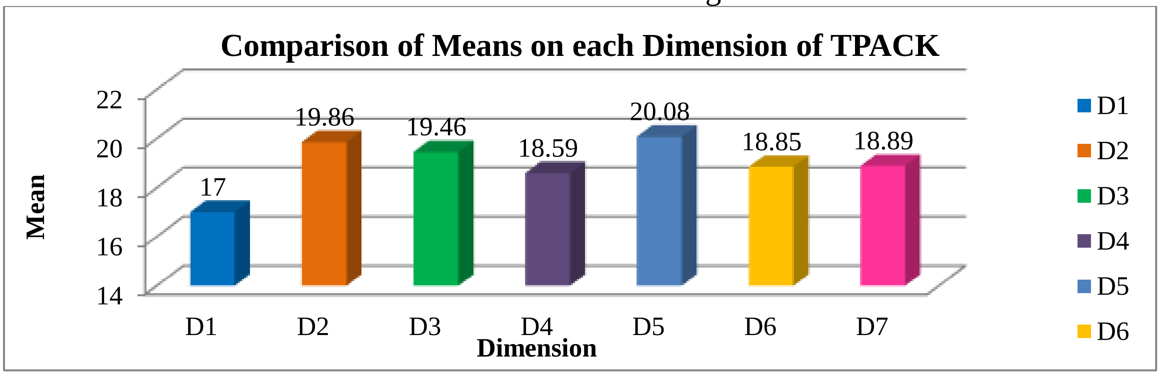

Figure 1 Comparison of Means on each Dimension of TPACK

Note. D1 = Technological Knowledge
D2 = Pedagogical Knowledge
D3 = Content Knowledge
D4 = Technological Content Knowledge
D5 = Pedagogical Content Knowledge
D6 = Technological Pedagogical Knowledge
D7 = Technological Pedagogical Content Knowledge

According to Figure 1, it can be interpreted that teacher educators had rich pedagogical content knowledge. However, they had insufficient knowledge of technology such as understanding of using computer software and hardware, presentation tools, and other technologies used in educational contexts.

Findings on the Technological Pedagogical and Content Knowledge of Teacher Educators in terms of Designation

To find out the significant difference in the technological pedagogical and content knowledge of teacher educators in terms of designation, teacher educators were divided into five groups such as Tutor, Assistant Lecturer, Lecturer, Associate Professor, and Professor.

According to Table 2, the means of lecturer were the highest in the dimensions of technological knowledge (19.33), pedagogical knowledge (21.00), technological content knowledge (20.67), pedagogical content knowledge (20.89), technological pedagogical knowledge (19.78), and the professor possessed the highest means in content knowledge (20.29) and technological pedagogical content knowledge (19.18). On the other hand, the assistant lecturer had the lowest means in all dimensions among their designations.

Table 2 Comparison of Means and Standard Deviations on each Dimension in terms of Designation

Designation	*N*	*M/SD*	Dimension						
			D1	D2	D3	D4	D5	D6	D7
Tutor	38	*M*	17.39	19.58	19.39	18.66	19.89	18.63	19.16
		SD	3.018	1.940	1.794	1.805	1.842	2.267	1.685
Assistant Lecturer	35	*M*	15.74	19.29	18.40	17.97	19.34	18.03	18.09
		SD	2.984	1.792	2.488	1.774	1.552	2.491	2.254
Lecturer	9	*M*	19.33	21.00	20.22	20.67	20.89	19.78	19.00
		SD	2.958	1.500	1.481	1.323	1.616	4.024	3.708
Associate Professor	40	*M*	17.98	19.93	19.48	18.83	20.00	18.95	19.03
		SD	2.465	1.474	1.853	1.960	1.177	2.470	1.833
Professor	38	*M*	16.18	20.32	20.29	18.37	20.84	19.45	19.18
		SD	4.373	2.207	2.265	3.830	2.163	3.562	3.455

Note. D1 = Technological Knowledge
D2 = Pedagogical Knowledge
D3 = Content Knowledge
D4 = Technological Content Knowledge
D5 = Pedagogical Content Knowledge
D6 = Technological Pedagogical Knowledge
D7 = Technological Pedagogical Content Knowledge

To determine the significant difference in the technological pedagogical and content knowledge of teacher educators in terms of designation, the collected data were analyzed by using (ANOVA).

Table 3 ANOVA Results of Technological Pedagogical and Content Knowledge of Teacher Educators in terms of Designation

Dimension	Designation	Sum of Squares	*df*	Mean Square	*F*	Sig. (2-tailed)
D1	Between Groups	173.550	4	43.387	4.065	.004**
	Within Groups	1654.450	155	10.674		
	Total	1828.000	159			
D2	Between Groups	34.302	4	8.576	2.501	.045*
	Within Groups	531.392	155	3.428		
	Total	565.694	159			
D3	Between Groups	70.868	4	17.717	4.094	.004**
	Within Groups	670.825	155	4.328		
	Total	741.694	159			
D4	Between Groups	56.453	4	14.113	2.342	.057 (ns)
	Within Groups	934.141	155	6.027		
	Total	990.594	159			
D5	Between Groups	48.538	4	12.134	4.130	.003**
	Within Groups	455.406	155	2.938		
	Total	503.944	159			
D6	Between Groups	46.368	4	11.592	1.451	.220 (ns)
	Within Groups	1238.032	155	7.987		
	Total	1284.400	159			
D7	Between Groups	29.494	4	7.373	1.190	.317 (ns)
	Within Groups	960.481	155	6.197		
	Total	989.975	159			

Note. D1 = Technological Knowledge D5 = Pedagogical Content Knowledge
D2 = Pedagogical Knowledge D6 = Technological Pedagogical Knowledge
D3 = Content Knowledge D7 = Technological Pedagogical Content Knowledge
D4 = Technological Content Knowledge, ns = not significant, *p<.05 **p<.01

Based on the results, there were significantly different in technological knowledge, pedagogical knowledge, content knowledge, and pedagogical content knowledge among their designations. In order to examine which groups had significant differences in technological knowledge, pedagogical knowledge, content knowledge, and pedagogical content knowledge among their designations, Post Hoc Multiple Comparison Test (Tukey HSD) was used (see Table 3).

Table 4 Multiple Comparisons for Pedagogical Knowledge, Content Knowledge and Pedagogical Content knowledge

Dependent Variable	Designation (I)	Designation (J)	MD (I-J)	Sig. (2-tailed)
Technological Knowledge	Lecturer	Assistant Lecturer	3.590	.031*
	Associate Professor	Assistant Lecturer	2.232	.030 *
Content Knowledge	Professor	Assistant Lecturer	1.889	.001 **
Technological Content Knowledge	Lecturer	Assistant Lecturer	2.695	.031 *
Pedagogical Content Knowledge	Professor	Assistant Lecturer	1.499	.002 **

Note. *p<.05, **p<.01

According to Table 4, there were significant differences between Lecturer and Assistant Lecturer at (p < 05), Associate Professor and Assistant Lecturer at (p < 05) in technological knowledge. For the dimension of content knowledge, there was a significant difference between Professor and Assistant Lecturer at (p <.01). In the technological content knowledge, there was a significant difference between Lecturer and Assistant Lecturer at (p < 0.5), and there was a significant difference between Professor and Assistant Lecturer at (p <.01). Therefore, it can be interpreted that the teachers' knowledge can develop over time, and through experience.

Findings on the Technological Pedagogical and Content Knowledge of Teacher Educators in terms of Teaching Experience

To examine the technological pedagogical and content knowledge of teacher educators in terms of teaching experience, the teaching experience of participants was divided into three groups: 0-10 years, 11-20 years, and over 20 years.

Table 5 ***Comparison of Means and Standard Deviations on each Dimension in terms of Teaching Experience***

Teaching Experience	*N*	*M/SD*	Dimension						
			D1	**D2**	**D3**	**D4**	**D5**	**D6**	**D7**
0-10 Years	42	*M*	17.14	19.45	19.40	18.50	19.86	18.64	19.05
		SD	3.104	1.797	1.654	1.798	1.761	2.272	1.724
11-20 Years	61	*M*	17.41	19.95	19.15	19.02	20.07	19.05	18.82
		SD	3.227	1.802	2.235	1.928	1.237	2.629	2.453
Over 20 Years	57	*M*	16.46	20.05	19.82	18.21	20.26	18.79	18.84
		SD	3.732	2.022	2.376	3.315	2.240	3.416	3.005

Note. D1 = Technological Knowledge
D2 = Pedagogical Knowledge
D3 = Content Knowledge
D4 = Technological Content Knowledge
D5 = Pedagogical Content Knowledge
D6 = Technological Pedagogical Knowledge
D7 = Technological Pedagogical Content Knowledge

According to Table 5, teacher educators who had (over 20 years) of teaching experience possessed the highest means in pedagogical knowledge (20.05), content knowledge (19.82), and pedagogical content knowledge (20.26). On the other hand, the teachers with (0-10 years) and (11-20 years) teaching experience possessed a higher mean of technological knowledge than the teacher with (over 20 years) teaching experience.

Therefore, it can be interpreted that teacher educators' pedagogical knowledge, content knowledge, and pedagogical content knowledge gradually increased according to the increment of the year of their teaching experience but they are not knowledgeable about technology like young teacher educators.

To determine the significant difference in the technological pedagogical and content knowledge of teacher educators in terms of teaching experience, the collected data were analyzed by using the one-way analysis of variance (ANOVA).

Table 6 ANOVA Results of Technological Pedagogical and Content Knowledge of Teacher Educators in terms of Teaching Experience

Teaching Dimension	Experience	Sum of Squares	*df*	Mean Square	*F*	Sig. (2-tailed)
D1	Between Groups	27.963	2	13.981	1.219	.298
	Within Groups	1800.037	157	11.465		(ns)
	Total	1828.000	159			
D2	Between Groups	9.594	2	4.797	1.354	.261
	Within Groups	556.099	157	3.542		(ns)
	Total	565.694	159			
D3	Between Groups	13.657	2	6.828	1.473	.232
	Within Groups	728.037	157	4.637		(ns)
	Total	741.694	159			
D4	Between Groups	19.636	2	9.818	1.588	.208
	Within Groups	970.957	157	6.184		(ns)
	Total	990.594	159			
D5	Between Groups	4.011	2	2.005	.630	.534
	Within Groups	499.933	157	3.184		(ns)
	Total	503.944	159			
D6	Between Groups	4.431	2	2.215	.272	.762
	Within Groups	1279.969	157	8.153		(ns)
	Total	1284.400	159			
D7	Between Groups	1.475	2	.737	.117	.890
	Within Groups	988.500	157	6.296		(ns)
	Total	989.975	159			

Note. *Note*. D1 = Technological Knowledge
D2 = Pedagogical Knowledge
D3 = Content Knowledge
D4 = Technological Content Knowledge,
D5 = Pedagogical Content Knowledge
D6 = Technological Pedagogical Knowledge
D7 = Technological Pedagogical Content Knowledge
ns = not significant

According to the results, teacher educators' technological pedagogical and content knowledge was not significantly different. Therefore, teacher educators had no different technological pedagogical content knowledge according to their teaching experiences (see Table 6).

Descriptive Statistics of Teacher Educators' Self-Efficacy on each Dimension

Table 7 Mean and Standard Deviation of Teacher Educators' Self-Efficacy

Dimension	*N*	*M*	*SD*
D1	160	15.23	1.799
D2	160	14.79	1.836
D3	160	15.13	1.783
D4	160	15.21	2.249
D5	160	15.09	2.431
D6	160	15.06	2.343

Note. D1 = Self-Efficacy in Instruction,
D2= Self-Efficacy in Adapting Individual Needs
D3 = Self-Efficacy in Motivating Students
D4 = Self-Efficacy in Maintaining Discipline
D5 = Self-Efficacy in Cooperating with Parents and Colleagues
D6 = Self-Efficacy in Coping with the changes

According to Table 7, the mean score of teacher educators' self–efficacy was the highest in instruction (15.23) and the mean score of self–efficacy in adapting to individual needs was the lowest (14.79). The comparison of the means for each dimension was presented in Figure 2.

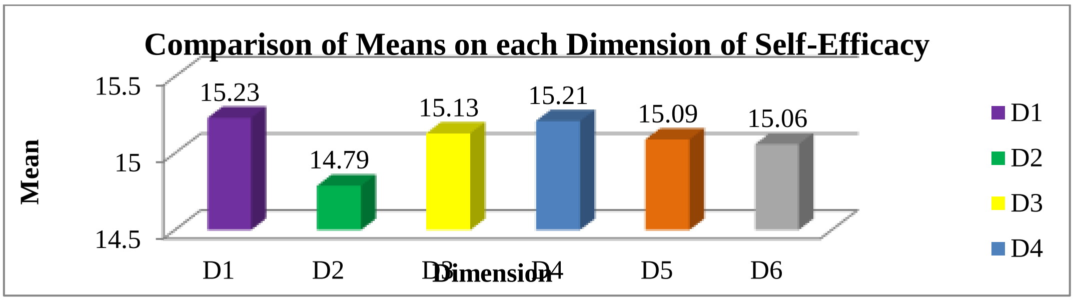

Figure 2 Comparison of Means on each Dimension of Self-Efficacy

Note. D1 = Technological Knowledge
D2 = Pedagogical Knowledge
D3 = Content Knowledge
D4 = Technological Content Knowledge
D5 = Pedagogical Content Knowledge
D6 = Technological Pedagogical Knowledge
D7 = Technological Pedagogical Content Knowledge

According to Figure 2, teacher educators had the highest self-efficacy in instruction but they have the lowest self-efficacy in adapting to individual needs.

Findings on Self-Efficacy of Teacher Educators in terms of Designation

To examine the self-efficacy of teacher educators in terms of designation, the obtained data was analyzed by using descriptive statistics, one-way analysis of variance (ANOVA), and Post Hoc test.

Table 8 Mean and Standard Deviation of Teacher Educators' Self-Efficacy in terms of Designation

Designation	***N***	***M/SD***	**Dimension**					
			D1	**D2**	**D3**	**D4**	**D5**	**D6**
Tutor	38	*M*	15.24	14.76	15.24	15.42	15.21	15.26
		SD	1.460	1.403	.998	1.588	1.318	1.349
Assistant Lecturer	35	M	14.60	13.91	14.40	14.46	14.09	14.00
		SD	2.018	2.280	2.199	3.248	1.318	3.325
Lecturer	9	M	15.22	15.22	15.67	16.00	16.67	15.44
		SD	1.986	2.438	2.121	1.936	1.936	2.242
Associate Professor	40	M	15.30	15.25	15.40	15.40	15.30	15.15
		SD	1.400	1.056	1.355	1.722	1.786	1.369
Professor	38	M	15.74	15.05	15.26	15.29	15.32	15.63
		SD	2.114	2.053	2.152	2.192	2.692	2.655

Note. D1 = Technological Knowledge
D2 = Pedagogical Knowledge
D3 = Content Knowledge
D4 = Technological Content Knowledge
D5 = Pedagogical Content Knowledge
D6 = Technological Pedagogical Knowledge
D7 = Technological Pedagogical Content Knowledge

According to Table 8, the professors had the highest means of self-efficacy in instruction (15.74) and coping with the change (15.63). The associate professors possessed the highest mean of adapting individual needs (15.25) and the means of the lecturers were the highest in motivating students (15.67), maintaining discipline (16.00) and cooperating with parents and colleagues (16.67) respectively. However, assistant lecturers had the lowest means of all dimensions.

To determine the significant difference in teacher educators' self-efficacy in terms of designation, the collected data were analyzed by using the one-way analysis of variance (ANOVA).

According to ANOVA results, dimensions of adapting to individual needs, cooperating with parents and colleagues, and coping with the changes were significantly different (see Table 9).

Table 9 ANOVA Results of Teacher Educators' Self-Efficacy in terms of Designation

Dimension	Designation	Sum of Squares	*df*	Mean Square	*F*	Sig. (2-tailed)
D1	Between Groups	23.851	4	5.963	1.884	.116 (ns)
	Within Groups	490.592	155	3.165		
	Total	514.444	159			
D2	Between Groups	39.632	4	9.908	3.093	.018*
	Within Groups	496.562	155	3.204		
	Total	536.194	159			
D3	Between Groups	25.263	4	6.316	2.038	.092 (ns)
	Within Groups	480.237	155	3.098		
	Total	505.500	159			
D4	Between Groups	28.829	4	7.207	1.441	.223 (ns)
	Within Groups	775.365	155	5.002		
	Total	804.194	159			
D5	Between Groups	61.925	4	15.481	2.734	.031*
	Within Groups	877.669	155	5.662		
	Total	939.594	159			
D6	Between Groups	54.961	4	13.740	2.605	.038*
	Within Groups	817.533	155	5.274		
	Total	872.494	159			

Note. D1 = Technological Knowledge; D2 = Pedagogical Knowledge; D3 = Content Knowledge; D4 = Technological Content Knowledge, D5 = Pedagogical Content Knowledge; D6 = Technological Pedagogical Knowledge; D7 = Technological Pedagogical Content Knowledge; $^{*}p < .05$, ns = not significant

Post Hoc Multiple Comparison Test (Tukey HSD) was used to examine which groups had significant differences in dimensions of adapting to individual needs, cooperating with parents and colleagues, and coping with the changes.

Table 10 Multiple Comparisons for Self-Efficacy in Adapting Individual Needs, Cooperating with Parents and Colleagues and Coping with the Changes

Dependent Variable	Designation (I)	Designation (J)	MD (I-J)	Sig. (2-tailed)
Adapting Individual Needs	Associate Professor	Assistant Lecturer	1.336	.013*
Cooperating with Parents and Colleagues	Lecturer	Assistant Lecturer	2.581	.034*
Coping with the Challenges	Professor	Assistant Lecturer	1.623	.023*

Note. *p<.05

Table 10 indicated that there were significant differences between Associate Professor and Assistant Lecturer at ($p < .05$) in adapting individual needs, Lecturer and Assistant Lecturer at ($p < .05$) in cooperating with parents and colleagues, Professor and Assistant Lecturer at ($p < .05$) in coping with the changes.

Findings on Teacher Educators' Self-Efficacy in terms of Teaching Experience

According to Table 11, teacher educators who had (over 20 years) of teaching experience possessed the lowest means of instruction (15.14), motivating students (15.05), maintaining discipline (14.77), cooperating with parents and colleagues (14.70), and coping with the changes (14.93) among their teaching experience. This findings said that the experienced teacher educators had lower self-efficacy than the young teacher educators.

Table 11 Descriptive Statistics of Teacher Educators' Self-Efficacy in Terms of Teaching Experiences

Teaching Experience	N	*M/SD*	D1	D2	D3	D4	D5	D6
0-10 Years	42	*M*	15.33	14.67	15.10	15.48	15.26	15.21
		SD	1.572	1.426	1.122	1.565	1.438	1.457
11-20 Years	61	*M*	15.25	14.77	15.21	15.43	15.34	15.07
		SD	1.598	1.856	1.473	1.511	1.788	1.861
Over 20 Years	57	*M*	15.14	14.91	15.05	14.77	14.70	14.93
		SD	2.150	2.090	2.401	3.134	3.391	3.206

Note. D1 = Technological Knowledge
D2 = Pedagogical Knowledge
D3 = Content Knowledge
D4 = Technological Content Knowledge
D5 = Pedagogical Content Knowledge
D6 = Technological Pedagogical Knowledge
D7 = Technological Pedagogical Content Knowledge

To examine the difference between teacher educators' self-efficacy in terms of teaching experience, one-way analysis of variance (ANOVA) was used.

Table 12 ANOVA Results of Teacher Educators' Self-Efficacy in terms of Teaching Experience

Dimension	Teaching Experience	Sum of Squares	*df*	Mean Square	*F*	Sig. (2-tailed)
1	Between Groups	.922	2	.461	.141	.869 (ns)
	Within Groups	513.522	157	3.271		
	Total	514.444	159			
D2	Between Groups	1.512	2	.756	.222	.801 (ns)
	Within Groups	534.682	157	3.406		
	Total	536.194	159			
D3	Between Groups	.809	2	.405	.126	.882 (ns)
	Within Groups	504.691	157	3.215		
	Total	505.500	159			
D4	Between Groups	16.764	2	8.382	1.67	.191 (ns)
	Within Groups	787.429	157	5.015		
	Total	804.194	159			
D5	Between Groups	13.774	2	6.887	1.17	.314 (ns)
	Within Groups	925.819	157	5.897		
	Total	939.594	159			
D6	Between Groups	1.965	2	.983	.177	.838 (ns)
	Within Groups	870.528	157	5.545		
	Total	872.494	159			

Note. D1 = Technological Knowledge D5 = Pedagogical Content Knowledge
D2 = Pedagogical Knowledge D6 = Technological Pedagogical Knowledge
D3 = Content Knowledge D7 = Technological Pedagogical Content Knowledge
D4 = Technological Content Knowledge, ns = not significant

According to ANOVA results, the self-efficacy of teacher educators was not significantly different in terms of teaching experience. The number of years teachers spent on their work can increase their self-efficacy because they gained experience when teaching. But the means of teachers' who had over twenty years of teaching experience were the lowest in the dimensions of self-efficacy in instruction, motivating students, maintaining discipline, cooperating with parents and colleagues, and coping with the changes. Therefore, it can be interpreted that the different years of teaching experience could not make any difference in their self-efficacy (see Table 12).

Findings on the Relationship between Teacher educators' Technological Pedagogical Content Knowledge and Self-Efficacy

To find out the relationship between teacher educators' technological pedagogical content knowledge and self-efficacy the Person-product movement correlation was utilized. The results of the Pearson-product movement correlation between teacher educators' technological pedagogical content knowledge and self-efficacy were presented in Table 13.

Table 13 Person-product Movement Correlation between Teacher educators' Technological Pedagogical Content Knowledge and Self-Efficacy

		TPACK	Self-Efficacy
Technological Pedagogical Content Knowledge (TPACK)	Pearson Correlation	1	.677***
	Sig. (2-tailed)		.000
	N	160	160
Self-Efficacy	Pearson Correlation	.677***	1
	Sig. (2-tailed)	.000	
	N	160	160

Note. ***Correlation is significant at the .001 level (2-tailed).

According to Table 13, there was a significant correlation between teacher educators' technological pedagogical content knowledge and self-efficacy (r = .677, $p < .001$). Therefore, it can be interpreted that there was a strong positive relationship between teacher educators' technological pedagogical content knowledge and their self-efficacy. To sum up, the better technological pedagogical content knowledge the teachers have, the higher self-efficacy they will possess.

Discussion and Suggestions

Discussion

The purpose of this research is to investigate teacher educators' technological pedagogical content knowledge on their self-efficacy. Based on the results of the findings, teacher educators had rich pedagogical content knowledge. On the contrary, they had insufficient technological knowledge and the ability to use technologies in their educational contexts.

In finding the differences between teacher educators' technological pedagogical content knowledge in terms of designation, there were differences between Assistant Lecturer and other designations of Professor, Associate Professor, and Lecturer. Based on the findings, Assistant Lecturer had the lowest level of technological knowledge, content knowledge, technological content knowledge, and pedagogical content knowledge among different designations. In the study of Thinzarkyaw (2020), there was a significant difference in technological and content knowledge by their rank. Therefore, this study was consistent with the study of Thinzarkyaw (2020).

The study of Bingimlas (2018) showed that teachers' Technological Knowledge was significantly different among teachers, with various levels of teaching experiences and the findings of Kazul and Erten (2014) also stated that there was a significant difference between teachers in the sub-dimension of TK. In this study, there was no significant difference between teacher educators who had 0-10 years, 11-20 years, and over 20 years of teaching experience. Therefore, this finding was not consistent with the study of Bingimlas (2018) and Kazul and Erten (2014).

In examining the extent of teacher educators' self-efficacy in instruction, the findings of this study revealed that teacher educators highly possessed instructional self-efficacy among six dimensions and they had insufficient self–efficacy in adapting to individual needs.

In the finding of the differences in teacher educators' self–efficacy in terms of designation, it was found that the Professor had higher self-efficacy in adapting to individual needs and coping with the changes, the Lecturer also had higher self-efficacy in cooperating with parents and colleagues than the self-efficacy of the Assistant Lecturer. Therefore, the Assistant Lecturer had the lowest self-efficacy in all dimensions.

In the finding of the differences in teacher educators' self-efficacy in terms of teaching experiences, there was no significant difference between teacher educators. The study of Malik (2011) stated that the number of years teachers spent on their work can increase their self-efficacy because they gained experience when teaching. However, the means of teachers' who had over twenty years of teaching experience were the lowest in the dimensions of self-efficacy in instruction, motivating students, maintaining discipline, cooperating with parents and colleagues, and coping with the changes in this study. Therefore, this finding was inconsistent with the study of Malik.

In exploring the relationship between teacher educators' technological pedagogical content knowledge and their self-efficacy, the finding confirmed that there was a significant positive relationship between teacher educators' technological pedagogical content knowledge and their self-efficacy. Bahriah and Yunita (2019) also stated that there is a relationship between the technological pedagogical content knowledge (TPACK) of sixty-one teachers with the self-efficacy. Therefore, this finding had supported by the study of Bahriah and Yunita (2019). The results of this study revealed that the better technological pedagogical content knowledge the teachers have, the higher self-efficacy they will possess.

Suggestions

According to the findings, the research suggestions and recommendations for further researchers were given.

In this study, the majority of teacher educators did not have enough technological knowledge. There were significant differences between teacher educators' technological pedagogical and content knowledge in terms of designation. Therefore, principals should encourage teachers to use technology in their teaching and learning. Besides, principals should support teachers with different technological tools and resources, workshops, and professional development programs related to pedagogical content knowledge.

This study pointed out that the majority of experienced teacher educators had lower self-efficacy. Teachers' self-efficacy beliefs are intertwined with psychological states such as anxiety, stress, and fatigue. Therefore, the principal should provide a safe and supportive environment in which teachers may learn and teach non-threatening, interact and establish rapport with each other.

