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Impact of Learner-Centred Teaching Environment with the Use of Multimedia-mediated Learning Modules in Improving Learning Experience

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Abstract

Malaysian tertiary education is still very much practicing the traditional teaching and learning approach. There had been a push by the Ministry of Education in Malaysia to move towards outcome-based education. Technology can be used to facilitate teaching and learning process moving towards outcome-based education. The use of technology can help forming learner-centred teaching environment where in this research students were exposed to online learning environment through the Internet platform and it was also known as a self-directed learning environment. Besides online platform, multimedia technology can be used to help enhance students' learning experience by motivating them to learn. This research allowed students to have independent learning using multimedia learning module. With the aid of technology used in education, learner-centred teaching could be formed. Learner-centred teaching allowed the focus to be shifted from lecturers to students, and then learner understanding and motivation would be improved. This research was conducted using mixed-method research design. Results from pre/post-tests, survey and students' comments were triangulated and indicated that learner-centred teaching environment with the use of multimedia-mediated learning module contributed in improving learner motivation compared to teacher-centred teaching environment. This research supported the benefits of shifting from teacher-centred teaching to learner-centred teaching environment.

Keywords: Learner-centered teaching; online learning; multimedia-mediated learning module; learner motivation

Abstrak

Pendidikan pengajian tinggi di Malaysia masih lagi mengamalkan pengajaran tradisional. Kementerian Pendidikan di Malaysia menggalakkan institusi pengajian bergerak ke arah pendidikan "outcome-based". Teknologi boleh digunakan untuk memudahkan proses pengajaran dan pembelajaran bergerak ke arah pendidikan "outcome-based". Penggunaan teknologi boleh membantu membentuk pengajaran berpusat pelajar di mana dalam kajian ini pelajar didedahkan dengan persekitaran pembelajaran dalam talian melalui platform Internet dan ia juga dikenali sebagai persekitaran pembelajaran yang kendiri. Selain platform dalam talian, teknologi multimedia boleh digunakan untuk membantu meningkatkan pengalaman pembelajaran pelajar dimana pelajar-pelajar bermotivasi untuk belajar. Kajian ini membenarkan pelajar untuk mempunyai pembelajaran bebas menggunakan multimedia pembelajaran modul. Dengan bantuan teknologi yang digunakan dalam pendidikan, pengajaran berpusatkan pelajar boleh dibentuk. Pengajaran berpusatkan pelajar dibenarkan tumpuan akan beralih daripada pensyarah kepada pelajar, dan kemudian pemahaman pelajar dan motivasi akan bertambah baik. Kajian ini dilaksanakan dengan menggunakan kaedah penyelidikan "mixed-method". Keputusan ujian pra/pos, kajian soal selidik dan komen-komen pelajar-pelajar digabungkan dan menunjukkan pengajaran berpusatkan pelajar dengan menggunakan modul pembelajaran multimedia dapat meningkatkan motivasi pelajar dibandingkan dengan pengajaran berpusatkan cikgu. Kajian ini menyokongkan kebaikan-kebaikan yang didapati apabila kaedah pengajaran ditukar daripada pengajaran berpusatkan cikgu kepada pengajaran berpusatkan pelajar.

Kata kunci: Pengajaran berpusatkan pelajar; pembelajaran dalam talian; modul pembelajaran multimedia; motivasi pelajar

1.0 INTRODUCTION

Conventional teaching or "chalk and talk" is the most basic teaching approach which is still in practice, it is also known as the conventional teaching where the educators would be standing in front of the classroom and conducting lectures. In this 21st century, teaching approach is no longer limited to this conventional teaching. However, many universities are still practicing conventional teaching approach. Recently, there had been a push from Ministry of Education in Malaysia to encourage educators to involve technology in teaching/ learning activities (Hong *et al.*, 2003; Raman, 2011) and move to learner-centred teaching (Ministry of Education, Malaysia, 2013). It is time for the lecturers to step forward to change from conventional teaching to learner-centred teaching. With the introduction of information technology, it had made the change easier for the educators to implement learner-centred teaching. In other words, this change has also affected education institution where learning is no longer limited to the square or rectangle shaped of classrooms. Therefore, it is not strange to hear about online learning or E-learning, distance learning or learning through the space of Internet. The introduction of online learning allows teaching to be focused from students' perceptions, students would be encouraged to have their self-directed learning and at the same time teachers become facilitator throughout the learning process (Oncu and Cakir, 2011). Learner-centred teaching can still deliver the knowledge to students efficiently and effectively (Weimer, 2002; Blumberg, 2004). Students in learner-centred teaching can still able to demonstrate the skills or knowledge through the assessment of coursework and examination. Online learning environment will see change in role of teacher from authoritarian to facilitator, and this would encourage students to become active learners (Weimer, 2002).

