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# THE IMPACT OF INTERACTIVE MULTIMEDIA-BASED INSTRUCTION ON TEACHING OF SCIENCE IN MYANMAR EDUCATION DEGREE COLLEGES

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## Abstract

The main purpose of this study is to investigate the impact of interactive multimedia-based instruction in teaching of science in Myanmar Education Degree Colleges. Pretest-posttest control group design, one of the true experimental designs was used. The research instruments were pretest, posttest, learning materials including lesson plans and attitude questionnaires for student teachers. By using the simple random sampling method, four Education Degree Colleges from Mandalay and Sagaing Regions were selected. The participants of the study were selected from Year 1 Semester 1 student teachers of four selected Education Degree Colleges in Myanmar. In research findings, the findings of overall teaching of science achievement showed that the experimental groups who received interactive multimedia-based instruction with the proposed instructional design were significantly higher than the control groups who did not. In addition, the positive attitudes towards interactive multimedia-based instruction increases after the treatment and there was a significant difference in the attitudes of student teachers towards the interactive multimedia-based instruction before treatment (Time 1) and after treatment (Time 2). Therefore, the research findings proved that the proposed instructional design of interactive multimedia-based instruction contributes a positive impact on teaching of science in Teacher Education Sector.

**Keywords**: Media, Interactive Multimedia, Instruction, Interactive Instruction, Multimedia-based Instruction

## Introduction

Today, education encounters challenges in all aspects of social, economic and cultural life of an individual. Scarcity of trained technical and skillful teachers in education system is one of the challenges. Therefore, the teachers need to learn to handle the modern teaching technology and multimedia to make their teaching styles to be smooth and effective (Wang, Fong & Kwan, 2009).

To improve the educational productivity, the teachers should keep in touch with the mainstream of multimedia within the education system, try to develop traditional techniques and using new teaching methods. The mainstream of the technological media in education is called multimedia which leads to infinite applications of computer technologies. The concept of this multimedia technology came into effect with appearance of sound cards, compact disks, use of digital cameras and then the video clips which made computer an essential educational tool in the world (Bartlett & Strough, 2003).

### Purpose of the Research

The main purpose of this research is to investigate the impact of interactive multimedia-based instruction in teaching of science in Myanmar Education Degree Colleges.

The specific objectives of this study are as follows;

1. To compare the teaching of science achievement of the student teachers who receive interactive multimedia-based instruction and those who do not receive it.

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2. To compare the attitudes of the student teachers towards the interactive multimedia-based instruction before treatment and after treatment.
3. To offer suggestions for the improvement of teaching of science based on the results of the study.

**Research Hypotheses**

1. There is a significant difference in the teaching of science achievement of the student teachers who receive interactive multimedia-based instruction and those who do not receive it.
2. There is a significant difference in the attitudes of the student teachers towards the interactive multimedia-based instruction before treatment and after treatment.

**Definition of Key Terms**

**Multimedia:** Multimedia is defined as the combination of multiple technical resources for the purpose of presenting information represented in multiple formats via multiple sensory modalities (Alessi & Trollip, 2001).

**Interactive Multimedia:** Interactive Multimedia is the presentation that incorporates with some combination of media while the user controls the delivery of that presentation and participates rather than observes (Bartlett & Strough, 2003).

**Instruction:** Instruction is considered as teaching with the integration of both method and media (Conati & VanLehn, 2000).

***Interactive Instruction*****:** *Interactive instruction* is defined as instructing whereby the teachers and the students involve actively in *learning* process by the ways of regular teacher-student interaction, student-student interaction, use of audio-visuals, and hands-on demonstrations (Marsh, Griffin & Lowrie, 2008).

**Multimedia-based Instruction:** The teaching learning process based on the multimedia materials created by the teacher (Shao, 2012).

## Review of Related Literature

### Nature of Multimedia in Education

Multimedia is multisensory; it engages the senses of the students. Multimedia can be defined in a variety of ways, but the term "multimedia" refers to a web-based interactive computer-mediated application that includes various combinations of text, sound, still images, audio, video, and graphics. Multimedia is also interactive; it enables both the student and the teacher to control the content flow of information (Becta, 2004).