There was a strong positive relationship between teacher educators' technological pedagogical content knowledge and self-efficacy. Therefore, teacher educators should have the TPACK competencies which can influence the quality of teaching of the teachers, can improve the education performance, and create a positive vibe to upgrade the teachers' confidence and increase self-efficacy in teaching.

The present study was delimited in terms of area of study, type of Education Degree College. Hence the following recommendations are made for future research:

1. Although this study focused on five Education Degree Colleges in Myanmar, further research should be carried out on other Education Degree Colleges and Academic Universities, and Basic Education Schools as well.
2. It was a small-scale study and did not cover all teacher educators from all Education Degree Colleges. Large sample size should be used so that many different results or reasons could produce.
3. Furthermore, as this research was a quantitative study, a qualitative study related to teachers' TPACK should be carried out to have a deeper understanding of that issue.

Conclusion

Technological pedagogical content knowledge is an essential part of the teacher education system today. In teacher education, it supports teacher educators to be completely up-to-date and knowledgeable and to effectively incorporate it into their lessons. Therefore, teacher educators can assist student teachers to have a better understanding of the content and educational practices and it can also encourage teacher candidates to apply this knowledge in their teaching profession later.

In in-service teacher education, technological pedagogical content knowledge is the heart of good teaching. As instructional technologies have evolved, the pedagogical paradigm has changed from teacher-centered to student-centered, and integrating up-to-date technologies into instruction evokes meaningful learning.

Therefore, teacher educators and principals should emphasize not getting adequate technological pedagogical content knowledge but utilizing innovative technologies and tools by linking with pedagogical content knowledge in an effective way that can support the development of teachers' self-efficacy.

Acknowledgments

I am deeply grateful to Dr Myat Myat Thaw (Rector, Sagaing University of Education) who allowed me to do this research. Then, I would like to express my honorable thanks to my supervisor, Prof. Dr Wai Wai Oo (Head of Curriculum and Methodology Department) for her invaluable instructions and excellent support to complete this research successfully.

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J. Myanmar Acad. Arts Sci. 2023 **Vol. XXI. No.6**

A STUDY OF THE INFLUENCE OF VOCABULARY ON READING COMPREHENSION IN LEARNING ENGLISH AT THE HIGH SCHOOL LEVEL

Theingi Khine[1] and Wai Wai Oo[2]

Abstract

The purpose of this study is to investigate whether using vocabulary exercises is effective or not in Grade Ten students' reading comprehension. The present study was an experimental study. The design adopted in this study was experimental study: the crossover repeated measure design. The study involved (100) participants who were Grade Ten students of English as a foreign language in Basic Education High School, Yathit selected using the simple random sampling technique. To measure their reading comprehension, three main tests that used only unseen passages were administered: pretest, posttest 1 and posttest 2. In the analysis of data, descriptive statistics, independent samples *t* test, analysis of covariance (ANCOVA), and paired samples *t* test were utilized. Independent samples *t* test was employed to determine whether a significant difference exists between the means of two groups. According to the result, analysis of covariance (ANCOVA) was used to ascertain there were differences in the reading achievement between researched students. The results showed that there were differences in the reading achievement between students who received vocabulary exercise and those who did not. Paired samples *t* test was used to analyze whether the improvement in the students' reading achievement by the use of vocabulary exercises exists. According to the results, each group had significant improvement in the reading achievement. It can be concluded that the application of vocabulary exercises can improve Grade Ten students' reading achievement.

Keywords: reading, reading comprehension, vocabulary

Introduction

Learning a language means mastering the four language skills of listening, speaking, reading and writing (Harmer, 2005). Among them, reading is one of the important language skills. The goal of reading is comprehension and reading comprehension means understanding what has been read. Moreover, reading comprehension is regarded as a fundamental skill necessary for educational achievement.

The successful reading is influenced by some factors. They are internal factors and external factors. Vocabulary is one of internal factors that influence on the students' reading comprehension. Vocabulary should be learned by the students. Vocabulary has an important role for all aspects language skills. In reading, the students' vocabulary affects the ability of students to understand the text and get the important information from the text. Nation (2001) held the view that the amount of familiar and unfamiliar vocabulary is one of the significant aspects in distinguishing the difficulties of a reading passage.

Nowadays, the high school students have great difficulty in reading English textbooks. They are reluctant to read English text as they do not understand the meaning of the vocabulary contained in the text. Thus, they may have low achievement of reading comprehension. Lack of vocabulary is one of the problems that the high school students deal with. So, this study focused on the influence of vocabulary on reading comprehension at the high school level.

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Purposes of the Study

The main purpose of the study is to explore the effectiveness of vocabulary on reading comprehension in learning English.

The specific objectives are as follows:

1. To investigate whether vocabulary acquisition can improve students' reading comprehension in learning English or not.
2. To give some suggestions based on the findings obtained from this study.

Research Questions

Based on the objectives of the study, the following research questions were constructed.

1. Is there any significant difference in the reading achievement between students who receive vocabulary exercises and those who do not?
2. Is there any improvement in the students' reading achievement by the use of vocabulary exercises?

Definition of Key Terms

Reading

Reading is a constructive process which the prior knowledge and experience affect the reader's comprehension of the text (McEntire, 2003, as cited in Furquo, 2013).

Reading Comprehension

Reading comprehension is the understanding, evaluating and utilizing of information and idea gained through an interaction between the reader and the author (Smith & Robinson, 1980, as cited in Nugraha, 2011).

Vocabulary

Vocabulary is a list of words with their meanings, especially in a book for learning a foreign language (Hornby, 2015).

Scope

This study was conducted at Basic Education High School, Yathit in Taungtha Township, Mandalay Region. The populations in this study were all Grade Ten students from the selected classes in the Academic Year (2018-2019). This study was only concerned with the influence of vocabulary on reading comprehension at the high school level and the duration was six weeks.

Review of Related Literature

The Importance of Teaching Reading in English

The students' achievement in all subjects depends on their ability in reading. In high school and university, reading ability becomes more important because students are more active to gain written information. That is why reading ability is an access to success in future. Having reading skill will be useful to get successful on the academic.

Harmer (2005) said that for the students, reading English text is an important role of teaching and learning process. Nunan (2003) also stated that reading is an essential skill for learners of English as a foreign language and for most of these learners; it is the most important skill to master in order to ensure success not only in learning English, but also learning in any content class where reading in English is required.

The goal of all reading instruction is ultimately targeted at helping a reader to comprehend a given text. According to McLaughlin (2012), reading comprehension can be defined as the ability to construct meaning through spoken or written communication. Reading comprehension is the goal of reading instruction. Therefore, readers must be able to construct meaning and make connections based on what they know and what they are reading. The more knowledge readers have about a topic before reading, the more they are able to form connections between what they know and what they read. Making connections is a key element to reading comprehension.

The Importance of Vocabulary

Vocabulary is central to English language teaching because without sufficient vocabulary, students cannot understand others or express their own ideas. It is supported by Wallace (1982, as cited in Furquo, 2013) who says that vocabulary is one of the most important parts of languages. Nadell, Johnson, and Langan (1998) said that having a good vocabulary is important due to many reasons. They are as follows:

1. Knowing a lot of words makes it easier for the students to understand others and for others to understand them.
2. A good vocabulary is the key to understanding what they read.
3. A large vocabulary can help them score higher on tests.
4. A solid vocabulary will help them do better in school and at work.
5. A strong vocabulary helps them believe in themselves.

Relationship between Vocabulary and Reading Comprehension

The correlation between vocabulary knowledge and reading comprehension has been well discussed by many experts. Vocabulary knowledge and reading comprehension strongly correlated. The relationship between vocabulary and reading comprehension is thought to be reciprocal, meaning that a reader who knows more words is likely to have better reading comprehension, while a reader who is successful with comprehension and frequently will have more opportunity to learn more words. Consequently, a reader who struggles with vocabulary will be less likely to comprehend text, and less likely to learn new words (Hiebert & Kamil, 2005).

Most researchers believe language learners have difficulty understanding reading texts because of the limited amount of their vocabulary. Nation (2001) explained that in order to understand 95% of reading content, readers have to know at least 4000 word families, including 2000 high-frequency words, 570 general academic words, at least 1000 technical words, and proper low-frequency word families. Nation believed students' reading comprehension will improve when their known words increase. Thus, it can be concluded that vocabulary acquisition is strongly related with reading comprehension for foreign language learners.

Research Method

Population and Sample

For this study, a simple random sampling technique was used to select a basic education high school. The school for this study was Basic Education High School, Yathit in Taungtha Township. A sample of (100) students was selected from the population of (160) Grade Ten students (see Table 1).

Table 1 Population and Sample Size

Name of School	No. of Population	No. of Sample
BEHS, Yathit	160	100

Research Design

The design adopted in this study was crossover repeated measure experimental design (Shuttleworth, 2009). It is based on nonequivalent control group design which is one of the quasi-experimental designs (Gay, 1987). The research design of this study is presented in Table 2.

Table 2 Research Design

G	No. of Students	Pretest	*G*	Treatment	Posttest 1	*G*	Treatment	Posttest 2
A	50	RCT	Ex	VE	RCT	C	control	RCT
B	50	RCT	C	control	RCT	Ex	VE	RCT

Note. VE = Vocabulary Exercises RCT = Reading Comprehension Test
Ex = Experimental C = Control

Instruments

In order to investigate the influence of vocabulary on reading comprehension to Grade Ten students, one pretest, two posttests and learning materials were used as instruments in this study.

Pretest

A pretest was developed to measure the previous reading comprehension of the selected samples. The pretest, a reading achievement test, contained two unseen passages. Test items were mainly based on Breaking News English developed by Banville (2018). The test was administered within one and a half hour allocated period. The students had to answer all the questions. The pretest was held in Basic Education High School, Yathit on October 29, 2018.

Posttest

Two reading achievement tests were applied as posttests for both groups to measure the students' reading achievement. Each posttest also contained two unseen passages. Test items were mainly based on Breaking News English developed by Banville (2018). The time allowed for these tests was (1:30) hours and they also needed to have to answer all questions. Then, the first posttest was held at BEHS, Yathit in Taungtha Township on November 16, 2018. After that, the second posttest was also held at BEHS, Yathit in Taungtha Township on December 7, 2018.

Learning Materials

Learning materials were selected from Vocabulary in Use (Intermediate Level), Vocabulary Levels Test revised by Webb et al. (2017), Grade Nine English Text Book and Grade Ten English Text Book. It contains the topics of (1) Nouns, (2) Verbs, and (3) Adjectives.

Procedure

First, in order of the required data, the instruments used for this study were developed under the guidance of the supervisor. The copies of the instruments were delivered to five experienced expert teachers in order to take their validation. After validation, the items were modified in accordance with the suggestions of those experienced teachers. And then, the pilot test was administered with (55) Grade Ten students from Basic Education High School No (1), Myinmu in Myinmu Township. The crossover repeated measure design was applied to carry out an experimental study. Basic Education High School Yathit, Taungtha Township, Mandalay Region was selected by using a simple random sampling technique. The sample size was (100) Grade Ten students from the selected school. The existing Grade Ten students of two classrooms among the classrooms were randomly selected and assigned to two groups: Group A and Group B. Both groups were examined by a pretest. After that, the two groups were randomly assigned Group A as experimental group and Group B as control group. The experimental group (Group A) was given a treatment by using vocabulary exercises for three weeks while the control group was not. After the treatment, both groups were examined by a posttest 1. Then, both groups were also crossed over to ascertain the effect of treatment. Only the experimental group (Group B) was given a treatment by using vocabulary exercises for three weeks. After the treatment, both groups were examined by a posttest 2. Then, the data were entered into a computer data file and were analyzed using the Statistical Package for the Social Science (SPSS 20).

Data Analysis

In analyzing the data, descriptive statistics was used. The means of the pretest scores were compared by using the independent samples *t* test. According to Gay (1987), if the groups were essentially the same on the pretest, the posttest scores were analyzed using independent samples *t* test. If they were not, analysis of covariance (ANCOVA) would be used. Thus the posttest scores were analyzed by using analysis of covariance (ANCOVA). To determine whether the improvement in the students' reading achievement by the use of vocabulary exercises exists, paired samples *t* test was used.

Research Findings

Findings of Pretest

For this study, the existing two classrooms were randomly selected and assigned to two groups: Group A and Group B. Both groups were examined by a pretest. The pretest scores were analyzed by using the independent samples *t* test in order to measure whether the two groups had the same initial ability in the reading achievement. The results are shown in Table (3).

Table 3 The Results of t test for Independent Samples on the Pretest Scores

School	Group	*N*	*M*	*SD*	*MD*	*t*	*df*	*p*
BEHS, Yathit	Group A	50	27.68	7.25	9.8	7.75	98	.000***
	Group B	50	17.88	5.23				

Note. ***$p < .001$.

As clearly seen in Table (3), the mean of group A was (27.68), and the mean of group B was (17.88). These two groups had a significant difference at .001 level before the treatment period. This means that Group A and Group B did not possess the same initial ability (see Figure 1).

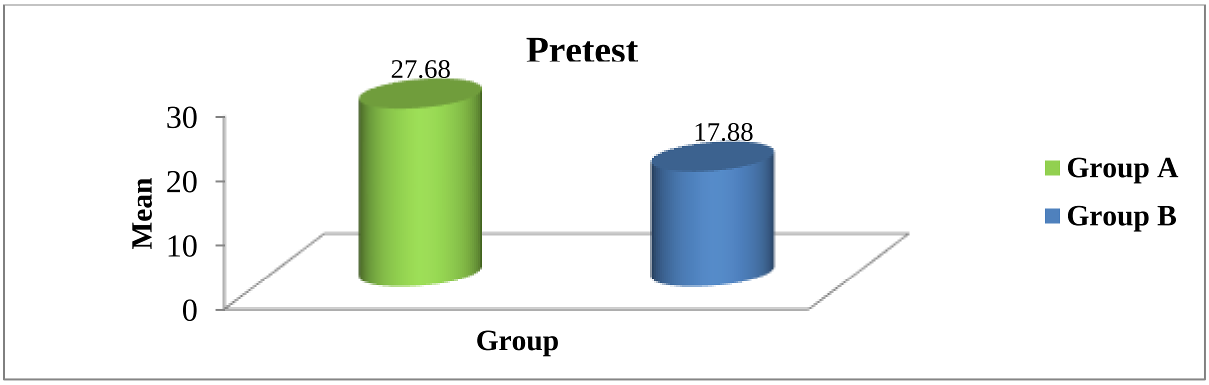

Figure 1. Comparison of means for pretest.

According to the results of Table (3) and Figure (1), the mean of group A was higher than that of group B in taking the pretest question. Therefore, it can be interpreted that the two groups' initial levels were not equivalent.

Findings of Research Question (1)

Research Question (1): Is there any significant difference in the reading achievement between students who receive vocabulary exercises and those who do not?

To examine this question, the two posttests scores of the experimental group and the control group were analyzed.

The analysis of pretest scores showed that the means of Group A and Group B were not the same. According to this finding, the posttests scores were analyzed by using the analysis of covariance (ANCOVA). In this way, the initial inequality could be adjusted and posttests scores could be compared. First, the data of the posttest 1 were analyzed, and then, the posttest 2 scores were analyzed.

Findings of the Posttest 1 Scores

At this period, Group A was the experimental group and Group B was the control group. In analyzing the performance of each question on the posttest 1, for Question number (I), a reading comprehension test of (25) items for (25) marks, it was found that the experimental group performed better on the reading comprehension test items than the control group. Most students from the control group left the question unanswered.

Question number (II) was also a reading comprehension test which consisted of (25) items for (25) marks. The experimental group also performed better on the reading comprehension test items than the control group. Most students from both control and experimental groups did not use enough effort in answering the questions. The overall performance of both groups can be seen in the following tables.

Table 4 Means and Standard Deviations for Posttest 1

School	Group	*N*	*M*	*SD*	*MD*
BEHS, Yathit	Experimental Group (A)	50	30.12	7.00	11.46
	Control Group (B)	50	18.66	5.55	

Table (4) shows the means and standard deviations of two groups which they acquired after the treatment for three weeks. And the mean of the control group was (18.66) and the mean of the experimental group was (30.12). It was found that the mean of experimental group was higher than the mean of control group.

Table 5 The ANCOVA Source Table for Posttest 1

Dependent Variable: posttest 1

Source	***Type III Sum of Squares***	***df***	**Mean Squares**	***F***	***p***
Corrected Model	3982.117	2	1991.058	60.097	.000
Intercept	1528.948	1	1528.984	46.149	.000
Pretest	698.823	1	698.827	21.093	.000
Group	830.067	1	830.067	25.054	.000***
Error	3213.673	97	33.131		
Total	66683.000	100			
Corrected Total	7195.790	99			

Note. ***$p < .001$.

According to Table 5, ANCOVA results mentioned that there was a significant difference between control and experimental groups, at $F(1, 97) = 25.054$, ***$p < .001$. Hence, it can be interpreted that using vocabulary exercises had a positive effect on the students' reading achievement. This result can be clearly seen in Figure (2).

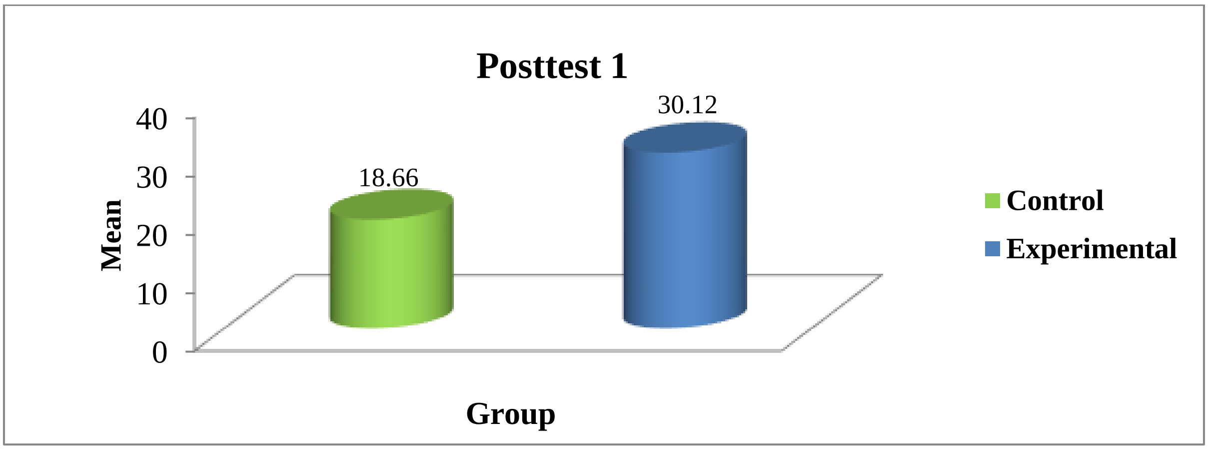

Figure 2. Comparison of means for posttest 1.

Findings of the Posttest 2 Scores

At this period, Group B was the experimental group and Group A was the control group. In analyzing the performance of each question on the posttest 2, Question number (I) consisted of (25) items for (25) marks. It was a reading comprehension test. Both control and experimental groups showed the same pattern of performance, but the control group did better on the test.

Question number (II) was also a reading comprehension test of (25) items for (25) marks. It was found that the control group performed better on the test than the experimental group. The following tables and figure are the overall performance of both groups on the posttest 2 questions.

Table 6 Means and Standard Deviations for Posttest 2

School	Group	*N*	*M*	*SD*	*MD*
BEHS, Yathit	Experimental Group (B)	50	23.78	4.04	-11.00
	Control Group (A)	50	34.78	5.82	

Table (6) presents the means and standard deviations of control and experimental groups on the reading comprehension questions. The mean of control group was (34.78) and standard deviation was (5.82). And, the mean of experimental group was (23.78) and standard deviation was (4.04). Thus, the results showed that the mean of control group was higher than that of experimental group.

Table 7 The ANCOVA Source Table for Posttest 2

Dependent Variable: posttest 2

Source	Type III Sum of Squares	*df*	Mean Squares	*F*	*p*
Corrected Model	3609.194	2	1804.597	93.062	.000
Intercept	2941.601	1	2941.601	151.696	.000
Pretest	584.194	1	584.194	30.126	.000
Group	806.384	1	806.384	41.585	.000***
Error	1880.966	97	19.391		
Total	91222.000	100			
Corrected Total	5490.160	99			

Note. ***$p < .001$.

The ANCOVA results on the reading comprehension questions stated that there is a significant difference between the control and experimental groups at $F(1, 97) = 41.585$, ***$p < .001$ (see Table 7). According to this finding, it can be interpreted that the control group, Group A, performed better on the posttest 2 than the experimental group, Group B. The comparison of means between the two groups on the posttest 2 is also presented in Figure (3).

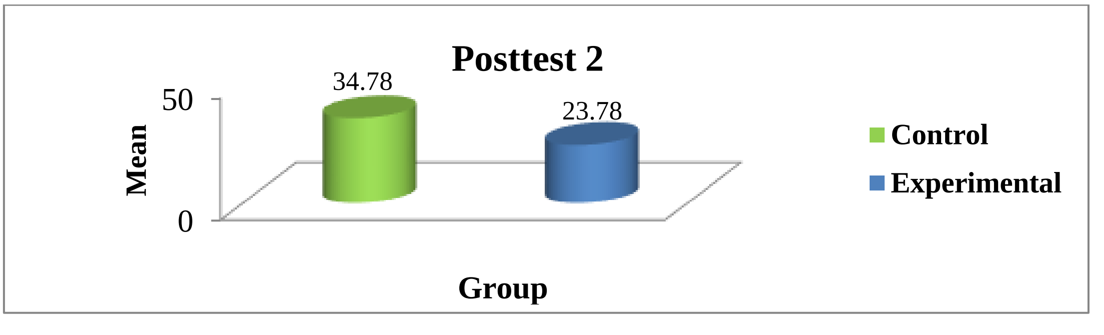

Figure 3. Comparison of means for posttest 2.

Findings of Research Question (2)

Research Question (2): Is there any improvement in the students' reading achievement by the use of vocabulary exercises? To examine this question, the means of pretest, posttest 1 and posttest 2 for both groups: Group A and Group B were calculated by using the paired samples *t* test separately.

Findings of Means on the Tests for Group A

The pretest, posttest 1 and posttest 2 means of Group A were analyzed by using the paired samples *t* test in terms of Pair 1, Pair 2 and Pair 3 in order to measure whether Group A had improvement in the reading achievement by the use of vocabulary exercises. The results are shown as follows:

(A) Pair 1

Table 8 t Value for Pretest and Posttest 1 Scores of Group A

Group	Test	*N*	*M*	*SD*	*MD*	*t*	*df*	*p*
Group A	Pretest	50	27.68	7.25	-2.44	-2.29	49	.026*
	Posttest1	50	30.12	7.00				

Note. *$p < .05$.

In comparing the means of two tests on the reading comprehension questions, the results indicated that the mean of posttest 1 (M =30.12, SD = 7.00) was greater than the mean of pretest (M =27.68, SD = 7.25), t (49) = -2.29, $p < .05$. So, Group A had improvement in the reading achievement after the treatment. Therefore, it can be interpreted that the use of vocabulary exercises can enhance the students' reading achievement. The results of Pair 1 can be clearly viewed in Figure (4).

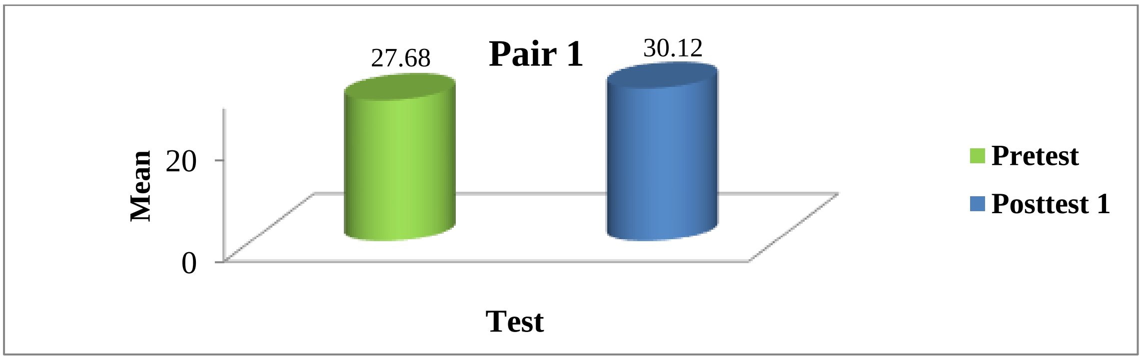

Figure 4. Comparison of means on pretest and posttest 1for Group A.

(B) Pair 2

Table 9 t Value for Posttest 1 and Posttest 2 Scores of Group A

Group	Test	*N*	*M*	*SD*	*MD*	*t*	*df*	*p*
Group A	Posttest 1	50	30.12	7.00	-4.66	-5.69	49	.000***
	Posttest 2	50	34.78	5.83				

Note. ***$p < .001$.

According to Table (9), the results showed that the mean of posttest 2 (M = 34.78, SD = 5.83) was significantly greater than the mean of posttest 1 (M = 30.12, SD = 7.00), t (49) = -5.69, *p* < .001. There is a significant difference between these two tests although Group A did not receive the treatment at this period. This is because of three reasons: effect of treatment, the students' mixed abilities and the instruction to keep on learning vocabulary. Figure (5) illustrates comparison of means between two tests of Group A.

