

An Investigation on Ict Application in Learning Mathematics among Engineering Technology Students

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Abstract: Mathematics teaching and learning is an important factor that leads to the success of the students' achievement. Since mathematics is one of the important subjects at Malaysian Institute of Information Technology (MIIT), Universiti Kuala Lumpur, this study aims to investigate on ICT application in learning mathematics among engineering technology students. The use of e learning and internet resources including social networking medium is integrated in traditional approach teaching mathematics. Ten bachelor students from Networking System program were selected to be the research participants. Semi-structured interviews and documents analysis were used to gather the information on their experience in learning mathematics using the ICT. The research findings revealed that the ICT could assist students in their understanding of the mathematics concept and were able to solve problem solving. This research also draws conclusion and recommendations to improve lecturers' style of teaching by using ICT equipment as a tool to make the teaching and learning environment more meaningful and interesting.

Key words: Engineering technology · Mathematics · ICT · E-learning · Application

INTRODUCTION

Since some students are gifted and there are still many students have to struggle in learning mathematics, [1], using ICT in teaching and learning is essential as it would improve students understanding of basic concept of mathematics and improves the way mathematics should be taught [2]. MIIT is an Information Technology faculty of Universiti Kuala Lumpur, majority of the lecturers used the ICT as a tool to teach not only in mathematics but also in other subjects. ICT promotes more interaction between lecturers and students as less time is being used to write on the white board. It gives more space to the students to think and understand the subject more without copying from the white board. Technology gives students access to new ways of exploring detailed concepts and it saves plenty of time. Students' motivation to learn mathematics can be increased as youngsters are more interested and exposed in using ICT equipments in their daily lives [3]. The integration of ICT into classroom can be infused through various students' learning styles [4].

The scenario in mathematics education has shown a new perspective in mathematics teaching from traditional approach to teaching with ICT. Enabling ICT in mathematics will help students to be exposed with exploration of new ways of learning mathematics and enhance their concentration in mathematics classroom [5]. However, some issues and challenges in integrating ICT in mathematics classroom should be considered as what has been raised by [6] which include the effectiveness of ICT in mathematics teaching, the educators' role when using ICT in mathematics classroom, the suitability of the chosen ICT, knowledge on how to use ICT and their competency. This has become the gap that should be explored in this study.

The main objective of this study is to investigate students' experience in learning mathematics using the ICT such as interaction and communication to discuss problem solving using the Facebook, the advantages and disadvantages of using the ICT such as the use Microsoft Powerpoint, the e learning system which is known as E-Citie, adequate facilities that support and provide

the ICT software and equipments, knowledge about ways to integrate ICT to enhance the teaching and learning and difficulty in integrating and using different ICT tools in a classroom. Since mathematics and engineering complement each other in developing mutual understanding among students in their respective field, therefore, the needs to teach engineering mathematics effectively is crucial in order to provide them with mathematical knowledge and the ability using ICT skills effectively in engineering problems [6].

MATERIALS AND METHODS

The research participants involved ten engineering technology students who enrolled in a networking and system programme. These students were from different level of mathematics achievement and gender. The selection was based on their assessment and their assessments were group into three categories: the lowest, the average and the highest test score. Three students scored the highest marks (S1, S2 and S3), three students scored the average marks (S4, S5 and S6) and three students scored the lowest marks (S7, S8 and S9). Only nine students were selected in this study due to the small number of students taking this subject. Engineering mathematics is a compulsory subject in order for them to graduate and also as a basic application to the technical subjects in their programme. In many years, the number of students failed in this subject is quite high due to their difficulty in understanding the concept. Therefore, the used of ICT has become the tools for students to learn more interactively and to boost their level of confidence and motivation to have a better grade in mathematics.

The assessment and analysis of students' answers were collected based on six questions which were related to the use of e-learning, the internet activities and the advantages and disadvantages of ICT application. In order to ensure that the process of the research was implemented successfully, the first phase of the study was conducted by the classroom lecturer and the second phase of the study was conducted by the researcher. The lecturer of the research participants' class was a female and has been teaching mathematics for more than 10 years. Traditional and ICT approach was implemented as the integration of her teaching style. Since all students were required to take assessments as part as their coursework marks, in the first phase of the study, a quiz was given to all the students during the second week

of the semester. In the fourth week, a test was given to the students and the total marks were taken to get the average of the two assessments. The students' scores were ranked into three categories: four students got the highest marks, three students got the average marks and three students got the lowest marks. Interview was conducted by the researcher to get all the detailed information regarding learning mathematics using the ICT.

Research Objective: The objective of this study is to explore students experience in learning mathematics using the ICT. It involved teaching strategy, advantages and disadvantages of using the ICT and students readiness in learning mathematics.

Findings and Intrepretation: The interview sessions with the students was done after the class hour. Ten students were called according to their level of achievements which was based on their test result. Each session took place about 20 minutes. The interviewer report all the feedback received from the students in her notebook. The feedback was analyzed in order to explore their experience in learning mathematics using the integration of traditional method and the ICT application. The results of the interview were summarized accordingly based on the students' responses.

