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Research article

On the Investigation of Using Multimedia on Sixth-Grade Students' Achievement on Mathematics; A Case Study

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Abstract

This study was an attempt to explore the effects of using multimedia on sixth-grade students' achievement. In so doing, 60 students out of 112 sixth-grade students were randomly selected and then divided into two groups. One of the group as the experimental group was taught mathematics within 6 weeks via multimedia instruments and the other group as the control group received no instruction. Both descriptive and inferential statistics were used to analyze the data. The findings indicated that students using multimedia instruction outperformed in mathematics compared to the students taught via traditional methods. The implications of these findings would be useful for the teachers and especially math instructors to apply multimedia in the educational settings.

Keywords: Multimedia, Traditional Instruction, Sixth-Grade Students' Achievement, Teaching Methods, Learning Mathematics.

Introduction

Because of the development associated with computer systems, individuals happen to be in a position to obtain information with the web, on the internet papers, on the internet content articles, as well as on the internet books.

These days, everybody having a PC offers instant use of the world's scripts and composing techniques (Fischer, 2001). The web offers made the route for that training associated with suggestions as well as info. Eisenstein (1979) proclaims ―the house as well as workplace tables possess gets to be the printer's shop (as reported within Fischer, 2001, g. 283). Computer systems can display created vocabulary as well as distribute ideas through the planet. A good ever-increasing number of individuals tend to be investing more time daily utilizing written—that is , keyboard—Vocabulary instead of voiced vocabulary (Fischer, 2001). Nevertheless, computer systems continued to be within a set placement before introduction associated with technologies like the apple IPod or even comparable media products which maintain e-reader applications.

E-Reader Products

E-Reader products such as the apple iPod have been in need within our present culture. A chance to collect textual info having a solitary contact on the display can make e-reader products extremely appreciated. The mat offers the benefits of the guide without having it's drawbacks—the mass, the restrictions how a lot textual content could be designed to squeeze into just one quantity, and also the issue which annotating the document guide indicates, in certain methods, destroying this (Ragen, 2008). Printing like a main approach to disbursing textual content is gradually vanishing. Regardless of whether e-readers would be the following reasonable action or even whether or not they tend to be a good evolutionary instead compared to groundbreaking item isn't obvious (Griffey, 2010). Not just perform e-readers permit adjustment of the textual content also, they are substantially less expensive when compared with conventional text messaging-book prices is substantially less than conventional books: Which range from $6-$10 bucks for each guide (Raab, 2010). Along with this type of common curiosity about e-readers as well as their own reduced price, the query associated with exactly how electronic books impact the training procedure gets very appropriate.

Media

Media technologies are fairly much like a conventional book when it comes to keeping info. Nevertheless, a chance to change the written text by itself with an digital camera retains the possibility of college students to utilize the press therefore permitting a far more thrilling technique when compared with regular be aware getting. Media technologies offers the possible as well as performance to keep pleasure with regard to customers when compared with which of the regular book. Any kind of understanding or even training ought to be related to emotions associated with enjoyment as well as pleasure rather than monotony or even concern (Freeman, 1996). Based on Shavinina as well as Loarer (1999), typical media software includes a minimum of 3 of those 7 elements:

1. Textual content (including information, captions, subtitles, along with other assets for example furniture associated with material, indices, dictionaries, as well as assist facilities)
2. . Information (such as graphs, spreadsheets, data, as well as crude information of numerous kinds)
3. Sound (including talk, songs, history sound, as well as special effects)
4. Images (often which range from conventional press this kind such as sketches, images, roadmaps, as well as paper prints in order to pictures prepared or even produced completely inside a computer)
5. Photo taking pictures, through disadvantages, 35mm slides, images, as well as digital camera models (which report photo taking pictures straight because pc graphics)

6. Computer animation (whether documented upon movie, or even made up of the computer)

7. Shifting photos (specifically, electronic movie, possibly transformed through analogue movie as well as movie, or even produced completely inside a computer).