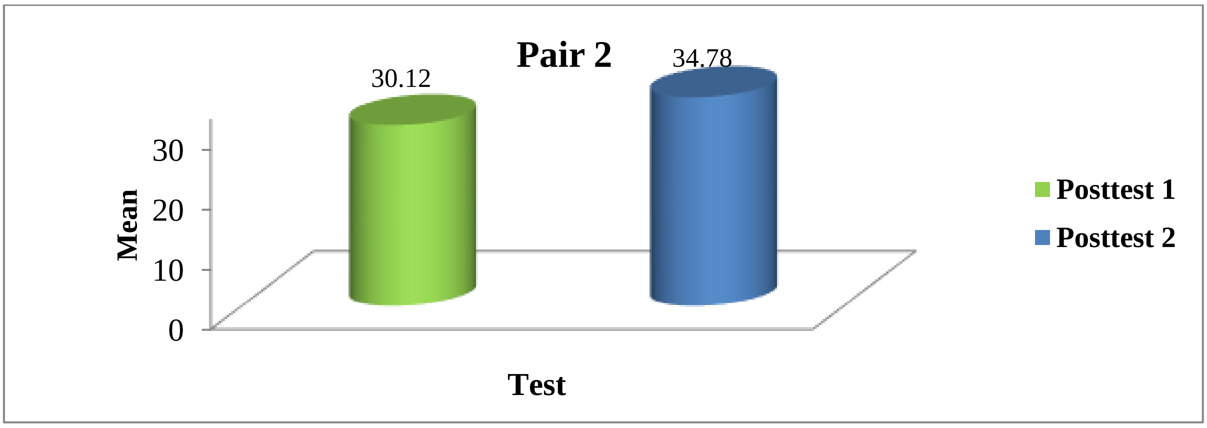

Figure 5. Comparison of means on posttest 1 and posttest 2 for Group A.

According to Figure (5), it is noted that Group A performed better on the posttest 2 than on the posttest 1. Thus, it can be interpreted that the students' reading achievement had progressed.

(C) Pair 3

Table 10 t Value for Pretest and Posttest 2 Scores of Group A

Group	Test	*N*	*M*	*SD*	*MD*	*t*	*df*	*p*
Group A	Pretest	50	27.68	7.25	-7.10	-8.10	49	.000***
	Posttest2	50	34.78	5.83				

Note. ****p* < .001.

As clearly seen in Table (10), the mean of pretest was (27.68) before the treatment, and the mean of posttest 2 was (34.78) after the study. It showed that the posttest 2 mean (*M* = 34.78, *SD* = 5.83) was significantly higher than the pretest mean (*M* = 27.68, *SD* = 7.25), *t* (49) = -8.10, *p* < .001. According to Table (10), the means of Group A had progress in the range from (27.68) to (34.78). Hence, these results positively contributed to the students' reading achievement. These results can be clearly seen in Figure (6).

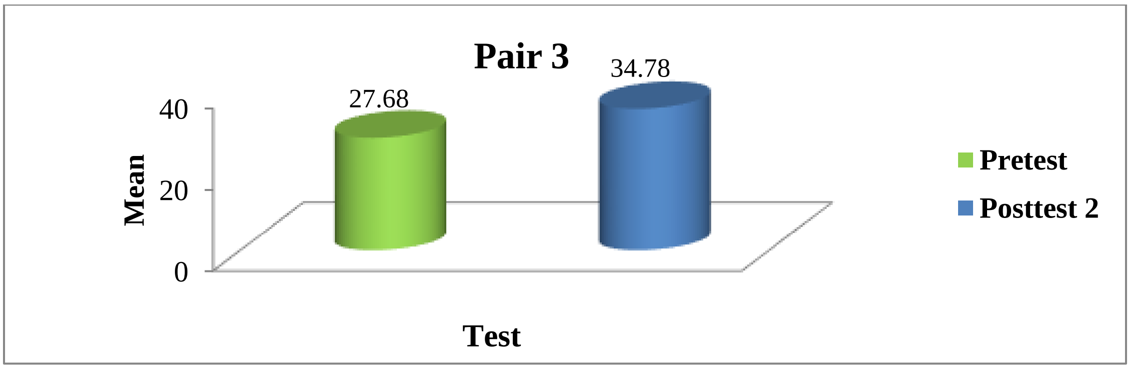

Figure 6. Comparison of means on pretest and posttest 2 for Group A.

According to the results of Pair 1, Pair 2 and Pair 3, it means that Group A had improvement in the reading achievement by the use of vocabulary exercises. Then the means of Group B were continued to analyze in order to investigate whether Group B had improvement in the reading achievement by the use of vocabulary exercises.

Findings of Means on the Tests for Group B

The pretest, posttest 1 and posttest 2 means of Group B were analyzed by using the paired samples *t* test in terms of Pair 1, Pair 2 and Pair 3. The results are shown as follows:

(A) Pair 1

Table 11 t Value for Pretest and Posttest 1 Scores of Group B

Group	Test	*N*	*M*	*SD*	*MD*	*t*	*df*	*p*
Group B	Pretest	50	17.88	5.23	-.78	-.93	49	.359 (ns)
	Posttest1	50	18.66	5.55				

Note. ns = not significant.

Table (11) showed that the mean of pretest was (17.88), and the mean of posttest 1 was (18.66). The results showed that the mean of posttest 1 (M = 18.66, SD = 5.55) was not significantly higher than the mean of pretest (M = 17.88, SD = 5.23), t (49) = -.93, $p > .05$. Thus, it can be said that the means of these two tests had nearly the same ability in taking the test questions before they were treated. Therefore, Group B did not have improvement in the reading achievement before the treatment.

Figure (7) clearly illustrates to present comparison of means on pretest and posttest 1 for Group B.

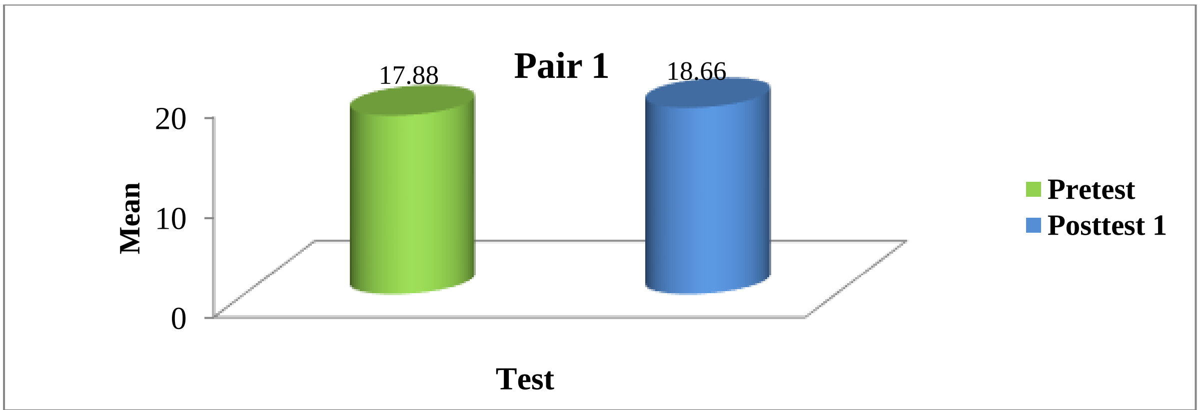

Figure 7. Comparison of means on pretest and posttest 1 for Group B.

(B) Pair 2

Table 12 t Value for Posttest 1 and Posttest 2 Scores of Group B

Group	Test	*N*	*M*	*SD*	*MD*	*t*	*df*	*p*
Group B	Posttest1	50	18.66	5.55	-5.12	-6.30	49	.000***
	Posttest2	50	23.78	4.04				

Note. ***p < .001.

As shown in Table (12), the mean of posttest 2 (*M* = 23.78, *SD* = 4.04) was significantly greater than that of posttest 1 (*M* = 18.66, *SD* = 5.55), *t* (49) = -6.30, *p* < .001. So Group B had a significant improvement after the treatment period. Thus, it can be interpreted that the use of vocabulary exercises had positive effect on improving the students' reading comprehension. The comparison of means on posttest 1 and posttest 2 for Group B is illustrated in Figure (8).

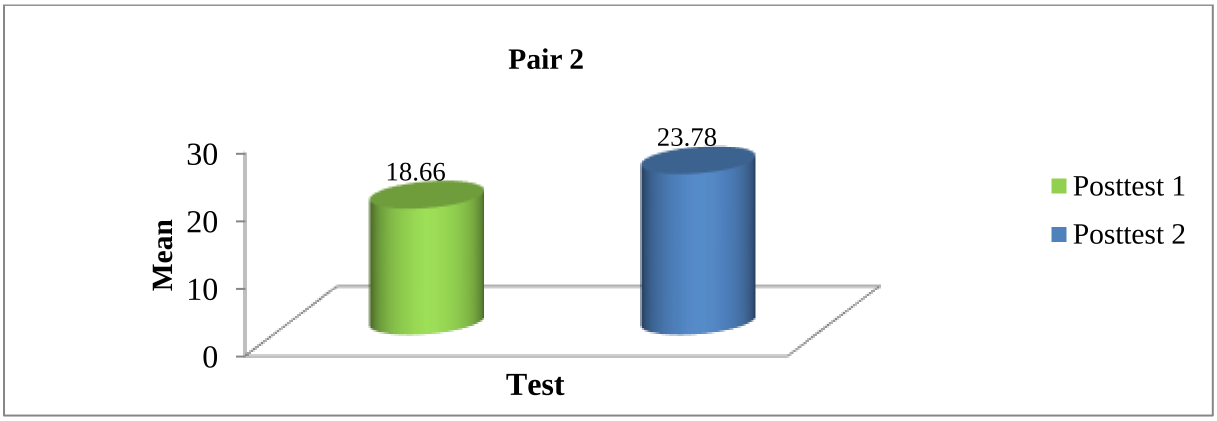

Figure 8. Comparison of means on posttest 1 and posttest 2 for Group B.

(C) Pair 3

Table 13 t Value for Pretest and Posttest 2 Scores of Group B

Group	Test	*N*	*M*	*SD*	*MD*	*t*	*df*	*p*
Group B	Pretest	50	17.88	5.23	-5.90	-7.61	49	.000***
	Posttest2	50	23.78	4.04				

Note. ****p* < .001.

The results showed that the mean of pretest was (17.88) before the treatment, and the mean of posttest 2 was (23.78) after the treatment (see Table 13). It is stated that the mean of posttest 2 (*M* = 23.78, *SD* = 4.04) was significantly greater than the mean of pretest (*M* = 17.88, *SD* = 5.23), *t* (49) = -7.61, *p* < .001. Thus, Group B had progress in the reading achievement after the treatment period. The results can be clearly viewed in Figure (9).

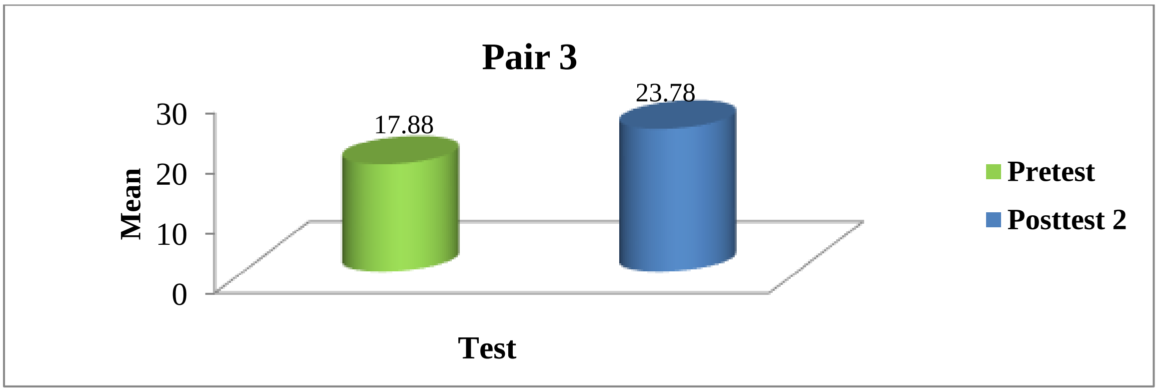

Figure 9. Comparison of means on pretest and posttest 2 for Group B.

According to Figure (9), the means of Group B had significant improvement in the range from (17.88) to (23.78). Therefore, it is obvious that the use of vocabulary exercises can improve the students' reading achievement.

By comparing the means of pretest, posttest 1 and posttest 2 in terms of Pair 1, Pair 2 and Pair 3, Group B also had improvement in the reading achievement by the use of vocabulary exercises. After analyzing the data of Group, A and Group B, it can be interpreted that the use of vocabulary exercises had a positive improvement in the performances of the researched students.

Discussion and Suggestions

Discussion

Vocabulary and reading comprehension cannot be separated. According to Rivers (1983, as cited in Nunan, 1991), the acquisition of an adequate vocabulary is essential for successful second language or foreign language use. This study was conducted to investigate the influence of vocabulary on reading comprehension at the high school level.

Discussion for Research Question (1)

The scores of posttests 1 and posttest 2 were analyzed in detail for the purpose of measuring students' proficiency in the reading comprehension. From the results of the posttest 1 scores on the reading comprehension questions, the means of students who received vocabulary exercises for three weeks were significantly higher than those who did not. Thus, it can be interpreted that using vocabulary exercises had a positive effect on the students' reading achievement.

The findings of the posttest 2 scores showed that the means of Group A students who did not receive vocabulary exercises were significantly greater than those of Group B students who received for three weeks. It can be interpreted that Group A performed better on the posttest 2 than Group B. According to this finding, there may be some reasons. This may be because the mean of Group A was already higher than Group B's mean on the pretest. Moreover, Group A may have the effect of treatment, carryover effect. Another reason found on the test is that some Group B students did not make enough effort to answer the test because of the lack of motivation in taking the test and they know that the scores will not be counted in passing their examination.

The significant levels in both tests were high. Generally, the use of vocabulary exercises has had some effects on the reading achievement of the students. The findings also indicated that foreign language learners' vocabulary acquisition greatly impacts on their reading comprehension. These findings were found to be consistent with the finding of Thanda Soe (2013) who found that there is a strong correlation between students' vocabulary acquisition and their reading comprehension of Myanmar EFL students. It is also confirmed with the finding of Bahri (2018) who claimed that although strategy of reading and experience of students help in comprehend a text, but vocabulary is more important in helping the students to comprehend the text. Farran (2016) also argued that vocabulary is foundational in foreign language and second language reading comprehension success.

Discussion for Research Question (2)

The scores of pretests, posttest 1 and posttest 2 questions were also analyzed by using the paired samples *t t*est in detail for the purpose of measuring the students' improvements in their reading achievement by the use of vocabulary exercises. For Group A, the means of pretest, posttest 1 and posttest 2 were compared in terms of Pair 1, Pair 2 and Pair 3. According to Pair 1, Pair 2 and Pair 3, the finding showed that Group A had improvement in the reading achievement by the use of vocabulary exercises.

For Group B, in order to measure whether Group B had improvement in the reading achievement by the use of vocabulary exercises, the means were compared according to Pair 1, Pair 2 and Pair 3. By comparing the means of pretest, posttest 1 and posttest 2, the findings showed that Group B also had improvement in the reading achievement by the use of vocabulary exercises. Nonetheless, after analyzing the data of Group A and Group B, it is obvious that reading achievement was significantly improved among the researched students. The findings indicated that the role of vocabulary in reading comprehension is directly in line with findings of the studies conducted by Chen, 2011 and Choi, 2013. Liu (2016) also said that vocabulary has always been crucial for foreign language learners in the reading comprehension since a learner must know most of the words in a running text so as to comprehend a certain text.

Some of the major limitations of the research can be identified as (1) the lack of enthusiasm of the students in the research, (2) some students did not make enough effort in answering the tests, and (3) some students were likely to pay more attention to their regular examination held in their schools.

Suggestions

Based on the results of this study, some suggestions for English teachers are offered.

(1) The teachers should make students aware of the importance of vocabulary in learning English, especially in reading.

(2) Teachers should pay attention to the students' vocabulary learning while they train the students for reading comprehension.

(3) Teachers should not only make good use of the textbook but also find some suitable extra materials from newspapers and magazines for enlarging the students' vocabulary.

(4) The teacher should encourage students to read extensive books as reading will increase the students' vocabulary.

(5) Teachers should recognize that understanding students' average vocabulary knowledge and reading ability are important to develop appropriate English tests that can actually assess students' reading comprehension.

Although some students paid their attention to pass their regular examination, they should be encouraged to enlarge their vocabulary as well as to recognize the influence of vocabulary on their reading achievement. Moreover, this study was conducted only the Grade Ten students within 2018-2019 Academic Year as cross-sectional survey, the longitudinal survey should be conducted to ensure data are representative and generalizable.

Conclusion

The data of this study showed that the researched students had a positive improvement in their reading achievement by the use of vocabulary exercises. The results support the research purpose; using vocabulary exercises can improve Grade Ten's students reading comprehension in learning English. The results also demonstrate the need for teachers to know their learners' vocabulary knowledge and reading comprehension abilities. In turn, this would help English teachers and curriculum developers design more appropriate learning tasks that widen learners' academic vocabulary knowledge and to improve reading achievement. Thus, this research can give a contribution for teachers and curriculum designers to assist learners to promote the growth of learners' vocabulary knowledge and reading comprehension.

Acknowledgements

We would like to offer our profound gratitude to Dr. Myat Myat Thaw (Rector, Sagaing University of Education), Dr. Khin Hnin Yee and Dr. San San Lwin (Pro-Rectors, Sagaing University of Education) who gave us permission to undertake this research. We would like to mention our heartfelt respect and special thanks to Dr. Soe Than (Retired Professor and Head of Department, Department of Curriculum and Methodology, Sagaing University of Education, for his invaluable guidance in conducting this research.

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J. Myanmar Acad. Arts Sci. 2023 **Vol. XXI. No.6**

A STUDY OF THE DIFFICULTIES OF STUDENTS AND INFLUENCING FACTORS ON LEARNING PHYSICS AT THE BASIC EDUCATION HIGH SCHOOL LEVEL

Thu Thu Linn[1]

Abstract

The purpose of this study is to investigate the difficulties and influencing factors of students and the reasons for their difficulties in learning physics at the Basic Education High School Level in Myanmar. This study is descriptive research design. By using the simple random sampling method, 475 Grade Ten students and 448 Grade Eleven students who are learning physics in four Basic Education High Schools in Shwebo, Sagaing Region were used as the sample. In the collection of data, two instruments, the questionnaire for the difficulties of the students in learning physics and the questionnaire for the influencing factors of the students in learning physics were used. In order to analyze the data, descriptive statistics, independent samples *t* test, one-way analysis of variance (ANOVA) and Pearson product-movement correlation were used. According to the results of the study, it can be seen that there was nearly two third of the total population of participants who had difficulty in learning physics and the majority of students are likely to face difficulties in solving problems in physics. The reasons for the difficulties of the students in learning physics were the complex, abstract nature and too much calculation of physics, lack of interest, mathematics skills and negative attitude of the students, the lack of the adequate school facilities and instructional materials. It can be concluded that physics teachers should establish and maintain a respectful, supportive and safe learning environment that is emotionally and physically conducive to learning in order to learn physics with great joy and success.

Keywords: Difficulty, Learning, Factor, Physics, Learning Difficulty in Physics

Introduction

Science and technology play an essential role since they have contributed to individual fulfillment, the well-being of communities, and to the health of nations. Thus, science education plays a key role to produce good citizens and skillful scientists needed to build a modern developed nation. In Myanmar, a developing country, it is necessary to develop through science, technology, and human resource capacity for rapid industrialization that will ensure economic growth and sustainable development of the country. One of the policies of Myanmar Education is to expand the various disciplines including science and technology required to build a country. Therefore, science education plays a vital role in Myanmar in developing the scientific attitude and potentialities of the citizen in order to be relevant to the national development goals.

Physics is the most basic science subject for all scientific and technological development worldwide (Adeyemo, 2010). According to Nteere, Kwaria and Kirimi (2017), it is the basis of technology and for effective living in the contemporary age of science and technology. Moreover, it is an important subject for economic, scientific and technological development and an essential part of the intellectual life of a man at the present day (Adeyemo, 2010). Thus, knowledge of physics is a requirement in order to fit in the present society. Through the learning of physics, students will acquire conceptual and procedural knowledge relevant to their daily life. Therefore, it is essential that every child should be given the opportunity to acquire at least basic knowledge and the concept of physics as a science. Therefore, physics is taught as a major school subject in both Basic Education and Higher Education in Myanmar in order to expand the science and technology

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required to build the country. However, it is found that there is a lack of acquiring the aims of teaching physics at the Basic Education High School Level in Myanmar. It can be inferred that high school students are deficient in the sound knowledge and skill of physics and the ability to apply physics in real life. In view of the foregoing reasons, the researcher made a decision in order to attempt to investigate the learning difficulties faced by physics students, the factors influencing the learning of the students, and to find out the underlying reasons for their difficulties in learning physics at the Basic Education High School Level.

Purposes of the Study

The main purpose of the study is to investigate the difficulties of students, the factors influencing their learning and the reasons of their difficulties in learning physics at the Basic Education High School Level. The specific objectives are as follows:

- To explore the existing difficulties encountered by students in learning physics at the Basic Education High School Level.
- To examine the difference in the difficulties of students in learning physics in terms of gender, grade, and school.
- To identify the factors influencing students in learning physics at the Basic Education High School Level.
- To assess the difference in the factors influencing students in learning physics in terms of gender, grade, and school.
- To find out the reasons why students have difficulty learning physics at the Basic Education High School Level.
- To explore ways to overcome the difficulties of students in learning physics.
- To give suggestions and recommendations in implementing the effective physics teaching learning process.

Research Questions

1. What difficulties do students encounter in learning physics at the Basic Education High School Level?
2. Is there any difference in the difficulties of students in learning physics in terms of gender?
3. Is there any difference in the difficulties of students in learning physics in terms of grade?
4. Is there any difference in the difficulties of students in learning physics in terms of school?
5. What factors are influencing students in learning physics at the Basic Education High School Level?
6. Is there any difference in the factors influencing students in learning physics in terms of gender?
7. Is there any difference in the factors influencing students in learning physics in terms of grade?
8. Is there any difference in the factors influencing students in learning physics in terms of school?
9. Are there any associations among the difficulties of students and the factors influencing their learning in physics?

Definition of Key Terms

Difficulty	-	A problem, or a thing or situation that causes problems (Hornby, 2015).
Learning	-	A persisting change in human performance potential which must come about as a result of the learner's experience and interaction with the world (Driscoll, 2005).
Factor	-	One of several things that cause or influence something (Hornby, 2015).
Physics	-	The most basic and fundamental natural science which involves universal laws and the study of the behavior and relationships among a wide range of important physical phenomena (Cutnell & Johnson, 2007).
Learning Difficulty in Physics	-	A learning difficulty in physics is a situation where a student fails to grasp a concept or idea and to perform a learning task in physics such as solving a problem and doing practical work and so on.

Scope

The study aimed at investigating the difficulties and influencing factors of the students and the reasons for their difficulties in learning physics at the Basic Education High School Level. This study, therefore, is geographically delimited to four Basic Education High Schools of Shwebo, Sagaing Region. The study focuses on Grade Ten and Grade Eleven students. Thus, the subjects are confined to (475) Grade Ten Students and (448) Grade Eleven Students from four selected high schools in (2018-2019) Academic Year.

Review of Related Literature

The Role of Physics in School Curriculum

Physics education enables students to attain the required skills for scientific thinking, producing knowledge, keeping track of developing technological changes, understanding and interpreting the events occurring in the nature. Physics is one of the sciences in the secondary school curriculum, which plays a vital role that helps in the achievement of some national goals (Salleh, 2004).

Aims and Objectives of Teaching Physics

In Myanmar, teaching physics at the Basic Education High School Level aims at acquiring the basic knowledge and skill of physics, acquiring competence in reasoning, comprehension, analysis, synthesis and evaluation, knowing and understanding the application of the basic knowledge and skill of physics to daily-life phenomena and national production, developing the enquiring mind and scientific attitude, and laying the foundation for further study in science and technology (Ministry of Education, MOE, 2007).

Difficulties of Students in Learning Physics at High School Level

According to Angell et al., (2004), students find physics difficult because they have to contend with different representations such as experiments, formulas and calculations, graphs, and conceptual explanations at the same time.

Adegoke (2017) revealed that physics students fail to construct meanings of the problem statement, and are unable to interlink the meaning of the statement. Moreover, the difficulties in solving physics problems are divided into four distinct categories. They are: comprehension, structure, operation, and judgment.

Influencing Factors on Learning Physics at High School Level

According to the various studies, there are a number of possible factors that contribute to the effective learning in physics. These factors are content-related factors such as the nature of the subject matter (Ornek, Robinson & Haugan, 2008), teacher-related factors such as positive attitude towards the subject and motivation of the teachers (Ogunmade, 2005), teaching-learning conditions such as the use of various teaching methods and instructional materials (Mills, 1991, as cited in Kipngeno, 2018), student-related factors such as interest and attitude towards the subject (Hidi & Harackiewicz, 2000; Nolen, 2003), parent-related factors such as supports for learning of children (Desforges & Abouchaar, 2003) and school-related factors such as adequate school facilities and teaching learning resources (Kelley et al., 2013, as cited in Baran, 2012).

Research Method

Subjects

The study was conducted in Shwebo, Sagaing Region. The participants were Grade Ten and Grade Eleven students from four Basic Education High Schools by using a simple random sampling method. The sample population for the study consisted of 923 physics students from the selected high schools (see Table 1).

Table 1 Demographic Data of Sample Population of 923 High School Students.

Characteristic of Sample Population	*n*	*Percent (%)*
Gender		
Male	364	39
Female	559	61
Grade		
Grade Ten	475	51
Grade Eleven	448	49
School		
A	238	26
B	232	25
C	242	26
D	211	23
Total	923	100

Instrumentations

The research instruments used for data collection in this study were survey questionnaires for both Grade Ten Physics students and Grade Eleven Physics students.

Questionnaire for Difficulties of Students in Learning Physics

In the study, this questionnaire was used to investigate the difficulties of students in learning physics at the Basic Education High School Level. It was divided into three dimensions and comprised of 21 Yes or No questions and two open-ended questions. The first dimension is concerned with the difficulties in understanding the subject, the second is related with the difficulties in solving problems and the last is with the difficulties in practical work, including 7 Yes or No questions in each dimension respectively.