Multimedia presentations are most effective when the different types of media support one another as teaching strategies which enhance students' learning. A well-developed multimedia can do more than good. The potential pedagogical value and rationale for using multimedia in classroom is given below:

1. To raise interest level: multimedia raises the interest of the student in learning and they appreciate a variety of media.
2. To enhance understanding: multimedia materials boost students' comprehension of complex topics of science.
3. To increase memorability: multimedia leads to better encoding and easier retrieval which confirms for long-term memory.

**Principles of Interactive Multimedia**

(1) The coherence principle advises designers to avoid the use of unnecessary words, sounds or graphics. Superfluous or irrelevant text, sound and graphics will require unnecessary processing and use of cognitive resources.

(2) The spatial contiguity principle advises designers to put text and graphics related to that text near each other in instructional message designs. The classic example of text on one page of a book and the figure being described by that text on a different page of that book causes unnecessary extraneous processing.

(3) The temporal contiguity principle advocates synchronizing audio and video in presentations. Presenting audio before video or video before audio, or video and audio that are not in sync confuses and distracts learners.

(4) The redundancy principle states that on-screen text is distracting when audio and graphics are also used. Learners can be distracted by the redundancy of focusing and refocusing between the text and narrations when graphics are presented with text and that text is read verbatim by a narrator. It is less distracting for a narrator not to read the on-screen text word-for-word.

(5) The signaling principle states that essential content can be highlighted to draw the learner's attention to it. Signaling can be used to cue learners to important content and can be highlighted text, the use of bold or italics or visuals of an instructor pointing to specific content on a whiteboard.

(6) The worked sample principle states that a step-by-step demonstration can help reduce complexity when problem-solving. Giving students an example to follow when working through similar problems gives them guidance to refer to and focuses their essential processing.

(7) The segmenting principle states that a continuous complex presentation should instead be broken down into shorter more manageable chunks. Complex content can be simplified by breaking that complexity down into easier components.

(8) The pretraining principle suggests that key, unfamiliar terminology and definitions be given and discussed before an instructional unit. Similar to segmenting, students can be prepared for learning by first presenting them with and discussing key concepts and definitions.

(9) The modality principle suggests the use of audio rather than on-screen text during video, animations or presentations. Presenting on-screen text with graphics only utilizes the visual processing capabilities of learners while using graphics with narration is more efficient as it utilizes both the learner's visual and auditory processing capabilities.

(10) The personalization or voice principle advocates the use of a more conversational tone when narrating visuals as opposed to a formal, academic tone. A friendly narrative tone fosters social presence which enhances motivation for learning.

(11) The embodiment principle suggests the use of human-like gestures when including on-screen agents in multimedia designs. The human-like gestures and personifications enhance the perception of virtual social presence and also increases learner motivation.

(12) The multimedia principle suggests presenting relevant graphics with text rather than just text. Static or dynamic graphics combined with text can often communicate more effectively and efficiently than just text alone by presenting concepts and principles as a visual schema.

(13) The engagement principle suggests that instructors and teachers actively involve students by asking them questions during presentations. Students will learn better when actively involved in a discussion vice passively listening to a lecture (Gagne, et. al., 2005).

## Application of Multimedia in Education

The word "Media" is the plural of "Medium" that means "form of communication." In Latin, Medium means "Between". This term refers to anything that carries information between a source and a receiver. Therefore, the role of media between the source and receiver is very important to deliver the message that needed to be delivering. The purpose of media is to facilitate communication and learning. Thus, there are six basic categories of media:

(1) Text,
(2) Audio,
(3) Visuals,
(4) Video,
(5) Manipulates (Objects), and
(6) People.

The most commonly used media in learning is "text." Text is an alphabetical character that may be displayed in any format, such as books, posters, chalk and white board, computer screen and many more. The next commonly used media is "audio." This includes anything which can be heard, such as a person's voice, music, mechanical sounds, noise, and many more. Third is "visuals". This medium is regularly used to promote learning. These include diagrams on posters, drawings on a board, photographs, graphics in a book, cartoons, and so on. Other type of media is "video."

