

The 6th International Malaysian Studies Conference (MSC6)

Engaging Malaysian Modernity 50 Years and Beyond

5-7 August 2008 | Crowne Plaza Riverside Hotel, Kuching



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Impact of Teaching and Learning Method with Multimedia Application Aided

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Abstract

This research is comparing the performance of student between control group which have underwent conventional teaching and learning method and treatment group which is using graphical animation courseware in teaching and learning method. This is an experimental type research with design of pre-post test which uses descriptive and inference statistic to analyze the data. The respondent of this research are junior student (first year first semester) who are taking the course Diploma of Electrical Engineering in Polytechnic of Johor Baru (PJB) and Polytechnic of Merlimau Melaka (PMM). 70 respondents are chosen randomly in this research. Coupled t-test is used which results in null hypothesis are being rejected and accept the alternative hypothesis. Generally, the findings from this research show that (a) there is a significant difference in enhancing the learning achievement test between group which s using conventional learning method and graphical animation courseware. (b) There is a significant difference in enhancing the learning achievement test among the students who has VT, VR, and VTVR combination ability in control and treatment group. (c) There is significant interaction effect in terms of student achievement between control and treatment groups with VT-VR combination. (d) Element of the graphical animation courseware which is used in the topic Electricity

Generating System of subject Electrical Technology 1 has an effect on the student learning process. As a conclusion, graphical animation courseware can enhance the achievement of VT or VR student totally.

1.0 INTRODUCTION

The usage of the multimedia courseware which has graphic animation as a teaching tool has been getting attention in our country education system. The conventional learning environment is not providing the chances for the student to involve actively in the learning process during the class. Teaching and learning process which use digital equipment is said to be able to strengthen self confidence, enhance the communication level and positive altitude on learning. By using the multimedia courseware in the process of learning, it is hoped that it will attract the interest and motivate the student (Siti Aishah, *et. al.*, 2004). Therefore, in order to achieve the aim of the education in Malaysia, the paradigm shift of the way of thinking and using technology is needed. According to Sahairil Azlan (2003), the usage of multimedia technology especially the interactive multimedia and animation in the teaching and learning process is the best alternative in delivering information effectively.

The advance of information and communication technology (ICT) has been causing huge impact on education. (Jonathan, *et. al.*, 2004) Education has to progress in concordant with the technology development. The rapid development of the information technology has caused the usage of computer in all level of education institution starting from primarily to tertiary education. In conjunction with this, controlling the information technology in technical field will produce highly skilled and innovative graduates. (Mohd Zuber, *et. al.*, 2005) One of the new developments in this field is the information technology. Technology multimedia is able to cause huge and deep effect in education and communication field.

Visualization or imagination is a technique in creating image, diagram or animation which is able to communicate with the message (whether in abstract or concrete idea) that is going to present to user. The ability of visualization encourages an individual creativity through idea generation and will enable deeper understanding on certain subject where dimension is used to show certain information. (Knight, 2000) According to Mohd Daud (2004), visualization is one of the thinking ability which the capability to imaging the shape and rotate the image in various direction. Visualization also is said to be an imagination technique which is done by an individual during learning process.

Through the usage of the multimedia courseware, the quantity of information which is presented in one period of time can be controlled so that the information is not over loaded for an individual short term memory capacity. (Jamalludin and Zaidatun, 2003) This shows that every individual has their own capability and is difference among each person. Thus, the visualization capability for an individual either possesses high visualization (HV) or low visualization (LV) will influence the learning performance.

2.0 METHODOLOGY

This research is an experimental type research which uses variation of design between groups that is pre-post test and 2 x 2 (visualization level x group of student) factorial designs. There are two polytechnic that are involved in this study. Each one of them represent a group of category that is control group and treatment group respectively and each category is divided into two level of visualization that is high visualization level and low visualization level. The visualization level is divided base on the result of the SVAT test and the group of student is divided according to polytechnic. In order to investigate the effect of graphic animation as a teaching aided tool in the process of teaching and learning. The design of this experimental research is chosen by the author because this is the best design of research in order to compare among the groups. (Chua, 2006a)

3.0 RESULT

Table 1: Distribution of SVAT test marks for treatment and control groups.

The marks of SVAT test (%)	Control group			Treatment group			
	Sex		Total	Sex		Total	
	Male	Female		Male	Female		
01 – 50	8	3	11	4	3	7	(LV)
51 – 60	20	4	24	22	6	28	(HV)
Total	28	7	35	26	9	35	

There are 35 respondents respectively in both the treatment and control groups as shown in **Table 1**. There are 18 or 26% of respondents from both the treatment and control groups have the LV characteristic. On the other hand, there are 52 or 74% of respondents have the HV characteristic.

