



The Effect of Multimedia –Aided Teaching on Kindergarten Children Mathematical Achievement And Attitude.

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ABSTRACT

This research was designed to investigate the effects of multimedia –aided teaching on kindergarten children mathematical achievement and attitude. Two methods of taught were used to teach mathematic. One group of student was taught by using multimedia and the other group was not exposed to multimedia presentation. The quasi-experimental design was applied in this study. Sampling consisted of 60 students who studied in kindergarten classes. The theoretical framework of this present study was founded on the cognitive theory of multimedia learning.

KEYWORDS

Multimedia Aided Teaching (MAT), Mathematical Achievement, and Cognitive Theory of Multimedia Learning.

INTRODUCTION

The rapid development of technology changed the educators' dialogue. The present dialogue is about taking advantage of technology to improve teaching and learning process. Varied application of multimedia technology offered rich environment to improve teaching and learning process. Especially, Multimedia includes more than one form of media such as text, graphics, animation, audio, video and video conferencing where it is appropriate with Sensory stimulation theory, which states that when multi senses are stimulated, greater learning takes place (Laird, 1985). Interactive learning involves using a computer in the delivery of learning and teaching materials where the students interact with the computer through the provision of reinforcement that is in line with the reinforcement theory. The theory states that a behavior is a function of its consequences and that learner will repeat the desired behavior if it is positively reinforced, and will not repeat it if the behavior is negatively reinforced (Skinner, 1953). In brief, various multimedia is able to provide a rich teaching and learning environment (Aldalalah, Fong, & Ababneh, 2010).

Multimedia has a dramatic effect on using technology in teaching and learning process (Aldalalah, Fong, & Ababneh, 2010; Chang & Lehman, 2002; Mayer & Merlin, 2010). For this reason, the use of Multimedia-aided teaching (MAT) in the teaching and learning process has a great effect on teaching and learning process (Alther & Wagner, 2004; Gilakjani, 2012). MAT is which refers to the use a presentation consisting of words, sound, and pictures in teaching content (Mayer & Merlin, 2010). Similarly, MAT is easy to develop or install from internet, and it also needs low budget in which only the Internet and the computer are needed (Shah & Khan, 2015). MAT has many rich and varied components which offer effective teaching and learning process and will benefit in teaching kindergarten children (Han, 2010). According to Weiss, Kramarski, and Talis (2007) stated that a suitable multimedia environment in kindergarten affects students' mathematical skills. In short, MAT has the opportunities to improve students' mathematical achievement at kindergarten (Rolfe & Gray, 2011; Shah & Khan, 2015; Mayer & Merlin, 2010). Therefore, the general objective of this study is to assess the effect of MAT on kindergarten children mathematical achievement.

HYPOTHESIS

There are two hypotheses in this study to achieve research objective.

H01: There is no significant difference in the mean scores of

mathematical achievement of pre-test between MAT group and traditional group.

H02: There is no significant difference in the mean scores of post-test between MAT group and traditional group in the mathematical achievement.

H03: There is no significant difference in the mean scores of the students' attitude between MAT group and traditional group.

LITERATURE REVIEW

Mayer (2010) declared that multimedia presentation offers many possibilities to facilitate knowledge construction. Likewise, Aldalalah, Fong and Ababneh (2010) recommended that researchers had to examine how students learn from multimedia text, especially now that ICT is progressively being integrated into the school curriculum. The concentration of instruction of school subjects and networked technologies appears unavoidable.

According to Mayer (2010), various multimedia presentations offer the opportunity for students to use words and pictures. Words mean printed text or spoken text. Pictures mean drawing, charts, graphics, maps, photos, animations and videos. Mayer (2010) stated that using pictures and words is better than using words alone. The students' comprehend better when watching and listening, than when watching alone (Mayer & Moreno, 1998)

According to Richard Mayer (2010), there are various principles in multimedia learning theory. Modality Principle is better to present a clarification using two models (words and pictures) representation rather than one. Contiguity Principle, it is better to give a multimedia clarification by presenting the words and pictures at the same time rather than separate in time. Split –Attention Principle, it is better to give a multimedia illustration by presenting the words via auditory narration rather than by just visual on screen text. Coherence Principle, using few rather than many extraneous words and pictures is better. The dual channel assumption, the human cognitive system is divided into two different channels for representing and control knowledge – pictorial and verbal channels. Limited capacity assumption, each channel in the human cognitive system has a incomplete capacity for holding and manipulating knowledge. Active processing assumption, meaningful learning happens when students engage in active processing within the channels.

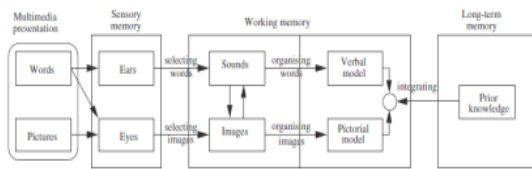


Figure 1 Mayer's Cognitive Theory of Multimedia Learning (Mayer 2010a)

Similarly, Aldalalah, Fong and Ababneh (2010) proclaimed that using multimedia presentations in teaching and learning process improve students' achievement. Similarly, Singh (Singh, 2003) pointed out that using MAT able to increase students' motivation and achievement, especially students who have low motivation and low prior knowledge. Gilakjani (2012) indicated that MAT increase students' interest level, improves their understanding, and raises their memorizing ability. Finally, the study which had done by Shah and Khan (Shah & Khan, 2015) pointed that MAT offers suitable environment in kindergarten for teaching and learning mathematic subject. According to him, kindergarten has to apply a multimedia environment in teaching mathematic.