In parallel with the online learning environment, the teaching materials used would be another important factor in enhancing the teaching and learning process. In traditional classroom teaching, tools or materials involved can be writing on whiteboard, showing video, listening to audio clips, presentation software (eg: MS PowerPoint), and interactive multimedia software (eg: Director or Flash). There have been many studies conducted and presented regarding the powerfulness of multimedia elements in the context of education, training, and even spread to entertainment such as gaming software, movie, and advertisement as well as in marketing industry. Learner understanding can be enhanced too with the use of multimedia technology (Nicholson and Nicholson, 2010). This study intends to report the impact of implementing a multimedia-mediated learner-centered teaching environment through the students' performances in the pretest/ posttest, survey results and students' comments.

2.0 BACKGROUND STUDY

2.1 Limitations of Conventional Teaching

Conventional teaching is also known as face-to-face teaching which involves the teacher standing in front of the classroom conducting the lecture while students are listening to the teacher. In this learning environment, the interaction between lecturer and students is limited. Lecturer needs to initiate discussion in the classroom. There are students who are passive learners. Therefore, the lecturer will have difficulty in ensuring all the students are learning in the classroom as there are students who may not pay attention, slow learners or they are shy to ask questions. Due to this, students seldom take initiatives to ask questions to the lecturers, this creates only one way communication in the learning process (Tutty *et al.*, 2005).

The above are some limitations of conventional teaching. In order to overcome those limitations, learning process is no longer limited to conventional teaching. Learner-centred teaching environment is introduced where it is learner focused, students control how much they want to learn or it is said self-directed learning. It allows students to have independent learning by controlling their own learning which can lead to successful learning environment (Herrington *et al.*, 2002). This also helps to create better learning attitude (Armbruster *et al.*, 2009).

2.2 Learner-Centred Teaching

Learner-centred teaching puts students as the focus in the learning process (Blumberg, 2004). Students can plan when they want to learn and also the methods they want to adopt for learning. They have the right to arrange the contents for learning. This teaching approach has a few benefits: improves student learning and student engagement, encourages students to know why they need to learn and how to learn, and allows students to have their self-awareness of their learning abilities and their process of gaining it (Blumberg, 2004). In learner-centred teaching, it is said where students were given the focus in the teaching and learning process (Weimer, 2002), this would help improve learner understanding and motivation. This is because in such environment, students are encouraged to play a more active role in the learning process. When they become active learners, they can be engaged in the learning process, and then they can be motivated in learning. Lastly, they will be able to improve their understanding.

In learner-centred teaching, students would experience a change in the learning process (Hunter, 2011) where they are no longer studying in a classroom but gaining their knowledge through a self-directed learning environment. This learning environment encourages students to have deeper learning since they can control their own pace of learning. At the end, students would have better learning attitude and achieve better performance in their studies (Armbruster *et al.*, 2009).

2.3 Online Learning

The advancement of technology allows the teaching and learning process not limited to face-to-face teaching. Learning now can be formed in a more convenient way, which is through the web. Students can learn at anytime and anywhere using the online learning platform. According to Oncu and Cakir (2011), there are three main benefits of online learning. Firstly, online learning environment would be familiar for students because they are born in the digital age which would increase their interest in learning. Secondly, students would be able to communicate with their teachers in more convenient manner through the Internet platform. Thirdly, online environment has the effect in enhancing learner engagement which helps to improve learning experience and performance.