It will be found different methods for showing understanding materials inside a media structure in order to college students. For instance, Mautone as well as Mayer (2001) analyzed the results associated with signaling within 3 different types of training communications: one is the medical description is offered within spoken type like a textual content passing, once the medical description is offered within spoken type because talk, so when the medical description is offered within spoken as well as visible type like a narrated computer animation. College students that obtained signaled textual content produced much more suitable solutions about the move check compared to do college students that obtained non signaled textual content. It's possible which media technologies might help college students effectively discover. Nevertheless, we should understand that failing to provide media technologies within a suitable type can result in damaging outcomes. The belief associated with show on the media software is associated with substantial significance when it comes to move understanding. an excessive amount of media excitement may hinder the much deeper cognitive digesting which is crucial in order to understanding (Mayer, Griffith, Jurkowitz, & Rothman, 2008). Within gentle of those issues, it's important to determine regardless of whether understanding is going to be enhanced or even restricted to media that is the concentrate from the present research. Following analyzing what's made up within an e-text, you should realize the idea of understanding as well as exactly how this pertains to the existing research.

Cognitive Concept associated with Media Understanding

The current research targets the media understanding gadget; consequently, it's vital that we realize the cognitive working of individuals understanding through media. Based on the cognitive concept associated with media understanding (CTML), the visible info digesting funnel can become full whenever college students should procedure on-screen images as well as on-screen textual content simultaneously (Mayer, 2001). Nevertheless, whenever phrases tend to be offered because narration, phrases could be prepared within the spoken funnel, therefore decreasing the cognitive fill within the visible funnel. In a number of research screening this particular concept, each non-interactive media conditions as well as interactive press conditions had been utilized. The outcomes display college students that study from interactive (graphics as well as narration) find out more seriously as well as carry out much better upon problem-solving move assessments compared to college students that study from non-interactive (graphics as well as on-screen text) (Moreno & Mayer, 1999; Mousavi, Reduced, & Sweller, 1995; Sweller, 1999). Austin (2009) clarifies the main dimensions associated with CTML: (CTML) is dependent on 3 cognitive technology concepts associated with understanding: the human being info digesting program consists of twin stations with regard to visual/pictorial as well as auditory/verbal digesting (i. at the., dual-channels assumption); every funnel offers restricted convenience of digesting (i. at the., restricted capability assumption); as well as energetic understanding involves conducting a matched group of cognitive procedures throughout understanding (i. at the., energetic digesting assumption). The cognitive concept associated with media

understanding specifies 5 cognitive procedures within media understanding: choosing appropriate phrases in the offered textual content or even narration, choosing appropriate pictures in the offered pictures, arranging the chosen phrases right into a coherent spoken rendering, arranging chosen pictures right into a coherent pictorial rendering, as well as adding the pictorial as well as spoken representations as well as earlier understanding (Austin,1340,9).

Several research studies have been done regarding the impacts of Multimedia on the process of learning. Hein et al. (2011) did a research and found the requirements and analysis in software engineering education at higher education level and their results showed that the new method (Multimedia Instruction) is superior to the traditional method.

Elliot (2010) conducted a research on multimedia in schools and investigated the impact of web-based training – regarding animation and learning of science and language. He concluded that the experimental group performed better than the average performance of the control group.

Albalvshy and Al Khalifa in 2002 and 2003 conducted a research on three groups The results of the their present study indicated that there was significant difference between experimental and control groups. Another research by Ranzijn in 1989 with German high school students was done. In his research two different forms of examples for the use of video and interactive computer-based training and learning the concepts have been studied. His results showed that computer-based learning concepts through interactive video are more effective. Results of Sheikh M. (2005) on the effectiveness of elementary mathematics software based on constructivist approach reflected the positive impact of computer training on improving student achievement compared to traditional training methods.

Golzari (2005) showed that the use of educational software in enhancing student learning opposed to traditional teaching methods is helpful. And using the structures in increasing student learning compared to traditional teaching methods is of paramount importance.

