The Use of Digital Whiteboard in Online Learning

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ABSTRACT

The traditional teaching technique of Business Mathematics mostly involves an extensive step-by-step explanation for solving any given problem. But during online classes, the main limitation is students may only listen to the lengthy explanation alone, without having chance to physically view the detailed steps. This may cause students to be less attentive, easily become bored, and subsequently lessen their interest in the subject. Due to this, some students decide not to attend the online classes for this subject or they possibly may leave in the middle of the lessons. To comply with this matter, a Digital Whiteboard has been integrated into the synchronized learning sessions. The use of Interactive Whiteboards has been widely regarded as one of the most ground-breaking teaching applications for a wide range of educational levels. It provides more effective learning where the students may view all the calculation steps on the whiteboard, as they are in the class, only it is done virtually. It also gives more chances of engagement between students and teachers. Microsoft Whiteboard is a popular application among educators that may be used as an exceptionally adaptable interactive whiteboard. The purpose of this research is to investigate students' perceptions of the usage of the Microsoft Whiteboard in the teaching and learning process. 72 students of UiTM Terengganu, from the Diploma of Muamalat (Part 2), taking Business Mathematics subject, were selected as the research sample. A 22-item online survey was used as the quantitative technique for data collection. Descriptive analysis was carried out to gauge the student's perception of the application of Microsoft Whiteboard. The findings showed positive results on students' perception, participation, and emotion, indicating high acceptance towards the application of Microsoft Whiteboard among students. Majority of students agreed that the usage of Microsoft Whiteboard has aided them to comprehend the materials conveyed during online in a better way. The use of a digital whiteboard can attract and supports students' participation, thus may improve their

understanding while learning. Thus, the use of the Microsoft Whiteboard application as one of the online pedagogies for the educators is highly encouraged.

Keywords: *digital whiteboard, microsoft whiteboard, online learning, perception,teaching and learning*

INTRODUCTION

The field of information technology is rapidly evolving. Along with the advancement of technology in our days, the use of technology in education is an important element that must be addressed. This is due to the ability of technology to modify instructors' teaching tactics, students' learning methods, and also general ways of administering education. This is supported by the study carried out by Tinio in 2022, who stated that technology has a substantial impact on education in terms of information acquisition and absorption for both instructors and students by promoting active, collaborative, creative, integrative, and evaluative learning. In order to continuously enhance the quality of teaching and learning, researchers performed a huge number of studies on the usefulness of using digital whiteboards in the teaching and learning process of various courses/subjects including Business Mathematics. Microsoft whiteboard is a visual collaboration tool that allows all participants to interact and they may have equal chances of brainstorming, discussing, and creating. It lets users share their ideas with others, or express their opinions, by drawing or writing in similar ways as they would with ink. Research has shown that Microsoft Whiteboard can help students to understand the taught materials, hence promote a better student-teacher's interaction in online classes (Rath et al., 2021). It is very useful, especially for the subjects which involved complicated calculations, such as Business Mathematics.

Most questions/problems of Business Mathematics require long step-by-step instructions to be solved. The usage of traditional methods that were extensively employed in the past caused pupils to feel bland, less engaged, and quickly bored because the way of delivery used was horizontal and less appealing (Dislen, 2013; Roehl et al., 2013). Adding to the bottleneck, disinterested, bored, and tired students often choose to not join online classrooms since they need a more digitally connected teaching and learning experience. This issue is not as simple matter since educational institutions had to deal with numerous technological and human-related issues. To successfully digitalize higher education, institutions must systematically restructure students' learning experiences and re-evaluate established pedagogical practices in the online setting (Conrad et al., 2022). Following the authors' suggestion, the approach of using Microsoft whiteboard in online learning was offered to teach Business Mathematics courses more effectively and to substitute the traditional whiteboard in class. To investigate students' perceptions of the usage of the digital whiteboard in the teaching and learning process, exploratory research was carried out. The research questions are:

      i. Do students participate well in learning using Microsoft Whiteboard?
     ii. How does the usage of Microsoft Whiteboard emotionally affect the students?

This study is based on Bem's perception theory to gain a better understanding of students' insights on the teaching and learning of calculation disciplines using Microsoft whiteboard. Bem (Bem & McConnell, 1970) claimed that an individual's behaviour should be used as evidence for his/her beliefs and attitudes. The concept of self-perception assumes that people are what they do. In this regard, the relationship between self-perception and behaviour is critical. The self-perception theory is widely regarded as one of the most influential theories explaining how self-knowledge is gained. Daryl Bem developed the theory in 1972 and claimed that people become aware of their inner states, such as attitudes and beliefs, by analysing their behaviours and the context in which they occur (Bem, 1972).

