AN INVESTIGATION INTO THE IMPACT OF EXPERIENTIAL LEARNING ON SCIENCE PROCESS SKILLS IN TEACHING SECONDARY SCHOOL STUDENTS

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Abstract

The purpose of this study was to investigate the impact of experiential learning on science process skills in teaching secondary school students. Explanatory sequential design was conducted in this study. The research design for quantitative study was the non-equivalent control group design. Intrinsic case study design was used as the qualitative design. Instruments like pretest and posttest were used as the quantitative ones. Semi-structured interview questions were used as qualitative instruments. For the internal consistency reliability, Cronbach's alpha coefficient was used. The reliability coefficient for the pretest was 0.72, and for the posttest was 0.76. A random sampling method was used to choose four high schools from two regions. The purposive sampling method was applied for collecting qualitative data. Quantitative data was analyzed by one-way analysis of covariance. The results showed that basic science process skills of students who received instruction with experiential learning on science process skills model were higher than those of students who did not receive it. Qualitative data was analyzed by thematic analysis. Qualitative findings revealed that students and teachers who participated in the experimental groups preferred the learning situation, and were willing to apply the experiential learning on science process skills model. All these results showed that the experiential learning on science process skills model was supportive in teaching science to achieve academic mastery and to acquire basic science process skills.

Keywords: learning, experiential learning, process skill, science process skills, basic science process skills

Introduction

Education is to help the student to develop his personality, to adjust himself to the society in which he lives; to learn to live and work with others, and to grow up to be active and creative forces in society (Khin Zaw, 2001a). In Myanmar society, education is a critical building block for nation building, national unity and sustainable development (MoE, 2016). Learning is a result of experiences and individuals do not always learn in the same way (Kolb, 1984). Teachers use different approaches to help students acquire knowledge, skills and experience.

Different characteristics of students are reflected in their learning processes. Experiential learning emerged as a result of considering students' individual differences. Experiential learning is a process of learning through experiences (practice, experiment, discovery and so on) to develop the students' science process skills, improve the students' metacognitive skills, enhance the skills through the implementation of the knowledge to the real situations, and give the students' the ability to self-learning (Kolb & Kolb, 2006).

In implementing experiential learning procedures, the students actively construct the new knowledge by themselves on the grounds of the already existing knowledge and engage in authentic learning experiences. So, this study was conducted to investigate the impact of experiential learning on science process skills in teaching secondary school students.

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Purposes of the Study

The purposes of the study are described as follows:

1. To find out the impact of experiential learning on the science process skills in teaching secondary school students
2. To explore the attitudes of teachers and students towards experiential learning on science process skills model
3. To make suggestions for the improvement of teaching science according to the results of the study

Research Questions

The research questions are described as follows:

1. How do basic science process skills differ between secondary school students who receive instruction with experiential learning on science process skills model and those who do not receive it?
2. What are the attitudes of teachers towards experiential learning on science process skills model?
3. What are the attitudes of students towards experiential learning on science process skills model?

Definition of Key Terms

The following terms were used to describe specific concepts throughout the study.

Learning

Learning is defined as the process by which behavior is developed or altered through practice or experience (Khin Zaw, 2001b).

Experiential Learning

Experiential learning is a teaching learning strategy in which learners are actively involved in the planning of learning activities, in the gathering, analyzing and using the subject, and in construction of knowledge through grasping and transformation of experience (Deryakulu, Büyüköztürk & Özçınar, 2010).

Process Skill

Process skill is the learners' cognitive activity of creating meaning and structure from new information and experiences (National Research Council, 1996).

Science Process Skills

Science process skills are the core skills that enable the easy learning and persistency of sciences, and that provide the students to be responsible and active in their own learning (Harlen & Elstgeest, 1992).

Basic Science Process Skills

Basic science process skills are the skills that scientists and students use when they do science. These skills are foundational skills for the development of more complex integrated skills employed at higher levels of secondary education. These skills are observing, inferring, measuring, communicating, classifying and predicting (Rezba, Sprague, McDonnough & Matkins, 2007).

