MATHEMATICS TEACHERS' PERCEPTIONS OF eBOOK USE IN MATHEMATICS LESSON : A PRELIMINARY STUDY

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Abstract

The utilization and effectiveness of eBook integration in mathematics teaching and learning depends largely on the teachers as they are the change agents in the classrooms. Therefore, we need to understand the teachers' perceptions and beliefs that underlie their decision making process. The eBook, a mini laptop complete with digitized textbook softwares, were introduced in Terengganu in 2009, in line with the concept of 1 student : 1 laptop. This study focuses on assessing the level of factors that might influence the acceptance of eBook in the teaching and learning of mathematics, namely the perceived usefulness, the perceived ease of use, the attitude and behavioural intention. Data were collected from 34 mathematics teachers in primary schools in Terengganu using a survey questionnaire. The findings in this study concluded that the level of perceived usefulness and the perceived ease of use of the eBook among mathematics teachers are moderate. Consequently, the attitude towards using of the eBook and the behavioural intention to use the eBook are also found to be moderate as well.

Keywords eBook, perceived usefulness, perceived ease of use, attitude towards using, behavioural intention.

Introduction

In today's rapid changing of information technology, the integration of technology in teaching and learning is vital. The vast impact of technology in transforming teaching and learning has urged the government to come up with firstly, The Smart Schools project as a part of Malaysia's Multimedia Super Corridor (MSC) project in 1999. Then in 2003, the introduction of PPSMI (*Pengajaran dan Pembelajaran Sains dan Matematik dalam Bahasa Inggeris*) in the year 2003, has in a way boost the usage of ICT in schools, with a budget of RM978.7 billions being allocated by the government for purchasing of laptops, LCD projectors and other ICT equipments (Azidah, Issham, Robitah, & Kumutha, 2011).

More recently, on September 6, 2013, the MOE launched a comprehensive review of the education system in Malaysia in a new Malaysian Education Blueprint 2013-2025 (*Pelan Pembangunan Pendidikan Malaysia 2013-2025*). It summarized the Government's aspiration of better preparing Malaysia's children for the 21st century by raising the education standard internationally and increasing public expectations on education policy. One of the main context and approach is to upgrade the use of ICT in education, leveraging it effectively to enhance learning. Measures such as equipping all 10,000 national schools with 4G Internet access and a virtual learning platform that can be used by teachers, students, and parents through the 1BestariNet program will be done instantly, showing the seriousness of the government in ensuring that ICT integration in learning is optimized (Ministry of Education, 2013).

Terengganu made the first step towards a vision of *Negeri Anjung Ilmu* (center of knowledge state) with the introduction of the eBook in 2009. The launching of the eBooks at Universiti Malaysia Terengganu (UMT) saw 25 000 of Year 5 students receiving their eBooks as the first step towards a vision of producing techno-savvy citizens in 2020 (Chang, Siow, Lee, Faris, & Zanariah, 2012; Amir et al., 2013). Laptops were expected to replace textbooks when all students received their eBooks from the state government. To date, each student from Year 4, Year 5 and Year 6 has received their own individual eBook. This is an early proactive measure by the state government of Terengganu towards preparation for the fast-paced expansion of information technology (Chang et al., 2012).

The term e-book can be defined as a book in digital form accessed via internet and viewed on a desktop, notebook or portable device, formatted for display on specific e-book readers (Rao, 2004). In this study, eBook refers to the individual laptop complete with the digital textbooks, and all tools, equipment, hardware, operating system, accessories, and softwares applications provided by the state government. Despite research evidences showing the capability

of technology in transforming teaching and learning and the large amount of money spent, the use of computers in classrooms remains minimal and inefficient (Teo, 2009; *Malaysian Education Blueprint 2013-2025*, 2013). A study by the Ministry Of Education in 2010, stated that approximately 80% of the teachers spent less than an hour a week using technology in teaching while the students perceived only one third of their teachers used ICT regularly in teaching (Ministry of Education, 2013).