Therefore, with regard to the type of sense, the information can be obtained as given below:

1. Auditory: sources of knowledge which provides information by listening.
2. Visual: sources of knowledge which provides information by watching.
3. Kinesthetic: sources of knowledge which provides information by movement.
4. Olfactory: sources of knowledge which provides information by smelling.
5. Taste: sources of knowledge which provides information by tasting.

These are media that shows motion and movement like DVD, Videotape, computer animation, and so on. Manipulative and the last media is "people." These may be teachers, students, or subject-matter experts. People are critical to learning. Students learn from teachers, other students and adults. Therefore, computer has been found to help and improve student learning. It also has been found to be better than using books, teachers, films, or other more traditional methods (Alessi & Trollip, 2001).

## Meaningful Learning with Multimedia

Mayer (2012) argues that meaningful learning from words and pictures happens when the learner engages in five cognitive processes. These processes are as follows.

1. selecting relevant words for processing in verbal working memory
2. selecting relevant images for processing in visual working memory
3. organizing selected words into a verbal model
4. organizing selected images into a pictorial model
5. integrating the verbal and pictorial representations with each other and with prior knowledge.

These cognitive processes in working memory determine which information is attended to or selected, which knowledge is retrieved from long term memory and integrated with new the information to construct new knowledge and ultimately, which bits of new knowledge are transferred to long-term memory. Knowledge that is constructed in working memory is transferred to long-term memory through the process of encoding (Mayer & Gallini, 1990).

## Method

In this study, pretest-posttest control group design, one of the true experimental designs was used.

**Subjects**: By using the simple random sampling method, four Education Degree Colleges from Mandalay and Sagaing Regions were selected. The participants of this study were selected from Year 1 Semester 1 student teachers of four selected Education Degree Colleges in Myanmar.

**Instrumentation:** As research instruments, pretest, posttest, and attitude questionnaires for student teachers were used.

**Procedure**

Pilot testing for lesson plan, pretest, posttest and questionnaires was held one week ahead of the main study with 30 student teachers and three teacher educators at Katha Education Degree College. Based on the findings of the pilot test, internal consistency reliability of the pretest, posttest and questionnaires were determined by the Cronbach's alpha. The Cronbach's alpha internal consistency reliability of the pretest, posttest and questionnaires are (0.736), (0.774) and (0.833) respectively.

Then, on 13 May 2022, the main study was conducted in four Education Degree Colleges. Firstly, pretest was administered to both groups to evoke the initial levels. The allocated time for the pretest is 90 minutes and the given marks is 50 marks.

The experimental groups received a new treatment and the control groups did not receive. The treatment duration is 12 weeks. At the end of the treatment period, all selected student teachers from two groups had to sit for posttest. The allocated time for this posttest is also 90 minutes and the given marks is 50 marks.

**Analysis of the Data**

Independent samples *t*-test, Wilcoxon Singed Rank Test and Spearman's rho correlation were used to analyze the data obtained from the pretest, posttest and attitude questionnaires. The findings and interpretations based on the data obtained will be discussed.

## Findings

The collected data were analyzed in order to get the accurate results and make appropriate interpretations.

**Findings of Independent Samples *t* test on the Pretest Scores in the Four Selected Education Degree Colleges (EDCs)**

The mean scores of pretests in the four selected Education Degree Colleges are as follows.

**Table 1. Results of Independent Samples *t* test on the Pretest Scores in the Four Selected Education Degree Colleges (EDCs)**

| Education Degree College | Group | N | M | SD | MD | *t* | *df* | *p* |
|---|---|---|---|---|---|---|---|---|
| EDC 1 | Experimental | 38 | 38.45 | 5.248 | 2.37 | 1.327 | 36 | .188 (ns) |
| | Control | 38 | 36.08 | 3.900 | | | | |
| EDC 2 | Experimental | 34 | 27.44 | 3.202 | 1.41 | 1.434 | 32 | .145 (ns) |
| | Control | 34 | 26.03 | 4.764 | | | | |
| EDC 3 | Experimental | 33 | 29.18 | 2.493 | 1.15 | 1.457 | 31 | .285 (ns) |
| | Control | 33 | 28.03 | 3.795 | | | | |
| EDC 4 | Experimental | 29 | 26.86 | 3.136 | 1.03 | 1.061 | 27 | .209 (ns) |
| | Control | 29 | 25.83 | 4.209 | | | | |

*Note.* ns = not significant

The results presented in Table 1 shows that there were no significant differences between the pretest scores of the experimental groups and control groups in all Education Degree Colleges before they are treated.

