

Adopting the “Explain EDU” Application Approach in Teaching Mathematics and Statistics

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ABSTRACT

Interactive whiteboards (IWB) is known as one of the most revolutionary instructional technologies for various educational levels. One of the popular applications among educators that can be used as an extremely versatile interactive whiteboard is 'Explain EDU' (EEDU) application. EEDU works as a platform for borderless learning, sharing and collaborating using an IWB. It is an iPad app that is used to create dynamic lessons, presentations and other content that can be easily shared with others. Students who participated in this study are those from Faculty of Computer and Mathematical Sciences who enrolled in a mathematics or statistics course at Universiti Teknologi MARA (UiTM) Terengganu during the March – July 2019 semester. This study aims to gain insight on students' opinions and perspectives in learning Mathematics and Statistics subjects when being taught by using the EEDU application. The result suggests that the use of Explain EDU application in class for teaching does enhance students attitude towards learning mathematics or statistics course.

Keywords: innovative teaching, interactive whiteboard, explain EDU application, iPad

1.0 INTRODUCTION

Students nowadays are more attached to the latest gadgets or anything related to technology. They are exposed to the variety of applications that are available on their devices, especially their smartphones. Providing interesting materials using this kind of technology will create more fun surrounding in the learning process, and hence can motivate them to learn (Subramani & Iyappan, 2018). Several applications that can be used as an innovation in the teaching process were also suggested. Among them are podcasts in Classroom, Screencast, Smartboard, Moddle and Interactive Whiteboard. Being exposed to technology can make students and lecturers be more IT literate (Subramani & Iyappan, 2018). Innovative teaching had been proven to have a positive impact on students' performance. Innovative and creative teaching can also enhance engagement with the students in the class (Naz & Murad, 2017). The

variety of educational applications that are available in the Google Playstore or Apple store could help lecturers in becoming more innovative without attending any specific training (King, 2011). In addition, innovation in teaching not only benefits the students, but also improve job satisfaction for lecturers who are experiencing less stressful teaching situations. (Hellmann, Paus, & Jucks, 2014). Samsonova (2021) revealed that most teachers have a positive attitude toward IWBs and are very satisfied with them.

Interactive whiteboard (IWB) is a new generation board that has been viewed as a beneficial technology which enhances students' learning and motivation and helps in teaching (Slay, Siebörger, & Hodgkinson-William, 2008; Wall, Higgins, & Smith, 2005). IWB enables learning interaction between teachers and students. Such devices do not only replace traditional blackboards but also allow users to integrate and manipulate multimedia elements. IWB supports files of any formats such as PowerPoint Presentation, Microsoft Word and Flash animations. The board may be touched with a finger or a stylus hence instructors have complete control of their own IWB at the tip of their fingers. Hence, instructors may have control over the course content from the IWB by making use of various features provided such as highlighting, annotating, drag and drop activities, zooming, screen shade, screen-sharing over the internet and connecting to a web-based application. Numerous studies have attempted to explain students' engagement with an interactive whiteboard in mathematics subjects (De Vita, Verschaffel, & Elen, 2018a, 2018b; Erbas, Ince, & Kaya, 2015; Swan, Schenker, & Kratcoski, 2008).

The promising benefits of IWB to teaching and learning have led to its increase in marketability and appeal (Slay, Siebörger, & Hodgkinson-William, 2008; Wall, Higgins, & Smith, 2005). IWB's possible advantages make it possible for an instructor to enhance their teaching with diverse educational approach and techniques and therefore, increase students' attention, incitement, engagement and participation in the class (Beauchamp & Parkinson, 2005; Glover, Miller, Averis, & Door, 2007; Wall, Higgins, & Smith, 2005). According to Campbell & Kent (2010), student's engagement and learning increase when IWB is implemented. Xu & Moloney (2011) studied the perception of students in learning Chinese through IWB and found that students believe IWB is successful to further improve the quality of various aspects of their learning.