According to a study on one-to-one access of laptop in mathematics classrooms, it enables changes in mathematics pedagogical strategies, increased productivity and quality of mathematical work, and helps to visualize abstract mathematical concepts (Freiman, Beauchamp, Blain, & Lirette-pitre, 2011). In addition, Bebell & Kay (2010) found that the teachers' integration of technology in teaching increased dramatically when the one-to-one laptop program was introduced. Numerous studies on one-to-one laptop for each student consistently reported that utilization in mathematics classroom has the lowest rate compared to other subjects without elaboration of the reasons (Zuber & Anderson, 2103; Bebell & Kay, 2010). A mix method study in Australia found that the most common beliefs of the mathematics teachers are that students learn their best in mathematics using pen and paper(Zuber & Anderson, 2012). While a study by Moses, Wong, Kamariah, & Rosnaini (2013) showed that mathematics teachers, have lower variance in attitude towards laptop use compared to science teachers.

This leads to this study which is based upon the Technology Acceptance Model (TAM) framework. Perceived usefulness is defined as the degree to which a person believes that using a particular system would enhance his or her performance (Davis, 1989). In this study, perceived usefulness is termed as the degree to which a mathematics teacher believes that the eBook would enhance his or her teaching performance and lead to future benefit. Perceived ease of use refers to the degree to which a person believes that using a particular system is perceived to be free of effort (Davis, 1989). While Venkatesh, Morris, Davis, and Davis (2003) defined attitude towards a behaviour as an individual's positive or negative feelings about performing the target behaviour, in this case the behaviour of using the eBook in mathematics lessons. Behavioural intention refers to an individual's intention to perform a given behaviour (Ajzen, 1991). Behavioural intention in this study refers to specific action or behaviours on the part of mathematics teachers in using the eBook in their teaching of mathematics.

Technology Acceptance Model (TAM)

Technology Acceptance Model (TAM) which is the theoretical basis of this study, originated from the Theory of Reasoned Action (TRA). This well known theory in psychology, was explained further by (Fishbein & Ajzen, 1975) who defines the relationship between, beliefs, attitudes, norms and intention towards behaviour. TAM centered around the attitude towards using the system, which is determined by two antecedents, the perceived usefulness and the perceived ease of use (Davis, 1989). These two factors are the determinant of attitude to use which will then influence the behavioural intention, the desire to use the technology. The model was designed to explain and predict users' acceptance on any type of technology and have been widely used and tested in numerous studies in Malaysia including technology acceptance (S. L. Wong & Teo, 2009), laptop use (Moses et al., 2013; Wong, Teo, & Russo, 2012) and game acceptance (Roslina et al., 2011; Roslina, Samsudin, Rasimah, Khalili, & Azizah, 2011) and also on mobile learning acceptance (Jazihan, Ahmad Fauzi, & Wong, 2012) and e-learning (Teo & Wong, 2013).

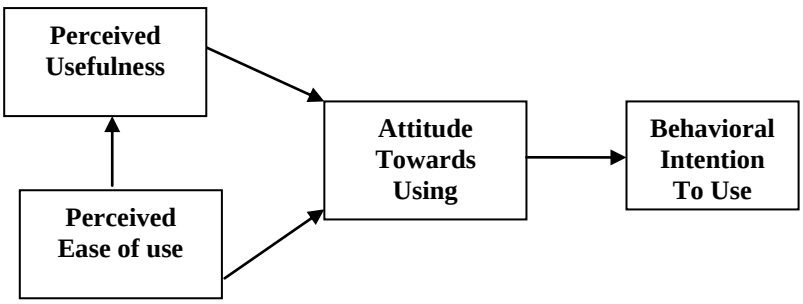

Figure 1 Technology acceptance model Davis (1989)

The Purpose of the Study

1. To investigate the level of mathematics teachers' perceived usefulness of the eBook.
2. To investigate the level of mathematics teachers' perceived ease of use of the eBook.
3. To assess the level of mathematics teachers' attitude towards eBook use.
4. To assess the level of mathematics teachers' behavioral intention towards eBook use.