Scope

This study was conducted at Magway and Bago Regions. The populations in this study were science teachers who were teaching in Grade Six and Grade Six students from the selected schools in the academic year (2022-2023). Basic science process skills were used for this study. This study was to investigate the impact of experiential learning on science process skills in teaching secondary school students and the duration was three months.

Review of Related Literature

Science is the investigation and interpretation of natural phenomena which occur in the daily life. It does not simply sit down and pray for things to happen, but seeks to find out why things happen. It experiments and tries again and again and sometimes fails and sometimes succeeds. The modern world is very different from ancient world due to the contribution of science in human life. Science is the system of knowing about the universe through data collected by observation and controlled experimentation. It is a way of thinking, a way of understanding the world (Carin & Sund, 1989).

Teaching science should help human to discover humility on one hand and the ability to affect their own futures on the other (Trowbridge & Bybee, 1990). The purpose of science was to develop an understanding of the major generalizations of science and associated scientific attitudes, and to get the children to know their environment by observing everyday things around them. The emphasis was on getting the information about the environment from firsthand observations rather than from books (Victor, 1989).

Effective science teachers used a variety of teaching methods, chose the best for each lesson. The use of experiential learning helped to integrate concept and practical work in science teaching and learning. So, this study was foster to use experiential learning in teaching science for the improvement of secondary school students' science process skills.

The Nature of Experiential Learning

Teaching has been with a long time and human beings learn from experience, teaching has been carried on its conditions and effects. Thus, experience has been the source of knowledge (Khin Zaw, 2001b). Kolb (1984) believed that learning is the process whereby knowledge is created through the combination of grasping and transforming experience. Experiential learning is learning through experience or learning by doing.

Learning is a process, not in terms of outcomes. All learning is re-learning. Learning requires the resolution of conflicts. It is a holistic process of adaptation. It results from synergetic transactions between the person and the environment. Furthermore, it is the process of creating knowledge. Experiential learning was built on the above six propositions (Kolb & Kolb, 2005).

The purpose of experiential learning was to give the chance to the students to interact with peers or groups or with the real world. Students learned experiences by doing, discovering, reflecting and applying. Through these experiences, students could develop communication skills, science process skills and self-confidence, and gain and strengthen decision-making skills by responding to and solving real world problems and processes.

The Nature of Science Process Skills

Science process skills are activities that scientists execute when they study or investigate a problem, an issue or a question. These skills are used to generate content and to form concepts (Carin & Sund, 1989). Science process skills can be classified as basic science process skills and integrated science process skills. Basic science process skills were used in this study. Basic science process skills are observing, inferring, measuring, communicating, classifying and predicting.

Observing is using the senses to gather information about an object or event. Inferring is making an "educated guess" about an object or event based on previously gathered data or information. Measuring is using both standard and non-standard measures and estimates to describe the dimensions of an object or event. Communicating is using words or graphic symbols to describe an action, object or event. Classifying is grouping or ordering objects or events into categories based on properties or criteria. Predicting is stating the outcome of a future event based on a pattern of evidence (Padilla, 1990). After the intervention, the students of the experimental groups could be able to observe, infer, measure, communicate, classify and predict individually.

The Experiential Learning on Science Process Skills Model

The teaching model included three instructional phases. These phases are preparation, implementation, and evaluation. There are three components in the first phase. These are (i) orientation of intended learning outcomes, (ii) selection of instructional strategies and resources, and (iii) linkage with prior knowledge and experience. The second phase includes eight components. These are (i) introduction to lesson, (ii) planning for experiential learning activities, (iii) enhancing awareness of experience, (iv) providing classroom experience, (v) reviewing and reflecting on experience, (vi) debriefing, (vii) extraction, and (viii) formative assessment. The third phase includes summative assessment and feedback. The three phases of the teaching model are shown in the following Figure 1.