When positive or encouraging results have been reported through various researches regarding the benefits of online learning, many universities introduced online learning. More preparation and careful planning would be required in online teaching, and the role of educators would also been shifted from content provider to content facilitator (Weimer, 2002). There were benefits identified from each learning approach and depending on what outcomes we would want to achieve, by then we determine whether one would complement or replace the

other (Jusri and Lim, 2003). In conclusion, online learning environment improves students' engagement in learning and promotes better learning outcomes (Oncu and Cakir, 2011).

2.4 Multimedia Learning

Multimedia usage is popular in everywhere and educators can enjoy the benefits of multimedia application at anywhere or anytime. Due to this, many universities have introduced online learning courses where lecture notes are designed using multimedia elements and uploaded to universities' intranets or their own Learning Management System (Alessi and Trollip, 2001).

Using multimedia technology in education is able to enhance students' problem solving skills and motivate students to learn (Liu *et al.*, 2009). Students who go through multimedia learning will have their mind stimulated and then able to have better retention rate (Reeves, 1998).

2.5 Interactive Multimedia Learning

In the online learning environment, students were told to access the web-based multimedia learning module in the computer laboratory. While browsing through the multimedia learning module, the students actually participated in the learning process by reading the contents, control the sound and the animation or video. They have the full control on the web-based multimedia learning module and they can make their own decision on how they want to learn. When students interact with the multimedia learning module, students' retention rates are improved (Vaughan, 2003).

When students access the multimedia learning module, their senses are stimulated and their attentions are captured, due to this, it contributes in increasing their retention rates (Reeves, 1998). In this situation, an active learning process where the learners are involved in every single learning activity is formed. This is also known as students are engaged in their learning, which in turn allows students to have higher retention rate and achieve better performances in class (Kiili, 2005; Oncu and Cakir, 2011).

This could be also reflected by the statement of *"Multimedia places a high degree of responsibility into the hands of the users to drive the learning process"* (Neo *et al.*, 2008). Lastly, Using multimedia technology in teaching provides opportunity for students to be engaged in the learning process and they were motivated and active throughout the whole process. Hence, learner understanding can be improved successfully (Neo and Neo, 2010).

■3.0 METHODOLOGY

This study was conducted at INTI International University. Students who studied in semester one of Diploma in Business Administration (DBAD) were involved in this study. There were local and international students who had completed their secondary school studies, which was either SPM or O-levels. All of them were required to enroll into a core IT subject in this programme. This subject was also the first IT subject introduced to this group of business students. A total of 44 students participated in this study, where there were 14 students involved in the conventional teaching environment and 30 students were involved in this learner-centered teaching environment through online learning using the multimedia learning module.

The students were given a set of 20 multiple questions (pre-test) two weeks before the conduct of the lecture. During the conduct of this study, students were given the URL to access the online multimedia learning module. Students went through their self-directed learning during this lecture. Once they had their lecture, they did the same set of questions (post-test) again. In the next class, students were given the survey questionnaire in order to collect students' perceptions on the learning environments which they had gone through.

■4.0 RESULTS AND DISCUSSION

4.1 Student Learning Outcome

The following table shows mean scores for the Pre-test and Post-test conducted for two learning environments. Pre-test and Post-test consists of full marks of 20.

Table 1 Mean scores for pre-test and post-test

Face-to-face	N	Mean	STD
Pre-test	14	7.64	2.06
Post-test	14	11.64	2.21
Online learning	**N**	**Mean**	**STD**
Pre-test	30	8.10	2.50
Post-test	30	12.80	3.25

From Table 1 above, it indicated that the mean scores of the post-tests in both learning environments were higher than the pre-tests. This showed that both learning environments were able to help students in learning. The online learning environment had a higher post-test mean score compared to conventional teaching environment. This shows that the web learning environment was able to contribute in improving students' performances, meaning students had successfully understood the content through this learner-centred teaching environment.

Before the comparison of the mean scores for pre-test and post-test can be performed, the normality test was used to test if the sample has a normal distribution. It is recommended by the statistician that when the sample size is lesser than 50 sets, it will be more reliable to use Shapiro-Wilk test (Field, 2009). From Table 2 below, it shows that the value is .885 and .080 and this is greater than 0.05 (exceeds the confidence level at 95%), then it can be assumed that the sample is normally distributed (Field, 2009).