Questionnaire for Factors Influencing Students in Learning Physics

The researcher made a decision to use this questionnaire to investigate the factors influencing the learning of the students in physics at the Basic Education High School Level. Instrument items in this questionnaire were content-related factors developed by Ekici (2016), teacher-related factors and parent-related factors developed by Gezahegn (2007), teaching-learning conditions developed by Buabeng (2015), student-related factors and school-related factors developed by Ogunmade (2005). The items selected to use in the questionnaire were modified to suit the purpose and context of this study. This questionnaire consists of (36) items: 12 items in teaching-learning conditions and parent-related factors with scales such as Never, Seldom, Sometimes, Often, Always and the other factors with five Likert scale such as Strongly Disagree, Disagree, Uncertain, Agree, and Strongly Agree.

After preparing the questionnaire and the test, experts review was conducted by three expert teachers from SUOE. After that, the questionnaires were modified. The questionnaires validated through pilot testing on (90) physics students at BEHS (3) Sagaing, Sagaing Region. The Cronbach's alpha of internal consistency for the difficulties of the students in learning physics was 0.789, and for the influencing factors on students' difficulties in learning physics was 0.767.

Procedure

First of all, the survey questionnaires were developed under the guidance of the supervisor in order to get the required data. For the validation of the instrument, the survey questionnaires were distributed to three experts from Department of Curriculum and Methodology in Sagaing University of Education. The instruments were modified regarding the advice and guidance of the experts before the pilot testing. After validating the instruments from the experts, a pilot testing was conducted on 28th September, 2018. According to the results of the pilot testing, some items were modified in order to be suitable for the main survey. Then, the major survey was conducted on 29th November, 2018. The questionnaires were distributed to the participants in order to collect the required data. After that, the researcher marked the responses with honesty. In the end, the data obtained from this survey were analyzed by using the Statistical Package for the Social Science (SPSS 20.0).

Data Analysis

The data were analyzed by using the descriptive statistics and inferential statistics; mean, standard deviation, one-way ANOVA (Analysis of Variance), *t* test for independent samples and Pearson *r* correlation matrix in order to investigate the difficulties and influencing factors of students and the reasons for their difficulties in learning physics.

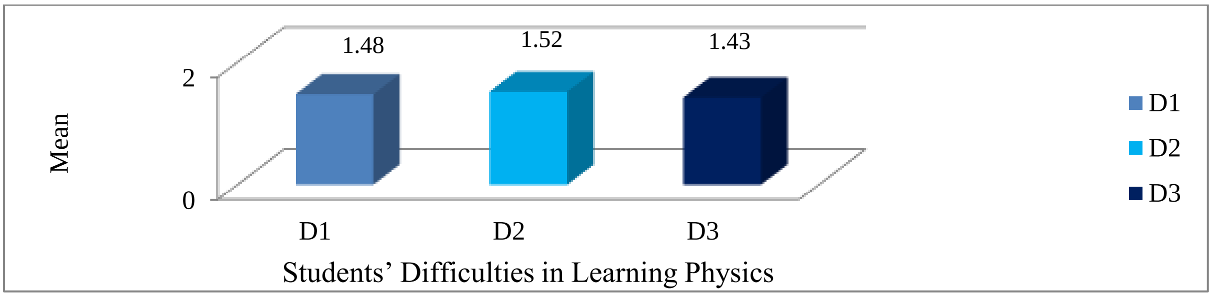
Findings

Findings on the Difficulties of Students in Learning Physics

Table 2 Means and Standard Deviations for Each Dimension of the Difficulties of Students in Learning Physics.

Dimension	*M*	*SD*	Mini	Max
Difficulties in understanding the subject	1.48	.223	7	14
Difficulties in solving problems	1.52	.230	7	14
Difficulties in doing practical work	1.43	.245	7	14

Table 2 and Figure 1 describe about the means of the difficulties of the students in understanding the subject, solving problems, and doing practical work in learning physics at high school level. In accordance with the results of the mean, it was found that the majority of students had difficulty solving problems in physics, accounting for 1.52 of the mean, whereas there was a minority of students faced the difficulty in doing practical work in physics, representing 1.43 of the mean.



Note. D1 = Difficulties in understanding the subject, D2 = Difficulties in solving problems, D3 = Difficulties in doing practical work

Figure 1 Comparison of the means for the difficulties of the students in learning physics

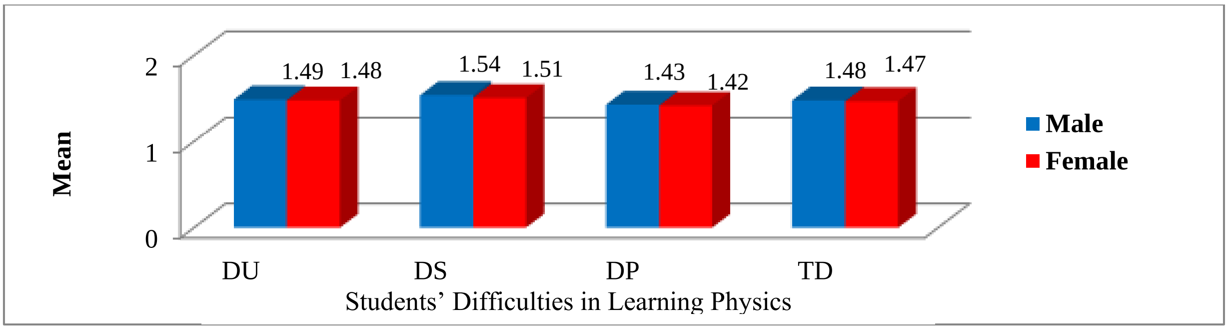
Findings on the Difficulties of Male and Female Students in Learning Physics

The independent samples *t* test was computed to determine gender differences in the difficulties of 329 males and 523 females in learning physics.

Table 3 Comparison of Male and Female Students on the Difficulties in Learning Physics.

Dimension	*M*	*SD*	*t*	*df*	*p*	*d*
Difficulties in understanding the subject			.33	850	.741	.02
Male	1.49	.235			(ns)	
Female	1.48	.215				
Difficulties in solving problems			1.95	850	.051	.13
Male	1.54	.233			(ns)	
Female	1.51	.228				
Difficulties in doing practical work			-.09	850	.929	.04
Male	1.43	.250			(ns)	
Female	1.42	.242				
Total difficulties in learning physics			.946	850	.348	.06
Male	1.48	.186			(ns)	
Female	1.47	.171				

Note. ns = not significant



Note. DU = Difficulties in understanding the subject
DS = Difficulties in solving problems
DP = Difficulties in doing practical work
TD = Total difficulties in learning physics

Figure 2 Comparison of the means of the difficulties of the students in learning physics in terms of gender

It can be seen in Table 3 and Figure 2 that there was no significant difference between male and female students' difficulties in understanding the subject, solving problems, and doing practical work in physics. Moreover, a significant difference does not exist in the total of the difficulties in learning physics. It can therefore be interpreted that male student faced the same number of difficulties in learning physics as female students did.

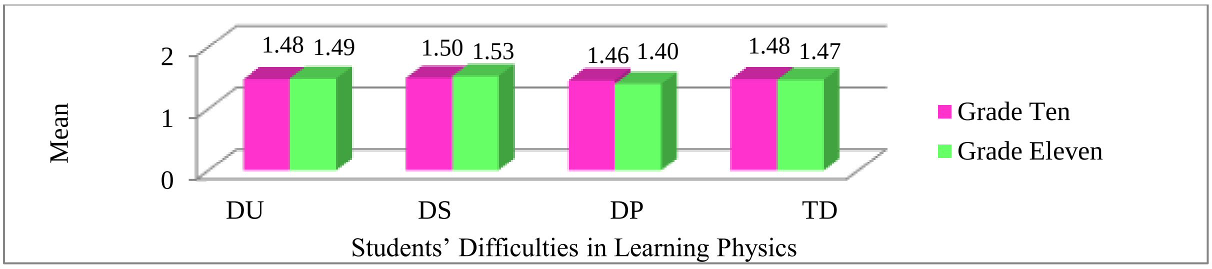
Findings on the Difficulties of Grade Ten and Grade Eleven Students in Learning Physics

In order to assess whether there was any significant difference in the difficulties in learning physics between 440 Grade Ten and 412 Grade Eleven students, or not, the independent samples *t* test was computed (see Table 4).

Table 4 Comparison of Grade Ten and Grade Eleven Students on the Difficulties in Learning Physics.

Dimension	***M***	***SD***	***t***	***df***	***p***	***d***
Difficulties in understanding the subject			-.677	850	.499	.04
Grade Ten	1.48	.219			(ns)	
Grade Eleven	1.49	.227				
Difficulties in solving problems			-1.78	850	.075	.13
Grade Ten	1.50	.228			(ns)	
Grade Eleven	1.53	.232				
Difficulties in doing practical work			3.44	850	.001**	.25
Grade Ten	1.46	.247				
Grade Eleven	1.40	.240				
Total difficulties in learning physics			.526	850	.599	.06
Grade Ten	1.48	.171			(ns)	
Grade Eleven	1.47	.184				

Note. ** $p < .01$, ns = not significant



Note. DU = Difficulties in understanding the subject
DS = Difficulties in solving problems
DP = Difficulties in doing practical work
TD = Total difficulties in learning physics

Figure 3 Comparison of the means of the difficulties of students in learning physics in term of grade

With regard to Figure 3, it was apparent that there was no significant difference between Grade Nine and Grade Ten students' difficulties in understanding the subject and solving problems in physics. However, it was found that there was significant difference between Grade Ten and Grade Eleven students' difficulties in doing practical work in physics at .001 level (p = .001). Therefore, it was found that the difficulties of Grade Ten students in understanding the subject and solving problems in physics were equivalent to that of Grade Eleven students, whereas there were more Grade Ten students than Grade Eleven students who faced difficulties in doing practical work in physics. Furthermore, it can be generally interpreted that Grade Ten students faced the same difficulty in learning physics as Grade Eleven students had since there was no significant difference in the total of the difficulties of Grade Ten and Grade Eleven students in learning physics.

Findings on the Difficulties of Students in Four High Schools in Learning Physics

The one-way ANOVA was conducted to measure whether there are significant differences among the difficulties of 852 students from the selected schools in learning physics.

Table 5 One–Way Analysis of Variance Table Comparing the Difficulties of Students in Four High Schools in Learning Physics.

Source	*df*	*SS*	*MS*	*F*	*p*
Difficulties in understanding the subject					
Between Groups	3	.742	.247	5.060	.002**
Within Groups	848	41.456	.049		
Total	851	42.199			
Difficulties in solving problems					
Between Groups	3	.218	.073	1.374	.249
Within Groups	848	44.758	.053		(ns)
Total	851	44.976			
Difficulties in doing practical work					
Between Groups	3	.910	.303	5.099	.002**
Within Groups	848	50.471	.060		
Total	851	51.382			
Total difficulties in learning physics					
Between Groups	3	.557	.186	6.007	.000***
Within Groups	848	26.204	.031		
Total	851	26.760			

Note. $^{**}p < .01$, $^{***}p < .001$, ns = not significant

According to Table 5, ANOVA results provide information about there was a significant difference among the four high schools concerning the difficulties of the students in understanding the subject, $F(3,848) = 5.060$, $p < .01$, concerning the difficulties of the students in doing practical work in physics, $F(3,848) = 5.099$, $p < .01$, and concerning the total of the difficulties in learning physics, $F(3,848) = 6.007$, $p < .001$. However, it was seen that there was no significant difference among the students in the selected schools concerning the difficulties in solving physics problems, $F(3,848) = 1.374$. Therefore, it can be interpreted that the difficulties of the students in learning physics except in solving problems in physics differed among the selected schools.

Findings from the Factors Influencing the Students in Learning Physics

For exploring the factors influencing on the 852 students in learning physics, descriptive statistics was employed.

Table 6 Means and Standard Deviations for the Factors Influencing Students in Learning Physics.

Factor	*M*	*SD*	Mini	Max
Content-related Factors	2.74	.666	1	5
Teacher-related Factors	3.10	.333	2	5
Teaching Learning Conditions	2.79	.413	2	4
Student-related Factors	2.74	.459	1	4
Parent-related Factors	3.07	.334	2	5
School-related Factors	3.04	.443	2	4

It was found in Table 6 that among the means of the factors, the mean of teacher factors was the highest and that of content factors, and student factors were the lowest. Thus, it can be interpreted that the most influencing factors of students in learning physics were teacher factors, whereas content factors and student factors were the least influencing factors among those factors in learning physics.

Findings from the Factors Influencing Male and Female Students in Learning Physics

To examine whether there are significant gender differences in the factors influencing on 327 males and 523 females in learning physics, independent samples *t* test was computed.

Table 7 Comparison of Male and Female Students on the Factors Influencing Students in Learning Physics.

Factor	*M*	*SD*	*t*	*df*	*p*	*d*
Content-related Factors			2.59	850	.01*	.19
Male	2.82	.671				
Female	2.69	.660				
Teacher-related Factors			-1.60	850	.11	.12
Male	3.07	.343			(ns)	
Female	3.11	.327				
Teaching-learning Conditions			.928	850	.353	.07
Male	2.81	.419			(ns)	
Female	2.78	.409				
Student-related Factors			.306	850	.760	.02
Male	2.75	.464			(ns)	
Female	2.74	.455				
Parent-related Factors			.303	850	.762	.03
Male	3.07	.353			(ns)	
Female	3.06	.322				
School-related Factors			2.349	850	.019*	.16
Male	3.08	.469				
Female	3.01	.423				

Note. *p < .05, ns = not significant

Table 7 reveals that there were significant differences between male and female students concerning content factors (p = .01), and school factors (p = .019) at .05 level but not in teacher factors, teaching learning conditions, student factors and parent factors. Therefore, it was clearly seen that content and school factors were more likely to influence male students than female students in learning physics and similar proportions of teacher factors, teaching learning conditions, student factors and parent factors influenced male and female students in learning physics.

Findings from the Factors Influencing Grade Ten and Grade Eleven Students in Learning Physics

Independent samples *t* test was computed in order to assess whether the factors influencing 440 Grade Ten and 412 Grade Eleven students are significantly different or not.

Table 8 Comparison of Grade Ten and Grade Eleven Students on the Factors Influencing the Students in Learning Physics.

Factor	***M***	***SD***	***t***	***df***	***p***	***d***
Content-related Factors			-3.28	850	.001**	.23
Grade Ten	2.67	.656				
Grade Eleven	2.82	.669				
Teacher-related Factors			-2.48	850	.014*	.15
Grade Ten	3.07	.338				
Grade Eleven	3.12	.327				
Teaching-learning Conditions			1.11	850	.266	.07
Grade Ten	2.81	.425			(ns)	
Grade Eleven	2.78	.400				
Student-related Factors			-1.39	850	.166	.08
Grade Ten	2.72	.448			(ns)	
Grade Eleven	2.76	.469				
Parent-related Factors			1.13	850	.260	.09
Grade Ten	3.08	.344			(ns)	
Grade Eleven	3.05	.324				
School-related Factors			-2.21	850	.028*	.14
Grade Ten	3.01	.431				
Grade Eleven	3.07	.453				

Note. $*p < .05$, $**p < .01$, ns = not significant

In accordance with Table 8, it can be seen that there were significant differences between Grade Ten and Grade Eleven students for content factors at .01 level (p = .001), and for teacher factors (p = .014), and school factors (p = .028) at .05 level but not for teaching and learning conditions, student factors and parent factors. Therefore, it can be interpreted that more Grade Eleven students than Grade Ten students were influenced by content, teacher, and school factors in learning physics.

Findings from the Factors Influencing Students in Four High Schools in Learning Physics

In order to measure whether there were significant differences among the factors influencing on 852 students from the selected schools, a one-way ANOVA was executed.

Table 9 One–Way Analysis of Variance Table Comparing the Factors Influencing the Students in Four High Schools in Learning Physics.

Source	*df*	*SS*	*MS*	*F*	*p*
Content-related Factors					
Between Groups	3	6.297	2.099	4.794	.003**
Within Groups	848	371.322	.438		
Total	851	377.619			
Teacher-related Factors					
Between Groups	3	1.709	.570	5.198	.001**
Within Groups	848	92.916	.110		
Total	851	94.625			
Teaching-learning Conditions					
Between Groups	3	.578	.193	1.132	.335
Within Groups	848	144.447	.170		(ns)
Total	851	145.025			
Student-related Factors					
Between Groups	3	1.670	.557	2.661	.047*
Within Groups	848	177.322	.209		
Total	851	178.992			
Parent-related Factors					
Between Groups	3	.756	.252	2.263	.080
Within Groups	848	94.446	.111		(ns)
Total	851	95.202			
School-related Factors					
Between Groups	3	3.859	1.286	6.692	.000***
Within Groups	848	163.029	.192		
Total	851	166.888			

Note. *$p < .05$, **$p < .01$, ***$p < .001$, ns = not significant

It is clear in Table 9 that ANOVA results describe about there was a significant difference among the students in four high schools concerning the content factors and teacher factors influencing in learning physics, F (3,848) = 4.794, 5.198, p < .01, concerning the student factors influencing in learning physics, F (3,848) = 2.661, p < .05, and concerning the school factors influencing in learning physics, F (3,848) = 6.692, p < .001. However, a significant difference did not exist among the schools concerning the teaching learning conditions and parent factors. Thus, it was clearly seen that the content factors, teacher factors, student factors, and school factors that influence the students in four high schools in learning physics differed, whereas teaching learning conditions and parent factors of the students were equivalent among the students in the four high schools.

Findings from the Reasons for the Difficulties of the Students in Learning Physics

To find out the reasons for the difficulties of the students in learning physics, Pearson product-moment correlation was computed and Table 10 shows the correlations among the difficulties of 852 students and the factors influencing on learning physics.

Table 10 Correlations between Difficulties of the Students and Factors Influencing in Learning Physics.

Variable	DU	DS	DP	TD
Content Factors	.321** (p = .000)	.197** (p = .000)	.180** (p = .000)	.303** (p = .000)
Teacher Factors	-.027	-.007	-.084* (p = .014)	-.056
Teaching-learning Conditions	-.089* (p = .009)	-.010	.020	-.029
Student Factors	-.151** (p = .000)	-.208** (p = .000)	-.192** (p = .000)	-.242** (p = .000)
Parent Factors	-.012	-.053	-.037	-.051
School Factors	-.074* (p = .031)	-.004	-.131** (p = .000)	-.093** (p = .006)

Note. DU = Difficulties in understanding the subject
DS = Difficulties in solving problems
DP = Difficulties in doing practical work
TD = Total difficulties in learning physics

According to Table 10, there were positive correlations between the content factors and all dimensions and total of the difficulties of the students in learning physics at the .01 level, amounting to r (850) = .321, .197, .180, .303, p = .000. Therefore, it can be interpreted that if the content factors are high, the difficulties of the students in learning physics will increase and if the content factors are low, the difficulties of the students in learning physics will decrease. On the other hand, there was a negative correlation between the teacher factors and the difficulties of the students in doing practical work in physics at .05 level, showing r (850) = -.084, p = .014, not in other difficulties. This means that if the teacher factors are high, the difficulties of the students in doing practical work in physics will decline. Furthermore, there was a negative correlation between the teaching learning conditions and the difficulties of the students in understanding the subject in physics at .05 level, accounting for r (850) = -.089, p = .009. Thus, it was found that if the teaching learning conditions are great, the difficulties of the students in understanding the subject in physics will drop off. Similarly, there were negative correlations between the student factors and all dimensions and total of the difficulties of the students in learning physics at .01 level, representing r (850) = -.151, -.208, -.192, -.242, p = .000. Therefore, it was found that if the student factors are high, the difficulties of the students in learning physics will decrease or if the student factors are low, the difficulties of the students in learning physics will increase. Besides, there was also a negative correlation between school factors and the difficulties of the students in learning physics at .05 level except in solving problems, contributing to r (850) = -.074, p = .021, r (850) = -.131, p = .000, r (850) = -.093, p = .006. Thus, it was seen that if the school factors are high, the difficulties of the students in learning physics, except in solving problems in physics will decrease and vice versa. On the contrary, there was no significant correlation between the difficulties of the students' parent factors.

Discussion and Suggestions

Discussion

The study aimed at investigating the difficulties of the students, factors influencing the students and finding out the reasons for their difficulties in learning physics at Basic Education High School Level.

In accordance with the results of the study, it was clearly seen that there was nearly two third of the total number of students who experienced difficulties in learning physics at the Basic Education High School Level. The greatest number of students faced the difficulties in solving problems in physics such as the difficulties in selecting the formulae to solve the problem, in classifying the given facts in the problem, in solving the rephrased problems, in understanding the meaning of a problem, in arriving at the correct answer and in computing the complex problems. Problem solving is at the heart of physics education (Adegoke, 2017). Thus, if a student is good at solving problems in physics, it can be interpreted that the physics teacher can implement the objectives of teaching at high school level with a great success. Therefore, physics teachers should be well aware how students face difficulties in learning physics and try to be able to handle it in order to achieve the objectives of teaching of physics.

Additionally, it was found that the difficulty of male students in learning physics was approximately equivalent to that of female students. It supposes that this is because both male and female students had the same interest, attitude towards the subject and mathematics skills in learning physics. Furthermore, it can generally be interpreted that both Grade Ten and Grade Eleven students faced an equal amount of difficulty in learning physics at the Basic Education High School Level.

Moreover, it was seen that there were many factors that can make the learning of students in physics progress and success. These factors were the nature of the subject such as complex and abstract concepts in physics, positive attitude of the teacher towards the subject, teacher’s motivation to be interested in the subject and to active participate actively in the teaching learning process, teacher’s explication, the use of instructional materials, student’s interest, student’s attitude towards the subject, student’s mathematics skills, active participation of the students in leaning, parent’s support in child’s learning such as giving enough study time, provision of necessary materials, parent’s encouragement and interest in child’s learning, provision of sufficient school facilities such as buildings, classrooms, furniture, laboratories and teaching learning resources such as instructional materials and apparatuses.

With regard to the findings of the study, it was seen that students experienced difficulties in learning physics because of the complex and abstract nature of physics, too much calculations in physics, lack of interest, mathematics skills and negative attitude of the students towards the subject, and the lack of the adequate school facilities and instructional materials. Thus, physics teachers should take cognizance of the difficulties of the students and reasons for their difficulties in learning physics and apply them in teaching the students with learning difficulties in order to lessen their difficulties and improve their abilities in learning physics.

Suggestions

In accordance with the findings of the study, the researcher believes that physics teachers should take some considerations into teaching physics at the Basic Education High School Level in Myanmar. Firstly, in order to teach the students to be able to grasp the fundamental concepts of physics, physics teachers should make students adequately comprehend the fundamental concepts, laws, and basic principles of physics and should encourage them to memorize the new vocabularies, symbols, and units in physics. Secondly, they should endeavor to teach students to acquire the adequate understanding of the concepts and techniques for solving problems and to select the data that are required to solve the problem. Furthermore, they should train students how to solve the physics problems with the easy way in the classroom. Students should also be given the ample time and opportunity to solve the physics problems during the process of learning physics. Moreover, they should often give students homework to solve the related problems after a unit and also a note on key topics in the lesson in order for the students to get the key and fundamental concepts in physics. Further research that investigates the difficulties of the students in learning physics at the Basic Education High School Level should be conducted by using achievement tests, or by case study research design. It will also be required to study with a larger sample size in other regions of the country. In addition, further research with other influencing factors on learning physics should be conducted since there may be other factors that influence students in learning physics.

Conclusion

Physics is an important subject for economic, scientific and technology and can help students to develop conceptual and procedural knowledge relevant to their daily life (Erinosho, 2013). This study aimed at investigating the difficulties, influencing factors of the students and the reasons of their difficulties in learning physics at the Basic Educational High School Level. The findings revealed that students are likely to have the highest level of difficulty in solving physics problems. Therefore, physics teachers should give the students the practice of being able to read the statement of the problem properly, carefully and thoroughly, to identify the given facts and the unknown facts, and to think the meaning of the problem critically during the instruction. Moreover, the findings from the study provide insight about attitude towards to the subject, motivation, encourage and assistance of a teacher are one of the most important features that can promote the students' ability and performance in learning physics. Similarly, students experience difficulties in learning physics due to the complex and abstract nature of physics and too much calculation. Thus, physics teachers should explain the lessons to students by associating with the daily life and give examples from daily life in order to acquire the sound fundamental concepts of physics and the ability in order to apply physics in their daily lives. Moreover, lack of interest, positive attitude and mathematics skills of the students can be the reasons why they had difficulty learning physics. Therefore, physics teachers should strive to encourage students to be interested in physics and to appreciate the importance of physics in their daily lives. For these reasons, this study will provide valuable information for physics teachers about how they can effectively teach physics, how they deal with the students of the different abilities and how they facilitate the learning difficulties of the students. In the same way, through this study, school administrators can grasp at the ways to generate the new brilliant generations and scientists. Likewise, it can give an opportunity to high school students to notice their own abilities and difficulties in learning physics. Thus, the researcher strongly believes that this study will serve as a worthful way for the journey to the improvement of the science education.

Acknowledgements

I would like to express my heartfelt gratitude and sincerest appreciation to Dr. Myat Myat Thaw (Rector, Sagaing University of Education), Dr. Khin Hnin Yee and Dr. San San Lwin (Pro-Rectors, Sagaing University of Education) who enabled me to undertake the study. I want to convey my wholehearted respect and indebtedness to Dr. Soe Than (Retired Professor and Head of Department of Curriculum and Methodology, Sagaing University of Education) for his aspirations and valuable contributions to shape the quality of this study. I would like to expend my reserved and immense gratitude to Dr. Wai Wai Oo (Professor and Head of Department, Department of Curriculum and Methodology, Sagaing University of Education) who gave the invaluable advice and inspiration for performing the study.