Perception is the experience of an object, event, and relationship acquired by resuming information and interpreting a message. It gives meaning to stimulus-response in resuming information and predicting messages which involves attention, hope, motivation, and memory (MANIK, 2000). Moreover, Michotte (Michotte, 2017) develops perception as a phase of the total process of action which allows people to adapt all activities to reality. Specifically, students' perception can be described as the developed opinion after having a certain experience that needs adjustment. Therefore, in this study, the students' perceptions were evaluated based on these criteria: 1) Student's participation and 2) Student's emotions during online learning by using Microsoft Whiteboard suited to their needs and condition. These two criteria are necessary to figure out students' perception of the use of digital whiteboards in online learning, hence it will be in accordance with the needs of this research.

The remainder of this paper is structured as follows: The second section presents the literature review, the third section describes the methods, the fourth section analyses the research results/discussions and the final section presents the conclusions as well as a discussion of the research implications.

LITERATURE REVIEW

Educational technologies are divided into learning tools, educational materials, learning settings, and learning techniques (Lazar, 2015). In developing students' perspectives, technology is a stand-alone and essential component (Alshehri, 2023). The availability of supporting tools and a combination of several online learning media during the teaching/learning process are among the important factors in conducting online classes (Laili & Nashir, 2021). For instance, Rojabi (Rojabi, 2020) discovered that although online learning via Microsoft Teams is something new for students, the interaction and learning environment it provides prompt students to participate in online learning. As a result, they will be able to better absorb the learning materials. In the reviewed studies, some students perceived to have high levels of digital literacy and knowledge of digital tool usage (Mendoza-Lizcano et al., 2020), (Zapata-Garibay et al., 2021), whereas some experienced difficulties in using online platforms (Moawad, 2020). In terms of perception, Laili (Laili & Nashir, 2021) revealed that online learning provides flexibility, but it also comes with several drawbacks. Based on this, it can be concluded that students had both positive and negative attitudes toward online learning. However, Nogueira (Nogueira et al., 2022) contradicted the statements of (Laili & Nashir, 2021). Although some students had no prior experience with computers, their growth was quite remarkable. Regardless of their family background (income or use of digital gadgets at home), their competencies on digital literacy and technologies improved over the semester.

Moreover, a diagram-based instructional tool for both online and in-person classes has been created by Mendez in 2002 by making use of a Microsoft Whiteboard-created digital canvas. The authors claimed that it prepares students to undertake more complicated diagram activities and design their diagrams by helping them understand and learn the critical thinking skills included in the offered diagrams. Furthermore, Prihastari (Prihastari & Widyaningrum, 2022) have researched to see how students use Microsoft whiteboards to apply culture-based environmental Mathematics. The study's findings showed that implementing learning techniques (creating learning plans, creating activity steps, and creating learning evaluations) to measure suitable cognitive, affective, and psychomotor elements increased learning. The success of online Business Mathematics education has been observed in individuals who prefer visual learning methods. These individuals, despite having limited prior knowledge of Mathematics, exhibited strong confidence due to their ability of navigating internet effectively (Azis & Leatemia, 2021).

The procedures that exhibit constructive participation in learning activities are regarded as students' engagement (Ben-Eliyahu et al., 2018). Several scholars have identified three key elements of engagement: affective (or emotional), behavioural, and cognitive (Ben-Eliyahu et al., 2018), (Pekrun & Linnenbrink-Garcia, 2012), (Fredricks et al., 2004). It was suggested that participation and learning are inextricably linked and mutually constitutive. To improve online learning, there must be an increase in learner involvement (Hrastinski, 2009). Behavioural engagement is the learner's physical actions that

show their involvement in the subject. It can be determined by looking at the amount of participation in discussion threads, completed assignments, page views, and academic tasks. Mershad (Mershad & Said, 2022) highlighted the significance of closely monitoring online lectures in remote learning courses to ensure that students are actively participating.

