ISSN 2278-3091
Volume 9 No.2, March - April 2020
International Journal of Advanced Trends in Computer Science and Engineering
Available Online at http://www.warse.org/IJATCSE/static/pdf/file/ijatcse127922020.pdf
https://doi.org/10.30534/ijatcse/2020/127922020

Effective Use of Multimedia Materials Mathematics Module 25 on Student Achievement

Zubir, Z [1], Ismail, A [2], Razali, S.S [3] Md Noh, N [4] Ana, A [5]
[1]Faculty of Technical and Vocational Education University Tun Hussein Onn Malaysia, Malaysia, zulfadzly@ymail.com
[2] Faculty of Technical and Vocational Education University Tun Hussein Onn Malaysia, Malaysia, affero@uthm.edu.my
[3] Faculty of Technical and Vocational Education University Tun Hussein Onn Malaysia, Malaysia, sitisoleha1994.ss@gmail.com
[4] Faculty of Technical and Vocational Education University Tun Hussein Onn Malaysia, Malaysia, nasihah.md noh@gmail.com
[5] Department Of Home Economics, Universitas Pendidikan Indonesia, Bandung, Indonesia, Ana@upi.edu

ABSTRACT

The researchers hope that the findings will help and positively impacted the teachers, students and the Malaysian Ministry of Education to ensure that the student level of mastery in the integer topics can be improved. The results of this study can help the students to improve their understanding of integer topics in solving problems that involve positive and negative numbers. It is also hoped that this study will help the students to improve the quality of learning experience in the integer topics through the use of multimedia materials during the learning and teaching process in the classroom. The sample of the study involved a group of 30 students for the multimedia teaching and another group of 30 students for traditional teaching. The results of this study were analyzed using the Statistical Package for Social Science (SPSS). The study is analyzed through the usage of multimedia materials of Mathematics Module 25 – Integer before and after to measure the student level of mastery in the integer topic.

Key words : Multimedia Materials, 25-Integer Mathematics Modules, Students and Ministry of Education Malaysia

1. INTRODUCTION

Education, science, and technology are now the priority for educators to generate creative, professional thinking and the ability to solve problems especially affecting educational development in the country. It was among the basic knowledge of life that needs to be mastered and linked between the individual and technology of mathematics. The domination in mathematics can enhance the arisen of a competitive generation and can effectively apply mathematical knowledge in everyday life especially in decision making when solving problems [1].

The Secondary School Curriculum (KSSM) for the elementary students was implemented in 2017 in conjunction with the development of the secondary school curriculum as to show that Malaysian education is always moving towards more holistic development in creating a balanced and harmonious intellectual capital, spiritual, emotional and physical (JERIS). At this moment, the transformations of the curriculum were focused on the aspect of intelligence in developing a smart, creative and innovative society. Mathematical Science also aims to produce mathematicians who are mathematically minded, creative and innovative to apply mathematical knowledge and skills in solving problems and making decisions when dealing with challenges in their daily life. According to Ref [2] the education system in Malaysia is based on the curriculum and syllabus designed and developed by the Center for Curriculum Development, Ministry of Education Malaysia [2]. The implementation of learning materials in Mathematics Modules is multimedia-based. Integers are one of the steps of the changes in the mathematics curriculum. Inside the modules, students need to formulate the situations presented in mathematical form using concepts, facts, and procedures before interpreting and applying mathematical works to evaluate mathematical results explicitly. It can also enhance the students toward higher-order, critical, creative and innovative thinking.

2. BACKGROUND AND PROBLEM STATEMENT

It is expected that students who undergo the process of math learning through KSSM will be the generation of critical thinking and creative skills in solving the problems they faced. In the mathematics curriculum of KSSM, among the changes emphasized is the use of technologies such as computer-based learning materials software provided by the Ministry of Education Malaysia. Rationally, providing a fun,

meaningful and challenging learning and teaching material (R&D) is essential to keep students prepared for the challenges of the 21st century. The use of multimedia-based learning materials in learning and teaching (R&D) in the classroom has a positive impact as compared to the traditional methods [3].

During the mathematics learning and teaching process, it will be much more exciting and rewarding if the learning and teaching methods developed able to help students in solving problems, improve their skills, generate interest, stimulate thinking and building high moral values in mathematics [4]. The basic knowledge of the operations of addition, subtraction, multiplication, and division in the integer topic involves positive and negative numbers that are essential in furthering the conceptual learning of algebraic expressions, basic measurements, and linear equations.

