

# USING MULTIMEDIA IN THE CLASSROOM AND EVALUATING ITS EFFECTIVENESS USING KIRKPATRICK'S PRINCIPLES

Zarina Che Embi<sup>1</sup>, Neo Tse Kian<sup>2</sup> and Neo Mai<sup>3</sup>

Multimedia University, Malaysia

(<sup>1</sup>zarina.embimmmu.edu.my; <sup>2</sup>tkneommmu.edu.my; <sup>3</sup>neomai@mmu.edu.my)

## ABSTRACT

For decades, the prevalent teaching method has been the traditional face-to-face method and it is still being used in today's classrooms. Though it has been effective, it is considered limited in today's fast-paced and digital world. With the introduction of multimedia and ICT, the teaching process has become more flexible and has shifted from learning about technology to learning with technology. Therefore, a myriad of ICT-based instructional strategies are now available for the teacher to use. The use of multimedia technology in the classroom has changed the manner in which teachers teach and students learn. As such, technology through the use of the Internet and the World Wide Web has made students' access to knowledge more convenient and flexible. In order to evaluate its effectiveness in the classroom, Kirkpatrick's model for evaluation was used. Since its introduction in 1959, Kirkpatrick's four-level model has been used extensively to evaluate training programs and as the basis for evaluation of a variety of educational settings. Therefore, this research seeks to study the effects on the students' learning process when multimedia-based instructions are used and to evaluate their effectiveness according to Kirkpatrick's levels of evaluation. The study was conducted in Multimedia University where multimedia technology was used to enhance the student's learning. Data were collected through pre-tests and post-tests, surveys and questionnaires and were later analysed. The study assesses the effects on the student learning as well as their perceptions in this learning environment. The findings are based on using Kirkpatrick's principles of learning evaluation. The results were positive and encouraging as the students were able to enhance their learning process while being motivated and enjoyed learning in this environment.

## KEYWORDS

Evaluation, Kirkpatrick learning evaluation model, Multimedia-based instructions, Teacher-centred, Student-centred, Problem-based environment

## INTRODUCTION

There are many types of multimedia-based delivery methods that are used today. Among others are the use of multimedia presentation in face-to-face instruction, multimedia module in web-based instruction and multimedia in problem-based or constructivist learning (Gibson, 2000; Jonassen & Land, 2000; Alessi & Trollip, 2001). With the introduction of multimedia and information and communication technology, educators began to perceive the importance of computers in the teaching process and it has become more flexible, shifting from technology-as-teacher to technology-as-partner (Jonassen *et al.*, 2003). Although there were some successes in the use of multimedia-based instructional systems, none of the technological enhancements provided the results as the educators had hoped for (Passerini, 2007; Vivek, 2003; Wang *et al.*, 2007). This study seeks to evaluate the effectiveness of different types of delivery modes in the classrooms of higher education using Kirkpatrick's four-level model of evaluation (Kirkpatrick, 1996). In this paper, findings from the demographics data and Level Two of the evaluation, which is to evaluate students' learning in the teacher-centred and student-centred delivery methods, are reported.

## THE STUDY

This study investigates the effectiveness of a multimedia-based instruction by means of a mixed research methodology. This methodology resides in the middle of quantitative and qualitative research methods because it incorporates elements of both approaches (Creswell, 2009). Concurrent triangulation approach is used in three case studies. The case studies being used in the teaching and learning environment are teacher-centred (TC), student-centred (SC) and problem-based (PB). The case studies were conducted at the Faculty of Creative Multimedia (FCM), Multimedia University, Malaysia.

In TC environment, multimedia was used for multiple media representation of the content that was presented to the students through a series of face-to-face instruction using Power Point slides. In SC environment, multimedia was used to allow students to construct knowledge in their learning process. A web-based module that had been created in the Multimedia Learning System (MMLS) was used. As for PB environment, students constructed and developed their own projects using multimedia tools in which the theoretical knowledge was acquired through TC and SC environment. PB was also used to map the data to the third level of Kirkpatrick Learning Evaluation Model (KLEM), created by Donald Kirkpatrick (1996).

At the beginning of the course, students were briefed of the research that was going to be conducted and the majority of them agreed to participate. Although some of them were not willing to participate, they still continued attending the classes as usual. During this session, only the ones who agreed to participate were given demographics survey questionnaires to fill-up. Variables such as age, gender, previous experience using a computer technology and application, and experience with related course content were examined to determine the attitudes and perceived abilities of the students coming into the course. The course utilised the three types of learning environment, i.e., TC, SC and PB. Pre-tests and post-tests were conducted to obtain a measure of learning that had been acquired by the students. Survey questionnaires were also given after the completion of certain modules of the course.