Based on the results of pretest, Figure 1 is illustrated as the comparison of pretest mean scores of the experimental groups and control groups in the four selected Education Degree Colleges.

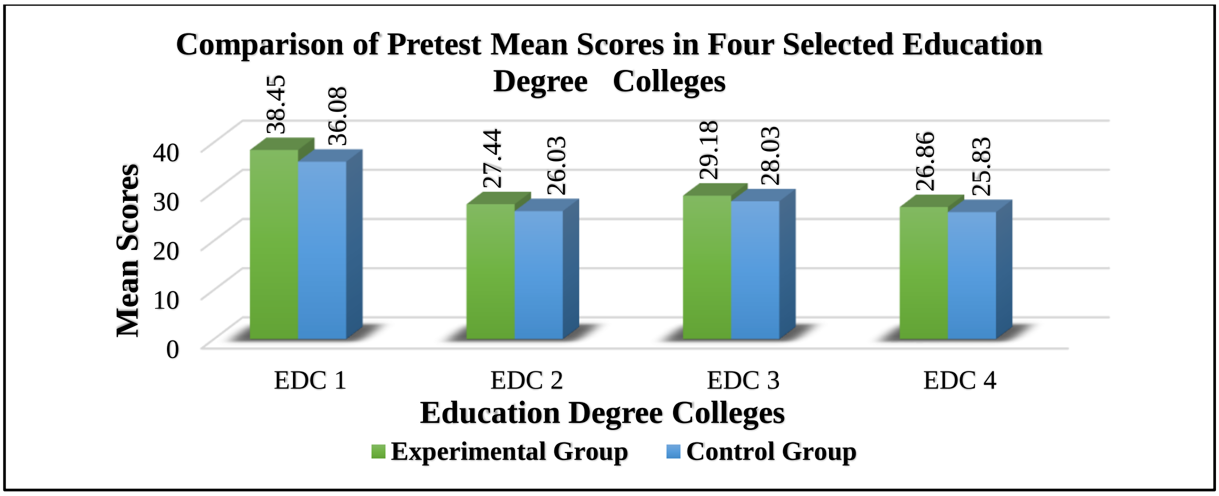


**Figure 1.** Comparison of Pretest Mean Scores in Four Selected Education Degree Colleges

Results of Independent Samples *t* test on the Posttest Scores in EDC 1

The following Table 2. shows the results of independent samples *t* test for posttest scores on teaching of science in EDC 1.

**Table 2. Results of Independent Samples *t* test on the Posttest Scores in EDC 1**

| Level | Group | N | M | SD | MD | *t* | *df* | *p* |
|---|---|---|---|---|---|---|---|---|
| Knowledge | Experimental | 38 | 6.92 | 0.784 | 1.84 | 3.713 | 36 | .000*** |
| | Control | 38 | 5.08 | 2.186 | | | | |
| Comprehension | Experimental | 38 | 7.11 | 0.798 | 2.08 | 8.182 | 36 | .000*** |
| | Control | 38 | 5.03 | 2.552 | | | | |
| Application | Experimental | 38 | 3.45 | 0.50 | 0.76 | 4.102 | 36 | .000*** |
| | Control | 38 | 2.68 | 0.989 | | | | |
| Analysis | Experimental | 38 | 11.11 | 1.886 | 6.55 | 5.773 | 36 | .000*** |
| | Control | 38 | 4.55 | 3.351 | | | | |
| Synthesis | Experimental | 38 | 8.26 | 0.446 | 4.74 | 2.999 | 36 | .000*** |
| | Control | 38 | 3.53 | 1.390 | | | | |
| Evaluation | Experimental | 38 | 7.13 | 1.319 | 3.13 | 3.986 | 36 | .001** |
| | Control | 38 | 4.00 | 0.735 | | | | |
| Overall | Experimental | 38 | 42.89 | 1.783 | 21.45 | 6.287 | 36 | .000*** |
| | Control | 38 | 21.45 | 6.950 | | | | |

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

**Results of Independent Samples *t* test on the Posttest Scores in EDC 2**

The following Table 3. shows the results of independent samples *t* test for posttest scores on teaching of science in EDC 2.