Shabbir (2004) did a research on third-year high school physics students using educational software and investigated its effects on cognitive and affective aspects of students. Results showed that computer-assisted learning instruction on physics would enhance their performance profoundly.

Because of the significance of using multimedia-assisted instructions, the present research is seeking to answer following questions?

1- Dose using multimedia-assisted instructions have any effect on the educational achievement of sixth-grade students on Mathematics?
2- Is there any significant effect of Multimedia on Mathematics topics such as *Fraction*, *Proportion*, *Percent*, *Decimal Numbers*, and *Approximate Numbers*?

Methodology

Participants and Procedures

60 students out of 112 sixth-grade students from 3 elementary schools in Tehran Province, Iran were randomly selected and then divided into two groups. Their age range was between 9-11 years old. One of the group as the experimental group was taught mathematics within 6 weeks via multimedia instruments and the other group as the control group received no instruction to achieve the homogeneity of subjects before conducting the research, a pre-test was taken. In the pretest, the students considered the question of prediction was evaluated for the training, so that before the test, the first of 10 multiple-choice questions included in the total score of 20 was chosen. The reason for this choice was that many questions are answered in less time and can be testing many questions is more suitable for grading easily. After the end of each lesson for testing mathematics topics such as conventional fractions, decimal numbers, approximate numbers, percentage, ratio and proportion, measurement of length and angle was specified. Then, common questions about the study were distributed between two groups of students.. The validity of questions was assessed based on discussion questions, sample test questions, sixth grade math book. In this study the test-retest method was used to test the reliability and validity of 0/894 for the test question and 0/839 were obtained for test questions, respectively. The method of appropriate using multimedia was presented to the instructors during two sessions. Then, within a week of the first session of multimedia software performing a complete ring held by the class teacher. The next meeting of the fraction teacher taught using multimedia software and conventional fractions were tested in the third session. Next week teachers taught decimal numbers using multimedia software and in training sessions in the weeks after the exam was floating-point numbers. After weeks of work for lessons about numbers, ratio and proportion, percentage and length and angle measurements were performed.

Data Analysis

Statistical methods which were used for data analysis include descriptive statistics consist of frequency, percentage and mean scores and inferential statistics, independent t-test, which is performed using spss software.

Before the beginning of the independent variable (multimedia software), a joint test of both control and experimental groups for different levels of information awareness to students in mathematics has been done, the results are as follow (Table 1.):

Table 1: Comparison of pre-test and t-test statistics groups

Confidence level	Standard Error Difference	Mean difference	Significant level	DF	t	Statistical Indicators
1/09191 -1/85858	0/73699	-0/38333	0/605	59	-0/520	**Pre-test**

According to table 1, it was concluded that there is no significant difference between the experimental and control groups, which indicates the homogeneity of of the two groups at the beginning of study. Moreover, table 2 shows the results obtained from analyzing different mathematics topics in this research.

Table 2: Mean different mathematics topics for both methods

Mean ± SE	Standard deviation	Mean	Number	Group	
0/21184	1/16029	18/9167	60	**Experiment**	**Fraction lessons**
0/25725	1/40902	17/6000	60	**Control**	
0/42548	2/33046	16/7500	60	**Experiment**	**Lessons decimal numbers**
0/34585	1/89428	16/7417	60	**Control**	
0/21053	1/15311	17/6583	60	**Experiment**	**Lessons approximate numbers**
0/41913	2/29569	16/1917	60	**Control**	
0/26390	1/44546	17/8667	60	**Experiment**	**Ratio and proportion lesson**
0/39093	2/14122	16/1917	30	**Control**	
0/40452	2/21567	17/9333	60	**Experiment**	**Course Measurement**
0/39079	2/14047	17/5167	60	**Control**	

As seen in table 2, the mean scores for teaching and learning fraction, approximate numbers, ratio and proportion, probability, statistics and multi-media approach is significantly better than the traditional method. But learning the mean of decimal numbers to multimedia and traditional methods does not differ too much. These finding would precisely answer the first question of the present research.