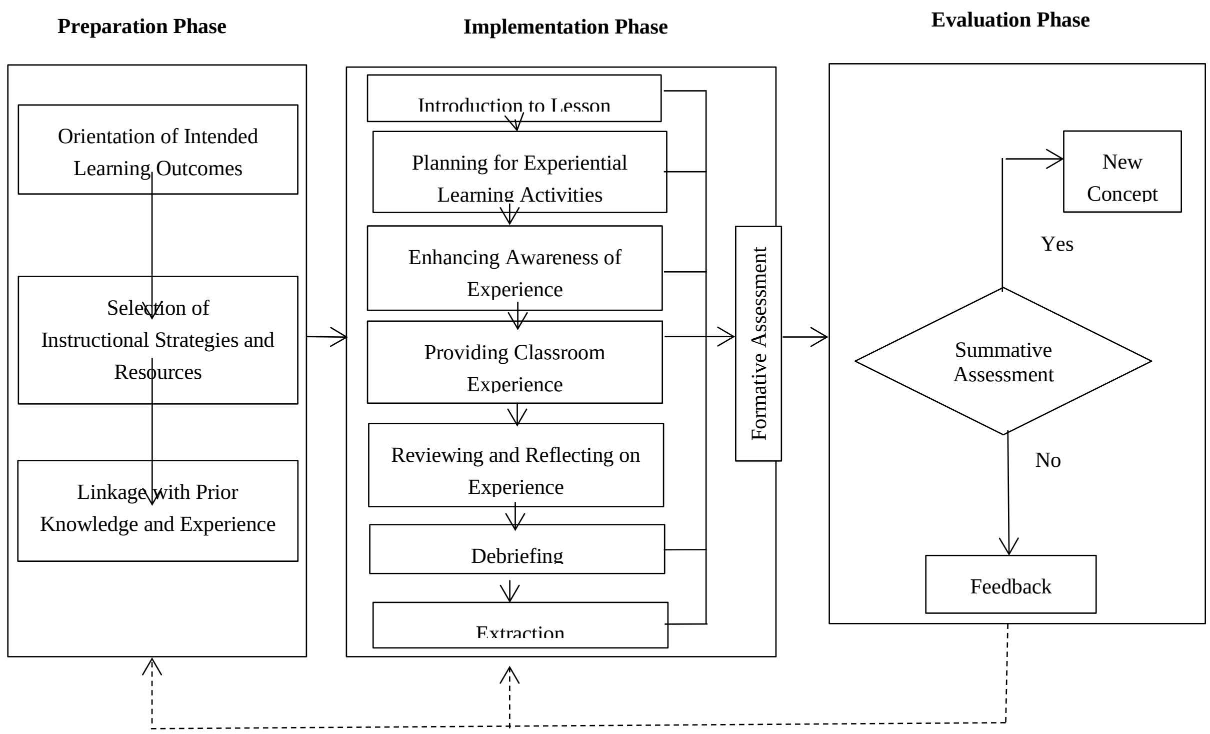

Figure 1. Experiential learning on science process skills model.

Research Method

Research Design

In this study, a mixed methods design was used. Among the basic mixed methods research designs, explanatory sequential research design was used for this study. The explanatory sequential design was illustrated in Figure 2.

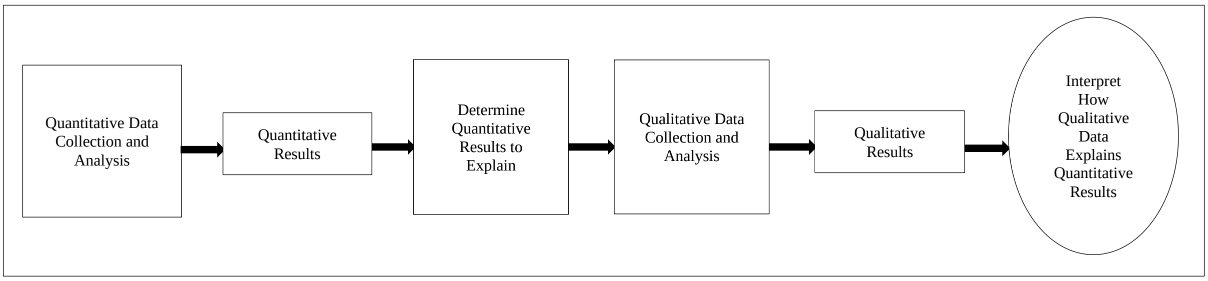

Figure 2. Explanatory sequential design.