STUDENTS' ATTITUDES

Students' attitudes have a prominent effect on students' achievements (Ellis, 2010). Therefore, the educators and teacher in the classroom are interested in increasing students' attitude.

There are many research approved that using multimedia increase students' attitude toward learning and teaching process (Hayes, 2000; Hall & Higgins, 2005; Shnaq&Domy, 2010). For instance, Hayes and Robinson (2000) pointed that multimedia have a positive effect on students' attitude. In the same manner, Hall and Higgins (2005) declared that students have a strong positive attitude toward using multimedia and believe it is helpful to them in their learning.

METHODOLOGY

Research Design

A quasi-experimental design that is the non-equivalent control group design applied in this study. Furthermore, random sampling technique was applied in order to have a sample that represents the study population. The initial group of participants in this study was 60 students who are in kindergarten. The total number was divided into two groups, 30 students studied mathematical subject by using MAT, and another section of the same subject offered by traditional method with the initial total of 30 students. In addition, the duration of this study was two weeks. Furthermore, the mathematical achievement test used in this study was adapted from the teacher's guide to the mathematic for the kindergarten level. The researcher asked six experts to check on the face and content validity of the test. To ensure the reliability of the mathematical achievement test, the researcher checked the reliability with a Test-Retest (Leech, Barrett, & Morgan, 2008). A Pearson's correlation was calculated to assess test-retest reliability of the mathematical achievement test scores where $r = .95$. This showed that there is good test-retest reliability.

Students Attitude questionnaire was used in this study. The researcher adapted shnaq and domy (2010) "The Students Attitude Toward E-learning Questionnaire. Students Attitude questionnaire had a total of 35 items from five Likert-scale; Not true - 1; Slightly true - 2; Moderately true - 3; Mostly true - 4; Very true -5." According to them, Students Attitude Toward E-learning Questionnaire was reported to have a Cronbach alpha of .96. In the current study, the Cronbach alpha coefficient was .95. Moreover, a panel of six experts was selected to establish the face and content validity of the attitude instrument.

RESULTS AND DISCUSSIONS

H01: There is no significant difference in the mean scores of mathematical achievement of pre-test between MAT group and traditional group.

The independent sample t-test was conducted to compare the mean difference between the different scores (Leech, Barrett, & Morgan, 2008). The independent samples t-test was calculated to compare the difference in the mean scores of the pre-test in the MAT and traditional groups. The first hypothesis was to investigate the homogeneity between MAT and traditional groups. The results of the independent sample t-test in which there is no significant difference on the mathematical achievement between the experimental group ($M = 13.88$, $SD = 4.10$) and control group ($M = 14.50$, $SD = 3.81$), $t(58) = .75$, $p = .46 > .05$). The magnitude of the difference in the means was very small ($\eta^2 = .009$).

H02: There is no significant difference in the mean scores of post-test between MAT group and traditional group in the mathematical achievement.

An analysis of covariance was performed to assess whether MAT had higher mathematical achievement than traditional method after controlling the pre-test based upon table the mean of the post-test scores. The mean of post-test scores for the group using MAT (16.06) was higher than the mean of post-test scores for the group using traditional method (14.63). The results indicated that after controlling the pre-test, there was a significant difference between MAT and traditional method in the post-test, with $F(1.58) = 50.79$ and $p = .00$. The effect size as indicated by the corresponding partial eta squared value is .5, and this is considered to be moderate according to Cohen's 1988 guidelines (Cohen, J, 1988).

H03: There is no significant difference in the mean scores of students' attitude between MAT group and traditional group.

An independent sample t-test was used to assess the difference in the mean of the post-test score of the MAT group and the post-test score of the traditional group.

The result of independent sample t-test illustrated that there was significant difference on attitude between the MAT ($M=3.100$, $SD= .719$) and traditional ($M=2.173$, $SD= .105$); $t(58) = 3.989$; $p=.02$). The effect size is .21, which according to Cohen (1988), is considered to be small.

This result is consistent with Mayer's (2010) cognitive theory of multimedia learning. According to him cognitive theory of multimedia learning, the students using MAT engaged in active processing within the channels (visual and the auditory channels). A meaningful learning occurs when students engage in active processing within the channels. In other words, meaningful learning occurs through the selection of suitable words and pictures and their organization into coherent pictorial and verbal models, and their integration with each other, with appropriate prior knowledge. The results from this study concurred with the results reported by many studies which confirmed the effectiveness of the MAT on mathematical achievement. For instance, Aldalalah, Fong and Ababneh (2010) declared that using multimedia presentation increased student achievement. Similar studies by Gilakjani (2012) indicated that MAT improve students' understanding and raises their memorizing ability.

CONCLUSION

The findings of this study have numerous practical implications. The findings of the study offer practical implications for the teachers in eliminating the kindergarten difficulties in mathematic achievement. This research enhances the teachers to apply a multimedia environment in teaching mathematic. MAT enhances students' achievement mathematic subject and attitude. This research suggested using MAT to facilitate mathematic learning and increase students' achievement.

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