Table 3: t-test statistics course length and angle measurements using conventional methods and multimedia

Confidence level Lower-Upper	Difference Standard error	Difference Mean	Significant Level	Df	t	Statistical Indicators
1/54255 -0/70922	0/56246	0/41667	0/462	58	0/741	**Course Measurement**

According to the data in Table 3 it is concluded that the use of multimedia teaching methods of measurement, there is no significant difference. In other words, the media has an effect on learning statistics and probability.

Table 4: t-test statistics course using traditional methods and techniques of software floating-point numbers

Confidence level **LowerUpper**	**Difference** **Standard error**	**Difference** **Mean**	**Significant Level**	**Df**	**t**	**Statistical Indicators**
1/10590 -1/08923	0/54831	0/00833	0/988	58	0/15	**Course Measurement**

We can conclude, according to the data in Table 4, regarding the use of traditional and multimedia teaching decimal numbers, there is no significant difference. In other words, using multimedia it is not effective in learning decimal numbers

Table 5: t-test statistics course approximate numbers using traditional methods and multimedia

Confidence level **LowerUpper**	**Difference** **Standard error**	**Difference** **Mean**	**Significant Level**	**DF**	**t**	**Statistical Indicators**
2/40555 0/52779	0/46904	1/46667	0/003	58	3/127	**Course Measurement**

According to the data in Table 5 it is concluded that the in using multimedia in teaching methods and the approximate numbers there is a significant difference. In other words, multimedia learning has been effective in approximate numbers.

Table 6: t-test statistics courses fraction using traditional methods and multimedia

Confidence level **LowerUpper**	**Difference** **Standard error**	**Difference** **Mean**	**Significant Level**	**DF**	**t**	**Statistical Indicators**
1.983730.64960	0.33325	1.31667	0.000	58	3.951	**Course Measurement**

According to the data in Table 6, it is concluded that the in use of traditional and multimedia teaching fraction, there is a significant difference. In other words, based multimedia learning has been effective in approximate numbers.

Table 7: t-test statistics, ratio and proportion, and of course using traditional methods and multimedia

Confidence level	**Difference** **Standard error**	**Difference** **Mean**	**Significant Level**	**DF**	**t**	**Statistical Indicators**

LowerUpper						
2.619150.73085	0.47167	1.67500	0.001	58	3.551	Course Measurement

According to the data in table 7, we can conclude between the use of traditional and multimedia teaching ratio and proportion, there are significant differences. In other words, based multimedia learning has been effective in approximate numbers.

Table 8: t-test statistics, ratio and proportion lesson using traditional methods and techniques of software

Confidence level LowerUpper	Difference Standard error	Difference Mean	Significant Level	DF	t	Statistical Indicators
1.518810.43453	0.27084	0.97667	0.001	58	3.606	Course Measurement

According to the data in Table 8 we can conclude the in the use of traditional and multimedia in teaching mathematics there is a significant difference. In other words, multimedia learning mathematics has been effective.

Conclusions

The present study found that the use of educational multimedia instruction courses has been successful in teaching decimal numbers and for the parameters such as measurements of length and angle has not been effective. Also it has been conductive in learning compared to traditional methods. These results were in line with the results of Hein et al (2011) Christian Gerber (1990), Elliott (2010) and Mayer and Moreno (1999, 1998), RenXin (1989), Sheikh M. (1383), Shabbir (1382). But it should be mentioned here that the results by Golzar (1383) showed that, the effectiveness of using multimedia methods is not always significant at any educational settings like guidance schools. On the other hand, related to the effectiveness of multimedia and traditional math education methods Albalushy and Khalifa (2002 and 2003) has found that students who use the teaching from both methods have been outperformed 40% than their counterparts.

Regarding the advantages of multimedia in teaching and learning of the various courses, the favorable conditions in terms of time and space and teaching aids to enhance students' skills, It seems that the current programs of school integration in , that is, the combination of traditional instruction and multimedia presentation can be more effective than using just one of these methods. The implications of these findings would be useful for the teachers and especially math instructors to apply multimedia in the educational settings.

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