Table 2: the Homogeneity Test of Anova Pre Test Score for the combination of treatment and control groups.

Pre test	Sum of squares	df	Mean of squares	F	Significant
Between groups	12.374	7	1.768	0.357	0.919
Within groups	133.796	27	4.955		
Total	146.171	34			

Table 2 shows the result of the pre test score for homogeneity test for both treatment and control groups. The single factor ANOVA (Analysis Of Variance) pre test score for the subject Electrical Technology 1 in the homogeneity test show that there is no significant difference between the control and treatment group which the significant value is larger than 0.05 (>0.05). This means that the early knowledge for both groups of students is the same. Thus, base on this result, it is assumed that the knowledge about the topic of Generating System in the subject of Electrical Technology 1 for both groups at the beginning of the research is the same.

Table 3 : The pre test means score, post test and the enhancement of student performance for treatment and control group.

Group	Pre test	Post test	Enhancement score	
Control	3.86	10.60	6.74	Mean
	35	35	35	N
	2.42	3.60	3.13	Standard deviation
Treatment	2.23	18.49	16.26	Mean
	35	35	35	N
	2.07	4.38	3.50	Standard deviation
Total	3.05	14.55	11.50	Mean
	70	70	70	N
	3.17	5.80	2.07	Standard deviation

Table 4 : The result for t-test.

Group	N	Mean	Standard deviation	t	df	Significant (2 tailed)
Treatment	35	-6.743	3.128	-12.753	34	0.000
Control	35	-16.257	3.501	-27.473	34	0.000

Table 4 shows the result of t-test and the level of significant. It is shown that the p value is smaller than the significant value, α ($p=0.00 < 0.05$). Thus, the null hypothesis is rejected and alternative hypothesis is accepted. This means that there is a statistically significant different in the test mean score for student learning achievement between the group of control student and treatment student.

Table 5 : The Pre Test Mean Score, Post Test and enhancement of the HV student achievement for the treatment and control group.

HV student	Pre test	Post test	Enhancement achievement	
Treatment	2.21	19.54	17.33	Mean
	28	28	28	N
	2.27	3.15	2.26	Standard deviation
Control	3.54	11.88	8.34	Mean
	24	24	24	N
	2.25	4.21	3.04	Standard deviation
Total	2.82	16.00	13.18	Mean
	52	52	52	N
	2.87	5.60	3.22	Standard deviation

Table 6 : T-test analysis is carried out on the enhancement of HV student achievement.

Group	N	Mean	Standard deviation	t	df	Significant (2 tailed)
Treatment	24	-8.333	2.259	-18.075	23	0.000
Control	28	-17.321	3.044	-30.115	27	0.000

As shown in **Table 6**, the result of the analysis which uses t-test to determine whether there is a statistically significant difference between the treatment and control groups. The result of the analysis shows that the null hypothesis is rejected due to the p value is smaller than α value ($p=0.00 < 0.05$). This means that there is significant differences in the test mean score of the HV student learning achievement between control and treatment groups.

Table 7 : The Pre Test Mean Score, Post Test and enhancement of LV student achievement for the control and treatment group.

LV student	Pre test	Post test	Enhancement score	
Control	4.55	7.82	3.27	Mean
	11	11	11	N
	2.70	2.96	1.50	Standard deviation
Treatment	2.29	14.29	12.00	Mean
	7	7	7	N
	1.25	1.80	1.16	Standard deviation
Total	3.67	10.34	6.67	Mean
	18	18	18	N
	2.87	2.76	1.21	Standard deviation

Table 8 : T-test analysis is carried out on the enhancement of LV student achievement.

Group	N	Mean	Standard deviation	t	df	Significant (2 tailed)
Treatment	11	-3.273	1.489	-7.288	10	0.000
Control	7	-12.00	1.155	-27.495	6	0.000

Table 8 shows the result of t-Test and level of significant. The analysis shows that the null hypothesis is rejected as the p value is smaller than the significant value, α ($p=0.000$). So, there is statistically significant difference in the test mean score of the student learning achievement enhancement among the LV student between control and treatment groups.

Table 9 : The Pre Test Mean Score, Post test and enhancement of the student achievement between combination of the HV and LV student.

Visualization level	Pre test	Post test	Enhancement score	
HV	2.83	16.00	13.17	Mean
	52	52	52	N
	2.33	5.36	5.26	Standard deviation
LV	3.67	10.33	6.66	Mean
	18	18	18	N
	2.47	4.10	4.58	Standard deviation
Total	3.05	14.54	11.49	Mean
	70	70	70	N
	3.96	5.67	3.33	Standard deviation

Table 10 : T-test analysis is carried out on the achievement enhancement of the combination of HV and LV student.