Source: From Mills & Gay (2016).

Non-equivalent control group design, one of the quasi-experimental designs, was used for quantitative study. Intrinsic case study design, one of the case study designs, was used for qualitative study. Within the case study approach, typical qualitative data gathering strategies or methods include interviews, observations and document analysis (Punch, 2009). In this study, semi-structured interviews were used.

Population and Sample Size

In this study, a simple random sampling technique was used to select four basic education high schools. Among (352) Grade Six students from four schools, (271) students were selected as samples (see Table 1).

Table 1 ***Population and Sample Size of Quantitative Study***

Region	Township	School	No. of Population	No. of Subject	
				Experimental	Control
Bago	Pyay	No. (1) BEHS, Pyay	109	37	36
	Shwedaung	BEHS, Shwedaung	49	28	21
Magway	Aunglan	No. (1) BEHS, Aunglan	136	46	45
	Sinbaungwe	BEHS, Sinbaung we	58	31	27
		Total	**352**	**142**	**129**

Four middle school science teachers and eight Grade Six students from selected schools were purposely selected as samples for interview. The population and sample size of qualitative study was presented in the following Table 2.

Table 2 ***Population and Sample Size of Qualitative Study***

Region	Township	School	No. of Teacher	No. of Student
			Interviewee	Interviewee
Bago	Pyay	No. (1) BEHS, Pyay	1	2
	Shwedaung	BEHS, Shwedaung	1	2

Region	Township	School	No. of Teacher Interviewee	No. of Student Interviewee
Magway	Aunglan	No. (1) BEHS, Aunglan	1	2
	Sinbaungwe	BEHS, Sinbaungwe	1	2
		Total	4	8

Instruments

Pretest, posttest and interview questions were used as instruments in this study.

Pretest

The pretest was constructed to measure the entry behavior of the students. The pretest items were based on Chapter (1) Nature of Science, Chapter (2) Matter, Chapter (3) Force, Chapter (4) Living Things, and Chapter (5) Cell and Cell Structure of Grade Six science textbook. Ten multiple-choice items and ten short questions were used. Total marks were sixty and time was allowed for one and a half hour. The reliability coefficient for the pretest was 0.72.

Posttest

The posttest was constructed to measure the students' basic science process skills. The constructed items for each question were based on Chapter (6) Reproduction, Chapter (7) Planet Earth, Chapter (8) Ecosystem and Chapter (9) Elements, Compounds and Mixtures from Grade Six science textbook. It employed ten items in multiple-choice format and fourteen items with short questions. Total marks were sixty and time was allowed for one and a half hour. The reliability coefficient for the posttest was 0.76.

Interview Questions

Interview questions were developed to study the attitudes of teachers and students towards the application of experiential learning on science process skills model in the classroom. Semi-structured interview questions for teachers consisted of thirteen items, and then semi-structured interview questions for students were seven items.

Learning Materials

Learning materials were selected from the Grade Six science textbook. Some video clips, pictures, and quizzes were prepared to get students' attention and to arouse their motivation.

Procedure

Firstly, an experiential learning on science process skills model was developed. Based on the experiential learning on science process skills model, lesson plans were developed. Before the main study, a pilot study was conducted at No. (2), Basic Education High School, Aunglan. And then, the two high schools were selected randomly from each of the selected regions. The intervention period was for about three months. Before the treatment, pretest was administered to examine students' existing knowledge concerning science. Then, the experimental groups were taught with experiential learning on science process skills model and the control groups were taught with formal instruction. After the treatment period, all the students in the experimental and control groups were administered by posttest to examine getting basic science process skills.

Furthermore, the four teachers who taught the experimental groups and the eight students of the experimental groups were interviewed to obtain in-depth information on the opinions of them. To conduct interview, it took about ten minutes for students and about twenty minutes for teachers.