Methodology

This preliminary study was conducted involving 34 mathematics teachers in four selected primary schools in Terengganu. In this study, the survey research design was administered. Surveys allow summarization of characteristics from different groups of individual and measuring of their attitudes, beliefs and opinions towards a certain issue (Ary, Jacobs, Sorensen, & Razavieh, 2010). Data gathering was done using a questionnaire, designed by the researcher, adapting previously validated scales. The questionnaire consists of 31 items with 4 constructs using the 5 point Likert Scales. For the construct of perceived usefulness and perceived ease of use, the items were adapted from Davis (1989) while the attitude scale was developed base on the original items by Venkatesh & Davis (2000). In addition, the behavioural intention items were developed by Venkatesh, Morris, Davis, & Davis (2003). These constructs were already tested and established with high validity and reliability by the researchers. The reliability test conducted in this study also yielded good Cronbach's alpha value for perceived usefulness (0.967), perceived ease of use (0.932), attitude (0.832) and behavioural intention (0.944) showing high reliability in the adapted questionnaire. Each factor was investigated, and range for each level was decided at 1-2.33 as low, 2.34-3.67 as moderate and 3.68-5.00 as high.

Results

Demographic Information

The demographic information of the mathematics teachers involved in this study is presented in Table 1. Female teachers that took part in this study makes up of 79.4% of the sample. Experienced teachers with more than 20 years of teaching mathematics are only 17.6% of those who took part in this study. It also shows that around 88.2% of the teachers use eBook less than 3 hours a day.

Table 1 Demographic Information

	Variable	Frequency	Percentage (%)
Gender	Male	7	20.6
	Female	27	79.4
Mathematics teaching experience	< 10 years	14	41.2
	11-20 years	14	41.2
	>20 years	6	17.6
eBook usage	<3 hours/day	30	88.2
	3-5 hours/day	3	8.8
	>5 hours/day	1	2.9

Overall Mean

The mean for the study is presented in Table 2. The highest mean attained was for the perceived usefulness (M=3.46, SD=0.83), followed by behavioural intention (M=3.32, SD=0.79) and next two construsts share the same mean , that is the perceived ease of use (M=3.28,SD=0.69) and attitude (M=3.28, SD=0.54).

Table 2 Overall Mean

Factors	Number of Items	Mean	SD	Level
Perceived Usefulness	8	3.46	0.83	Moderate
Perceived Ease of Use	8	3.28	0.69	Moderate
Attitude	8	3.28	0.54	Moderate
Behavioral Intention	7	3.32	0.79	Moderate

Perceived Usefulness

Teachers' perception on perceived usefulness is encouraging. The item "Using the eBook increases my teaching effectiveness in mathematics" has the highest mean, indicating that teachers perceived the eBook as useful in helping to teach mathematics effectively with only 1 teacher who strongly disagree and most teachers (61.8%) agree or strongly agree on the item. While on the contrary, the lowest mean in this construct is the item "Using the eBook helps my students to understand mathematics better" which means that while many agree that the eBook is useful, it may not help in comprehending better in mathematics where 44.1% of the teachers answered "not sure" on the item. The overall perception level on perceived usefulness is however, moderate.

Table 3 Teachers' perceived usefulness

Items	Mean	SD	Level
Using the eBook enables me to accomplish tasks in mathematics teaching more quickly.	3.53	0.93	Moderate
Using the eBook can improve my teaching performance in the mathematics classrooms.	3.53	0.90	Moderate
Using the eBook enhances my productivity in mathematics teaching	3.56	0.93	Moderate
Using the eBook increases my teaching effectiveness in mathematics.	3.65	0.92	Moderate
Using the eBook makes my mathematics teaching easier	3.47	0.96	Moderate
Using the eBook helps my students to achieve better marks in mathematics	3.26	0.90	Moderate
I find the eBook useful in teaching and learning mathematics.	3.44	0.89	Moderate
Using the eBook helps my students to understand mathematics better	3.21	0.95	Moderate

Perceived Ease of Use

It is seen through the results that teachers moderately belief that the eBook is easily operated. However, the item "eBook interaction does not require mental effort" yielded the lowest mean indicating that interacting with the eBook does need a certain degree of mental effort and may be a quite complex task. Whilst the highest mean item is "It would be easy for me to become skillful in using the eBook" where the responses break into Strongly Agree (2.9%); Agree (61.8%); Neutral (29.4); Disagree (2.9%) and Strongly Disagree (2.9%). This reveals that most teachers are confident that eBook is an easy to use tool, probably due to their own experiences and familiarity with computers. Perceiving the eBook as an easily operated tool is important in ensuring the comfort of using eBook without problems which may increase its acceptance rate.