**Table 3. Results of Independent Samples *t* test on the Posttest Scores in EDC 2**

| Level | Group | N | M | SD | MD | *t* | *df* | *p* |
|---|---|---|---|---|---|---|---|---|
| Knowledge | Experimental | 34 | 6.71 | 1.115 | 2.53 | 5.231 | 32 | .000*** |
| | Control | 34 | 4.18 | 1.242 | | | | |
| Comprehension | Experimental | 34 | 3.65 | 0.49 | 1.33 | 4.525 | 32 | .000*** |
| | Control | 34 | 2.32 | 1.8 | | | | |
| Application | Experimental | 34 | 3.41 | 0.70 | 0.65 | 3.884 | 32 | .000*** |
| | Control | 34 | 2.76 | 0.43 | | | | |
| Analysis | Experimental | 34 | 8.53 | 0.71 | 2.94 | 5.212 | 32 | .000*** |
| | Control | 34 | 5.59 | 1.02 | | | | |
| Synthesis | Experimental | 34 | 8.03 | 0.87 | 2.71 | 4.584 | 32 | .000*** |
| | Control | 34 | 5.32 | 1.15 | | | | |
| Evaluation | Experimental | 34 | 7.00 | 1.26 | 1.56 | 8.833 | 32 | .000*** |
| | Control | 34 | 5.44 | 1.21 | | | | |
| Overall | Experimental | 34 | 42.35 | 2.23 | 14.91 | 6.396 | 32 | .000*** |
| | Control | 34 | 27.44 | 3.20 | | | | |

*Note.* $^{***}p<.001$.

**Results of Independent Samples *t* test on the Posttest Scores in EDC 3**

The following Table 4. shows the results of independent samples *t* test for posttest scores on teaching of science in EDC 3.

**Table 4. Results of Independent Samples *t* test on the Posttest Scores in EDC 3**

| Level | Group | N | M | SD | MD | *t* | *df* | *p* |
|---|---|---|---|---|---|---|---|---|
| Knowledge | Experimental | 33 | 7.09 | 0.723 | 3.03 | 2.919 | 31 | .000*** |
| | Control | 33 | 4.06 | 0.788 | | | | |
| Comprehension | Experimental | 33 | 3.70 | 0.467 | 0.82 | 3.986 | 31 | .000*** |
| | Control | 33 | 2.88 | 0.331 | | | | |
| Application | Experimental | 33 | 3.76 | 0.435 | 0.76 | 3.235 | 31 | .000*** |
| | Control | 33 | 3.00 | 0.000 | | | | |
| Analysis | Experimental | 33 | 9.12 | 1.083 | 1.06 | 6.751 | 31 | .000*** |
| | Control | 33 | 8.06 | 0.704 | | | | |
| Synthesis | Experimental | 33 | 7.76 | 1.001 | 3.27 | 5.114 | 31 | .000*** |
| | Control | 33 | 4.48 | 1.278 | | | | |
| Evaluation | Experimental | 33 | 6.79 | 1.111 | 2.21 | 7.332 | 31 | .000*** |
| | Control | 33 | 4.58 | 1.119 | | | | |
| Overall | Experimental | 33 | 41.76 | 2.450 | 14.70 | 9.368 | 31 | .000*** |
| | Control | 33 | 27.06 | 2.221 | | | | |

*Note* ****p*<.001.

**Results of Independent Samples *t* test on the Posttest Scores in EDC 4**

The following Table 5. shows the results of independent samples *t* test for posttest scores on teaching of science in EDC 4.