Data Analysis

The data were analyzed by one-way analysis of covariance (one-way ANCOVA) and thematic analysis. One-way analysis of covariance adjusts posttest score for initial differences on the dependent variable (Mills & Gay, 2016). One-way analysis of covariance was used to determine whether there were significant differences between the basic science process skills test scores of two independent samples: one was experiential learning on science process skills model applied group and the other was unapplied group. The collected data from interview were analyzed by using thematic analysis.

Research Findings

Findings of Pretest

The data obtained from the pretest scores were analyzed by using one-way analysis of covariance (one-way ANCOVA) to determine whether there was a significant difference between entry behaviors of experimental groups and control groups. Table 3 was used to illustrate the analysis of covariance results for pretest scores.

Table 3 ***Analysis of Covariance Results for Pretest Scores***

School	Group	N	*M*	*SD*	*MD*	*F*	*p*
S1	Experimental	37	44.00	6.29	5.39	1.179	$.001^{**}$
	Control	36	38.61	7.51			
S2	Experimental	28	49.07	4.26	6.88	3.573	$.000^{***}$
	Control	21	42.19	6.64			
S3	Experimental	46	47.67	5.28	4.89	3.625	$.000^{***}$
	Control	45	42.78	6.56			
S4	Experimental	31	38.61	7.96	6.54	0.055	$.002^{**}$
	Control	27	32.07	7.33			

Note. S1 = BEHS, Pyay; S2 = BEHS, Shwedaung; S3 = BEHS, Aunglan; S4 = BEHS, Sinbaungwe.
$^{**}p < .01$. $^{***}p < .001$.

These data showed that there were significant differences between the entry behavior of experimental groups and control groups in four selected schools.

Findings of Research Question (1)

The research question (1) is "How do basic science process skills differ between middle school students who receive instruction with experiential learning on science process skills model and those who do not receive it?". To answer this research question, the posttest scores of four selected schools were analyzed by using one-way analysis of covariance (one-way ANCOVA).

Findings of Posttest

Table 4 was used to show analysis of covariance results for posttest scores in school 1.

Table 4 ***Analysis of Covariance Results for Posttest Scores in School 1***

Basic Science Process Skill	Group	N	*M*	*SD*	*MD*	*F*	*p*
Observing	Experimental	37	9.28	0.66	0.29	2.70	.105 (ns)
	Control	36	8.99	0.74			
Inferring	Experimental	37	8.91	1.25	1.17	9.04	$.004^{**}$
	Control	36	7.74	1.79			
Measuring	Experimental	37	9.56	.64	0.02	0.01	.909 (ns)
	Control	36	9.54	1.03			
Communicating	Experimental	37	8.28	1.24	2.51	75.49	$.000^{***}$
	Control	36	5.77	1.03			
Classifying	Experimental	37	9.11	1.15	0.42	1.45	.232 (ns)
	Control	36	8.69	1.61			
Predicting	Experimental	37	8.77	1.29	3.01	53.99	$.000^{***}$
	Control	36	5.76	1.90			

Note. ns = not significant. $^{**}p < .01$. $^{***}p < .001$.

Based on the results, there were no significant differences between experimental group and control group for the posttest scores of observing skills, measuring skills and classifying skills. But, the posttest scores of experimental group were significantly higher than that of control group for inferring skills, communicating skills and predicting skills. Therefore, it can be interpreted that the students of experimental group could get experience, understand the lessons, and participate the hands-on activities and experiments more than those of control group. Table 5 was used to show analysis of covariance results for posttest scores in school 2.

Table 5 ***Analysis of Covariance Results for Posttest Scores in School 2***

Basic Science Process Skill	Group	N	*M*	*SD*	*MD*	*F*	*p*
Observing	Experimental	28	8.94	1.29	1.33	11.99	$.001^{**}$
	Control	21	7.61	0.80			
Inferring	Experimental	28	7.88	1.79	1.77	7.84	$.007^{**}$
	Control	21	6.11	1.90			
Measuring	Experimental	28	8.11	1.88	0.40	0.46	.500 (ns)
	Control	21	7.71	1.51			
Communicating	Experimental	28	8.10	1.54	1.57	9.17	$.004^{**}$
	Control	21	6.53	1.43			
Classifying	Experimental	28	7.48	1.64	0.92	3.04	.088 (ns)
	Control	21	6.56	1.51			
Predicting	Experimental	28	7.11	1.42	2.17	25.52	$.000^{***}$
	Control	21	4.94	0.96			

Note. ns = not significant. $^{**}p < .01$. $^{***}p < .001$.