Explain Everything (EE) is an interactive online whiteboard platform for which two apps were offered: Explain Everything Whiteboard (EEW) and Explain EDU (EEDU). EE works as a platform for borderless learning, sharing and collaborating using an IWB. It is an iPad app that is used to create dynamic lessons, presentations and other content that can be easily shared with others. Some of its features, such as an easy-to-use design, screen-casting, and interactive whiteboard tool, let user animate, record, annotate, associate, and explore ideas, knowledge, and understanding. Every project created is truly unique visual stories, as it started with an infinite canvas where users can add new and existing media (including video, images, PDFs, and web browsers), annotations, and text to it. According to Ranga (2018), EE application aids better visualization of concepts, promotes ubiquitous learning opportunities for students, and provides personalized feedback on documents in seminar courses.

EDU (EEDU) is an educational app created in 2011 for iOS-operated systems only. It is a basic whiteboarding tool and is available as a one-time purchase. It does not have all the features of Explain Everything Whiteboard (EEW). EEW is available on most iOS, Android, and Chromebook systems, as well as web browsers. It has all of the features of Explain EDU, along with additional cloud features, such as project collaboration and conversion into videos. In this study, the educators had chosen EEDU as a preferred app to be used in teaching compared to EEW since it only requires a one-time payment and the features in EEDU is sufficient to assist in teaching.

This study will be useful to determine the efficiency and benefits of the high-price technology, which could benefit other educators for the implementation of the technology in the classroom through students opinion. Hence, the objectives of our study are:

1. To measure the opinions of students towards the use of EEDU in class.
2. To study the differences in students level of education (Bachelor, Diploma) on their opinions towards the use of EEDU in classroom.

2.0 METHODOLOGY

A set of questionnaires which consists of 10 items with 5-Likert scale was distributed to the students with 'score 1' being the least agreement towards the item and 'score 5' being the most agreements towards to item. The questionnaire was designed to investigate students' opinion and satisfaction towards the use of EEDU in their learning. The students involved in this study are those who undertook mathematics or statistics course throughout the semester and was taught by EEDU application in class. The questionnaire was distributed to the students in the classroom, and the collected data were then analysed using SPSS 25.0 packet program.

3.0 RESULT AND DISCUSSION

3.1 Descriptive Statistics

The sample of this study involves 175 students from the Faculty of Computer and Mathematical Sciences at Universiti Teknologi MARA (UiTM) Terengganu who were taught using EEDU application in class involving mathematics or statistics subjects in the March - July 2019 semester. As can be seen in Table 1, respondents consist of 4 different programs; Bachelor in Computational Mathematics (CS247), Bachelor in Computer Science (CS230), Bachelor in Information System (CS244/264) and Diploma in Computer Science (CS110).

Table 1: Number of students from different program

Gender	Program				Total
	CS247	CS230	CS244/264	CS110	
Male	2	7	17	41	67
Female	24	11	41	32	108
Total	26	18	58	73	175

Since a 5-likert scale (1 = least agreement; 5 = most agreement) feedback was collected, the closer the mean value to 5, the more agreement it captures. As can be seen in Table 2, the average of students agreement towards all items are more than 4 where the highest mean belongs to the item 'I am satisfied with my lecturer teaching by using EEDU' (4.33) item. This is followed by 'The use of different colours to highlight important details makes me understand better' (4.31) item and 'EEDU makes learning more exciting' (4.19) item whereas the least agreement is from item 'I can interact better with lecturers using EEDU' (4.01).

Table 2: Descriptive Statistics

Items	Items	Mean	Std. Deviation
1	EEDU makes learning more exciting	4.19	0.647
2	The use of different colours to highlight important details makes me understand better	4.31	0.700
3	EEDU use increases my interest in the class	4.14	0.667
4	EEDU makes the courses more interactive	4.14	0.681
5	I concentrate better in class when EEDU is used to deliver instruction.	4.05	0.726
6	I can interact better with lecturers using EEDU	4.01	0.703
7	EEDU increases my motivation towards the course	4.07	0.711
8	I believe using EEDU improves my grades	4.07	0.773
9	EEDU helps me and my friends learn together	4.10	0.700
10	I am satisfied with my lecturer teaching by using EEDU	4.33	0.681

These findings reveal that students are satisfied when taught by EEDU application. With the use of different colours to highlight important details, especially important formulas, students could understand

better hence increases interest and makes them more excited and motivated to learn mathematics or statistics subject. From result in Table 1, the interaction between students and lecturers are also enhanced since lecturers will face the students when teaching using EEDU application.