The learning carried out using software such as this module is one of the most efficient ways of communicating information, guiding, training and evaluating student achievement in mathematics [5]. To create an effective learning and teaching environment, the multimedia-based materials are used to provide a more interactive teaching design between teachers and students.

On the other hand, the disadvantages of students in dominating the integer topics is lacking understanding of the question and lacking in good counting skills, which makes the students difficult to solve problems when involving with negative and positive numbers [6]. Students should be exposed to the skills of mastering in the integer topics gradually using different learning materials such as Mathematics Module 25 - Integer learning materials software. Knowledge and skills involving the positive and negative integers are among the mathematical skills that students need to equipped because these are the basic skills to be applied in other topics of mathematical skills [7]. A recent study by Ref [8] stated that students' level of understanding of positive integer topics is moderate.

Some students felt that the integer topic is not important to be mastered because it is not connected with their daily life and this inaccurate impression has left students uninterested with the topics [9]. Students' weakness in mastering the concept of negative numbers is because negative numbers are abstract.

3. METHODOLOGY

The methodology is used as guidance throughout the research so that the data obtained was valid and reliable, and it can be shared with other researchers. The results of the quality and admiration of the study depend on the smoothness of the systematic process of the research work. A well-researched gives one the satisfaction of being the researcher. Besides, the research results can also serve as a guideline and reference for further research.

Populations of the study are Form One students of Religious High School in Bugisiah, Benut, and Pontian. Researchers considered time management and the facilities as part of the commitment to streamline the research process. According Ref [10], the population is the target group for the researchers to get the results of the study while the sample is the respondents who were selected to represents the population of 30 students who using multimedia materials and another 30 students who involved in traditional way of teaching. The sample chosen is intended to focus on the first level students who studied the integer topic that contained in the first level of the mathematics syllabus and students who have to use the GREAT Mathematics Module according to the latest KSSM that applied in the year 2017. The sample also consists of male and female students who had a similar level of achievement in mathematics subject.

In this study, the research instruments used are divided into two multimedia learning materials and tools for data collection. In conducting the quiz experimental, the researcher will use two types of learning methods: teachers who use multimedia materials in teaching the treatment groups, and teachers who use textbooks in teaching. The multimedia material used is the Mathematics Module 25 - Integer, which is a mathematical software provided by the Ministry of Education Malaysia (MOE) for KSSM 2017 starting at level one in the teaching and learning process. Another method of teaching is by using textbooks which supported with whiteboard and pen markers throughout the teaching and learning process. The researcher has ensured that these two learning methods used in the teaching and learning process of integer topics follow the level-one mathematics syllabus prescribed by the MOE. This is to make sure that the researchers use the same lesson plan for both groups to avoid biased during the research.

Furthermore, the research tool used in the data collection consists of a set of diagnostic test instruments provided to the sample of pre and post of this study. The content of the test consists of the same set of questions as it measures the same variables but at different times. The researcher used a diagnostic test that contained 8 subjective questions for pre and post-test and it only focuses on the integer topic which involves addition, subtraction, multiplication and division operations with positive and negative numbers. This diagnostic test instrument was adapted from the questions provided in the GREAT Module, 25 - Integer Mathematics Module.

4. DATA ANALYSIS

To analyze the data obtained, the Statistical Package of Social Science (SPSS) computer version 22.0 was used. The statistical descriptive analysis includes the finding of mean, standard deviation and percentages, while statistical inferential analysis is obtained by using Pearson *Correlation.* The reliable of each item listed was determined by the internal consistency through the statistical test of Alpha Cronbach. This method was chosen due to the multiple scaled questions used in the research such as the Likert scale, and references are based on the value of the correlation and interpretation. Table 1 shows the method and types of analysis used in this study.

Table 1: Analysis Method

Objective	Analysis
Identify the level of student mathematics mastery in integer topics before and after using multimedia materials in the 25 - Integer Mathematics Module.	Descriptive Analysis Size -Min Score -Min
Identify the differences between student achievement levels in integer topics before and after using multimedia materials Mathematics Module 25 - Integer.	Analysis Inference (SPSS)
Identify the relationship between the effective use of multimedia materials Mathematics Module 25 - Integer and student achievement in integer titles.	Analysis score correlation, r