**Table 5. Results of Independent Samples *t* test on the Posttest Scores in EDC 4**

| Level | Group | N | M | SD | MD | *t* | *df* | *p* |
|---|---|---|---|---|---|---|---|---|
| Knowledge | Experimental | 29 | 6.90 | 0.673 | 0.38 | 5.611 | 27 | .339 (ns) |
| | Control | 29 | 6.28 | 1.360 | | | | |
| Comprehension | Experimental | 29 | 3.45 | 0.506 | 0.59 | 3.335 | 27 | .000*** |
| | Control | 29 | 2.86 | 0.351 | | | | |
| Application | Experimental | 29 | 3.07 | 0.704 | 0.48 | 7.425 | 27 | .004** |
| | Control | 29 | 2.59 | 0.501 | | | | |
| Analysis | Experimental | 29 | 9.14 | 1.125 | 1.07 | 3.223 | 27 | .000*** |
| | Control | 29 | 8.07 | 0.704 | | | | |
| Synthesis | Experimental | 29 | 6.14 | 1.481 | 1.79 | 5.221 | 27 | .000*** |
| | Control | 29 | 4.34 | 1.289 | | | | |
| Evaluation | Experimental | 29 | 7.34 | 1.078 | 1.07 | 6.568 | 27 | .010* |
| | Control | 29 | 4.55 | 1.152 | | | | |
| Overall | Experimental | 29 | 38.76 | 1.958 | 7.35 | 8.127 | 27 | .000*** |
| | Control | 29 | 26.90 | 2.226 | | | | |

*Note*. ns = not significant, **p*<.05. ***p*<.01. ****p*<.001.

Figure 2. shows the comparison of overall posttest mean scores among the four selected Education Degree Colleges.

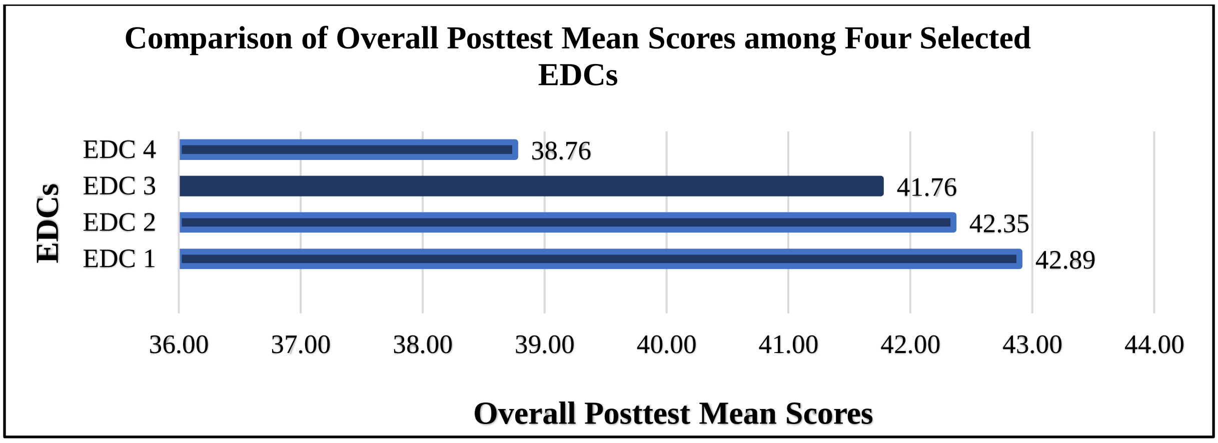


**Figure 2.** Comparison of Overall Posttest Mean Scores among Four Selected EDCs

The results illustrated in Figure 2 shows that EDC 1 performed better than all of the other EDCs. Therefore, it can be interpreted that the use of interactive multimedia-based instruction with the proposed instructional design had the greatest contribution to overall teaching of science achievement in EDC 1.

Table 6. shows Wilcoxon Signed Rank Test Results for student teachers' attitudes towards the interactive multimedia-based instruction before treatment (Time 1) and after treatment (Time 2).