3.2 Independent t-test

Independent t-test analysis was carried out in order to investigate the difference between level of education (bachelor, diploma) among the items investigated. Upon the results in Table 3, there exist a significant difference for items ‘The use of different colours to highlight important details makes me understand better’ (p-value = 0.020) and ‘I concentrate better in class when EE is used to deliver instruction’ (p-value = 0.027) between the level of education.

Before t-test is analysed, it is important to interpret Levene’s Test for Equality of Variance. Levene’s Test for Equality of Variance is a test that determines if the two groups have about the same or different amounts of variability between scores. As can be seen in Table 3, equal variances are assumed for all items except for item 5. Item 5 have a different amount of variability between scores of the level of education.

The Independent t-test is now being analysed and shows that three items are significant at 95% confidence level namely item 5 (I concentrate better in class when EE is used to deliver instruction; p-value =0.035), item 8 (I believe using EE improves my grades; p-value = 0.023) and item 9 (EE helps me and my friends learn together; p-value = 0.046). It is safe to say that the opinions of students are different between the level of education for item 5, item 8 and item 9.

Table 3: Independent t-Test of level of education with all the items

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
1	Equal variances assumed	1.012	0.316	-1.131	173	0.26	-0.112	0.099	-0.308	0.084
	Equal variances not assumed			-1.132	155.715	0.26	-0.112	0.099	-0.308	0.084
2	Equal variances assumed	2.141	0.145	1.868	173	0.063	0.199	0.107	-0.011	0.41
	Equal variances not assumed			1.861	152.885	0.065	0.199	0.107	-0.012	0.411
3	Equal variances assumed	0.138	0.711	-1.717	173	0.088	-0.175	0.102	-0.375	0.026
	Equal variances not assumed			-1.693	146.968	0.093	-0.175	0.103	-0.378	0.029
4	Equal variances assumed	0.212	0.646	-0.227	173	0.821	-0.024	0.105	-0.23	0.183
	Equal variances not assumed			-0.227	154.511	0.821	-0.024	0.105	-0.231	0.183
5	Equal variances assumed	3.908	0.05	-2.208	173	0.029	-0.243	0.11	-0.46	-0.026
	Equal variances not assumed			-2.133	134.551	0.035	-0.243	0.114	-0.468	-0.018
6	Equal variances assumed	2.205	0.139	-1.718	173	0.088	-0.184	0.107	-0.396	0.027
	Equal variances not assumed			-1.683	143.136	0.094	-0.184	0.109	-0.4	0.032
7	Equal variances assumed	1.844	0.176	-1.17	173	0.244	-0.127	0.109	-0.342	0.088
	Equal variances not assumed			-1.181	160.217	0.239	-0.127	0.108	-0.341	0.086
8	Equal variances assumed	0.268	0.606	-2.292	173	0.023	-0.268	0.117	-0.5	-0.037

	Equal variances not assumed			-2.236	140.457	0.027	-0.268	0.12	-0.506	-0.031
9	Equal variances assumed	3.317	0.07	-2.007	173	0.046	-0.214	0.106	-0.424	-0.004
	Equal variances not assumed			-2.031	161.309	0.044	-0.214	0.105	-0.421	-0.006
10	Equal variances assumed	0.137	0.711	-0.044	173	0.965	-0.005	0.105	-0.211	0.202
	Equal variances not assumed			-0.043	149.194	0.966	-0.005	0.106	-0.214	0.205

The independent t-test proved that items 5, 8 and 9 are significantly different opinion among the level of education. The mean value of each item for different level of education is assessed. Based on the mean value in Table 4, the mean for Bachelor students (mean = 3.9) is higher compare to Diploma students (mean = 3.8904) for item 5, the mean for Bachelor students (mean =4.19) is higher compare to Diploma students (mean = 3.92) and the mean for Bachelor students (mean = 4.19) is higher compare to Diploma students (mean = 3.97) for item 5. In other word, Bachelor students agree more to the items 5, 8 and 9 as compared to Diploma students.