In this paper, we will report the findings from the demographics data and the evaluation of Level Two of KLEM for TC and SC environments. Level two evaluates learning as the measurement of changes in the attitudes, knowledge, and skills of participants as a result of the program (Kirkpatrick, 1996). While Level One evaluates the reaction of the students, Level Two goes beyond reaction and evaluates the knowledge and skills of the students. In other words, Level Two evaluates the relevant knowledge and skills that were increased. Pre-tests are used to determine the knowledge of the content before the learning and post-tests are used to measure the amount of knowledge after the learning.

## FINDINGS

A total of 53 students filled-up and returned the demographics survey. Demographics data were collected at the start of the course to gather data on their background, including age group, gender, race, faculty, year of study and current score (CGPA). Statistical data analysis was conducted using SPSS software. Age ranges were fairly balanced across the students. The number of females in the course outweighed the number of males by nine only. The result from the demographics survey is depicted in Table 1.

**Table 1. Frequency counts from demographics survey.**

		Frequency	Percentage
Age group	Less than 20 years	8	15.1
	21-25 years	42	79.2
	26-30 years	3	5.7
Gender	Male	22	41.5
	Female	31	58.5
Race	Malays	27	50.9
	Chinese	16	30.2
	Indian	5	9.4
	Others	5	9.4
Faculty	Information Technology	11	20.8
	Engineering	6	11.3
	Management	36	67.9
Year	1	4	7.5
	2	28	52.8
	3	13	24.5
	4	3	5.7
	More than 4 years	5	9.4
Current CGPA:	Below 2	1	1.9
	2.0-2.66	19	35.8
	2.67-3.32	26	49.1
	3.33-3.66	4	7.5
	3.67-4.0	3	5.7
<b>Total</b>		<b>53</b>	<b>100.0</b>

Besides obtaining data on their background, data on how long they normally use the internet, computer self-efficacy scale and attitudes towards the internet were also gathered. A statistical analysis was performed to compare the mean score by gender as shown in Table 2. It was found that the males use the internet longer than the females with a significant P value of less than 0.05. Nevertheless, the other two measures did not show any significant difference between males and females.

**Table 2. Compare mean score by gender.**

	Gender	N	Mean	Std. Deviation	T test	P value
Duration of internet usage	Male	22	7.95	2.10	2.07	0.04**
	Female	31	6.77	2.00		
Pertaining computer self-efficacy scale	Male	22	63.14	7.27	1.53	0.13
	Female	31	59.74	8.37		
Pertaining the attitude towards the internet	Male	22	81.41	7.94	-0.69	0.50
	Female	31	82.65	5.21		

\*\* Significant value  $P \leq 0.05$

A total number of 52 students were given pre-tests before TC and SC environment were carried out. Immediately thereafter, post-tests with the same questions were given to gauge any learning that had taken place. The results of the tests for TC and SC are shown in Table 3 and Table 4 respectively, where it is broken down into the mean (M) of both tests and the standard deviation (SD). For TC environment, the post-test has a much higher mean compared to the pre-test which indicates a very positive change in the student's learning. For SC environment, the post-test is also higher than the pre-test but not as much difference as in TC environment. It indicates that students learn more in TC environment, which leads to the support of existing literature that claims that the technological enhancements have not provided the results as the educators had hoped for.

**Table 3. Paired samples statistics - TC environment.**

		Mean (M)	Std. Deviation (SD)
Pair 1	Pre-test	9.88	2.006
	Post-test	14.38	2.180

**Table 4. Paired samples statistics - SC environment.**

		Mean (M)	Std. Deviation (SD)
Pair 1	Pre-test	11.39	2.466
	Post-test	13.38	2.407

In order to ascertain the significance of the change in mean (M) for both tests, the results of the tests were statistically analysed using a paired sample T-test. Using this method, statistical significance is accepted where P is less than 0.05 when testing for 95% confidence. The results for both environments are shown in Table 5 and 6. For both environments, there is a statistically significant difference as P values are less than 0.05. This proves that students have actually made significant progress in their learning process after being exposed to TC and SC environments.

**Table 5. Paired samples t-test - TC environment.**

	Paired Differences					T	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference			
				Lower	Upper		
Pre-test Post-test	-4.500	2.288	.317	-5.137	-3.863	-14.182	.000

**Table 6. Paired samples t-test - SC environment.**

	Paired Differences					T	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference			
				Lower	Upper		
Pre-test Post-test	-1.984	2.554	.319	-2.622	-1.346	-6.215	.000

## CONCLUSION

This study demonstrated how Kirkpatrick Learning Evaluation Model was used to provide evidence to the student-centred and teacher-centred learning environments. Their background was identified and analysed before proceeding to the next level of evaluation. For Level Two evaluation, it was found that the students showed positive progress in their learning in teacher-centred and student-centred environments. However, the results showed that the mean difference was higher in the teacher-centred environment. Further statistical analysis proves that both environments can elevate the learning process. Hopefully, this study is able to seek the implementation of various multimedia-based delivery methods in the learning continuum and their effects on the students' learning process and evaluate the effectiveness of using the technology in the classrooms based on Kirkpatrick's principles.

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