Table 2 SPSS output for normality test

Test of Normality (Face-to-face)						
	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Difference	.143	14	.200*	.971	14	.885
Test of Normality (Online Learning)						
Difference	.124	30	.200*	.938	30	.080
a. Lilliefors Significance Correction						
*. This is a lower bound of the true significance.						

Next, the pre-test and post-test mean scores are compared using the Paired-Samples T-Test and the results are shown in Table 3. The differences of the pretest and posttest mean scores

in both learning environments were significant, it is because the p-value is less than .05 (Field, 2009).

Table 3 Paired sample t-test

Paired Sample Test								
	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pre-test – Post-test (F2F)	**-4.000**	2.075	.555	-5.198	-2.802	-7.211	13	**.000**
Pre-test – Post-test (Online learning)	**-4.700**	3.303	.603	-5.933	-3.467	-7.795	29	**.000**

4.2 Learning Environment Survey Results

During the next class, a set of questionnaire were given to all the participants in the study to collect their feedback towards the online learning environment. It intended to find out student's perceptions towards the two learning environments. The survey was measured in 5 points Likert scale (1 for Strongly Disagree, 2 for Disagree, 3 for Undecided, 4 for Agree, and 5 for Strongly Agree). The survey used for the conventional teaching environment contained 20 items whereas the survey used for the online learning environment contained 35 items, including items related to multimedia module and web platform. These additional items are not relevant in the conventional teaching environment. There are important items found from the environment survey where the results show that the learner-centred teaching environment using web-based interactive multimedia module contributed better in learning experience, it also makes the learning process more interesting and engaging compared to conventional teaching environment. The following tables show the mean scores and percentages for students' perceptions on this online learning environment according to two categories, which are understanding and motivation:

(i) Understanding

Learner understanding looks into whether the learning environment can help students to obtain knowledge and understand what they learned from the lesson.

Table 4 Understanding (face-to-face)

No.	Survey Items	Mean (M)	STD	%
7	The content presented in the lecture was relevant to my learning	3.64	.497	64.3
10	I was clear about the objectives of the lecture	3.57	.646	64.3
11	The content was easy to understand	3.50	.760	50.0
14	I know better about the subject after the lecture	3.50	.760	50.0
13	I was able to learn better with the conventional method of teaching	3.50	.760	35.7
16	I understood the course content after the lecture	3.43	.756	57.1

The grand mean score for this category in face-to-face teaching environment is **3.52**. The first item extracted for this category measures if the content was relevant to students' learning and the mean score is 3.64, with standard deviation of .497 and the cumulative positive response rate is 64.3%. The item on if students agreed that they understood the course content after the lecture where this item has the lowest mean score of 3.43 among the other items in this category with standard deviation of .756 and cumulative percentage of 57.1%. There is an item to measure students' understanding on the lecture objectives; this achieves 3.57 mean score, .646 in the standard deviation and cumulative percentage of 64.3%. Students were also asked whether the content was easy to understand and only 50% of the students agreed to this, the mean score is 3.50 and standard deviation is .760. This is followed by the item which investigates if the students know better about the subject after the lecture. The mean score for this item is 3.50, standard deviation is .760 and 50% cumulative percentage of positive response. The last item in this category assesses if students are able to learn better with this learning environment. The mean score is 3.50 and with standard deviation of .756 and the cumulative percentage is 35.7% (See Table 4).

Table 5 Understanding (online learning)

No	Survey Items	Mean (M)	STD	%
2	The content was easy to understand	4.10	.548	90.0
5	I understood the course content in the web-based module	4.00	.587	83.3
10	I was able to learn better with multimedia content	3.97	.718	73.3
17	The content presented in the module was relevant to my learning	3.87	.571	83.3
19	The content in the application relevant to the chapter objectives	3.87	.629	73.3
21	Multimedia made understanding the content better	3.83	.699	73.3
24	The instructions in the application was easy to understand	3.80	.551	80.0
33	I was clear about the objectives of the multimedia learning module	3.70	.702	70.0
35	I know better about the subject after using the web module	3.60	.675	63.3