The Use of E-Learning: Most students used e-learning to download notes, tutorials and assignments that have been uploaded by their lecturer. The e-learning was also used by the students in obtaining information such as announcement of test and postponement of classes. However, one of the students seldom used e-learning since his preference was to copy all the related files from his classmates.

S5 "I normally just copied from friends that already downloaded the notes".

Complaints were received from few of the participants regarding poor service of the server. Taking too much time to download the learning materials has made no evidence shown during class time. Errors and server down were among problems faced by these students in getting the materials ready for them as mentioned by this participant.

S1 "Sometimes e-learning errors occur and difficult to get notes, slow access".

The second part of the analysis of the questions is ICT application in teaching and learning mathematics by lecturer. Based on the all students' responses, their lecturer uploaded all the notes, teaching materials, tutorials, assignment and students' marks in the e-learning as what have been mentioned by S2, S6 and S7.

The Use of Internet Activities: Social network medium such as Facebook and Twitter were commonly used among students particularly in getting communicating with their classmates. Youtube and specific websites were referred as learning material in enhancing their understanding. Videos on explanation of certain topics play an important role in making the learning of difficult topics more interesting. Some interesting websites were also used to be the students' reference materials. Past examinations questions were collected by the students to be used in their revision. The students used these videos to help them in solving some of the given problems as commented by this participant.

S2 "I used Youtube to watch video how to solve my mathematics problems".

During learning process, common software like Microsoft Powerpoint was used by the lecturer to deliver their lesson in class. The internet activities were also recommended by the lecturer for the students' learning purposes. However, the lecturer used the whiteboard in explaining some of the mathematical concepts to complement the notes that have been uploaded in e-learning.

S8 "My lecturer used combination of slides presentation and whiteboard for her teaching".

The Advantages and Disadvantages of Ict Application:

These participants were also questioned on the advantages and disadvantages of ICT applications. Among the advantages of using ICT are their roles as medium of transporting the learning materials such as notes, tutorial, past tests and examinations questions. For instance, the students used ICT to access their marks from the system that has been provided by the institute. Since the information can be obtained easily from the internet, the students used this opportunity to collect

some references for their learning purposes. Furthermore, some interactive lesson can be used by their lecturers in order to make their teaching more meaningful as the given feedback by this participant.

S2 "To gain extra information, the lecturers can prepare more interactive slides".

With the help of ICT, transferring the information from internet can be done without any obstacles for these students. Like what has been informed by one of the students.

S3 "It is quite easy to prepare the assignment since most of the task can be simplified with copying and pasting from any particular website to a Word file".

Although the advantages are known, some challenges in using ICT application in mathematics that include the internet can be accessed easily and due to server problem as well as misused of the social networking such as Facebook. The students used Facebook to communicate on social issues. Likewise, students are not getting better in their mathematical understanding but rather upgrading their ICT new skill.

DISCUSSION

From the interview, the conclusions that can be made including the elearning, computers and internet were widely used for teaching and learning mathematics as well as many ideas can be easily shown to the students if the lecturers use the interactive slides such as graphical visualization and elaborating the abstract concept of mathematics. By integrating the traditional style of teaching and ICT would be more meaningful to students in understanding the subject. The findings of this study is also consistent with what has been proposed by [7] who pointed that the use of ICT would facilitate the students' learning including putting more variety in lesson, more routine classroom activities which can be carried out quickly and higher quality.

The support from the institution is also important in ensuring that the process of teaching using ICT application is successful. Latest technology and updated software are among the vital needs pointed by the students. The technology that the institution is being used should be in line with the current technology.

Despite the interesting factor integrating ICT in mathematics lesson, some barriers are also found among lecturers who are not efficiently using ICT in their lesson [8]. Lacking in professional development in using ICT [9] and especially in training of the use of software packages [10] are considered as the failing reason why teachers do not adopt ICT in their classroom activities. The lecturers have problem in preparing their lesson integrated with ICT [11] and how to use the effective teaching strategies [12] particularly to the computer literate generation.

CONCLUSION

Reflection and further analysis have to be done in improving the ICT application in mathematics classroom. Compared to traditional teaching, teaching mathematics with ICT requires skill, creativity and good infrastructure in order to make the lesson more meaningful. Students should be motivated in learning mathematics with the aid of ICT. The use of ICT should be fully utilized in giving exposure how mathematics can be fun in solving their problems. Both educators and students must willingly explore the use of ICT in their respective part. The institution should provide continuous professional development for educators and resources (Sue and Peter, 2004) so that the combination of mathematics and ICT will ensure the success of the learning outcome. The mathematics curriculum should be suited according to the type of ICT use in classroom and instructional strategies must be well blended with ICT. This will lead to ICT- Savvy employees.

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