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THE IMPACT OF DIFFERENTIATED INSTRUCTION ON STUDENTS' ACHIEVEMENT IN MATHEMATICS AT MIDDLE SCHOOL LEVEL

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Abstract

The purpose of this study is to investigate the impact of differentiated instruction on students' achievement in mathematics at middle school level. Both quantitative and qualitative research methods were conducted to obtain the required data. The design adopted for quantitative study was one of the quasi-experimental designs, non-equivalent control group design. The subjects were (30) Grade Six students from BEHS (Tamarkone) in Wundwin Township, (67) Grade Six students from BEMS (1) in Wundwin Township, (140) Grade Six students from BEHS (1) in Thazi Township and (59) Grade Six students from BEHS (Khetmauk) in Thazi Township. The instruments used in the study were pretest, learning style inventory, posttest, observation checklist and interview questions. Experimental groups were taught with differentiated instruction, while the control groups were taught the same concept using formal method. Students' mathematics achievement was compared using one-way ANCOVA. The results showed that there were significant differences between middle school students who receive differentiated instruction and those who do not receive it on the scores of mathematics achievements for selected schools. The questionnaires findings showed that Grade Six students have positive attitudes towards mathematics learning through differentiated instruction. The interview findings pointed out that they propounded it is very suitable and valuable instructional design for teaching of mathematics.

Keywords: Differentiated Instruction, Mastery Learning Style, Understanding Learning Style, Interpersonal Learning Style, Self-expressive Learning Style, Mathematics Achievement.

Introduction

Gregory and Chapman (2002, cited in Dixon, Yssel, Connell & Hardin, 2014) expressed that it is an important role in education to change and renewal. Factors that contribute to the ever-changing classroom landscape include common core state standards, standards-based classrooms, high expectations and accountability for all students, multicultural diversity, recognition of different learning styles and multiple intelligences, and rapid societal and technological changes. Therefore, teachers should consider new instructional design for the students of different learning abilities.

Statement of the Problem

In Myanmar's schools, all students have the opportunities to learn the same content in exactly the same way. The students may try to learn the content in their own ways according to their learning styles. Therefore, a major issue in the classroom teaching is whether the specific learning differences of each student are being met. Differentiated instruction can help teachers to promote academic achievement in students.

Purposes of the Study

The main purpose of this study is to investigate the impact of differentiated instruction on students' achievement in mathematics at middle school level. The specific purposes are as follows.

1. To develop a differentiated instructional design for middle school students.
2. To explore the impact of differentiated instructional design on middle school students' achievement in mathematics.

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3. To investigate students' attitudes towards mathematics learning through differentiated instruction.
4. To find out the teachers' attitudes for implementing differentiated instruction in the mathematics classroom.
5. To give suggestions and recommendations for the improvement of mathematics teaching.

Research Questions

This study aims to answer the following research questions.

1. Is there a significant difference in the mathematics achievement between middle school students who received differentiated instruction and those who did not receive it?
2. How do the students who received differentiated instruction have attitudes towards mathematics learning through differentiated instruction?
3. How do the teachers who taught differentiated instruction have attitudes for implementing differentiated instruction in the mathematics classroom?

Scope of the Study

The present study is geographically restricted to two townships in Meiktila District: Wundwin and Thazi. Participants in this study are Grade Six students who are learning mathematics with reformed curriculum and junior teachers from the selected schools in the (2021-2022) Academic Year in which junior teachers' teaching and learning activities are linked with differentiated instruction. In this study, chapter one to four in Grade Six Mathematics Textbook Volume (I) and chapter one to two in Grade Six Mathematics Textbook Volume (II) were selected to use in the experiment.

Definition of Key Terms

The key terms used in this study are presented as follows.

Differentiated Instruction. Differentiated Instruction is described as student-centered and can be used to reach and engage students based on their diverse interests, strengths, weaknesses and how they learn best (Tomlinson, 2001, cited in Amadio, 2014).

Mastery Learning Style. The mastery learning style describes learning that focuses on remembering basic facts and details (Dodge, 2005, cited Thomas & Brunsting, 2010).

Understanding Learning Style. Understanding learning style describes learning that develops reasoning skills and an understanding of concepts, patterns, and proofs for ideas (Dodge, 2005, cited Thomas & Brunsting, 2010).

Interpersonal Learning Style. The interpersonal learning style describes learning from approaches that emphasize cooperative learning, real-life contexts, and connections to everyday life (Dodge, 2005, cited Thomas & Brunsting, 2010).

Self-expressive Learning Style. The self-expressive learning style describes learning that produces original work using creative application and synthesis of old skills and information (Dodge, 2005, cited Thomas & Brunsting, 2010).

Mathematics Achievement. The achievement test score which represents mathematics achievement of the student is defines as mathematics achievement (Dail, 2008).

Significance of the Study

Htoo Thant (2018) said that Myanmar government has continued changes and improvement from the by-heart learning with good marks and high grades to the system which is leading towards learning about twenty first century skills such as communication, collaboration, creativity and problem solving, critical thinking, and citizenship in education sector. In Myanmar, KG+12 system had been introduced.

Glasgow, McNary and Hicks (2006, cited in McLean, 2010) said that the curriculum changes, teachers cannot recognize the multitude of differences in individual students within a given classroom, but often they have failed to integrate these differences into their teaching strategies. This research is expected to give some benefits for teachers and students in teaching-learning process. By using differentiated instruction, every student is expected to be more involved in learning mathematics and feel happier in doing of practical works.

Review of Related Literature

Background Philosophies for Developing Differentiated Instruction

Educational philosophies related to this study are pragmatism, progressivism and constructivism.

Differentiated instruction is rooted in pragmatism. According to pragmatism, knowledge gained through doing, acting and living is useful and it emphasizes the functional knowledge and understanding. (Wilson, Kenneth & Bennett, 1994, cited in Magableh & Abdullah, 2020). Thus, it fosters the learners to be creative and constructive by nature and to be an active participant in educational process.

In progressivism, children's interests and feelings are the center of education, instead of past knowledge and value (IDCJ, 2004). Thus, students' practice in instructional procedures through emphasizing their interests and feelings is conducted in implementing differentiated instruction process.

Both Vygotsky's and Piaget's theories are also constructivist, emphasizing that children actively construct knowledge and understanding rather than being passive receptacles (Savery & Duffy, 2001). Therefore, social interaction plays a fundamental role in the proposed design of differentiated instruction.

Background Learning Theories for Developing Differentiated Instruction

Six learning theories are taken into consideration in the proposed differentiated instructional design.

Piaget's (1936, cited in McLeod, 2008) theory of cognitive development explains how a child constructs a mental model of the world. Piaget regarded as cognitive development as a process which occurs due to biological maturation and interaction with the environment. Thus, the proposed design for differentiated instruction is concerned with the developmental aspect of human learning and the way in which content is structured for learning.

The approach of differentiated instruction is held by the socio-cultural learning theory which is based on the work of Russian psychologist Lev Vygotsky (1962, 1978, cited in Burkett, 2013). The socio-cultural learning theory holds that the previous experiences and culture of the learner are critical because these influence the learning process for each individual. Therefore, social interaction is essential to the development of cognition.

Differentiated instruction is grounded Gardner's multiple intelligence theory. The theory is based on the belief that all of the human intelligences should be recognized and nurtured as well as all combinations of the multiple intelligences (Armstrong, 1994, cited in Burkett, 2013). Therefore, teachers should be recognized and nurtured their students according to their multiple intelligences to adapt learning.

Brain-based learning has important implications for the differentiated classroom. The students must be in an environment conducive to learning. Students need to be challenged at appropriate levels in order for learning to occur. The brain needs to create its own understanding of ideas and skills by being presented with the concept to the facts so the learner can see the relationship between these and thus connect new information to prior knowledge (Burkett, 2013). Thus, the three concepts of brain-based learning can be considered in differentiated instruction depending on student levels of readiness, the needs of the teacher, and the nature of the content being taught.

According to Kolb (1984, cited in ETEY, 2016), experiential learning theory defines learning as the process whereby knowledge is created through the transformation of experience. Therefore, as different learners come into the classrooms with different backgrounds, the learning style of each student is one important fact that should be taken into account in implementing successful teaching and learning process.

Customized learning is really more focused on how students can be guided to initiate their own projects. It encourages them to willingly seek out knowledge according to their own drive and choice as opposed to how other methods give emphasis to specific cognitive and literary disciplines for the sake of the students' general progress (LLA, 2019).Therefore, the concept of customized learning theory is considered in proposed differentiated instructional design to encourages the students seek out knowledge through their own drive and choice, emotions, ambitions, and draw out their innate abilities to cope with actual life challenges.

Background Teaching Models for Developing Differentiated Instruction

Seven teaching models are taken into consideration in the proposed differentiated instructional design.

The four components of Glaser's model are instructional objectives (IO), entering behavior (EB), instructional procedures (IP) and performance assessment (PA) (Khin Zaw, 2001). So, Glaser's basic teaching model is adopted for the major components involved in the proposed instructional design for differentiated instruction.

Professor Dr. Talyzina's neo-cybernetic model is composed of instruction objectives, entering behavior, selection of knowledge, technological devices, step-by-step psychological theory, teaching algorithms, feedback phase, regulation (Khin Zaw, 2001). Therefore, in developing proposed instructional design for differentiated instruction, the ideas of Talyzina's model are mainly adopted for the first component (learning objectives), second component (pre-assessment, third component (instructional procedures) and feedback phase of proposed design.

According to Tomlinson's DI model, students' readiness, interests and learning profiles are important for teachers to recognize when providing instruction as they influence how students make sense of new information. Moreover, teachers must adapt the curricular elements, content, process and products according to students' readiness, interests and learning profiles (Erickson, 2010). Therefore, in developing proposed instructional design for differentiated instruction, the ideas of Tomlinson's model are mainly adopted for proposed design.

Dr. Khin Zaw's multimodal theoretical constructs consists of five main principles or components namely, channel capacity, brain resilience, redundancy, unitizing/symbolizing modes, and diffusing/re-synthesizing mode (Khin Zaw, 2001). The third component of instructional procedures in proposed design includes positive or negative redundancy. Moreover, the third component in the proposed design bases utilizing/symbolizing modes and diffusing/ resynthesizing modes. Therefore, this model is adopted for the major components involved in the proposed instructional design for differentiated instruction.

According to To-With-By Model, stage one, or tier one, is “to” that is main lesson. In other words, “to” means the direction of instruction. Stage two, or tier two, is the “with” stage. “With” means the guided instruction. Stage three, or tier three, is the “by” stage. “By” means self-directed learning (Campbell, 2009). Therefore, in developing proposed instructional design for differentiated instruction; the ideas of To-With-By Model are mainly adopted for the third component (instructional procedures) of proposed design.

The ten-body brain-compatible elements of the highly effective teaching (HET) model are absence of threat/ nurturing reflective thinking, sensory-rich "being there" experiences, meaningful content, enriched environment, movement to enhance learning, choices, adequate time, collaboration, immediate feedback, and mastery (application) (Kovalik, 2017). Learning is a relationship between brain and body to enhance learning through their emotion, performance and movement. Therefore, in developing proposed instructional design for differentiated instruction, the ideas in ten elements in HET model are mainly adopted in the proposed instructional design.

The goal of Thomas and Brunsting (2010) was to make a deep connection between mathematics and learning styles. They identified four distinct styles of mathematics learners such as mastery math students, understanding math students, self-expressive math students and interpersonal math students. Therefore, in developing proposed instructional design for differentiated instruction, the ideas of grouping based on four mathematical learning styles are mainly adopted in the proposed instructional design.

Proposed Instructional Design for Differentiated Instruction

In proposed differentiated instructional design, there are five main components. Each of them is briefly explained as follows.

Learning objectives. In this component, learning objectives are identified based on Bloom’s Taxonomy of educational objectives and skills in twenty first century.

Pre-assessment. In analyzing pre-assessment component, the instructor assesses the students’ background knowledge.

Whole class instruction (grouping). The instructor assesses background knowledge such as a whole class. In whole class learning, the instructor provides students with opportunities to work collaboratively as a whole class. The students are grouped homogeneous groups based on four mathematical learning styles within one lesson.

Questioning (scaffolding strategy). The instructor uses questions as a scaffolding activity to provide support, assess progress and be adjusted according to student’s needs in discussion or interaction.

Collaborative learning (learning activities). The instructor uses a collaborative learning strategy to involve student groups in a whole class activity. Each group brainstorms responses related to the questions. Then, the class discusses and reflects on the whole class effort.

Learning process. Learning process is acquiring new knowledge, understanding, behaviours, skills, values and attitudes.

Small group instruction (grouping). When considering for implementing mathematics activities, the instructor uses small group activities. In small group learning, students are assigned to four groups based on commonalities with regard to their respective learning style (mastery, understanding, interpersonal and self-expressive).

Cooperative learning (scaffolding strategy). The instructor uses cooperative learning to incorporate scaffolding in homogeneous groupings that focus on providing peer and resource supports.

Task rotation (learning activities). The instructor use task rotation based on their four learning styles. The tasks are based on four different strategies such as mastery strategies, understanding strategies, interpersonal strategies and self-expressive strategies.

Students' Reflection. Student's reflection is to be aware of their own thinking processes and to be able to make transparent to others. It is an assessment why they learned and how they learned and what needs to be done as a result.

Partners/ Individuals (grouping). When considering for implementing students' reflection, the instructor gives two choices for students such as partners or individuals.

Graphic organizers/Think-alouds (scaffolding strategy). In working with partners, the instructor uses graphic organizers to provide multiple formats to help students organize thinking and research. For individual learning experiences, the instructor uses think-alouds to provide opportunities for students to engage in metacognitive activities while being provided with support and guidance.

Discussion breaks/ Learning logs (learning activities). In working with partners, the instructor uses discussion breaks to provide an opportunity for students to discuss ideas, questions and information. In individual learning experiences, the instructor uses learning logs to track and reflect their learning.

Formative Assessment. The instructor can assess students' learning throughout the learning process of the model by formative assessment strategies such as asking questions, observing students' facial expressions and body language, and by listening students' discussion.

Summative Assessment. The students work more independently. After the evaluation process, the instructor examines whether the students achieved the desired learning outcomes or not. If they achieve these outcomes, they are moved to the next content. Unless they achieve these outcomes, feedback is made to provide next lesson preparation (See Figure 1).

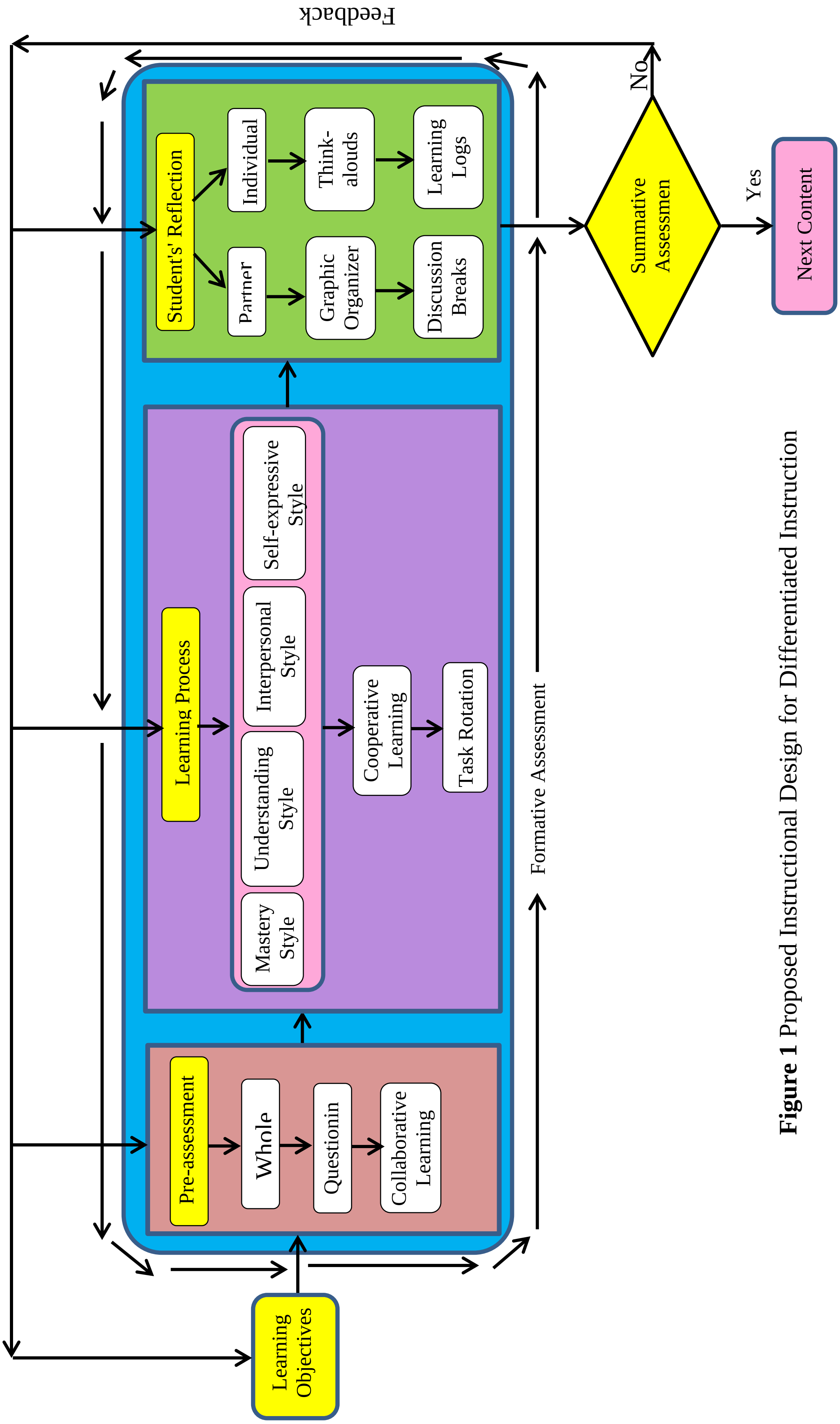

Figure 1 Proposed Instructional Design for Differentiated Instruction

Research Method

Both quantitative and qualitative research methods were used in this study.

Research Design

The aim of this study is to investigate the impact of differentiated instruction on students' achievement in mathematics at middle school level. This study was adopted by using the explanatory sequential mixed method (QUAN→qual) design.

Quantitative Research Method

Quantitative research method was used to analyze students' mathematics achievement and higher order thinking skills and lower order thinking skills. The non-equivalent control group design, one of the quasi-experimental designs, was adopted in this study.

Population and Sample. Grade Six students were selected from the selected schools as the subjects. Table 1 shows population and sample of the quantitative study.

Table 1 Population and Sample

Selected Township	Selected School	No. of population	No. of Subject
Wun Dwin	B.E.H.S (Tamarkone)	30	30
	B.E.M.S (1) Wundwin	67	67
Thazi	B.E.H.S(1) Thazi	140	140
	B.E.M.S (Khetmauk)	59	59

Instruments. Pretest, learning style inventory and posttest were used as quantitative research instruments.

Pretest. The pretest question consists of (14) multiple choice items and (5) short questions. Test items were constructed based on Grade Four mathematics textbook. The total score for pretest is (30) marks. Time duration is (45) minutes, (1) period.

Learning style inventory. In this study, the inventory for four learning styles was used by Thomas and Brusting (2010). Each component consisted of (10) items on five-point Likert-type scale from (1) to (5), totally (40) items were included in this inventory.

Posttest. The posttest question consists of (13) multiple choice items and (7) short questions. Test items were constructed based on Grade Six mathematics textbook. The total score for posttest is (30) marks. Time duration is (45) minutes, (1) period.

Learning materials. To construct learning activities for differentiated instruction, four chapters were selected from Grade Six mathematics textbook Volume (I) and two chapters were selected from Grade Six mathematics textbook Volume (II).

Data Analysis. The Statistical Package for Social Science (SPSS) Version 20 was used to analyze the quantitative data. The data were analyzed by using one-way analysis of covariance (One-Way ANCOVA).

Qualitative Research Method

Qualitative research method was used to investigate attitudes of students and teachers.

Population and Sample. Students who participated in the experimental groups and teachers who taught the experimental groups were selected as the subjects.

Instruments. Observation checklist, questionnaire and interview were used.

Classroom Observation Checklists. In this study, controlled observation which is non-participant and overt will be used. The 'yes' or 'no' checklist was used for assessing differentiated instruction, where the behavior never occurred is marked '0', the behavior occurred is '1'.

Questionnaire. Five-point Likert-type scale from (1) to (5) was used to indicate the attitudes towards mathematics learning through differentiated instruction.

Interview. The first part of interview question is about the demographic information and the second one is about the attitudes of teachers towards the proposed differentiated instructional design.

Data Analysis. In this study, coding analysis was used to analyze the qualitative data. Thematic analysis in content analysis was used to establish the existence and frequency of concepts, most often represented by words of phrases in a text.

Pilot Study

Pilot study was conducted with Grade Six students and middle school teachers in B.E.H.S (Branch-Shaw Pin), Meiktila District. The internal consistency (Cronbach's Alpha) of the pretest, posttest and students' attitudes questionnaire were 0.797, 0.820 and 0.891 respectively. Therefore, these questionnaires and items were suitable to use for experimental study.

Procedure

Before the experimental study, the training for differentiated instruction lasts for three days. And then, the sample schools were selected randomly from Wundwin and Thazi Townships. A pretest was administered to both groups to measure the initial levels and then learning style inventory was administered to determine which learning style students have based on four types of mathematics learning styles. Learning styles results in all selected schools can be seen in Table 2.

Table 2 Learning Styles Results in S1, S2, S3 and S4

Learning Style	No. of Participant				Total
	S1	S2	S3	S4	
Mastery Learning Style	3	2	12	10	27
Understanding Learning Style	4	13	17	11	45
Interpersonal Learning Style	6	11	27	7	51
Self-expressive Learning Style	2	8	14	2	26
Total	**15**	**34**	**70**	**30**	**149**

Note. S1=B.E.H.S (Tamarkone); S2= B.E.M.S (1), Wundwin;
S3= B.E.H.S (1), Thazi; S4= B.E.M.S (Khetmauk)

The results showed that the number of interpersonal learning style learners was at the first position, understanding learning style at the second position, mastery learning style at the third position and self-expressive learning style at the fourth position. Therefore, it can be interpreted that most of the students preferred to participate in interpersonal style learning (See Table 2).

Research Findings

Quantitative Research Findings of Pretest

Table 3,4,5,6 show one-way ANCOVA results for pretest scores of Grade Six students in S1, S2, S3 and S4.

Table 3 One-way ANCOVA Results for Pretest Scores of Grade Six Students in S1

Source	Type III Sum of Squares	*df*	Mean of Squares	*F*	Sig
Corrected Model	.033[a]	1	.033	.002	.960
Intercept	7905.633	1	7905.633	592.922	.000
ID	.033	1	.033	.002	.960 (ns)
Error	373.333	28	13.333		
Total	8279.000	30			
Corrected Total	373.367	29			

Note. a. R Squared =.000 (Adjusted R Squared= .36), ns= not significant

The results showed that there were no significant differences between entry behaviours of the experimental groups and the control groups in S1.

Table 4 One-way ANCOVA Results for Pretest Scores of Grade Six Students in S2

Source	Type III Sum of Squares	*df*	Mean of Squares	*F*	Sig
Corrected Model	79.718[a]	1	79.718	8.482	.005
Intercept	19152.195	1	19152.195	2037.771	.000
ID	79.718	1	79.718	8.482	.005**
Error	610.909	65	9.399		
Total	19884.000	67			
Corrected Total	690.627	66			

Note. a. R Squared =.115 (Adjusted R Squared= .102), $^{**}p < .01$

The results showed that there were significant differences between entry behaviours of the experimental groups and the control groups in S2.

Table 5 One-way ANCOVA Results for Pretest Scores of Grade Six Students in S3

Source	Type III Sum of Squares	*df*	Mean of Squares	*F*	Sig
Corrected Model	1.607[a]	1	1.607	.129	.720
Intercept	35107.779	1	35107.779	2817.419	.000
ID	1.607	1	1.607	.129	.720 (ns)
Error	1719.614	138	12.461		
Total	36829.000	140			
Corrected Total	1721.221	139			

Note. a. R Squared =.001 (Adjusted R Squared= .006), ns= not significant

The results showed that there were no significant differences between entry behaviours of the experimental groups and the control groups in S3.

Table 6 One-way ANCOVA Results for Pretest Scores of Grade Six Students in S4

Source	Type III Sum of Squares	*df*	Mean of Squares	*F*	Sig
Corrected Model	195.771[a]	1	195.771	33.523	.000
Intercept	16080.516	1	16080.516	2753.566	.000
ID	195.771	1	195.771	33.523	.000***
Error		57	5.840		
Total	16674.000	59			
Corrected Total	528.644	58			

Note. a. R Squared =.370 (Adjusted R Squared= .359), $^{***}p < .001$

The results showed that there were significant differences between entry behaviours of the experimental groups and the control groups in S4.

Quantitative Research Findings of Posttest

Table 7 shows one-way ANCOVA results for mathematics achievement on posttest scores of Grade Six students in S1, S2, S3 and S4.

Table 7 One-way ANCOVA Results for Mathematics Achievement on Posttest of Grade Six Students in S1, S2, S3 and S4

School	Source	*df*	*F*	*MD*	Sig. (2 tailed)	Partial Eta Squared	Unadjusted Mean		Adjusted Mean	
							EG	CG	EG	CG
S1	Pretest	1	.064		.802	.002				
	Group	1	23.504	4.66	.000***	.465	20.73	16.07	20.73	16.07
	Error	27								
S2	Pretest	1	.136		.713	.002				
	Group	1	24.198	3.40	.000***	.274	21.03	17.55	20.98	17.58
	Error	64								
S3	Pretest	1	.147		.702	.001				
	Group	1	76.596	3.09	.000***	.359	21.49	18.39	21.48	18.39
	Error	137								
S4	Pretest	1	.190		.664	.003				
	Group	1	40.531	4.57	.000***	.420	22.00	17.62	22.09	17.52
	Error	56								

Note. EG= Experimental Group, CG=Control Group,
S1=B.E.H.S (Tamarkone), S2= B.E.M.S (1), Wundwin,
S3= B.E.H.S (1), Thazi, S4= B.E.M.S (Khetmauk);
$^{***}p < .001$.

The results show that the use of proposed instructional design has a significant effect on posttest in students' mathematics achievement.