Based on the results, there were no significant differences between experimental group and control group for the posttest scores of measuring skills and classifying skills. But, the posttest scores of experimental group were significantly higher than that of control group for observing skills, inferring skills, communicating skills and predicting skills. Therefore, it can be interpreted that the students from experimental group could make inferences and predictions about their observations and design investigations to test their experiences more than those of control group. Table 6 was used to show analysis of covariance results for posttest scores in school 3.

Table 6 ***Analysis of Covariance Results for Posttest Scores in School 3***

Basic Science Process Skill	Group	N	*M*	*SD*	*MD*	*F*	*p*
Observing	Experimental	46	9.10	0.68	0.16	0.28	.596 (ns)
	Control	45	8.94	1.82			
Inferring	Experimental	46	8.12	2.18	2.66	35.16	$.000^{***}$
	Control	45	5.46	1.74			
Measuring	Experimental	46	9.79	0.65	0.89	15.90	$.000^{***}$
	Control	45	8.90	1.24			
Communicating	Experimental	46	8.24	1.40	3.51	102.70	$.000^{***}$
	Control	45	4.73	1.67			
Classifying	Experimental	46	9.36	1.16	1.39	25.01	$.000^{***}$
	Control	45	7.97	1.27			
Predicting	Experimental	46	8.06	1.64	4.14	104.46	$.000^{***}$
	Control	45	3.92	2.03			

Note. ns = not significant. $^{***}p < .001$.

Based on the results, there was no significant difference between experimental group and control group for the posttest scores of observing skills. But, the posttest scores of experimental group were significantly higher than that of control group for inferring skills, measuring skills, communicating skills, classifying skills and predicting skills. Therefore, it can be interpreted that the students from experimental group could construct ideas and concepts by using hands-on experience more than those of control group.

Table 7 was used to show analysis of covariance results for posttest scores in school 4.

Table 7 ***Analysis of Covariance Results for Posttest Scores in School 4***

Basic Science Process Skill	Group	N	*M*	*SD*	*MD*	*F*	*p*
Observing	Experimental	31	8.84	0.85	0.36	1.70	.198 (ns)
	Control	27	8.48	1.15			
Inferring	Experimental	31	8.38	1.56	2.19	17.74	$.000^{***}$
	Control	27	6.19	2.04			
Measuring	Experimental	31	9.78	1.25	1.83	10.96	$.002^{**}$
	Control	27	7.95	2.50			
Communicating	Experimental	31	8.37	1.34	2.27	49.40	$.000^{***}$
	Control	27	6.10	0.81			

Basic Science Process Skill	**Group**	**N**	***M***	***SD***	***MD***	***F***	***p***
Classifying	Experimental	31	8.95	1.28	2.86	40.59	.000***
	Control	27	6.09	1.89			
Predicting	Experimental	31	9.11	0.81	3.27	49.65	.000***
	Control	27	5.84	2.19			

Note. ns = not significant. $^{**}p < .01$. $^{***}p < .001$.

Based on the results, there was no significant difference between experimental group and control group for the posttest scores of observing skills. But, the posttest scores of experimental group were significantly higher than that of control group for inferring skills, measuring skills, communicating skills, classifying skills and predicting skills. Therefore, it can be interpreted that the students from experimental group could categorize the basic knowledge and ideas, predict the main ideas for the new situation, and create a display to communicate data and observation, and a graph for the presentation of data to others more than those of control group.

Findings of Research Question (2)

The research question (2) is "What are the attitudes of teachers towards experiential learning on science process skills model?". In order to get in-depth data, four teachers who taught experimental groups in four schools were interviewed in this study. The data from teachers' interviews were analyzed by thematic analysis. Thus, the emerging themes are opportunities for learning, improvement, effectiveness, and challenges.