The grand mean score for this category in online learning environment is **3.87** which is higher than the conventional teaching environment. For this category, there were 9 survey items being extracted from the questionnaire. Table 5 presents the extracted survey items for this "Understanding" category. There were 90% of students agreed that the content was easy to understand, this item has mean score of 4.10 and standard deviation is .548. Next, there were 83.3% of students who agreed that they could understand the course content in the web module, mean score is 4.00 and standard deviation is .587. This is followed by 73.3% of students who agreed that they were able to learn better with multimedia content. This item achieved mean score of 3.97 and standard deviation of .718. Next, there were 83.3% of students who agreed that the content presented in the web module was relevant to their learning (mean score is 3.87 and standard deviation is .571). This is then followed by 73.3% of students who agreed that the content in the web module was relevant to the chapter objectives, mean score is 3.87 and standard deviation is .629. Next, there were 73.3% of

students agreed that the multimedia made understanding the content better, the mean score is 3.83 and standard deviation is .699. The students also agreed that the instructions in the web module were easy to understand, this item achieved mean score of 3.80, and the standard deviation is .551 and the cumulative positive response rate is 80%. Next, there were 70% of students who agreed that they were clear about the objectives of the multimedia learning module, mean score is 3.70 and standard deviation is .702. Lastly, there were 63.3% students who agreed that they knew better about the subject after using the web module, mean score is 3.60 and standard deviation is .675.

(ii) Motivation

Learner motivation is where students find it interesting to learn in the environment and they will pay more attention during the learning process.

Table 6 Motivation (face-to-face)

No.	Survey Items	Mean (M)	STD	%
15	I enjoyed learning with the conventional method of teaching	3.50	.855	42.9
17	I found the lecture interesting and engaging	3.43	.852	50.0
18	I liked the conventional method of teaching.	3.29	.914	42.8
19	I was interested to learn more about the topic after the lecture	3.14	.663	28.6
20	I was motivated learning with the conventional method of teaching	3.07	1.072	28.6

Table 6 presents the mean scores, standard deviation and percentage for items extracted for motivation in face-to-face teaching environment. The grand mean score for motivation in face-to-face teaching environment is 3.29. There were 42.9% students agreed that they enjoyed this conventional teaching environment where the mean score for this item is 3.50, the standard deviation is .855. Then it is followed by the item which indicates students found the environment is interesting and engaging, this item achieves mean score of 3.43, standard deviation of .852 and 50% cumulative percentage. There were 42.8% students agreed that they liked this teaching environment (mean score is 3.29, standard deviation is .914). There were only 28.6% students agreed that they found it interest to know more about the topic after the lecture (mean score is 3.14, standard deviation is .663) and they were motivated to learn in this learning environment (mean score is 3.07, standard deviation is 1.072).

The grand mean score for motivation in online learning environment is 3.87 as shown in Table 7 which are again higher than the conventional teaching environment. There were 86.7% of students agreed that learning in this web environment was interesting and engaging and this item has a mean score of 4.00 and standard deviation of .643. The item which measures if students enjoyed learning in the web environment achieved mean score of 4.00 as well, the standard deviation is .695 and the cumulative positive response rate is 83.3%. The students also agreed that multimedia could make learning fun and motivating. This item has mean score of 3.97, standard deviation of .669 and cumulative positive response rate is 83.3%. There were 73.3% of students who agreed that the interactive features in the module made learning fun and engaging, the mean score is 3.87 and standard deviation is .730. This is then followed by 70% of the students liked to be able to learn at their own pace in this web learning environment, mean score is 3.90 and standard deviation is .885. There were 73.3% students (mean score is 3.83, standard deviation is .874) agreed that they liked the multimedia content in the web. Next, there were 80% of students found them to be motivated to learn on the web, mean score is 3.80 and standard deviation is .805. There were 73.3% of students who were interested to learn more about the topics in the web module (mean score is 3.77 and standard deviation is .898). Besides that, 70% of students indicated that they prefer this learning method for their learning process (mean score is 3.77 and standard deviation is .774). There were 63.3% of students found interacting with the module motivated them to learn (mean score is 3.73 and standard deviation is .740). The last item is to find out whether students liked learning using the web module than the traditional classroom, the results is 60% of students liked this web environment, mean score is 3.63 and standard deviation is .928.