Findings of Observation Checklist in S1, S2, S3 and S4

Observation checklist results for each dimension in S1, S2, S3 and S4 can be seen in Table 8.

Table 8 Observation Checklist Results of Five Dimensions in S1, S2, S3 and S4

School	Average Percentage									
	Physical Environment		Teacher Behaviors		Student Engagement		Materials/ Resources		Assessmen t Strategies	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
S1	94	6	98	2	91	9	96	4	99	1
S2	91	9	97	3	92	8	97	3	99	1
S3	93	7	98	2	95	5	96	4	99	1
S4	95	5	97	3	93	7	95	5	99	1
Average Percentage	**93**	**7**	**97**	**3**	**93**	**7**	**96**	**4**	**99**	**1**

Note. S1=B.E.H.S (Tamarkone), S2= B.E.M.S (1), Wundwin,
S3= B.E.H.S (1) Thazi, S4= B.E.M.S (Khetmauk)

The classroom observation checklist results support the results of the research study. Most of the observational time in each dimension as physical environment, teacher's behavior, student engagement, resources and, assessment strategies followed differentiated instructional rules according to these results.

Findings of Students' Attitudes towards Mathematics Learning through Differentiated Instruction

To obtain the students' attitudes towards mathematics learning through learning activities based on the proposed differentiated instructional design, survey questionnaires were used. Students' responses on these items are expressed in Table 9.

Table 9 Responded Rates of Students' Attitudes towards Mathematics Learning based on the Proposed Differentiated Instructional Design

No.	Statement	N	Percentage (%)				
			Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
1	I explain my ideas and thoughts by verbal sharing in solving the problems.	149	6	3	2	6	83
2	I explain my ideas and thoughts by writing in solving the problems.	149	6	1	3	7	83
3	I listen to my friends' ideas and thoughts in solving the problems.	149	4	3	3	7	83
4	I hesitate to explain my ideas and thoughts with friends in solving the problems.	149	80	9	3	5	3
5	I actively participate in class discussion for solving the problems.	149	6	3	3	5	83

No.	**Statement**	**N**	**Percentage (%)**				
6	I discuss the problems with the whole class.	149	5	3	4	4	84
7	I discuss the problems with the pair.	149	4	3	4	5	84
8	Through the proposed differentiated instructional design, I take my responsibilities when I discuss the problems with the group.	149	4	2	3	6	85
9	I value individual work for solving the problems.	149	2	1	2	7	88
10	I cooperate the selected learning activities with the friends.	149	4	3	3	7	83
11	I am difficult to change my ideas and thoughts without discussion.	149	91	4	2	2	1
12	I try to develop my ideas and thoughts in solving the problems.	149	3	2	2	6	87
13	I try to get broad knowledge in solving the problem or creating the new ideas.	149	3	1	2	6	88
14	I try to solve the problem regarded as a chance without being afraid of getting wrong answers.	149	4	1	2	6	87
15	I try to solve the problems with creating new ideas.	149	3	2	2	7	86
16	I try to ask for the problems when I face the difficulties.	149	6	1	2	6	85
17	I describe and explore the problems to be solved.	149	5	0	3	10	82
18	I decide and perform the ways and the problems to be solved.	149	4	1	2	8	85
19	I am difficult to select and formulate the ways and the problems to be solved.	149	85	9	2	1	3
20	I reflect and repair the ways and the problems to be solved.	149	3	1	1	6	89
21	I communicate with the friends in learning activities based on the mutual respect.	149	3	2	2	7	86
22	I perform the learning activities with ease.	149	87	4	4	2	3
23	I help each other in leaning activities if needed.	149	4	4	2	5	85
24	I discuss and communicate with others rudely.	149	87	7	1	1	4
25	I try to achieve a proper balance in the learning activities according to my respective duties.	149	4	1	1	4	90

Note. N = number of students who participated in the experimental group

According to the responses of survey questionnaires, it can be interpreted that students have positive attitudes towards mathematics learning with communication skills, collaboration skills, creativity and problem solving, and critical thinking, and citizenship through the proposed differentiated instructional design.

Findings of Teachers' Interviews

Four teachers who taught the experimental groups in the selected schools were interviewed. Coding analysis and thematic analysis were used to analyze the qualitative data. There are five themes to analyze the data.

Theme 1 (Teaching Experience): All teachers who taught in the experimental groups had many teaching experiences and their total teaching services are above 10 years. They all had both primary teacher training and junior teacher training. Three teachers were BA degree holders and the rest of three teachers is BSc degree holder but only one teacher was in line with her mathematics major specialization and teaching.

Theme 2 (Knowledge about Differentiated Instruction): According to their responses, they understand differentiated instruction. They said there were differences between the new curriculum prescribed by the ministry of education and the proposed instructional design. Teaching aids and learning materials are easy to collect in daily life situations for teachers and effective for students. Classroom setting was prepared for all students to be ease and then the students actively participate in all class learning activities.

Theme 3 (Challenges): The challenge was that knowledge about differentiated instruction, time allocation, class size, differences between urban and rural students, knowledge about collaborative summarizing.

Theme 4 (Overcoming the Challenges): They solved those problems by knowledge from training orientation to differentiated instruction, adaptation with time allocation, preparation with classroom setting and peer discussion.

Theme 5 (Advantages): They propounded that it is very suitable and valuable design for teaching of mathematics. In general, the proposed differentiated instructional design improved students' mathematics learning.

Summary of Research Findings

Research findings from the selected schools are summarized as follows.

1. There were significant differences between experimental groups and control groups on the posttest scores of mathematics achievement in all four selected schools.
2. The students in the experimental group developed positive attitudes towards their mathematics learning.
3. Teachers propounded that it is very suitable and valuable design for teaching of mathematics.

Discussion

In terms of the statistical results, students' performance had significant difference on overall mathematics achievement. Findings from students' questionnaires and teachers' interviews prove that proposed instructional design for differentiated instruction has positive impact on students' mathematics achievement and thinking skills. Therefore, it can be interpreted that most of the students preferred to participate in interpersonal style learning among four schools. It is hoped that using instructional design for differentiated instruction in middle school mathematics teaching can develop students' mathematics achievement.

Suggestions

It can be suggested that the teachers should try to read books concerned with teaching-learning process and discuss teaching-learning process with peer teachers to improve students' achievement in different ways. The teachers should try to create positive classroom atmosphere, give clear instruction, motivate student to engage in class activities, carefully manage resources and, carefully use instructional assessment strategies. Moreover, teachers should be aware of time limitation to make group work more meaningful. Therefore, it is suggested that teacher-student ratio should be 1:30 according to Myanmar situation. Therefore, it can be suggested that teachers should try to study e-learning to meet students' different needs in 21st century demands and explore different levels in e-learning for target groups to be effective teaching-learning classrooms.

Conclusion

The results of quantitative study and the qualitative study support the objectives of the research of the study. According to the findings on the research, it is hoped that this proposed instructional design can be useful to some extent for mathematics learning. Finally, it can be concluded that this study will also serve as a future reference for researchers in other subject areas. Not only in mathematics but also in other subjects, concepts are the basic building blocks of understanding. Based on these findings, further researches can be conducted on the effectiveness of mathematics through differentiated instruction.

Acknowledgements

Firstly, we would like to offer respectful to Dr. Khin Zaw (Retired Rector, YUOE), Dr. Kay Thwe Hlaing, (Rector), Dr. May Myat Thu, Dr. Khin Khin Oo, and Dr. Nyo Nyo Lwin (Pro-Rectors, YUOE), Daw Aye Aye Kywe (Retired Associate Professor, YUOE) who allowed us to carry out this study successfully. Then, we would like to express our thanks to Professor Dr. Khin Mar Khine (Professor and Head of Department, Department of Curriculum and Methodology, YUOE), who lovingly and patiently guided for achieving this study.

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J. Myanmar Acad. Arts Sci. 2023 **Vol. XXI. No.6**

A STUDY OF THE RELATIONSHIP BETWEEN LEARNING STYLE AND BIOLOGY ACHIEVEMENT OF GRADE NINE STUDENTS

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Abstract

This study explored the relationship between learning style and Biology achievement of Grade Nine students. The study adopted a descriptive research design and employed a quantitative method. The target population in this study was Grade Nine students who chose the subject combination of Chemistry, Physics and Biology, and 415 participants were selected as sample from selected high schools in Sagaing Township. Data were collected by using a questionnaire based on Fleming's (2015) VAK learning styles which include 45 items. The results revealed that the students in this study could be classified into six learning styles: unimodal; Auditory learning style (A) 44.1%, Visual learning style (V) 34.22%, Kinesthetic learning style (K) 12.77%, bimodal; Visual-Auditory (VA) 6.02%, Visual-Kinesthetic (VK) 2.17% and Auditory-Kinesthetic (AK) 0.72%. To measure students' Biology achievements, Biology achievement test was designed by the researcher based on the content area of Chapters (1 to 3) from Grade Nine Biology textbook. Independent samples *t*-test showed no significant difference in Biology achievement by gender. One-way ANOVA showed that there are significant differences in Biology achievement by school level. Chi-Square test showed a statistically significant association between Gender and Learning Style preference. Pearson's Correlation analysis showed no significant relationship between learning style and achievement in Biology subject.

Keywords: learning, learning style, biology achievement

Introduction

Learning style is essential in academic environment because it can help students to gain the academic goals. Students are assumed academically capable of understanding lessons and assignments. The majority of them do pass, but the blame falls on the academic standards or teaching methods for those who fail. However, little consideration is given to the ways that students learn and the students' learning styles. Ideally, the way teachers teach should match the way students learn, as well as how they prefer to learn. Teachers must adapt their teaching approaches to suit the ways students learn and their learning styles. An awareness of learning style can help teachers to be more flexible in the ways they present information and design courses and learning objects (Mestre, 2010). Utilizing awareness of learning style within the educational background promotes more effective learning and hence improved academic achievement (Nzesei, 2015).

Orhun (2007, cited in Bosman, 2015) supported this view by adding that when students are taught by means of approaches that complement their learning styles, and when they become aware of their own learning styles, their academic achievements significantly increase. Cassidy (2004) and Reese (2002) also stated that learning styles have turned to have a real effect on the achievement of students (cited in Moayyeri, 2015). There have been so many researches to find out the impact of learning style and academic achievement on various subjects with a view to upgrading the teaching-learning processes to be more fruitful. But in the history of Myanmar education, not many studies on this issue can be found. To fill this gap, what students preferred learning styles are and how they relate to their academic achievement, focusing on Biology students of Grade Nine from high schools in Sagaing Township, were investigated.

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Purpose of the Research

The main purpose of this research is to investigate the relationship between learning style and Biology achievement of Grade Nine students in Sagaing Township.

Specific Objectives

The specific objectives of this study are as follows:

- To identify learning style preferences of the students in the Sagaing Township
- To explore the difference in Grade Nine students' learning styles by gender and school level
- To find out the difference in Biology achievement of Grade Nine students by gender and school level
- To give suggestions and recommendations based on result of the study

Research Questions

1. What are the learning style preferences of the students in the Sagaing Township?
2. Is there any significant difference in Grade Nine students' learning styles by gender and school level?
3. Is there any significant difference in Biology achievement of Grade Nine students by gender and school level?
4. Is there any relationship between Biology achievement and learning style of Grade Nine students in Sagaing Township?

Definition of Key Terms

Learning - Learning is the acquisition of novel information, behaviors, or abilities after practice, observation, or other experiences, as evidenced by change in behavior, knowledge, or brain function (VandenBos, 2015).

Learning Style - Learning style is the way the students concentrate, and their method in processing and obtaining information, knowledge, or experience psychologically (Jantan & Razali, 2002, cited in Othmana & Amiruddinb,2010, p. 653).

Biology Achievement - Biology performance of students as measured by the grades taken from the Biology Achievement Test (BAT) used in the study (Ozkan, 2003, p. 9).

Scope of the Study

A total of 415 Grade Nine students (179 male students and 236 female students) were selected from six high schools in Sagaing Township in 2018-2019 academic year by using a stratified sampling technique. In this study, VAK Learning Style Model developed by Fleming (2015) was used to measure the learning style of students. Three types of learning styles: visual, auditory and kinesthetic were used to measure the learning style of students.

Review of Related Literature

Learning Style

In the1960s, there arose the belief of learning styles that everyone had his own learning style but significantly different in time to catch up, the way of learning new knowledge and experience and the storage and retrieval of the new knowledge (Reid, 2005). It is very essential for teachers to help learners figure out their own learning strategies and provide positive feedback on weakness and strength of their learning styles. Those who teach students also need to respect their learning style and encourage their development while at the same time growing possibilities for the learners to test with different approaches of learning (Farajolahi & Nimvari, 2014).

Felder (1996) stated that "students have different learning styles, characteristic strengths and preferences in the ways they take in and process information". Affective learning styles include (1) conceptual level (2) locus of control, (3) achievement motivation, and (4) social motivation. Moreover, physiological learning styles have to do with visual, auditory, tactile and kinesthetic preferences of the learner, as well as health-related behaviour, biorhythms, individual need for mobility, and preferences for certain environmental components (Sims & Sims, 1995, cited in Canipe, 2001).

Honey and Mumford Learning Style Model

Honey and Mumford (1992, cited in Salman, 2006) defined the term "learning styles" as 'a description of the attitudes and behaviours which determine an individual's preferred way of learning'. The models of learning style are presented.

Activists : Activists are people who learn by doing. They like to involve themselves in new experiences, and will 'try anything once'. They tend to act first and consider the consequences afterwards.

Reflectors : Reflectors learn by observing and thinking about what happened. They like to consider all the possible angles and implications before coming to a considered opinion. They spend time listening and observing, and tend to be cautious and thoughtful.

Theorists : Theorists like to understand the theory behind the actions. They need models, concepts and facts in order to learn. They like to analyze and synthesize, and feel uncomfortable with subjective judgments.

Pragmatists : Pragmatists are keen on trying things out. They look for new ideas that can be applied to the problem in hand. They like to get on with things and tend to be impatient with open-ended discussions; they are practical, down to-earth people.

VAK Learning Style Model

The present study is embedded on the VAK [Visual (V), Auditory (A) and Kinesthetic (K)] theory originally developed by Fleming (2001).

Visual (V) learners: Visual learners need to see the teacher's body language and facial expression in order to fully understand the content of a lesson. They like to sit at the front of the classroom and they may think in pictures as they need to see a mental model of the learning material (visual information is processed and stored in the occipital lobe at the back of the brain) (Simsek, 2014).

Auditory (A) learners: They learn best through verbal lectures, group discussions, radio, email, using mobile phones, speaking, discussion boards and web-chat. Such students may repeat what has already been said, or ask an obvious and previously answered question. They often need to say it themselves as they learn through saying it their way (Fleming, 2015).

Kinesthetic (K) learners: They are quite active and cannot stand still in their places in the class. They always want to be the ones who do the tasks in the class such as cleaning the board, opening the window, closing the window and bringing chalk. They might fail to understand what is going on in the lesson if they are forced to sit for a long time. They usually cause problems in the class if they are not engaged in the right tasks. As such, they are generally affected negatively by the schooling system and might be declared as naughty, lazy and unintelligent. They make the least use of ‘chalk and talk’ teaching (Jones, 1998, cited in Simsek, 2014).

Need and Significance of Learning Biology

According to Michael (2012), Biology is one of the important science subjects and is taught in senior secondary schools. It is basically the study of life and also one of basic Science subjects which play a fundamental role in economic development of a country. As it facilitates learners to cover more about the world, it is necessary to provide effective learning activities for learners. Adesoji and Olatunbosun (2008) stated that this will lead to the attainment of scientific and technological greatness. In addition to the effectiveness of learning activities, teacher is of very important ones who determine the success of learning goals. Therefore, it is very important to recognize the personality of Biology teachers training to demonstrate, expand, and deliver Biology contents to learners.

Academic Achievement and Learning Style

The importance of learning styles is being not only necessary, but also important for individuals in academic settings. Most students favour to learn in particular ways with each style of learning contributing to the success in retaining what they have learnt. As Chuah Chong-Cheng (1988) stated that students retain 10% of what they read, 26% of what they hear, 30% of what they see, 50% of what they see and hear, 70% of what they say, and 90% of what they say as they do something (cited in Abidin, Rezaee, Abdullah & Singh, 2011). These facts revealed that each learning style has its own strengths and weaknesses. Moreover, Woolhouse and Blair (2003) also stated that an understanding of individual learning styles and knowledge pertaining to these styles are used in many educational establishments to aid students’ academic success and increase class attendance (cited in Ercan, Ural & Kurtulmus, 2015). And, learning styles play an important role in students’ academic achievement. Therefore, the more different activities of learning styles teachers used, the higher students’ achievement were.

Research Method

This research was conducted employing a survey descriptive design and the quantitative method. In this study, it was determined to seek whether and there exists difference between two or more quantifiable variables (learning styles, gender, school level and Biology achievement) or not and to investigate relationship between learning style and Biology achievement.

Population and Sample

All participants were Grade Nine students especially those chose the subject combination: Chemistry, Physics and Biology. First, all the Basic Education High Schools in Sagaing Township were categorized into three levels according to the pass percentage of the matriculation examination held in March 2018. Then, the schools were selected by using the stratified sampling technique. Two schools for high level, two schools for moderate level and two schools for low level were randomly selected. A total of 415 Grade Nine students (179 males and 236 females) from six high schools in Sagaing Township participated in this study. The selected number of students and schools are presented in Table 1.

Table 1 Number of Selected Schools and Students in Sagaing Township

School Level	Name of School	No. of Selected Student		
		Male	Female	Total
High	BEHS (1) Sagaing	53	80	133
	BEHS (Branch) Nyaung Gone	20	25	45
Moderate	BEHS Sa Taung	39	56	95
	BEHS (2) Sagaing	29	27	56
Low	BEHS (3) Sagaing	19	24	43
	BEHS Naung Bin Wen	19	24	43
Total	**6**	**179**	**236**	**415**

Instrumentation

In this study, VAK Learning Style Model developed by Fleming (2015) was used to measure the learning style of students. This model includes three types of learning styles: visual, auditory and kinesthetic. Each learning style contains fifteen items.

In the questionnaire, there are forty-five items developed on five-point Likert-scale; strongly disagree, disagree, undecided, agree and strongly agree. In order to measure the Biology achievement of the students, an instrument based on the content area of Chapter 1,2 and 3 from Grade Nine Biology text book prescribed by the Planning and Training Department, Ministry of Education in 2018-2019 AY was constructed. The test item consists of 13 items for true or false, 12 items for completion, 13 items for multiple choice and 12 items for matching type. Each correct answer for each item was scored one mark and the score for every wrong answer for each item was zero according to the marking scheme developed by the researcher.

After preparing the questionnaire and the test, experts' review was conducted by five expert judgments. After that, the questionnaire and the test were modified. Then to find the reliability of the test, the pilot testing was done with a sample of (100) students from Basic Education High School, Ywar Thit Kyi and Ohn Daw. The internal consistency for the questionnaire and that for the test were determined to be (0.861) and (0.835) using Cronbach's Alpha.

Procedure

First, in order of collecting required data, the questionnaire of Fleming's VAK Learning Style Model (2015) was translated into Myanmar version. Content validity was determined by expert judgment. After getting the validity of these instruments, a pilot testing was conducted. The pilot testing for the instruments was conducted in July 2018. The modified instruments were distributed to all participants of the six sample schools and administered with the help of the teachers of those schools in August, 2018. After two weeks all the responses were collected, and then the data were entered into a computer data file and were analyzed using the Statistical Package for the Social Sciences (SPSS 20).

Data Analysis

The data were analyzed by using descriptive statistics. Moreover, one-way ANOVA, independent samples *t*-test and Pearson's Product-Moment correlation were used to analyze student's learning style and their biology achievement.

Findings

Analysis of Grade Nine Students' Learning Style Preferences in the Selected Schools

Table 2 Mean Scores and Standard Deviations of Students' Learning Style Preferences in the Selected Schools

Learning Style	*N*	*Min*	*Max*	*M*	*SD*
1.Visual	142	47	75	62.39	5.075
2. Auditory	183	47	72	61.40	5.189
3. Kinesthetic	53	52	72	61.98	4.713
4. Visual-Auditory	25	51	74	61.28	5.624
5. Visual-Kinesthetic	9	52	65	60.89	4.372
6. Auditory-Kinesthetic	3	56	65	60.33	4.509

Note. N= Numbers, Min=Minimum, Max= Maximum, M=Mean, SD=Standard Deviation

Firstly, descriptive statistics were analyzed for means and standard deviations, minimum and maximum scores of sub-scales related learning style in order to investigate learning styles the students preferred. As shown in Table 2, most of the students in this study preferred auditory. Auditory learning style (A) had the highest number of students 183(44.1%) compared to the other learning style types. Visual learning style (V) was the next common category with the number of students of 142(34.22%) and kinesthetic learning style (K) had the number of students of 53(12.77%). In bimodal learning styles, visual-auditory learning style was the highest number of students of 25 (6.02%), visual-kinesthetic learning style was the number of students of 9 (2.17%) and the least preferred learning style dimension was the auditory-kinesthetic modalities (AK), 3 (0.72%). Figure 1 represented six learning styles of the sample students.

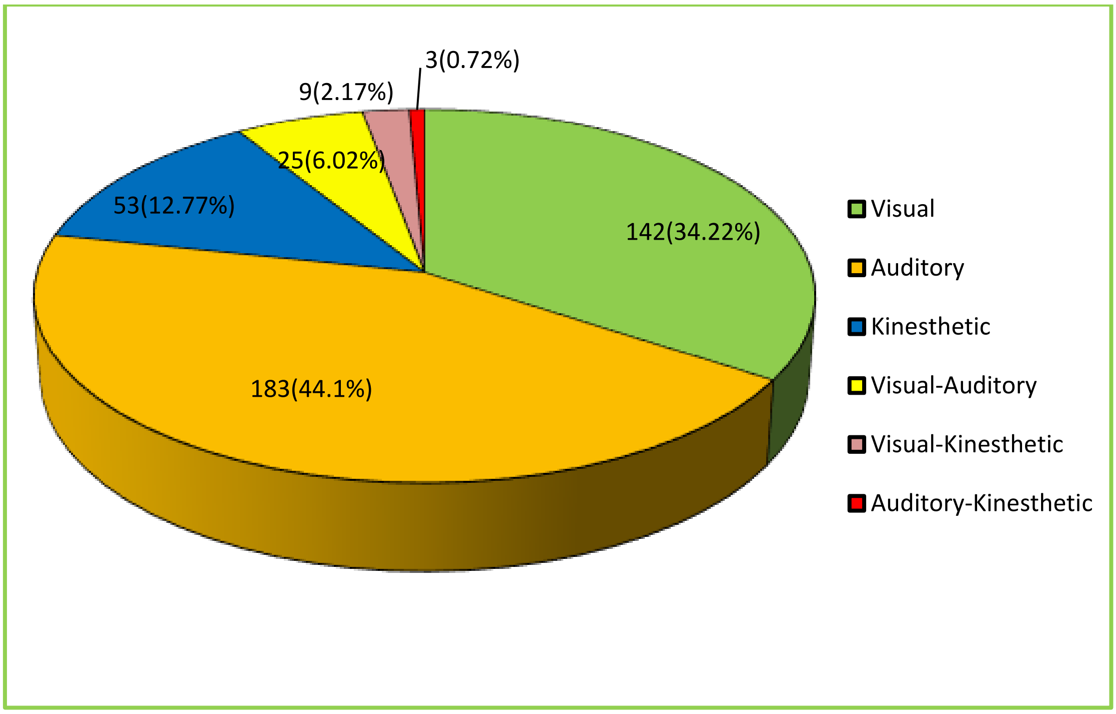

Figure 1 Students' Preferred Learning Style

Learning Style Preferences by Gender

Table 3 Descriptive Statistics of Learning Style Preferences by Gender

Learning Style	Gender	*N*	*M*	*SD*
1.Visual	Male	69	61.77	5.364
	Female	73	62.99	4.748
2.Auditory	Male	56	60.98	5.196
	Female	127	61.58	5.195
3.Kinesthetic	Male	41	62.17	5.152
	Female	12	61.33	2.807
4.Visual-Auditory	Male	7	58.86	7.581
	Female	18	62.22	4.583
5.Visual-Kinesthetic	Male	5	60.60	5.320
	Female	4	61.25	3.594
6. Auditory-Kinesthetic	Male	1	56.00	-
	Female	2 (0.8%)	62.50	3.536

When examined through a gender perspective, there was a slight difference in the percentage of the students who prefer various learning styles except single auditory learning style and kinesthetic learning style (see Table 3). There were highly differences in the mean scores of auditory learning style and kinesthetic learning style by gender. It can be seen that, although female students with auditory learning style were significantly higher than male students, male students with kinesthetic learning style were significantly higher than female students. Graphically presented, the learning styles between male and female students groups were shown in Figure 2.