Opportunities for learning: The students participated in group activities, discussed with group members, and then presented opinions well and made logical explanations. The teacher encouraged students to cultivate a spirit of self-reliance by using problem-solving strategies, inquiry, self-directed learning and brainstorming. So, giving learning opportunities for students could provide a successful teaching-learning process.

Improvement: The students got own creative skills, improved personal qualities, expressed the ways of thinking, and interested and preferred to do practical works by learning with the experiential learning on science process skills model. They engaged authentic learning experiences and heightened knowledge and experience concerning real-world by using multiple senses. So, the implementation of the experiential learning on science process skills model in the classroom could improve students' learning.

Effectiveness: By engaging students in hands-on experiences and reflection, they were better able to become valuable experiences, develop reflective practice habits, and promote teamwork and communication skills. Thus, the use of the experiential learning on science process skills model was effective for meaningful learning.

Challenges: The teacher had challenges in implementing the proposed model. Requiring patience and guidance, having more than one right answer, causing loss of focus, insufficient experience and time are some difficulties for teachers. Although the implementation of the experiential learning on science process skills model was effective, the teachers had some difficulties in implementation.

Findings of Research Question (3)

The research question (3) is “What are the attitudes of students towards experiential learning on science process skills model?”. In order to get in-depth data, eight students who were in experimental groups from the selected schools were interviewed in this study. The data from students’ interviews were analyzed by thematic analysis. Thus, the emerging themes are active participation, autonomous, enrichment, and hands-on experience.

Active participation: The students worked in groups and discussed with group members. They also shared ideas, experiences and feedback with other members, and they actively participated in the group activities. Thus, students’ active participation is a theme to consider for using the experiential learning on science process skills model.

Autonomous: By learning with the experiential learning on science process skills model, the students faced with unknown situations and tasks in a real context. To finish those tasks, they need to identify self-awareness and skills, to find out self-access, to create and innovate, and to think critically and problem-solving. Those skills make students as autonomous students. Thus, students’ autonomous is a second theme to consider for using the experiential learning on science process skills model.

Enrichment: They obtained many opportunities such as freedom of thought and group discussion when they received with the instruction of experiential learning on science process skills model. They explored, learned and enriched information, knowledge and experience by continuing to learn based on previous knowledge and experience. Thus, the use of the experiential learning on science process skills model is enriched for students’ experiences.

Hands-on experience: Some students gained knowledge and experience from own practical work by learning with real things around the environment. It is because of their active participation in practical work. Then, they reapplied knowledge and experience in their real life. Thus, students’ hands-on experience is a theme to consider for using the experiential learning on science process skills model.

Discussion and Suggestions

Discussion

This study was conducted to investigate the impact of experiential learning on science process skills in teaching secondary school students.

Discussion for Research Question (1)

Pretest and posttest scores were analyzed by using one-way analysis of covariance to examine the students’ entry behavior and basic science process skills. For the observing skill questions, there were significant differences between the experimental group and the control group in school 2. But, there were no significant differences between experimental groups and control groups in school 1, school 3, and school 4. The mean scores of the experimental groups were higher than that of the control groups in school 1, school 3, and school 4. For the inferring skill questions, there were significant differences between experimental groups and control groups in all schools. For the measuring skill questions, there were significant differences between experimental groups and control groups in school 3 and school 4. But, there were no significant differences between experimental groups and control groups in school 1, and school 2. The mean scores of experimental groups were higher than that of control groups in school 1, and school 2.

For the communicating skill questions, there were significant differences between experimental groups and control groups in all schools. For the classifying skill questions, there were significant differences between experimental groups and control groups in school 3 and school 4. But, there were no significant differences between experimental groups and control groups in school 1, and school 2. The mean scores of experimental groups were higher than that of control groups in school 1, and school 2. For the predicting skill questions, there were significant differences between experimental groups and control groups in all schools. Therefore, it can be interpreted that the students who received instruction with experiential learning on science process skills model performed better in basic science process skills test after the intervention.