5. FINDINGS

Level of student mastery in the integer topic of mathematics before using the multimedia materials Module 25 - Integer. Table 2 shows the level of mastery in the integer topic of 30 respondents from the multimedia teaching group, M1, and another 30 respondents from the traditional teaching group, M2. According to Table 2, the highest percentage of 66.7% shows that out of 20 students have scored within 0-39 points which categorized as grade G. Therefore, the level of students' mastery in the integer topic of mathematics before using multimedia materials Module 25 - Integer for the students from multimedia teaching group (M1) is at a minimum level. Whereas, the students from the traditional teaching group (M2) show the highest percentage of 100.0% where all of 30 students scored within 0-39 points which categorized as grade G. Levels of student proficiency in the integer topics of mathematics before using multimedia materials of Mathematics Module 25 - Integer for students from the traditional teaching group (M2) is categorized as the level where the score has yet to reach the minimum level. Although these two groups are at the minimum level, the researchers found that some of the students could achieve even a higher level in the integer topic where there are three students who achieved good grades and a student who achieved satisfying grades if they are given the lesson through multimedia materials.

Table 2: Student's Mastery Level for M1 and M2 (Pre-test)

M1				
Grade	Min	Max	Score	Total
A	85	100	Brilliant	0 (0%)
B	70	84	Praise	0 (0%)
C	60	69	Good	3 (10.0%)
D	50	59	Satisfying	1 (3.3%)
E	40	49	Reached the minimum	6 (20.0%)
F	00	39	Has not reached the minimum	20 (66.7%)
M2				
Grade	Min	Max	Score	Total
A	85	100	Brilliant	0 (0%)
B	70	84	Praise	0 (0%)
C	60	69	Good	0 (0%)
D	50	59	Satisfying	0 (0%)
E	40	49	Reached the minimum	0 (0%)

Level of mathematics mastery in integer topics after using multimedia materials Module 25 - Integer. Tables 3 show the control level of 30 respondents from the multimedia teaching group, M1, and 30 respondents from the traditional teaching group, M2, in the integer topic. According to Table 3 (M1), the highest percentage of students is 43.3% which equivalent to 13 students who had grade G which within the range of 0-39. Therefore, the level of students' mastery in the integer topic after using the multimedia material Mathematics Module 25 - Integer for the students from the multimedia teaching (M1) is at a minimum level. Whereas in M2, the students from the traditional teaching group (M2) have shown the highest percentage of 100.0% where all of 30 students were in Grade G. Level of the student mastered the integer topic from the traditional teaching group (M2) was categorized as the level where the score has yet to reach the minimum level. The analysis shows that there is a decrease in the number of students from the multimedia teaching group who have not reached the minimum level after using the multimedia materials Mathematics Modules 25 - Integer from 20 to 13 students. Besides, there was an increase in the number of students who achieved grade B which was within the range of 70-84 from 0to three with a 10% percentile in the honors level.

Table 3: Student's Mastery Level for M1 and M2 (Post-test)

M1				
Grade	**Min**	**Max**	**Score**	**Total**
A	85	100	Brilliant	0 (0%)
B	70	84	Praise	3 (10%)
C	60	69	Good	3 (10.0%)
D	50	59	Satisfying	6 (20.0%)
E	40	49	Reached the minimum	5 (16.7%)
G	00	39	Has not reached the minimum	13 (43.3%)
M2				

Grade	Min	Max	Score	Total
A	85	100	Brilliant	0 (0%)
B	70	84	Praise	0 (0%)
C	60	69	Good	0 (0%)
D	50	59	Satisfying	0 (0%)
E	40	49	Reached the minimum	0 (0%)
G	00	39	Has not reached the minimum	30 (100.0%)

Table 4 shows the difference in mean scores of students' achievement in integer topic which obtained from the multimedia teaching group (after M) before and after using the multimedia materials of Mathematics Module 25 - Integer.

Table 4: The differences in mean scores before and after using multimedia materials

Test	μ	N	SD	SE (μ)
Pre-test (**OM1**)	31.4667	30	17.20	3.14
Post-test (**OM2**)	42.5000	30	17.63	3.21

Based on Table 5, the researchers found that the differences in the mean score between the post-test for both groups are 11.033 for the multimedia teaching group (M1) were higher than the traditional teaching group (M2) which is 8.633.

Table 5: Mean difference of post-test scores for multimedia teaching group (M1) versus traditional teaching group (M2)

Test	μ	N	SD	SE (μ)
Pre-test (**M1**)	11.033	30	11.481	2.096
Post-test (**OM2**)	8.633	30	9.121	1.665

To answer the fourth research question, the researchers analyzed using Pearson's Correlation test to identify the relationship between the effectiveness of multimedia materials of Mathematics Module 25 - Integers and student achievement in the integer topic.