In education, emotional data is commonly utilised to deliver automated feedback or to adapt the system to the learner automatically. Emotion-aware learning technologies, according to D'Mello (D'Mello, 2013), were those that can automatically detect and respond to students, either by delivering emotional feedback or intervening in the learning process. Suero (Suero Montero & Suhonen, 2014) also discusses the possibilities of using a text-based approach to analyse learners' emotions in online learning to assist self-reflection or monitor learners' well-being during a course. According to (Salta et al., 2022), students in three undergraduate learning communities showed a statistically significant lower level of emotional engagement in the online learning environment compared to the traditional learning environment. In fact, technology was viewed by students as a supplementary tool that could never substitute the place of teacher-students interaction. Students considered communication to be a crucial component of the classroom (Alshehri, 2023). Face-to-face communication was still required for learning mathematics and fostering human engagement, despite the promise of online learning (Julien & Dookwah, 2020).

METHODOLOGY

The population of this study were Diploma of Muamalat students (Part 2), taking Business Mathematics course, from UiTM Terengganu. They have been exposed and taught using the Microsoft Whiteboard application in class. Stratified random sampling was used to select the sample of students, based on their registered group (Group A, B, C and D). 72 students have been selected as the sample, which exceeded the minimum of 63 sample size, as suggested by Krejcie and Morgan (Krejcie & Morgan, 1970) (Table 1). However, as recommended by Bougie & Sekaran (2019) a sample size of 30 to 500 is sufficient to conduct research, so it was considered reliable.

Table 1: Table for determining sample size for a given population

Universe	Sample	Universe	Sample	Universe	Sample	Universe	Sample
10	10	100	80	1,250	294	6,000	361
15	14	200	132	1,500	306	7,500	366
20	19	300	169	2,000	322	10,000	370
30	28	400	196	2,500	333	15,000	375
40	36	500	217	3,000	341	20,000	377
50	40	600	234	3,500	346	30,000	379
60	44	700	248	4,000	351	40,000	380
70	59	800	260	4,500	354	50,000	381
80	66	900	269	5,000	357	75,000	382
90	73	1,000	278	5,500	359	1,000,000	384

Source: adapted from Krejcie, R. and Morgan, D. (1970)

A set of questionnaires consisting of 22 items with a 5-Likert scale was distributed to the students. The questionnaire, which includes particular variables, was used to investigate the students' perception, participation, and emotions toward the use of Microsoft Whiteboard in their learning. The questionnaire was developed by using Google Form and distributed online to all the respondents through Google Classroom. The collected data were then analyzed using SPPS 25.0 packet program. Descriptive analysis using the mean method with the mean score divided into 3 levels was utilized with the following interpretations: weak levels (mean 1.00 to 2.33), moderate levels (mean 2.34 to 3.66), and high levels (mean 3.67 to 5.00).

RESULT AND DISCUSSION

A pilot study was conducted to examine the perception and participation of students towards the use of Microsoft Whiteboard in their learning of subjects that involve complicated calculations (Business Mathematics, in our case). The mean score of more than 4 for all of the items being asked proved that teaching and learning through the integration of Microsoft Whiteboard can help students to focus and understand more. Fun and excitement in the classroom also have been increased, which helps to improve the student's achievements, compared to before when a conventional method was used.

The questionnaires for this study were disseminated to 75 students and a total of 72 responses were returned. Using Statistical Package for the Social Sciences (SPSS), the data were analysed descriptively to identify the frequency, percentage, and mean score. 65% of the respondent were females and the rest were males.

The findings show very positive results (summarized in Table 2). All mean scores are greater than 4 which indicates a high acceptance of the matters being discussed. A mean score of 4.5 or 90% of the students agreed that the use of Microsoft Whiteboard help them to understand the topics taught in class. This digital whiteboard can assist to boost student's productivity by allowing lecturers to simply sketch processes in various shapes and colours. A virtual whiteboard boosts efficiency even further by allowing users to effortlessly copy or erase portions of the whiteboard and even store the file for future use. 89% (mean = 4.4583) of the students enjoy learning with Microsoft Whiteboard since they can focus more on the contents of the subject learnt and they also feel the excitement throughout the learning process with the use of this app. Students feel more comfortable when Microsoft Whiteboard is being used (mean = 4.4306), and they also think it helps them to remember the lessons easier (mean = 4.4167).