Table 4: Descriptive Statistics among level of education

Items	Items	Mean	
		Diploma	Bachelor
1	EEDU makes learning more exciting	4.12	4.24
2	The use of different colours to highlight important details makes me understand better	4.42	4.23
3	EEDU use increases my interest in the class	4.04	4.22
4	EEDU makes the courses more interactive	4.12	4.15
5	I concentrate better in class when EEDU is used to deliver instruction.	3.9	4.15
6	I can interact better with lecturers using EEDU	3.9	4.09
7	EEDU increases my motivation towards the course	4	4.13
8	I believe using EEDU improves my grades	3.92	4.19
9	EEDU helps me and my friends learn together	3.97	4.19
10	I am satisfied with my lecturer teaching by using EEDU	4.33	4.33

This finding reveals that Bachelor students think that they have increased concentration in class when lessons are taught by using EEDU. They also have higher believed that using EEDU would improve their grade and that it would help them study with their friends. Overall, EEDU increases student involvement and excitement with the subject being taught by engaging students in activities; thus, motivates the students and allows them to study independently.

3.3 DISCUSSION

This result suggests that the use of EEDU application does have a positive effect on students' experience on their learning environment. This study is evidence that EEDU has enhanced students learning in terms of their excitement and interest to learn mathematics or statistics, better concentration and interaction with lecturers and among friends and increases their motivation and satisfaction towards learning mathematics or statistics subjects. This result is consistent with the findings by Chance, Ben-Zvi, Garfield, & Medina (2007), which justifies that introducing an element of technology in interactive teaching and learning could stimulate learning satisfaction and thus improved the ability to learn among the students. In addition, according to the findings by Vezzetti & Violante (2013), of a post-deployment

student survey, the application's visual and interactive features have the potential to increase user satisfaction. Also, there is a link between students' participation in formative IWB activities and their math achievement (Chen, Gamble, Lee, & Fu, 2020)

The use of interactive whiteboard using EEDU, specifically in the subject involving mathematical skills, supports the students' understanding of the course. The effectiveness of the application provides a greater chance for the students to easily understand and makes them easily remember the topics that have been taught, hence enhance their performance in the calculation subjects.

The findings of the study also provided empirical evidence on the generational changes among students by highlighting the importance use of EEDU as interactive learning tools and perceived it is much relevant as compared to traditional learning methods (Twenge, 2009). The emerging technologies suit the need of today's students (generation millennium) which is unique because they grow up with digital and cyber technologies.

4.0 CONCLUSION

An interactive learning style is assuredly a factor that affects the students' understanding of subjects involving mathematical skills. A step-by-step calculation solution is required in these subjects. Hence, students are expected to participate in class to understand the different ways in solving calculation problems taught by the lecturer. Being taught by EEDU application would enable the students to revise the topic repeatedly since the app offers recording tools. Moreover, this study strongly supports the practice and policy of UiTM, which requires the lecturers to apply blended learning in their teaching. Apart from this, improvements can be applied in future research to investigate the impacts of using EEDU towards students' performance.

Explain everything is about online interaction with distance learning benefits. The tool is reliable enough for use by both teachers as well as students of different levels. The digital tool allows students and teachers to interact on a whiteboard, thereby helping to bring group activities to the fore. EEDU application should be used for teaching worldwide in times of global pandemic due to the Covid-19 outbreak. Schools, colleges and universities are changing from a face-to-face classroom to an open distance classroom. The use of online whiteboards such as EE in class would ease the transition from face-to-face teaching to online teaching during COVID-19.

For university to adopt EEDU, a workshop on the use of EEDU would be helpful to first introduce this tool to the lecturers. More methodological work is needed to identify on what influence satisfaction among students towards the use of EEDU for teaching. Hence it would be very useful to conduct a factor analysis to determine the factor that contributes to the satisfaction on the use of EEDU for teaching in view of students' perspective.

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