**Table 6. Wilcoxon Signed Rank Test Results for Student Teachers' Attitudes**

| EDC | N | Dimensions | Before Md | After Md | Z | Asymp Sig (2-tailed)*p* | *r* |
|---|---|---|---|---|---|---|---|
| EDC 1 | 38 | D1 | 36 | 48.5 | -5.376 | .001** | .36 |
| | | D2 | 37 | 48.5 | -5.339 | .005** | .21 |
| | | D3 | 36.5 | 48 | -5.304 | .007** | .55 |
| | | D4 | 36 | 47.5 | -5.383 | .000*** | .42 |
| | | D5 | 34.5 | 47 | -5.378 | .000*** | .21 |
| EDC 2 | 34 | D1 | 37 | 48 | -5.055 | .003** | .61 |
| | | D2 | 35 | 47.5 | -5.066 | .001** | .45 |
| | | D3 | 36.5 | 48 | -5.090 | .000** | .21 |
| | | D4 | 35 | 47.5 | -5.063 | .005** | .55 |
| | | D5 | 35.5 | 48 | -5.076 | .002** | .36 |
| EDC 3 | 33 | D1 | 38 | 46 | -4.882 | .004** | .57 |
| | | D2 | 36 | 48 | -5.016 | .000*** | .61 |
| | | D3 | 37 | 48 | -5.000 | .021* | .42 |
| | | D4 | 36 | 48 | -4.943 | .040* | .22 |
| | | D5 | 35 | 49 | -5.018 | .000*** | .21 |
| EDC 4 | 29 | D1 | 34.50 | 47 | -4.709 | .031* | .56 |
| | | D2 | 32 | 46 | -4.707 | .000*** | .61 |
| | | D3 | 33.50 | 45 | -4.707 | .020* | .32 |
| | | D4 | 29.50 | 47 | -4.706 | .310 (ns) | .33 |
| | | D5 | 31 | 46 | -4.609 | .225 (ns) | .48 |

| EDC | N | Dimensions | Before Md | After Md | Z | Asymp Sig (2-tailed)*p* | *r* |
|---|---|---|---|---|---|---|---|
| Overall | 134 | D1 | 37 | 48 | -9.982 | .000*** | .21 |
| | | D2 | 32 | 48 | -10.032 | .000*** | .33 |
| | | D3 | 34 | 48 | -10.016 | .000*** | .59 |
| | | D4 | 32 | 48 | -10.001 | .000*** | .52 |
| | | D5 | 32 | 48 | -10.015 | .000*** | .38 |

Note: D1 = General Attitudes towards Using Multimedia, D2 = Using Multimedia in Instruction, D3 = Benefits of Using Interactive Multimedia-based Instruction, D4 = Barriers in Using Interactive Multimedia-based Instruction, D5 = Perceived Support for Using Interactive Multimedia-based Instruction, Md = Median, ns = not significant, ***$p < .001$, **$p < .01$, *$p < .05$

In the four selected Education Degree Colleges, Wilcoxon Signed Rank Test revealed a significant difference dealing with total attitudes towards dimension 1, dimension 2, dimension 3, dimension 4 and dimension 5 between before treatment (Time 1) and after treatment (Time 2). The median score on the attitudes towards dimension 1 increased from before treatment (Md = 37) to after treatment (Md = 48) and ($p = .000$, $p < .001$). The median score on the attitudes towards dimension 2 increased from before treatment (Md = 32) to after treatment (Md = 48) and ($p = .000$, $p < .001$). The median score on the attitudes towards dimension 3 increased from before treatment (Md = 34) to after treatment (Md = 48) and ($p = .000$, $p < .001$). The median score on the attitudes towards dimension 4 increased from before treatment (Md = 32) to after treatment (Md =48) and ($p = .000$, $p < .001$). The median score on the attitudes towards dimension 5 increased from before treatment (Md = 32) to after treatment (Md = 48) and ($p = .000$, $p < .001$). It can be interpreted that the positive attitudes towards five dimensions increase after the treatment and there was a significant difference in the attitudes of student teachers towards the interactive multimedia-based instruction before treatment (Time 1) and after treatment (Time 2) in the four selected Education Degree Colleges.

To examine the correlation between student teachers' attitudes towards interactive multimedia-based instruction and overall teaching of science achievement in the four selected Education Degree Colleges, Spearman's rho correlation was used.

**Table 6. Correlation between Student Teachers' Attitudes and Overall Teaching of Science Achievement**

| | OSA | D1 | D2 | D3 | D4 | D5 |
|---|---|---|---|---|---|---|
| **OSA** | 1 | .584** | .622** | .681** | .655** | .649** |
| **D1** | | 1 | .611** | .617** | .532** | .913** |
| **D2** | | | 1 | .490** | .299** | .372** |
| **D3** | | | | 1 | .470** | .726** |
| **D4** | | | | | 1 | .995** |
| **D5** | | | | | | 1 |

*Note.* **. Correlation is significant at the 0.01 level (2-tailed). OSA = Overall Science Achievement, D1 = General Attitudes towards Using Multimedia, D2 = Using

Multimedia in Instruction, D3 = Benefits of Using Interactive Multimedia-based Instruction, D4 = Barriers in Using Interactive Multimedia-based Instruction, D5 = Perceived Support for Using Interactive Multimedia-based Instruction

According to the results presented in Table 6, overall teaching of science achievement of student teachers was significantly correlated with the attitudes towards interactive multimedia-based instruction in all dimensions.