Table 4 Teachers' Perceived Ease of Use

Items	Mean	SD	Level
Teaching mathematics using eBook is easy for me	3.09	1.03	Moderate

I find it easy to get the eBook to do what I want it to do	3.09	0.93	Moderate
My interaction with the eBook is clear	3.41	0.86	Moderate
My interaction with the eBook is understandable	3.41	0.82	Moderate
It would be easy for me to become skillful in using the eBook	3.59	0.74	Moderate
I find the eBook flexible to interact with	3.35	0.73	Moderate
It is easy for mathematics teachers to acquire knowledge from the eBook	3.41	0.74	Moderate
eBook interaction does not require mental effort	2.88	0.77	Moderate

Attitude

The level of teachers' attitude towards the eBook is moderate, hinting that they are quite positive towards the use of eBook in mathematics lesson. It is important to note that the highest mean item "The eBook makes my mathematics lessons more interesting" has 70.5% of the teachers agreement (agree and strongly agree) indicating that most teachers realised that teaching mathematics using eBook will make the lessons more amusing. However, the item "Using the eBook may be suitable for teaching other subjects, but not for mathematics" which is a negative item recoded, yield the lowest mean (M=2.91, SD=0.83). This finding is in accordance to previous studies claiming that Mathematics lesson has the lowest rate of laptop use compared to other subjects and thus, seen as a subject learnt best using pen and paper (Bebell & Kay, 2010; Freiman et al., 2011; Zuber & Anderson, 2012).

Table 5 Teachers' Attitude

Items	Mean	SD	Level
Using the eBook in teaching mathematic is a good idea.	3.50	0.86	Moderate
The eBook makes my mathematics lessons more interesting.	3.65	0.69	Moderate
Working with the eBook is fun.	3.47	0.71	Moderate
I like teaching mathematics using the eBook.	3.06	0.89	Moderate
Using the eBook may be suitable for teaching other subjects, but not for mathematics*.	2.91	0.83	Moderate
The integration of eBook in mathematics lessons will be accepted it the future	3.47	0.62	Moderate
I can plan my lessons better with the eBook than without it.	3.21	0.85	Moderate
I look forward to using the eBook in my classroom.	3.00	0.92	Moderate

Behavioural Intention

Behavioural intention in this study refers to the intention of teachers to use the eBook in the near future. The item "I intend to learn more about the mathematical applications in the eBook" has the highest mean, implying that teachers yearn to explore more about the mathematical applications that could be used in their lessons. A high percentage of 73.5% agree on this intention while only 11.8% do not agree about it. On the other hand, only 26.5% agree and 5.9% strongly agree on "I would recommend others to use eBook in mathematics teaching" hinting that they are not willing to recommend their peers to use the eBook in mathematics lesson although they are positive, willing and intend to explore the eBook in future.

Table 6 Teachers' Behavioral Intention

Items	Mean	SD	Level
Whenever possible, I intend to use the eBook in mathematics teaching	3.53	0.86	Moderate
I use the eBook to do different mathematics teaching tasks	3.41	0.82	Moderate
I will always try to use the eBook during mathematics class	3.12	0.81	Moderate
I would recommend others to use eBook in mathematics teaching	3.06	0.98	Moderate
I plan to use the eBook frequently in mathematics teaching	3.18	1.00	Moderate

I am positive in using the eBook in mathematics classes in the upcoming years	3.35	1.01	Moderate
I intend to learn more about the mathematical applications in the eBook	3.62	0.89	Moderate

Conclusion

This study seeks to understand and assess the mathematics teachers' level of acceptance of eBook use. Descriptive analysis was done using the SPSS 20. For perceived usefulness, the teachers scored moderate, perceiving that the eBook is useful to enhance their teaching performance and could lead to future benefits. Furthermore, teachers' perceived ease of use which ensures comfort in usage of the eBook with little problems has also attained a moderate level. The findings then showed that mathematics teachers have a positive attitude towards using the eBook, and thus, have also yielded the moderate level for behavioural intention. Of the four constructs, perceived usefulness produced the highest mean even though all constructs are on the moderate level.

Regardless, more extensive studies ought to be carried out to understand the mathematics teachers' acceptance of the eBook. This is just a preliminary study with a very small sample size. Future studies should involve bigger sample, focusing on investigation of the external factors that might affect teachers' attitude and behavioural intention towards the eBook. Still, this study presents interesting inputs to consider for further research regarding eBook integration in mathematics lessons.

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