Table 2: Student's perception of learning using Microsoft Whiteboard

Item	Mean	Std. Deviation
Microsoft Whiteboard makes me understand better the topics taught in class.	4.5000	.71207
I enjoy learning with Microsoft Whiteboard	4.4583	.71083
I can focus on the course content more when Microsoft Whiteboard is used	4.4583	.69073
Microsoft Whiteboard makes learning more exciting	4.4583	.71083
I feel comfortable when Microsoft Whiteboard is being used	4.4306	.70863
Microsoft Whiteboard use makes it easier for me to remember what I learned in class	4.4167	.70711

Table 3 shows positive results on student's participation in class using Microsoft Whiteboard. All mean scores exceeded 4 (which indicate high acceptance). On average, 90% of the students agree that Microsoft Whiteboard helps them, and their friends to learn together (highest mean = 4.47) and assist them to have better interactions with lecturers (mean = 4.3889). The digital whiteboard helps the performance of teaching during online classes. It can assist individuals in visualising a process and foster cooperation among participants by allowing them to readily contribute ideas to the board using sticky notes or coloured markers. With the use of Microsoft Whiteboard also, a lecturer can easily explain to the student any question that they did not understand step by step. Students can directly watch and annotate on the board. Once the lesson is over, a lecturer may save the whiteboard (typically as an image or PDF) and share it with students for their future reference. Interactive student-lecturers communication will bring a significant impact on the quality of education. Constructive and close relationships between students and lecturers will provide positive educational experiences as well as good academic and personal growth (Lau 2003; Pascarella and Terenzini 1991).

Table 3: Student's participation in learning using Microsoft Whiteboard

Item	Mean	Std. Deviation
Since I can concentrate better when my lecturer uses Microsoft Whiteboard, I feel less sleepy in class	4.2222	.79119
I actively participate in the online class	4.2639	.80479
I felt comfortable participating in the course discussions.	4.4444	.66901

Microsoft Whiteboard helps me and my friends learn together	4.4722	.69144
I can interact better with lecturers using Microsoft Whiteboard	4.3889	.74220

As displayed in Table 4, all items gave high positive feedback from the respondents. Students held a high self-desire in learning by Microsoft Whiteboard (mean = 4.3194). This is because the features of the Whiteboard are interesting for them and they were having fun, interacting with their friends and lecturers while learning. The students feel that they were able to form distinct impressions of some of their friends in online learning by using Microsoft Whiteboard (4.1111). They may express their feelings and reactions by responding emotionally about ideas or learning activities through the use of emoji or stickers (mean = 4.0972).

Table 4: Student's emotions in online learning by using Microsoft Whiteboard

Item	Mean	Std. Deviation
I was able to form distinct impressions to some of my friends in online learning.	4.1111	.70322
I am really desired to learn using Microsoft Whiteboard	4.3194	.78411
I felt comfortable expressing emotion through the online medium.	4.0000	.85580
I found myself responding emotionally about ideas or learning activities in this course.	4.0972	.85843
I felt that my point of view was acknowledged by my class member.	4.0000	.76912

CONCLUSION

The combination of various digital tools in online learning makes the process becomes more dynamic, taking full advantage of the visual and sensory senses of students. This encourages the interests and engagement of students in learning hence assist to achieve the main objective of teaching, which is to foster effective education among students.

Microsoft Whiteboard is a valuable tool, particularly when complicated elaborations on Mathematical concepts are required. Explanations are more convenient if details drawings and drawings are done, especially in imparting the knowledge of where and how to apply and use Mathematics skills and concepts. By using Microsoft Whiteboard, students can repeatedly learn the topics they are insisted on, by simply referring to the step-by-step methods provided on the digital whiteboards. Integrating technology through video, online meetings and digital whiteboard is one of the mechanisms that promotes effective teaching and learning for students to excel in the calculation course. Thus, educators should consider the use of the Microsoft Whiteboard application as one of their online pedagogies.

In a nutshell, the use of this technology should be adopted predominantly in subjects of theoretical nature due to its capabilities to act as complementary, additional resources, or aids to the lecturers and simultaneously provide an effective and fun learning process. This study utilized Bem's perception theory (1972) and identified participation and emotion as the two factors necessary to bring students' perception on the use of digital whiteboards in teaching and learning using Microsoft whiteboard. This work strongly supports the practice and policy of UiTM, which requires the lecturers to apply blended learning in their teaching. Current findings, with several improvements, can be applied in future research to investigate the impacts of using Microsoft Whiteboard on students' engagement and performance. For a more extensive research, other factors that may influence the use of this application, also should be accounted.

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AUTHORS' CONTRIBUTION

All authors provided critical feedback and helped shape the research, analysis and manuscript.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest regarding the publication of this paper.

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