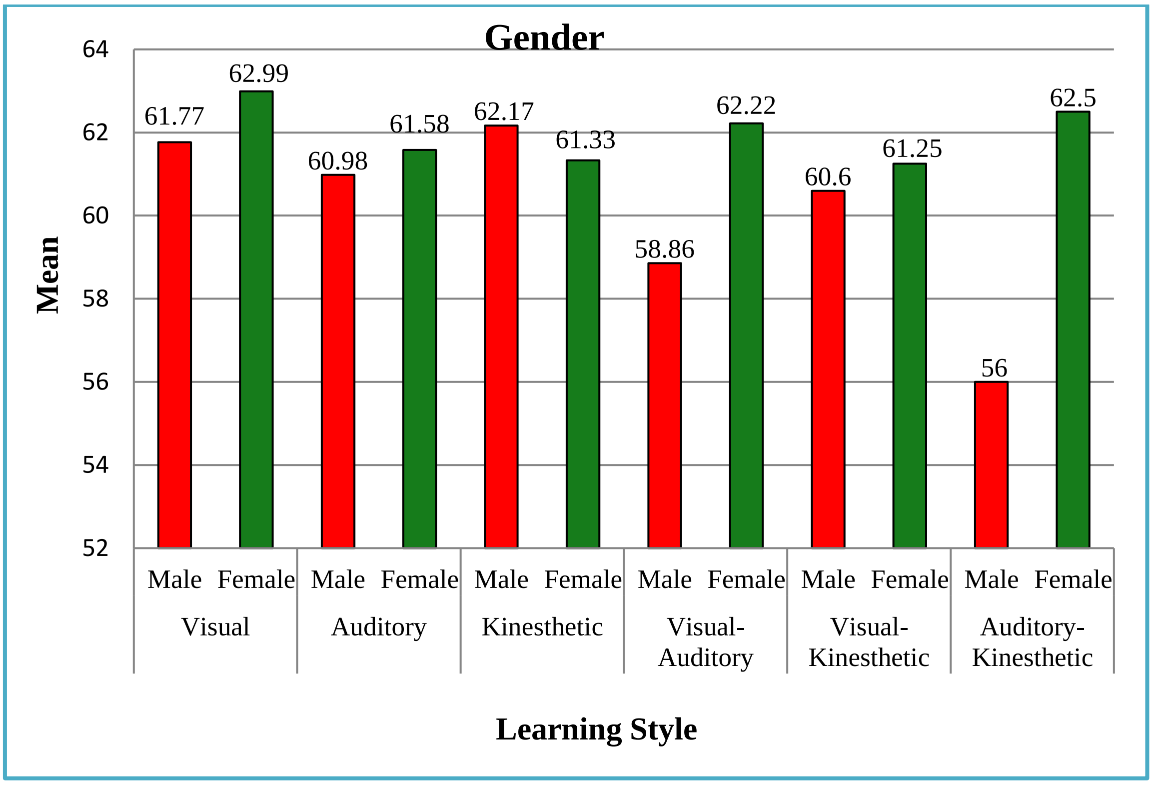

Figure 2 Learning Style Preferences by Gender

Correlation of Learning Style Preferences by Gender

Table 4 Chi-Square Analysis of the Preferred Learning Style by Gender

Gender	N	Learning Style						χ^2	P
		Visual	Auditory	Kinesthetic	VA	VK	AK		
Male	179	69	56	41	7	5	1	41.771	.000***
Female	236	73	127	12	18	4	2		
Total	415	142	183	53	25	9	3		

Note. *** p< .001

Table 4 reveals that the results analyzed by "Chi-Square" test to scrutinize whether there were significant differences between male and female students with regard to their preferred learning styles. The Chi-Square results indicated that male and female students were significantly different on which they have the preferred learning style (χ^2 = 41.771, *df* = 5, *p* < .001). Cramer's V which indicates the strength of the association between two variables is 0.317 and thus the effect size is considered to be moderate to typical according to Cohen (1988, cited in Leech, Barrett & Morgan, 2005).

Correlation of Learning Style Preferences by School Level

Table 5 Chi-Square Analysis of the Preferred Learning Style by School Level

School Level	*N*	Learning Style						χ^2	P
		Visual	Auditory	Kinesthetic	VA	VK	AK		
High	178	63	72	24	13	5	1	12.611	.246
Moderate	151	58	64	15	8	4	2		(ns)
Low	86	21	47	14	4	0	0		
Total	415	142	183	53	25	9	3		

Note. ns=not significant

Since the sample of participants was selected from the different schools from three levels in Sagaing Township, the differences in the learning styles of Grade Nine students were analyzed. Chi-Square test was used again to examine whether or not there is significant difference in the learning styles of Grade Nine students by school level. The result of the Chi-Square test (χ^2 = 12.611, *p* = .246) indicated that there is no significant difference in the learning styles of students by school level (see Table 5).

Comparison of Students' Biology Achievement by Gender

Table 6 Independent Sample *t-test* Result for Biology Achievement by Gender

Gender	*N*	*M*	*SD*	*MD*	*t*	*P*
Male	179	35.53	8.114	-.229	-.282	.778 (ns)
Female	236	35.75	8.276			

Note. ns=not significant

According to Table 6, the mean scores for Biology achievement of male and female students were (35.53) and (35.75). From the two groups' means, it indicated that the average mean score of Biology achievement of the female students was slightly higher than that of the male students. An independent samples *t*-test was conducted to compare Biology achievement score for males and females. There was no significant difference in scores for males and females, *t* (413) = -.282, *p* = .778.

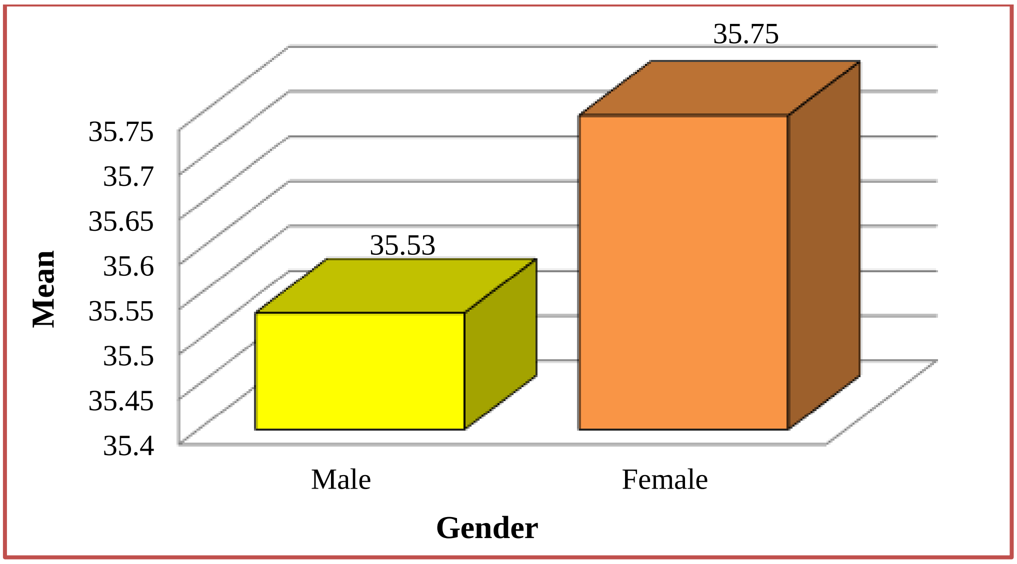

Figure 3 Biology Achievement by Gender

Figure 3 illustrated the comparison of mean scores for the male students' Biology achievement and the female students' Biology achievement based on the result of *t*-value.

Analysis of Grade Nine Students' Biology Achievement in terms of School Level

Since the participants were selected from the different schools of three levels in Sagaing Township, the differences in Biology achievement of Grade Nine students were analyzed. For this purpose, the descriptive statistics was used.

Table 7 showed that the mean score of Biology achievement is 34.84 for High level schools, 37.85 for Moderate level schools and 33.49 for low level schools. The mean score of Biology achievement for moderate level schools was the highest among the three school levels.

Table 7 Descriptive Statistics of Biology Achievement by School Level

School Level	*N*	*Min*	*Max*	*M*	*SD*
High	178	15	49	34.84	7.908
Moderate	151	18	48	37.85	7.553
Low	86	15	48	33.49	9.039

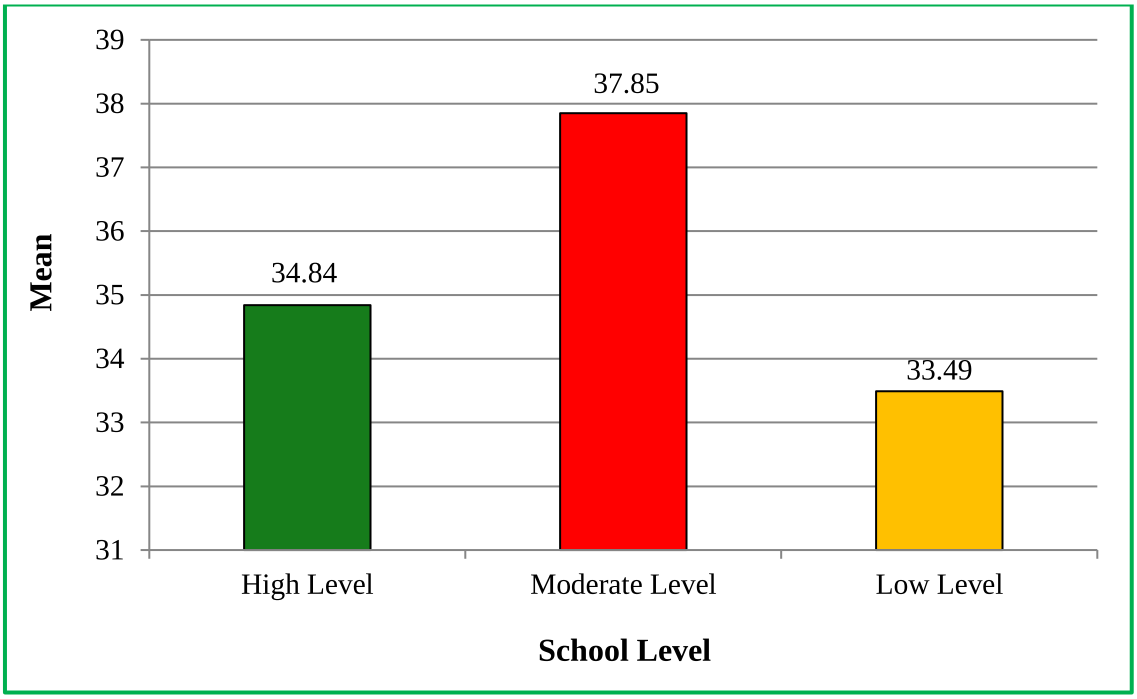

Figure 4 Comparison of Mean Scores for Biology Achievement by School Level

Figure 4 presents the mean scores of all the selected schools. This might be concluded that the students from Moderate level schools were more likely to perform better than those from other levels in Biology scores.

Comparison of Biology Achievement of Grade Nine Students by School Level

According to Figure 4, it can be seen that students from Moderate level schools perform better than those from other levels in Biology achievement. In order to find out whether there was any significant difference or not in Biology achievement by school level, one-way ANOVA was conducted (see Table 8).

Table 8 One-way ANOVA Result of Biology Achievement by School Level

Variable		**Sum of Squares**	***df***	**Means Squares**	***F***	***P***
Biology Achievement	Between Groups	1247.145	2	623.572	9.669	.000***
	Within Groups	26570.581	412	64.492		
	Total	27817.725	414			

Note. *** $p < .001$

According to the results from Table 8, there was a significant difference in Biology achievement by school level at the 0.001 level. To obtain more detailed information of which level had significant differences, Post-Hoc Test was executed by using Scheffe test (see Table 9).

Table 9 The Result of Post Hoc (Scheffe) Multiple Comparisons for Biology Achievement by School Level

School Level (I)	**School Level (J)**	**Mean Difference (I-J)**	***Sig*.**
Moderate	High	3.005	.004**
	Low	4.359	.000***

Note. ** $p < 0.01$, *** $p < .001$

From these results, it can easily be seen that the students from moderate level schools were significantly difference to the students from high and low level schools according to the mean scores of Biology achievement.

Effects of Learning Style on Biology Achievement

In order to determine the effect of learning style of Grade Nine students on Biology achievement, descriptive analysis and one-way ANOVA were used (see Table 10). According to Table 10, the mean score of Biology achievement of visual-kinesthetic was the highest among the other learning styles. It might be concluded that students who had visual-kinesthetic learning style were more likely to perform better in Biology achievement than the students who had the other learning styles.

Table 10 Descriptive Statistics of Biology Achievement by Learning Style

Variable	Learning Styles	*N*	*M*	*SD*
Biology - Achievement	Visual	142	35.46	8.223
	Auditory	183	35.90	8.174
	Kinesthetic	53	34.42	8.677
	Visual-Auditory	25	35.60	8.292
	Visual-Kinesthetic	9	**40.00**	5.385
	Auditory-Kinesthetic	3	39.33	3.055
	Total	**415**	**35.66**	**8.197**

Figure 5 presents the comparison of Mean Scores for Biology Achievement by Learning Style.

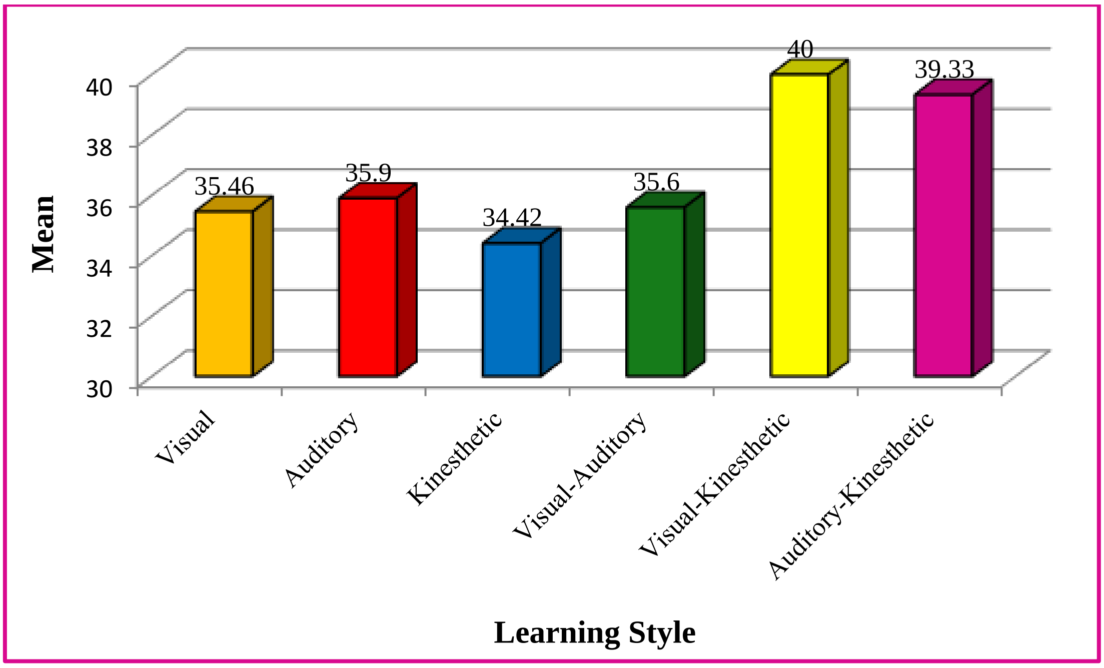

Figure 5 Comparison of Mean Scores for Biology Achievement by Learning Style

According to the results of Table 11, no statistically significant difference was found among six different learning styles on Biology achievement, $F(5, 409) = .915, p > 0.05$. In other words, learning styles had no significant effect on the Biology achievement.

Table 11 ANOVA Results of Biology Achievement by Learning Style

	Sum of Squares	*df*	Mean Square	*F*	*Sig.*
Between Groups	307.839	5	61.568	.915	.471
Within Groups	27509.886	409	67.261		(ns)
Total	27817.725	414			

Note. ns= not significant

Relationship between Learning Styles and Biology Achievement

Table 12 The Result of Pearson Correlation for Learning Style and Biology Achievement

		Learning Style	Bio Achievement
Learning Style	Pearson Correlation	1	.035
	Sig. (2-tailed)		**.478**
	N	415	415
Bio Achievement	Pearson Correlation	.035	1
	Sig. (2-tailed)	**.478**	
	N	415	415

Then, to examine the relationship between learning style and Biology achievement, Pearson's correlation was calculated (See Table 12). There was no relationship between learning style and Biology achievement score, which was no statistically significant (r = .035, n = 415, $p >$ 0.05). It can be concluded that there is no effect of learning style on Biology achievement of Grade Nine students from selected schools in Sagaing Township.

Discussion

According to the results of descriptive statistics analyses, the most preferred learning style is auditory learning style followed by visual learning style as the second place and the kinesthetic learning style as the third position and the others are bimodal learning styles. The least preferred learning style is the bimodal, auditory-kinesthetic modalities. The predominant learning styles among the students in the selected schools were auditory learning style and visual learning style. A few students preferred bimodal learning style. This research finding indicated that the majority of students in Sagaing Township are auditory learners; they enjoy the oral-aural learning channel. Thus, they want to engage in discussions, conversations, and group works.

The second majority of students in Sagaing Township are visual learners. Therefore, they prefer to learn via the visual channel and they like to read a lot, which requires concentration and time spent alone. For visual learners, visual aids, diagrams, demonstrations, and videos as well as Power Points with additional embedded visual pictures, animations can enhance their learning. According to Nel and Nel (2013, cited in Bosman & Schule, 2018), visual learners are generally the largest group in a classroom.

As for the relationship between gender and learning style, a statistically significant difference was observed in gender. **Chi-Square** test showed that both males and females do not equally prefer the same learning style. There is a significant difference by gender in auditory and kinesthetic learning style. This means that the female students more preferred auditory learning style than the male students in Sagaing Township. The result is in line with the findings of

Bosman (2015). The female students tend to prefer an auditory learning style than male students. Therefore, it may be concluded that female students learn from hearing words spoken and from oral presentations and they can recall information by reading aloud or moving their lips as they read.

There was a significant difference in kinesthetic learning style between males and females. The male students more preferred kinesthetic learning style than female students in the six schools studied in Sagaing Township. The result is consistent with the finding of Bosman (2015) that showed male students were more inclined to be kinesthetic learners than female students. It was found that female students generally used auditory learning style while male students preferred kinesthetic learning style. It can be concluded that, male students learn through experience and being involved physically in the classroom and tend to remember information well by actively participating in activities, role plays in the classroom and field trips. In this study, it was concluded that gender effects on learning style.

Upon Chi-Square test analysis of the differences between school levels and learning styles, it can be seen that there is no statistically significant difference between school level and learning style preference; that is, students in all school levels; high, moderate and low, equally prefer learning style. In this study, it can be concluded that there was no effect of school level on learning styles.

According to the independent samples *t*-test, there was no significant difference in Biology achievement of male and female students. Consistently, Tambaya, Sabitu and Mataza (2016) revealed in their study that there was no significant difference in Biology achievement for male and female students.

The One-way ANOVA result also showed that there was a significant difference in Biology achievement by school level. To observe more detail information, Post-hoc Scheffe multiple comparisons was conducted. The result showed that the students from moderate level schools are significantly difference to the students from high and low level schools according to the mean scores of Biology achievement. In Sagaing Township, the students from moderate school level have the highest Biology achievement.

According to Pearson’s correlation coefficient result, there was no significant correlation between Biology achievement of students and different learning styles. The result is consistent with the finding of Awang, Samad, Faiz, Roddin and Kankia (2017). Their result showed no significant correlation was found between learning style preferences and academic achievement in Malaysian Polytechnic schools. It can be concluded that there is no effect of learning style on Biology achievement of Grade Nine students from selected schools in Sagaing Township. This is particularly clear that these two variables have no relationship. These facts reveal that each learning style has its own strengths and weaknesses.

Suggestions

The present study had other necessities because of its scope and selected sample. It was suggested that the future research need to conduct a replication of this study for different grade levels, different schools, different townships, different districts and different regions in Myanmar. Furthermore, the future researchers should conduct the study with larger sample size from different states and regions to be more generalized, reliable and valid. Moreover, it would be advisable that the future researchers should focus on the influence of the students’ background on their academic learning. Impacts of their affective and cognitive variables on student’s academic achievement can also be investigated in future studies.

The present study has yielded some important insights into learning style preferences among students and the recommendations are given as follow.

1. Teachers / Instructors need to take into account their students' diverse learning styles, design instructional methods that meet diversity and remain sensitive of such during the instruction process;
2. Teachers should also help their students to understand their learning style preferences and make use of them to be life-long learners; and
3. School administrators need to provide various learning materials which can bring diversity in the classroom through using visual, auditory and kinesthetic materials such as the use of technology and students' project writing and presentation.

Conclusion

Based on the findings of the present study, it can be concluded that students' learning style preferences are not influenced by school level. The auditory style had the highest percentage among the single-mode learning styles, followed by the visual style. The results of this study provide useful information for proposing reductions in passive lecture hours and preparing a more problem-based curriculum using active learning strategies. Teachers should take cognizance of such information when planning and executing their lessons if they want to improve the learning and academic achievement in their classes. Based on the findings, the study also recommended ways to prepare for effective teaching. Moreover, teachers should know the effective way of teaching to come closer in order to provide optimal learning environment for most students in their classrooms. Thus, the researcher believes that this research will make a valuable contribution of new knowledge with regard to teaching and learning in Biology subject.

Acknowledgements

First of all, we would like to express our special thanks to all teachers in our life and our parents. We would like to express our respectful thanks to U Aung Thaik Tun (Rector, University for the Development of the National Races of the Union- UDNR), Dr. Moe Moe (Pro-Rector, Academic, UDNR), Daw Nant Rosalin (Professor, Head of Department of Methodology, UDNR), Dr. Khin San Tint (Retired Professor/Expert, UDNR), Dr. Soe Than (Retired Professor and Head of Department, Sagaing University of Education), Dr. Wai Wai Oo (Professor and Head, Department of Curriculum and Methodology, Saging University of Education, SUOE), and Daw Phyu Zin Thant (Associate Professor, Head of Department of English, UDNR) for their guidance and good will in assessing our research study and invaluable comments and suggestions.

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J. Myanmar Acad. Arts Sci. 2023 **Vol. XXI. No.6**

A STUDY OF THE ATTITUDES OF TEACHER EDUCATORS TOWARDS LESSON STUDY USED IN EDUCATION DEGREE COLLEGES

Khin Sandar Hlaing[1] and Soe Soe Thein[2]

Abstract

The purpose of this study is to explore the attitudes of teacher educators towards lesson study used in Education Degree Colleges. The quantitative research method was used to study the attitudes of teacher educators towards lesson study. In this study, (200) teacher educators from Education Degree Colleges in Magway Region and Mandalay Region were selected by using a simple random sampling technique. To collect data, the questionnaires were based on the investigation of teachers' perspectives on the lesson study process developed by Wright (2009), the implementation of lesson study program for developing professionalism in teaching profession developed by Copriady (2013), and teachers' viewpoints on the practical implementation of lesson study developed by Haghighiford and Marzbon (2016). Six dimensions were comprised for the questionnaires. Due to the means of six dimensions, teacher educators from the selected Education Degree Colleges were more likely to receive professional development through lesson study but it is necessary to implement lesson study practically in a different way. According to the result, there were no significant differences in the attitudes of teacher educators towards lesson study in Education Degree Colleges in terms of teaching services and qualification. And then, there was a significant difference in the attitudes of teacher educators towards lesson study in Education Degree Colleges in terms of designation. It can be concluded that teachers had positive attitudes towards the different parts of the questionnaires that deal with lesson study. This study can give guidelines for teacher educators to conduct better and more effective teaching and learning process so that student teachers will achieve purposeful learning.

Keywords: Attitude, Teacher Educator, and Lesson study

Introduction

In teacher education, lesson study is a collaborative activity that lies at the heart of teacher professional development (Lewis, 2000, cited in Cajkler, Wood, Norton & Pedder, 2013). Japan is the cradle of lesson study. Since the start of the public education system in 1872, it has been the model for teachers' professional development (Takahashi, 2014, cited in Willems & Bossche, 2019). Through lesson study, professional development makes teachers more effective in teaching and learning by exposing educators to new delivery strategies, evaluation styles, and record-keeping methods. The important fact of lesson study is to conduct research: to seek a solution to a teaching and learning problem (Takahashi & McDougal, 2016).

Lesson study can be implemented at all levels to learning, teaching, curriculum development, assessment, teacher education development. Teachers can learn from other experienced teachers through lesson study to become effective future teacher educators of teaching and learning. After all, implementing lesson study to professional education development has effectiveness for both teachers and students, but most importantly, it helps teacher educators to become better educators and develop into the competent educationists.

Purpose of the Study

The purposes of this study are as follows:

1. To explore the attitudes of teacher educators towards lesson study used in Education Degree Colleges in each dimension.
2. To compare the attitudes of teacher educators towards lesson study used in Education Degree Colleges in terms of teaching services, qualification and designation.

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3. To give suggestions and recommendations based on the results of the study.

Research Questions

1. How do teacher educators consider lesson study used in Education Degree Colleges?
2. How do the attitudes of teacher educators towards lesson study differ in terms of teaching services, qualification, and designation?

Definition of Key Terms

Attitude: Attitude is an evaluative statement or judgment concerning objects, people, or events (Robbins & Judge, 2013).

Teacher Educator: A teacher educator is a person who teaches at a teacher education institution or supports students' field work in schools, and contributes substantially to the development of students towards becoming competent teachers (Koster 2002, cited in Lunenberg, Dengerink & Korthagen, 2014).

Lesson Study: Lesson study is an approach to professional development that centers on collaboration. Lesson study is a structured approach to teacher learning, and certain common elements are necessary to justify calling it lesson study (Bjuland, & Mosvold, 2015).

Scope of the Study

This research is intended to study the attitudes of teacher educators towards lesson study used in Education Degree Colleges. All teacher educators from Education Degree Colleges in Magway Region and Mandalay Region were selected as participants in this study in 2021- 2022 Academic Year.

Review of Related Literature

Characteristics of Lesson Study

Lesson study incorporates many characteristics of effective professional development activities for teachers and students to enhance the effectiveness of teaching and learning situation, especially pre-service, and in-service teacher education. Murata (2011) suggested that a number of the characteristics of lesson study are listed below.

Lesson study is centered on teachers' interests: Teachers' interests are central to their professional development. Lesson study goals should be something teachers feel is vital to research and relevant to their own classroom practice.

Lesson study is student focused: Lesson study is about student learning. At any component of the lesson study cycle, the activities should focus teachers' attention on student learning and its connections to lesson/teaching.

Lesson study features a research lesson: Teachers have shared physical observation experiences (in some special cases, video could also be utilized in place of class lessons but this is often not recommended), that provide opportunities for teachers to be researchers.

Lesson study may be a reflective process: Lesson study provides many time and opportunities for teachers to reflect on their teaching practice and student learning, and therefore the knowledge gained from and for the reflective practice should be shared in some format with the larger teaching and academic communities.