## Discussion

The application of the interactive multimedia for instruction is an instructional situation in which the student teachers are given control to review the learning material in their own space and their own individual interests, needs, and cognitive processes. The basic objective of interactive multimedia material is not to replace the role of the teacher educator but to change the teacher educator's role entirely. As such, multimedia must be extremely well designed and sophisticated enough to mimic the best teacher, by combining its design with the various elements of the cognitive processes and the best quality of the technology. With today's multimedia courseware, once a program has been designed and built in with the appropriate response, it should be flexible and permit change and alteration. Although multimedia as a tool cannot replace hands-on learning, it can enhance and strengthen the impact of activities in the science classroom in Education Degree Colleges.

According to the research findings, there is a significant difference in the teaching of science achievement of the student teachers who receive interactive multimedia-based instruction and those who do not receive in all four selected Education Degree Colleges. There is a significant difference in the attitudes of the student teachers towards the interactive multimedia-based instruction before treatment and after treatment. Moreover, overall teaching of science achievement of student teachers was significantly correlated with the attitudes towards interactive multimedia-based instruction in all dimensions.

## Suggestions

The student teachers in Education Degree Colleges are the prospective teachers to lead the Education System in the future of Myanmar. According to Sicilia (2005), science teachers should be efficient, quick, and must have practical knowledge in subject and most important is to be able to answer all how things relate, what the scientific facts are and why things happen. Science teacher educators must be full of curiosities and should prepare to answer all problems. Most important thing is mastery in the subject, confidence and compassion.

It is suggested that student teachers in Education Degree Colleges should be able to try effective science teachers who are proficient in subject matter, pedagogical skills and technological skills through interactive multimedia-based instruction.

The Teacher Education Institutions should equip student teachers with a number of theoretical and practical experiences on the duties of the professional teachers to determine the quality of prospective teachers to produce good citizens for the country. Another factor that can affect to implement interactive multimedia-based instruction is electricity supply, internet access and free Wi-Fi around the campus of Education Degree Colleges.

It is suggested that the future development of teacher education sector in Myanmar should be based on the concepts of cybernetics to regulate and control the process of Education Degree Colleges for producing qualified prospective teachers.

(1) New science teaching approaches and techniques should be applied in various school levels: pre-school, primary school, middle school, high school and University level.
(2) In this study, sample Education Degree Colleges were randomly selected from Mandalay Region and Sagaing Region. Further research study should be carried out in the rest of the States and Regions by using different participants for replication.
(3) Since participants are Year 1 Semester 1 student teachers in Education Degree Colleges, further research should be carried out with Year 2, Year 3 and Year 4 student teachers of Education Degree Colleges.
(4) Since the content areas are limited to Year 1 Semester 1 science course, further research should be carried out other science content areas in Education Degree Colleges.
(5) This study was designed as pretest-posttest control group design; one of the true experimental designs as quantitative research, further research should be carried out with posttest-only control group design and Solom four-group design as well as other mixed methods research designs. Moreover, further research should be carried out with other qualitative designs such as ethnography, phenomenology, grounded theory, case study and critical studies.

## Conclusion

According to Fang (2006), the term 'multimedia,' which is constituted by 'multi' means integrating many expression methods and 'media' which implies technical words such as computer, dialogue, and digital, has changed its meaning through the decades. The term multimedia can be defined as a platform that integrates analogue information in various forms such as text, images, and audio-visual materials to a single digitized data and relays them using several (multi) vehicles (media). It is a system that allows users the use of easy and high-speed information communication networks. Multimedia is the exciting combination of computer hardware and software that allows to integrate video, animation, audio, graphics, and test resources to develop effective presentations on an affordable desktop computer.

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