Table 6: Correlations between scores before and after using the multimedia materials

		Pre	Post
Pre	Pearson Correlation	1	0.783
	Sig. (2-tailed)	.	0.000
	N	30	30
Post	Pearson Correlation	0.783	1
	Sig. (2-tailed)	0.000	.
	N	30	30

In this research, the researcher analyzed the post-test of the multimedia group using the correlation coefficient after the students used the Mathematics Module 25 – Integer is r = 0.783 and it was also significant at $p < 0.05$. According to Salkind (2003), when r = 0.783 indicates that the strength of both pre and post-test scores is high. Hence, it is found that the correlation between pre and post-test scores is highly positive. This shows that the students who score higher in the pre-test are also likely to score higher in the post-test. The questionnaire used by the researcher is to identify the effectiveness of the multimedia material of Mathematics Module 25 - Integer among the students to reinforce the findings of the research conducted. A pilot study was conducted to determine the reliability of the items. The results of the analysis through the Statistical Package Social Science 22.0 (SPSS) found that the reliability of the items is at a moderate level where Alpha Cronbach is 0.611. A total of 60 questionnaires were distributed to 60 first-year students at Bugisiah Religious High School, Benut, and Pontian. According to Table 7, a total of 60 questionnaires (100%) were successfully completed and answered by the respondents. The questionnaire consists of two sections includes three questions in Part A and 15 questions in Part B.

Table 7: instrument percentage

Questioner	Frequency	Percentage (%)
Accepted	60	100
Non accepted	0	0
Amount of spreading	60	100

According to Table 8, the number of respondents in this research is 60 students. The respondents consist of first-grade students who have a modest level in their mathematics achievement. All respondent has to undergo the mathematics teaching and learning process of integer topic through the Mathematics Module 25 - Integer.

Table 8: Frequency Distribution and Percentage by Gender

Gender	Frequency(N)	Percentage (%)
Man	27	45.0
Women	33	55.0
Total	**60**	**100.0**

The researchers found that the highest number of students in the mathematics subject of Primary School Assessment Exam (UPSR) is grade B which is 21 students, grade A with 15 students, grade C with 14 students, and grade D with 10 students. It is concluded that the students' achievement in mathematics of UPSR is at an average level.

Table 9: Frequency distribution of mathematical results in UPSR

Grade	Frequency	Percentage (100%)
A	15	25.0
B	21	35.0
C	14	23.3
D	10	16.7
Total	**60**	**100.0**

According to Table 10, the subject that most students interested in is Mathematics which shows 18 students and followed by 17 students in English. It is shown that a quarter of the total respondents were interested in mathematics subjects.

Table 10: Frequency and percentage of core subjects of interest to students

Subject	Frequency	Percentage (%)
Malay	14	23.3
English	17	28.3
History	3	5.0
Mathematics	18	30.0
Sciences	8	13.3
Total	**60**	**100**

After analyzing the items as in Table 11, the researcher found that all items in Part B had the highest mean scores. The highest value of mean score is recorded at item 4 which is 4.87, followed by item 12 which is 4.67, and item 5 which is 4.62. Item 4 shows that the students have mastered the basic operations of mathematics such as addition, subtract, multiply, and division. The second highest is item 12which indicates that the students prefer their teachers to repeat the lessons using the Mathematics Module 25 – Integer when they unable to understand the concept of Integer. The third highest is item 5 which indicates that Mathematic teachers have used the Mathematics Module 25 - Integer when teaching the integer topic in the classroom. The researchers also found that item 14 and 15 with mean scores of 4.45 and 4.47 is the highest mean scores where it is indicated that the use of multimedia materials of Mathematics Modules 25 - Integer in the teaching and learning process has impacted by increases in student knowledge and understanding of the topics.