Lesson study is collaborative: Teachers work interdependently and collaboratively in lesson study.

By understanding how different assumptions of lesson study could also be modified while maintaining these key characteristics, teachers will better understand the prevailing educational system and cultural values and beliefs that support the system. If necessary, these key characteristics can be adaptable. Thus, in turn, helps teachers understand how different parts of the system work and what parts are more critical to the system than the others. Therefore, lesson study can provide that chance. And it is at the heart of every teacher's practice to promote long term teaching improvement.

Effectiveness of Lesson Study

The effectiveness of lesson study is that teachers can share experiences and skills, learn from each other, develop their competencies and self-confidence and construct better lesson methods (Project of SCCA- phase 2, 2011).

According to Podhorsky and Fisher (2007), there are several strengths of lesson study as a process.

- emphasis on planning meaningful lessons that meet student needs,
- inquiries about student assessment, and
- the impetus for formulating short and long-term curriculum goals,
- increased levels of reflection on teaching practices,
- the lesson study learning community as the basis of the professional development program,
- the relationship of the lesson study teams,
- the structure of lesson study as a model for teacher-led professional development,
- its emphasis on lesson planning, and
- its excellent preparation for professional teaching standards.

Research Method

A quantitative research method was used. A survey was made to collect data to study the attitudes of teacher educators towards lesson study used in Education Degree Colleges. This study was conducted in Magway Region and Mandalay Region. The number of participants was (200) and they were selected by using a simple random sampling method to carry out the research work. As for the instrument, questionnaires were constructed on the basic of questionnaires of Wright (2009), Copriady (2013), and Haghighiford & Marzbon (2016). After preparing the instruments, validity was determined by the expert judgments. Then the pilot test was conducted and the Cronbach's alpha internal consistency reliability for the instrument was determined. Since the results of the pilot test were reliable and valid, the instrument was employed to collect the data for the main study. And then the major survey was conducted in four Education Degree Colleges in Magway Region and Mandalay Region. Finally, the data obtained from this survey was analyzed by using Statistical Package for the Social Sciences (SPSS) version 25. The data were analyzed by using descriptive statistics. Moreover, one-way ANOVA was performed whether there were any significances in the attitudes of teacher educators towards lesson study.

Findings

Findings for the Attitudes of Teacher Educators towards Lesson Study Used in Education Degree Colleges for each Dimension

In order to find out the attitudes of teacher educators towards lesson study used in Education Degree Colleges in terms of acceptance on lesson study, understanding lesson study, collaboration in lesson study, professional development through lesson study, effectiveness of lesson study, and practical implementation of lesson study, means and standard deviation were analyzed. Table 1 showed means and standard deviations of the attitudes of teacher educators towards lesson study used in Education Degree Colleges in each dimension.

Table 1 Means and Standard Deviations for the Attitudes of Teacher Educators towards Lesson Study Used in Education Degree Colleges in each Dimension

No.	Dimension	No. of Item	N	Minimum	Maximum	M	SD	Average Mean
1	Acceptance on Lesson Study	10	200	27	50	41.04	3.65	4.10
2	Understanding Lesson Study	10	200	29	50	41.11	3.66	4.11
3	Collaboration in Lesson Study	10	200	30	50	40.93	3.38	4.09
4	Professional Development through Lesson Study	10	200	30	50	41.16	3.63	4.12
5	Effectiveness of Lesson Study	10	200	30	50	41.05	3.49	4.10
6	Practical Implementation of Lesson Study	10	200	28	50	40.29	3.71	4.03
	Total/Average	**60**	**200**	**180**	**300**	**245.57**	**19.07**	**4.09**

Table 1 showed that the mean for the attitudes of teacher educators towards professional development through lesson study was found the highest (4.12) and for the mean of practical implementation of lesson study was found the lowest (4.03). Therefore, teacher educators from selected Education Degree Colleges were more likely to receive professional development through lesson study and it is necessary to implement lesson study practically in a different way. To be clear, Figure 1 illustrated the comparison of means of teacher educators' attitudes for each dimension.

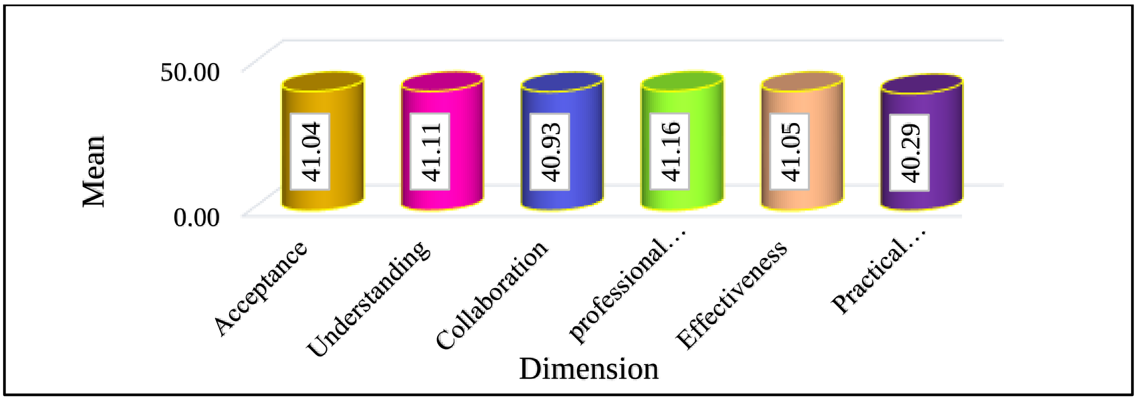

Figure 1. The comparison of means for the attitudes of teacher educators towards lesson study used in education degree colleges in each dimension.

Findings for the Attitudes of Teacher Educators towards Lesson Study Used in Education Degree Colleges in terms of Teaching Services

To find out whether there was a significant difference in the attitudes of teacher educators towards lesson study used in Education Degree Colleges in terms of teaching service, one-way analysis of variances (ANOVA) was used. In this study, there were six groups of teaching services (0-5, 6-10, 11-15, 16-20, 21-25, and 26 and above) years (See Table 2).

Table 2 Table of Comparison of Mean and Standard Deviation on Each Dimension in Terms of Teaching Services

Teaching Service	N	M/SD	Dimension					
			D1	D2	D3	D4	D5	D6
0-5	42	M	41.26	41.60	41.31	41.48	41.48	40.98
		SD	3.53	4.06	4.06	4.07	3.97	4.11
6-10	38	M	40.13	40.26	40.74	40.89	40.89	39.47
		SD	3.06	2.81	2.31	3.45	3.27	3.34
11-15	32	M	40.37	40.31	40.31	40.19	40.31	39.12
		SD	4.01	3.23	3.02	3.29	3.15	4.00
16-20	35	M	41.03	41.00	40.26	41.00	40.34	40.03
		SD	4.11	4.28	3.04	3.25	2.58	2.94
21-25	12	M	41.00	41.08	40.75	41.00	41.42	40.75
		SD	2.25	3.39	2.38	2.95	3.03	3.36
26 and above	41	M	42.20	42.10	41.83	42.02	41.83	41.32
		SD	3.77	3.59	4.09	4.02	4.14	3.76
Total	200	M	41.04	41.10	40.93	41.16	41.05	40.28
		SD	3.65	3.65	3.38	3.63	3.49	3.70

Note: D1= Acceptance on lesson study D2= Understanding lesson study
D3= Collaboration in lesson study D4= Professional development through lesson study
D5= Effectiveness of lesson study D6= Practical implementation of lesson study

To describe the significant difference in the various dimensions in terms of teaching services, the collected data were analyzed by using ANOVA (See Table 3).

Table 3 ANOVA Results of the Attitudes of Teacher Educators towards Lesson Study Used in Education Degree Colleges in terms of Teaching Services.

No.	Dimension	Teaching Services	Sum of Squares	df	Mean Squares	F	Sig.
1	Acceptance on lesson study	Between Groups	57.369	5	11.474	.855	.512
		Within Groups	2602.311	194	13.414		(ns)
		Total	2659.680	199			
2	Understanding Lesson Study	Between Groups	30.651	5	6.130	.452	.812
		Within Groups	2632.144	194	13.568		(ns)
		Total	2662.795	199			
3	Collaboration in Lesson Study	Between Groups	106.062	5	21.212	1.899	.096
		Within Groups	2166.958	194	11.170		(ns)
		Total	2273.020	199			
4	Professional Development through Lesson Study	Between Groups	107.920	5	21.584	1.662	.146
		Within Groups	2518.960	194	12.984		(ns)
		Total	2626.880	199			
5	Effectiveness of Lesson Study	Between Groups	54.907	5	10.981	.897	.484
		Within Groups	2374.593	194	12.240		(ns)
		Total	2429.500	199			
6	Practical Implementation of Lesson Study	Between Groups	68.247	5	13.649	.998	.420
		Within Groups	2652.508	194	13.673		(ns)
		Total	2720.755	199			
	Total	Between Groups	2071.740	5	414.348	1.143	.339
		Within Groups	70313.280	194	362.440		(ns)
		Total	72385.020	199			

Note. ns = not significant

According to Table 3, there was no significant difference in the attitudes of teacher educators towards lesson study used in Education Degree Colleges in terms of teaching services F (5,194) = 1.143, p > .05. This means that the attitudes of teacher educators towards lesson study had nearly the same in terms of teaching services.

Findings for the Attitudes of Teacher Educators towards Lesson Study Used in Education Degree Colleges in terms of Qualification

To find out whether there was any significant difference in the attitudes of teacher educators towards lesson study used in Education Degree Colleges in terms of qualification, one-way analysis of variances (ANOVA) was used. In this study, there were five groups of qualifications (BA/BSc, BEd, MA/MSc, MEd and PhD) (See Table 4).

Table 4 Table of Comparison of Mean and Standard Deviation on Each Dimension in Terms of Qualification

Qualification	N	M/SD	Dimension					
			D1	D2	D3	D4	D5	D6
B.A./BSc.	13	M	40.92	40.77	40.54	40.46	40.54	40.31
		SD	1.75	2.65	2.79	2.07	2.07	1.11
B.Ed.	65	M	41.71	41.55	41.11	41.18	41.09	40.66
		SD	3.71	3.54	3.40	3.71	3.60	3.88
M.A./M.Sc.	88	M	41.13	41.39	41.32	41.89	41.61	40.39
		SD	3.27	3.79	3.41	3.53	3.43	3.85
M.Ed.	33	M	39.52	39.64	39.73	39.48	39.64	39.30
		SD	4.69	3.83	3.37	3.81	3.65	3.58
Ph.D.	1	M	42.00	40.00	40.00	40.00	42.00	39.00
		SD	00.00	00.00	00.00	00.00	00.00	00.00
Total	**200**	**M**	**41.04**	**41.10**	**40.93**	**41.16**	**41.05**	**40.28**
		SD	**3.66**	**3.66**	**3.38**	**3.63**	**3.49**	**3.699**

Note: D1= Acceptance on lesson study D2= Understanding lesson study
D3= Collaboration in lesson study D4= Professional development through lesson study
D5= Effectiveness of lesson study D6= Practical implementation of lesson study

To describe the significant difference in the various dimensions in terms of qualification, the collected data were analyzed by using ANOVA. Table 5 showed the results of the attitudes of teacher educators towards lesson study used in Education Degree Colleges in terms of qualification.

Table 5 ANOVA Results of the Attitudes of Teacher Educators towards Lesson Study Used in Education Degree Colleges in terms of Qualification

No.	Dimension	Qualification	Sum of Squares	Df	Mean Squares	F	Sig.
1	Acceptance on Lesson Study	Between Group	107.443	4	26.861	2.052	.089 (ns)
		Within Group	2552.237	195	13.088		
		Total	2659.680	199			
2	Understanding Lesson Study	Between Group	93.926	4	23.481	1.782	.134 (ns)
		Within Group	2568.869	195	13.174		
		Total	2662.795	199			
3	Collaboration in Lesson Study	Between Group	65.907	4	16.477	1.456	.217 (ns)
		Within Group	2207.113	195	11.319		
		Total	2273.020	199			
4	Professional Development through Lesson Study	Between Group	146.759	4	36.690	2.885	.024*
		Within Group	2480.121	195	12.719		
		Total	2626.880	199			
5	Effectiveness of Lesson Study	Between Group	98.323	4	24.581	2.056	.088 (ns)
		Within Group	2331.177	195	11.955		
		Total	2429.500	199			
6	Practical Implementation of lesson Study	Between Group	43.599	4	10.900	0.794	.530 (ns)
		Within Group	2677.156	195	13.729		
		Total	2720.755	199			
	Total	Between Groups	2917.076	4	729.269	2.047	.089 (ns)
		Within Groups	69467.944	195	356.246		
		Total	72385.020	199			

Note. *p< .05, ns = not significant

According to Table 5, there was any significant difference in the attitudes of teacher educators for professional development through lesson study in terms of qualification $F(4,195) = 2.885$, $p < .05$. However, there was no significant difference among their qualification for other dimensions. It can be assumed that the attitudes of teacher educators selected Education Degree Colleges are nearly the same in the dimensions of acceptance on lesson study, understanding lesson study, collaboration in lesson study, the effectiveness of lesson study, and practical implementation of lesson study. However, their attitudes differed in the dimension of professional development through lesson study according to their qualification.

Findings for the Attitudes of Teacher Educators towards Lesson Study Used in Education Degree Colleges in terms of Designation

To find out whether there was any significant difference in the attitudes of teacher educators towards lesson study used in Education Degree Colleges in terms of designation, one-way analysis of variances (ANOVA) was used. In this study, there were five groups of designation (Tutor, Assistant Lecturer, Lecturer, Associate Professor, and Professor) (See Table 6).

Table 6 Table of Comparison of Mean and Standard Deviation on Each Dimension in Terms of Designation

Designation	N	M/SD	Dimension					
			D1	D2	D3	D4	D5	D6
Tutor	68	M	41.29	41.57	41.24	41.74	41.37	40.63
		SD	3.33	3.64	3.47	3.67	3.57	3.87
Assistant Lecturer	58	M	40.10	40.28	40.22	39.83	40.50	39.69
		SD	3.66	3.13	2.96	3.38	3.44	3.54
Lecturer	7	M	39.43	40.29	41.14	40.00	39.57	39.29
		SD	2.15	2.36	1.68	3.61	2.57	3.30
Associate Professor	43	M	41.21	40.98	40.42	40.95	40.58	40.00
		SD	3.53	3.56	3.12	2.83	2.98	3.24
Professor	24	M	42.75	42.25	42.62	43.46	42.75	41.54
		SD	4.47	4.94	4.30	4.15	4.01	4.28
Total	200	M	41.04	41.10	40.93	41.16	41.05	40.28
		SD	3.66	3.66	3.38	3.63	3.49	3.70

Note: D1= Acceptance on lesson study D2= Understanding lesson study
D3= Collaboration in lesson study D4= Professional development through lesson study
D5= Effectiveness of lesson study D6= Practical implementation of lesson study

To describe the significant difference in the various dimensions in terms of designation, the collected data were analyzed by using ANOVA (See Table 7).

Table 7 ANOVA Results of the Attitudes of Teacher Educators towards Lesson Study Used in Education Degree Colleges in terms of Designation

No.	Dimension	Designation	Sum of Square	df	Mean of Square	F	Sig.
1	Acceptance on Lesson Study	Between Groups	144.852	4	36.213	2.808	.027*
		Within Groups	2514.828	195	12.897		
		Total	2659.680	199			
2	Understanding Lesson Study	Between Groups	91.671	4	22.918	1.738	.143
		Within Groups	2571.124	195	13.185		(ns)
		Total	2662.795	199			
3	Collaboration in Lesson Study	Between Groups	115.751	4	28.938	2.616	.037*
		Within Groups	2157.269	195	11.063		
		Total	2273.020	199			
4	Professional Development through Lesson Study	Between Groups	263.504	4	65.876	5.435	.000***
		Within Groups	2363.376	195	12.120		
		Total	2626.880	199			
5	Effectiveness of Lesson Study	Between Groups	118.512	4	29.628	2.500	.044*
		Within Groups	2310.988	195	11.851		
		Total	2429.500	199			
6	Practical Implementation of Lesson Study	Between Groups	77.145	4	19.286	1.423	.228
		Within Groups	2643.610	195	13.557		(ns)
		Total	2720.755	199			
	Total	Between Groups	4405.928	4	1101.48	3.160	.015*
		Within Groups	67979.092	195	348.611		
		Total	**72385.020**	**199**			

Note. *p < .05, ***p < .001, ns = not significant

Based on Table 7, there was a significant difference in the attitudes of teacher educators towards lesson study used in Education Degree Colleges in terms of designation F (4,195) = 3.160, p< .05. However, there was no significant difference in the attitudes of teacher educators towards lesson study in the dimensions of; understanding lesson study and practical implementation of lesson study due to their designation. It can be interpreted that the attitudes of teacher educators towards lesson study differed in the dimensions of acceptance on lesson study, collaboration in lesson study, professional development through lesson study, and effectiveness of lesson study according to their designation. The attitudes were nearly the same in the dimension of understanding about lesson study and practical implementation of lesson study due to their designation. Therefore, to be clear, Post-Hoc test was executed by Tukey HSD method.

Table 8 The Results of Tukey (HSD) Multiple Comparison for the Attitudes of Teacher Educators towards Lesson Study used in Education Degree Colleges in terms of Designation

Dependent Variable	(I) Designation	(J) Designation	Mean Difference (I-J)	Sig.
Attitudes towards Lesson Study	Tutor (T)	Assistant Lecturer (AL)	7.218	.198
		Lecturer (L)	8.124	.808
		Associate Professor (AP)	3.699	.847
		Professor (P)	-7.537	.436
	Assistant Lecturer (AL)	Tutor (T)	-7.218	.198
		Lecturer (L)	.906	1.000
		Associate Professor (AP)	-3.519	.882
		Professor (P)	-14.754*	.012*
	Lecturer (L)	Tutor (T)	-8.124	.808
		Assistant Lecturer (AL)	-.906	1.000
		Associate Professor (AP)	-4.425	.978
		Professor (P)	-15.661	.293
	Associate Professor (AP)	Tutor (T)	-3.699	.847
		Assistant Lecturer (AL)	3.519	.882
		Lecturer (L)	4.425	.978
		Professor (P)	-11.235	.130
	Professor (P)	Tutor (T)	7.537	.436
		Assistant Lecturer (AL)	14.754*	.012*
		Lecturer (L)	15.661	.293
		Associate Professor (AP)	11.235	.130

Note. *$p < .05$

Table 8 indicated that a significant difference was found between Assistant Lecturer and Professor are in the designation at .05 level. So, it can be interpreted that teacher educators who are Assistant Lecturers had different attitudes from the teacher educators who are Professors. It may be due to the fact that Professors had more teaching experience and practice in lesson study than Assistant Lecturers.

Findings of Responses to Open-ended Questions

Four open-ended questions were asked to obtain more information from the participants. By exploring the participants' attitudes, the researcher was better at tailoring advice and information sharing. In addition, open-ended questions allow participants to explore the personal reason for making positive changes in their attitudes and how to go about making those changes. Within the following four open-ended questions, participants answered these questions according to their thoughts, beliefs, and feelings. The study briefly presented the feelings of their answers in the following.

1. How frequently do teacher educators practice lesson study activities in their teaching? (1. Daily 2. Once a weak 3. Once per month 4. Once per Academic Year 5. Never Practice it)

According to the responses of teacher educators selected from Education Degree Colleges on the frequency of practicing in lesson study, 44% of teacher educators (88 out of 200 teacher educators) indicated that they practiced lesson study activities once per month, 46.5 % of teacher educators (93 out of 200 teacher educators) indicated that they practiced it once per academic year and 9.5% of teacher educators (19 out of 200 teacher educators) indicated that they have never practiced it.

2. State the effectiveness of lesson study for students.

Most of teacher educators (187 out of 200 teacher educators) answered the effectiveness of lesson study for students as follows:

- Students can get positive outcomes.
- Students engage in lessons and units as active participants.
- Students can understand lessons easily.

3. Describe the effectiveness of lesson study for teachers.

Almost all teacher educators (195 out of 200 teacher educators) described the effectiveness of lesson study for teachers as follows:

- Lesson study improves the quality of learning for educators to become professional educators.
- Lesson study provides to deepen subject-matter knowledge.
- Teacher educators can get a better collaboration through lesson study.

4. As a teacher, describe what might be the challenges in implementing the lesson study process.

Some of the teacher educators (175 out of 200 teacher educators) answered the challenges in implementing the lesson study as follows:

- Teacher educators need sufficient time and support to be able to plan together and collaborate so they can implement the lesson study regularly.
- They face difficulties to change their professional beliefs.

Discussion, Suggestions and Conclusion

Discussion

This study is to investigate the attitudes of teacher educators towards lesson study used in Education Degree Colleges. According to the literature survey, lesson study is a method of improving teaching and learning for students and teachers. Gunawan (2017) stated that lesson study is a collaborative activity of lecturers designing learning and evaluating the success of teaching strategies to improve the quality of the learning process and student learning outcomes. The idea of lesson study is simple: collaborating with fellow teachers to plan, observe and reflect on lessons. Developing a lesson study, however, is a more complex process.

For the current study, two research questions were investigated. The first research question was "How do teacher educators consider lesson study used in Education Degree Colleges?" And the second research question was "How do the attitudes of teacher educators towards lesson study differ in terms of teaching services, qualification, and designation?".

According to the results of each dimension, teacher educators in Education Degree Colleges in Magway Region and Mandalay Region had positive attitudes towards lesson study. It is supposed that they accepted that they can develop better procedures for learning through lesson study. However, the required main points and practices of lesson study for the development of teachers' skills in understanding and observing classroom practices are still unknown. To be successful teaching, they have to implement lesson study in an effective way.

Tachie (2020) explored teacher attitudes towards lesson study. He pointed out that lesson study was carried out as a professional way of planning -through a positive attitude, dedication, and commitment as a group with one common idea.

Based on the comparison of mean of the attitudes of teacher educators towards lesson study in terms of teaching services, qualification and designation, there was no significant difference in the attitudes of teacher educators towards lesson study in terms of teaching services and qualification. Therefore, the attitudes of teacher educators towards lesson study did not directly affect the teaching services and their qualifications.

On the other hand, there was a significant difference in the attitudes of teacher educators towards lesson study in terms of designation except for the dimension of understanding about lesson study implementation of lesson study. Thus, the designation of teacher educators affects on the attitudes of teacher educators towards lesson study.

According to the responses of opening-ended questions, lesson study provides the benefits for teacher educators; the quality of learning to become professional educators, deep subject matter knowledge, and better collaboration. On the other hand, the students engage lesson as active participants so that they can understand their lesson easily and they can get positive learning outcomes. In the practice of lesson study, teacher educators faced the challenges such as insufficient time, support, instructional materials, and collaboration to be able to plan and implement lesson study together. For that reason, it was the weak practice of lesson study in selected Education Degree Colleges. As the consequence, teacher educators did not get the rich experience and knowledge of lesson study. Therefore, teacher educators should practice lesson study regularly and systematically. The principals should encourage them to involve actively in conducting lesson study and support adequately.

Suggestions

The current study explored the attitudes of teacher educators towards lesson study used in Education Degree Colleges. It was found that almost all teacher educators' attitudes had good in the lesson study process. Lesson study increases teaching confidence and had direct benefits for student learning through collaboration with colleagues. Moreover, the implication of lesson study is the formation of study groups as a place for sharing and discussion about teaching and learning. Therefore, teacher educators should follow the suggestions to develop the quality of teaching. Teacher educators should involve in the process of lesson study effectively. They should create supportive relationships among the team members for dialogue, analysis, and critique through lesson study. This study emphasized only the attitudes of teacher educators towards lesson study used in Education Degree Colleges from Magway Region and Mandalay Region. To obtain more valid findings, the research study should be expanded to other Education Degree Colleges in Myanmar. Moreover, research is an unending process and every research work provides clues for further investigation. Therefore, further studies should focus on learners for their achievement. The following further investigations may be based on the results of this study. With this view, some recommendations were provided for further research.

1. Lesson study should be one of the regular in-service training in teacher education programs.
2. It is recommended that educational stakeholders should be actively involved in the organizational structures that support teachers' effective participation in lesson study. This may contribute enhancing teachers' knowledge and practice, enabling learners to achieve in the teaching learning process.
3. This study contained survey data only. Further research should be conducted in qualitative research. From the results of the study, the next study should be done to meet the possible needs in the implementation of lesson study for the professional development of teacher educators.

Conclusion

To develop the profession of teaching, teacher educators have to implement lesson study as it plays an essential role in the quality of the teaching and learning process for the professional development of the teacher. The teacher educators acknowledged that lesson study helped them develop the teaching profession and know students' needs, and conduct the best approach in shaping students' character.

Therefore, this study is hoped to be helpful for teacher educators as well as administrators by providing the results regarding the attitudes of teacher educators towards lesson study used in Education Degree Colleges. Based on the findings of the study, they will become aware of teacher educators' professional development in the teaching learning process. The findings of this study are also applicable to teachers, administrators, and educational stakeholders and provide some support for further implementation of lesson study in teacher education. The lesson study approach permits teachers involved in professional development to become as active in their learning as they expect their students to be. By creating a supportive, meaningful, enjoyable, and effective learning environment or opportunities for teacher educators, they can be improved their professional development. This study will give guidelines for teacher educators to conduct a better and more effective teaching learning process so that students will achieve purposeful learning. Moreover, this study will provide bases for further research studies in the area of the lesson study process.

Acknowledgements

First of all, I am deeply grateful to Dr. Myat Myat Thaw (Pro-Rector, Sagaing University of Education) who allowed me to do this research. Then, I would like to express our honorable thanks to Prof. Dr Wai Wai Oo (Head of Curriculum and Methodology Department) and Dr. Soe Than (Retierd Professor, Head of Curriculum and Methodology Department) for their invaluable instructions. I would like to express the deepest appreciation to my supervisor, Daw Soe Soe Thein (Associate Professor) for her excellent support, and valuable advice to complete this research successfully.

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