The findings of the study were in line with the findings of Alkan (2016). He found that experiential learning is a theory that is effective in academic achievement and scientific process skills. According to the data, the experiential learning on science process skills model could improve basic science process skills. Therefore, it supported the research question (1) that there was a significant difference in basic science process skills between secondary school students who received instruction with experiential learning on science process skills model and those who did not receive it.

Discussion for Research Question (2)

Interview questions were used to examine the attitudes of teachers towards using experiential learning on science process skills model. Data from interview questions were analyzed by thematic analysis. The teachers who participated in the interview showed positive attitudes towards using experiential learning on science process skills model. The teachers said that experiential learning on science process skills model improved students' performance and basic science process skills. All the teachers thought that experiential learning on science process skills model made their students active learners since it promoted their students' thinking skills, social skills, and motivation.

Many teachers agreed that the application of experiential learning on science process skills model promoted the new science curriculum since it had a lot of activities that needed the students to do actions, be active, search for information and work with other students. The results of the teachers' interviews found that all teachers who taught in experimental groups had many teaching experiences, and they all agreed that the teaching and learning steps in experiential learning on science process skills model were effective in science teaching. Therefore, it can be interpreted that experiential learning on science process skills model to implement in the classroom was convenient and effective.

This study was consistent with the research findings of the experiential learning method that affected early childhood science process skills at TK Da'arurahma Majalaya Academic Year 2019/ 2020 in the Covid-19 era. This research was carried out by Nafiqoh and Wulansuci in 2020. They found that Covid-19 did not affect the development of the scientific process in early childhood, although learning switches to being carried out online and carried out in the homes of individual students. This did not dampen the enthusiasm of children to carry out volcanic eruption activities. Therefore, it supported the research question (2) that the attitude of all the teachers had positive attitude towards experiential learning on science process skills model.

Discussion for Research Question (3)

Interview questions were used to examine the attitudes of students towards using experiential learning on science process skills model. Data from interview questions were analyzed by thematic analysis. The students who participated in the interview showed positive attitudes towards using experiential learning on science process skills model. The students said that experiential learning on science process skills model improved their performance and basic science process skills. So, it can be interpreted that most of the students accepted the usefulness of applying this model on improving their attitudes.

The result was in line with the study of Wurdinger and Carlson (2010), the data revealed that through experiential learning, students gained confidence in their own abilities, and discovered innovative ways to overcome obstacles. Experiential learning allowed students to experiment and discover solutions on their own. Therefore, it supported the research question (3) that the students who received instruction with experiential learning on science process skills model had positive attitude.

Suggestions

Based on the results of this study, some suggestions for Science teachers are offered.

- The teacher should arouse the students' curiosity regarding with the lesson and allow them to find out what happened.
- The teacher should assess the students' learning throughout the learning process by asking questions, observing their facial expressions and body language, and listening to their concept discussion.
- The teacher should be careful to give enough time to students for making activities, or searching information.
- The teacher should give the students the chance to perform action or search for information dealing with the topic being taught.

Conclusion

The research findings showed that experiential learning on science process skills model could benefit students in learning science. This is because learning with experiential learning on the science process skills model was more supportive of the development of basic science process skills than the formal instruction. According to the results of teachers' interviews, it was observed that teachers had not known or even used it in science teaching. However, after using the experiential learning on science process skills model, the teachers said that they saw the enthusiasm and motivation of students in their involvement in learning, despite the barriers they faced. Therefore, this experiential learning on science process skills model was effective in teaching science.

According to the results of students' interviews, it was found that experiential learning on science process skills model led to changes in students' thoughts about themselves and the learning environment. It was observed that students had good science process skills. As a result, students learn quickly and also retain information well through experiential learning activities. Thus, it can be interpreted that the use of experiential learning on science process skills model enhanced fostering the students' attitudes towards science learning, their interest and their achievement in science. Therefore, this study showed that students learned by doing that, and being actively participated in learning leads to positive attitudes and increased interest in science learning.

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