Table 11: Mean, Standard Deviation and Interpretation of Stage achievement

No.	Item	μ	SD	Stage
01	I love to study Math.	4.30	0.67	High
02	I'm having trouble understanding concepts in Integer topics.	3.93	0.52	High
03	I like learning Integer topics.	4.18	0.43	High
04	I have mastered basic operations in mathematics such as add, subtract, multiply and divide.	4.87	0.34	High
05	My math teacher used the 25 - Integer Math Module when teaching Integer topics in the classroom.	4.62	0.52	High
06	I love learning Integer topics using the Mathematical Module 25 - Integer.	4.43	0.50	High
07	I asked a friend if I didn't understand Integer topics.	4.50	0.57	High
08	I asked my math teacher if I didn't understand the concept of Integer.	4.47	0.50	High
09	I became more aware of the Integer concepts that teachers taught using the 25 - Integer Mathematics Module.	4.45	0.53	High
10	My teacher gave me the exercises included in the 25 - Integer Math Module to help me understand the concept of Integer.	4.52	0.50	High
11	I can do problem-solving activities in the 25 - Integer Mathematics Module.	4.31	0.60	High
12	I would like teachers to repeat the lesson using the 25 - Integer Math Module if I do not understand the Integer concept.	4.67	0.48	High
13	I was able to engage in learning and teaching sessions using the 25 - Integer Math Module.	4.35	0.58	High
14	The Mathematical Module 25 - Integer helps me to improve my knowledge on Integer topics.	4.45	0.50	High
15	Math Module 25 - Integers help me to improve my understanding of Integer topics.	4.47	0.50	High

5. CONCLUSION

This research is an experimental study that aims to identify the effect of multimedia material based learning through the Mathematics Module 25 - Integer on student achievement in integer topic for elementary students. This integer topic was chosen because it is an introduction to the basic operations that involve positive and negative numbers as well as the use of signs and operations that could confuse the students. A knowledge and skills involving the positive and negative integers are one of the mathematical skills that students need to master because these are the basic skills to be used in other mathematical topics. Students need to master the concept in solving the integer problems so that they do not have problems in learning topics like algebraic expressions, basic measurements, and linear equations. With the use of multimedia materials, it is hoped that the students will well master the integer topic to improve their achievement in the mathematics subjects. The students need a form of teaching that is easy for them to learn especially when it comes to solving the integers involving positive and negative numbers. To conduct an effective teaching and learning sessions, teachers need to be open-minded and considerate on the activities which they want to carry out to meet the needs of students who require a harmonious learning environment. A variety of teaching techniques can provide opportunities for the students to improve their achievement in mathematics. Therefore, more detailed and accurate research needs to be carried out in the future on the teaching and learning process through multimedia material [4,6].

ACKNOWLEDGEMENT

The authors would like to thank the Ministry of Higher Education, Malaysia, for supporting this research under the Research Fund E15501, Research, Research Management Centre, UTHM and Geran Penyelidikan Pasca Siswazah (GPPS) VOT No. H436. In addition, the authors also wish to thank Form One students of Religious High School in Bugisiah, Benut, and Pontian, who had given their full cooperation to ensure the success of this study.

REFERENCES

[1] Azura Ishak, Z. K. (2009). Perbandingan Pengajaran Berasakan Multimedia dan Traditional Ke Atas pencapaian Matematik dan Sikap Matematik di Kalangan Pelajar Berisiko. Teknologi Maklumat & Multimedia, 79-89.

[2] Hassan, A. B. (2012). Instrumen Penilaian Pembimbing Dalam pelaksanaan Pembelajaran Berasakan Kerja Pelajar di Industri. Fakulti Pendidikan Universiti Teknologi Malaysia.

[3] Mayer, R. E. (2002). For whom is a picture worth a thousand words? Extension of a Dual-Coding theory of multimedia learning. Journal of Education Psychology. 389-401. https://doi.org/10.1037/0022-0663.86.3.389

[4] Mokhtar, M.A. (2006). Keberkesanan modul matematik interaktif dalam meningkatkan kefahaman pelajar sekolah menengah terhadap topic pembahagian sel. Universiti Putra Malaysia.

[5] Trollip, A. (2001). Multimedia for learning. USA: Pearson Education.

[6] Arbi, N. H. (2004). Kesilapan kesilapan yang sering dilakukan oleh pelajar tingkatan dua dalam topik nombor interger. Universiti Pendidikan Sultan Idris: Tesis Sarjana.

[7] Sang, M. S. (2006). Nota pengurusan pengajaran pengajaran-pembelajaran. Kuala Lumpur: Multimedia-ES Resources Sdn. Bhd.

[8] Manan, N. H. (2002). Kesan maklum balas dalam pengajaran berbantukan computer terhadap pencapaian pelajar yang berbeza tahap kebimbangan Matematik. Universiti Sains Malaysia: Tesis Srjana.

[9] Hamdan, H.B. (2009). Mengkaji kesalahan pelajar tingkatan 2dalam menyelesaikan masalah bagi topic nombor negative. Universiti pendidikan Sultan Idris: Tesis Sarjana.

[10] Airasian L. R. (2003). Education reseach. NJ: Merill: 7th Edition.