Student	N	Mean	Standard deviation	t	df	Significant (2 tailed)
HV	52	-13.173	5.261	-18.057	51	0.000
LV	18	-6.667	4.576	-6.181	17	0.000

The result of the t-Test and level of significant is as shown in **Table 10**. The results of this analysis shows that the null hypothesis is rejected due to p value is smaller than the significant value, α ($p=0.000$). Thus, alternative hypothesis is taken and so there is significant differences in the test mean score of student learning achievement between the combination of HV and LV student

Table 11 : The result of Pearson Coefficient Correlation Test between the enhancement of learning achievement for the treatment group student and student visualization.

		Visualization	Achievement enhancement
Visualization	Pearson correlation	1	0.895
	Significant level (2 tailed)		0.000
	N	35	35
Achievement enhancement	Pearson correlation	0.895	1
	Significant level (2 tailed)	0.000	
	N	35	35

The analysis as shown in **Table 11** shows that there is a strong relationship between the enhancement of the student test score and student visualization with correlation coefficient, $r = 0.895$. The correlation coefficient (r) is a value which is used to measure how strong the relationship between two variables is. So, when the $p = 0.000$ ($p < 0.05$) shows that the null hypothesis is rejected and alternative hypothesis is accepted. Thus, there is significant interaction in terms of student achievement with combination of HV-LV.

Table 12 : The result of Pearson Coefficient Correlation Test between the enhancement of learning achievement for the control group student and student visualization.

		Visualization	Achievement enhancement
Visualization	Pearson correlation	1	0.911
	Significant level (2 tailed)		0.000
	N	35	35
Achievement enhancement	Pearson correlation	0.911	1
	Significant level (2 tailed)	0.000	
	N	35	35

There is a very strong relationship between the enhancement of the student test score and the student visualization which the correlation coefficient, r shows the value of 0.911 (**Table 12**). The value of $p = 0.000$ ($p < 0.05$) shows that the null hypothesis is rejected and alternative hypothesis is accepted. There is a significant interaction in terms of student achievement with combination of HV-LV.

Table 13 : Mean score for the element of graphic animation courseware.

No.	The element of graphic animation courseware	Mean score	Standard deviation	Level
1	The usage facility	3.77	0.84	High
2	The design of interface is suitable	3.81	0.72	High
3	Teaching and learning	4.80	0.79	High
4	Motivation	4.19	0.92	High

As shown in **Table 13**, the result of analysis for items in all the element of graphic animation courseware shows that they are at high level. This means that generally the students agree that the elements of the graphic animation courseware are at an effective level and it is important in aiding the teaching process for the Electrical Technology 1 subject.

4.0 DISCUSSION AND CONCLUSION

The achievement enhancement of the mean score shows that after the teaching and learning session which use graphic animation courseware in the class, can enhance the level of understanding on the content of Electrical Technology 1 in the topic of Generating System. The level of understanding can improve the student learning achievement. This achievement has proved the result of investigations which are done by Zol Bahri (2001), Sahairil Azlan (2003) and Eun Mi Yang & Andre (2003). Bandura (1977) and Gagne (1985) have given the same opinion which is supported Azizi *et. al.* (2005) that student who involves in the media aided teaching and learning process show an improvement in their test performance. Besides that, student with HV is a student who

possess high intelligence and excellent in art class able to give a clear visual during thinking of something, easy to read diagram, map and graphic, describe the human body or thing exactly to its origin, can watch movie, slide and picture, enjoy playing jigsaw, maze or other visual activity. Visual intelligence is one of the aspects from the Multiple Intelligences which is created by Dr. Howard Gardner, an education professor from Harvard University in the year 1983. Technical student with visual intelligence usually possess the characteristics such as like to play puzzle, jigsaw, Lego, maze, stair snake, block arrangement and others. They like to exploit their toys, dismantle and reconstruct the toys, like to take picture, possess high imagination and easily remember the position of a things or a location. Thus, it would be more interested to the HV student if the learning process is able to satisfy their imagination range which is farther than other student. That is why they always look like a thinker as they like to spend their time to do the things as mention above or just day dreaming. The usage of different elements in courseware is to present a message which will increase the chances of achieving objectives and aims. For the element of facility usage, the result of this research shows that the overall mean score for this item is 3.77. This shows that the effectiveness of this element in the graphic animation courseware is at high level and it is also user friendly to the student. The results of this research have been supported by the results obtained from Mohammad Nur Azhar and Baharuddin (2004). In this criterion, students do not face any problem like lost in the study and them able to exit the programme any time they want.

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