Table 7 Motivation (online learning)

No	Survey Items	Mean (M)	STD	%
7	I find learning with the web interesting and engaging	4.00	.643	86.7
8	I enjoyed learning in the web environment	4.10	.548	90.0
13	Multimedia made learning fun and motivating	3.97	.669	83.3
16	I liked being able to learn at my own pace and time	3.90	.885	70.0
18	The interactive features in the module made learning was fun and engaging	3.87	.730	73.3
22	I liked the multimedia content in the web module	3.83	.874	73.3
23	I was motivated learning on the web	3.80	.805	80.0
25	I was interested to learn more about the topics in the web module	3.77	.898	73.3
27	I prefer this teaching / learning method in my learning process	3.77	.774	70.0
29	Interacting with the module motivated me to learn the content	3.73	.740	63.3
34	I liked learning on with this application rather than the traditional classroom	3.63	.928	60.0

Students' perceptions towards both of the learning environments indicated that the online learning environment helped students to have better learning experience. Learner motivation and learner understanding helped to engage students in the learning process, when the students enjoyed the learning, it would help them to achieve better performance in learning.

4.3 Students' Comments

Students were also asked to give their comments regarding the learning environments that they had gone through. Please refer to the Table 8.

From the students' comments, it is noted that students gave good comments for both learning environments. However, it is noted that students in the online environment mentioned phrases such as "*can focus more*", "*fun and interesting*", "*learn in our own place at any time*", "*web module is interesting*", "*better than boring books*", these are all encouraging comments about the online learning environment. Therefore, this multimedia-mediated learner-centred environment could provide more options for students to look for more information to support their studies and they could enjoy their own pace of learning.

The comments also supported the survey results where this online learning environment could help to improve learner understanding and learner motivation.

Table 8 Students' comments

Face-to-face
Understanding
"Can made me more understand the lecturer."
"The conventional method, is good because it help to understand."
"Some lecturer is teaching so student can absorb the knowledge."
"More clearly and understand about the subject."
"Gain more knowledge about the particular subject."
"It help me to have more information."
"Help me more understand of the lecture."
"I liked the notes but suggest lecturer to use more pictures, video, sound and animation next time. Then I can understand easily."
Motivation
"60% like it."
"I like the conventional method of teaching."
"The uses after the lecturer or after any single chapter we are being tested is really helpful especially for me."
"Let me to more understand and I could absorb the knowledge well if I am interesting with it. If not I just can absorb about 30% to 40% of what lecturer taught."
"More interesting and would not feel boring."
Online learning
Understanding
"It has extra explanation."
"Easy to understand."
"It made me easier to understand."
"I understand the topic much more better."
"More easy to understand the topic."
"Can learn with fun and peace mind. So, I can understand very well."
"Make me more understand."
"More simple and the vocabulary are not difficult to understand."
"It has helped to make me understand more clearly."
"Can more understanding since I can focus more."
Motivation
"All the colourful pictures are provided, sound effect makes less boring."
"It is more easily to learn and it is interesting."
"It was visually and interesting when learning."
"Very easy to access and can interact with the teachers. Can learn in our own place at any time."
"It is fun and interesting to learn."
"Very interesting."
"It is more interesting and more attractive."
"Interested the topics and quiz."
"The things that I like about the web module is that it is very interesting and fun. With it, I have learnt a lot of things."
"It is interesting, and it far more better than looking at those boring books."

4.4 Observation

Throughout the conduct of this study, students' behavior and attitude were observed. During the conduct of this study, the students were excited on the multimedia module. They felt happy and could not wait to start their learning. Some even copied down some contents from the online multimedia module into their own notepad. There were a few students who asked questions to the lecturer when they had doubt on the content. It is obvious that students were showing interest in the learning process and they liked the multimedia learning module.

5.0 CONCLUSION

From the Pre-test/ Post-test score, it is noted students' performances improved. The use of the web-based multimedia learning module allowed students to have better interactivity with the learning modules and achieve better understanding and motivation. Therefore, this online learning environment which helped to form learner-centred teaching had successfully enhanced learner understanding and motivation. This paper would like to highlight that with the use of multimedia technology and learner-centred teaching approach, it was able to improve students' performance in the teaching and learning process and also it managed to motivate students in learning (Weimer, 2002; Nicholson and Nicholson, 2010). This study had concluded that students were successfully motivated in the web learning environment and students gave encouraging comments about this web learning environment as well as on the learning module. These promising results would encourage lecturers to consider moving from conventional teaching to learner-centred teaching.

References

[1] Hong, K.S., Ridzuan, A.A. and Kuek, M.K. 2003. Students' Attitudes toward the Use of the Internet for Learning: A Study at a University in Malaysia. *Journal of Educational Technology & Society*. 6(2003): 45–49.

[2] Raman, A. 2011. The Usage of Technology Among Education Students in University Utara Malaysia: An Application Of Extended Technology Acceptance Model. *International Journal of Education and Development using Information and Communication Technology (IJEDICT).* 7(2011): 4–17.

[3] Ministry of Education, Malaysia. 2013. *Menyusuri Transformasi Pengajian Tinggi.* 280.

[4] Oncu, S. and Cakir, H. 2011. Research in Online Learning Environments: Priorities and Methodologies. *Computers & Education,* 57(2011): 1098–1108.

[5] Weimer, M. 2002. Learner-Centered Teaching: Five Key Changes to Practice. *San Francisco, CA: Jossey-Bass.*

[6] Blumberg, P. 2004. Beginning Journey toward a Culture of Learning Centered Teaching. *Journal of Student Centered Learning*. 2(2004): 68–80.

[7] Nicholson, J. and Nicholson, D.B. 2010. A Stream Runs through IT: Using Streaming Video to Teach Information Technology. *Campus-Wide Information Systems*. 27(2010): 17–24.

[8] Tutty, J., White, B. and Pascoe, R. 2005. Experiences from a Wireless-Enabled Tablet Classroom. *Proceedings of 2005, Conferences in Research and Practice in Information Technology (CRPIT 2005),* Australia. 165–172.

[9] Herrington, J., Oliver, R. and Reeves, T.C. 2002. Patterns of Engagement in Authentic Online Learning Environments. Presented at the Ascilite Conference.

[10] Armbruster, P., Patel, M., Johnson, E. and Weiss, M. 2009. Active Learning and Student-centered Pedagogy Improve Student Attitudes and Performance in Introductory Biology. *CBE—Life Sciences Education*. 8(2009): 203–213.

[11] Hunter, M. S. 2012. Creating and Developing Learner-Centered Classrooms, *Proceedings of 2012, 31st Annual National Conference on The First -Year Experience*, *National Resources Centre*, San Antonio, Texas, USA. 53–60.

[12] Jusri, T. and Lim, G. 2003. Significance of Online Teaching vs. Face-to-Face: Similarities and Difference. *Proceedings of 2003, World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education.* Phoenix, Arizona, USA.

[13] Alessi, S. M. and Trollip, S. R. 2001. *Multimedia for Learning: Methods and Development.* 3rd ed. United States: Allyn & Bacon.

[14] Liu, M., Toprac, P. and Yuen, T.T. 2009. What Factors Make a Multimedia Learning Environment Engaging: A Case Study. *IGI Global.*

[15] Reeves, T. 1998. The Impact of Media and Technology in Schools: A Research Report. Prepared for the Berterlsmann Foundation.

[16] Vaughan, T. 2003. *Multimedia: Making It Work.* 6th ed. McGraw-Hill Professional.

[17] Kiili, K. 2005. Participatory Multimedia Learning: Engaging Learners. *Australasian Journal of Educational Technology*. 21(2005): 303–322.
[18] Neo, M., Neo, T. K. and Yap, W. L. 2008. Students' Perceptions of An Interactive Multimedia-Mediated Web-Based Learning Environment: A Malaysian Perspective. *Proceedings Ascilite of 2008, Hello? Where Are You in the Landscape Of Educational Technology?* Melbourne, Australia. 658–666.
[19] Neo, M. and Neo, T.K. 2010. Students' Perceptions in Developing a Multimedia Project within a Constructivist Learning Environment: A Malysian Experience. *The Turkish Online Journal of Educational Technology*. 9(2010): 176–184.
[20] Field, A. 2009. *Discovering statistics using SPSS*. 3rd ed. Sage Publications.