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## ASSESSING STUDENT SATISFACTION WITH BLENDED LEARNING IN MATHEMATICS COURSES

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**Abstract:** *This paper presents students' satisfaction on blended learning specifically within a Mathematics course at Universiti Teknologi MARA (UiTM), Perak Branch, Tapah Campus. The study addresses various concerns related to blended learning approach for example students' satisfaction with this teaching mode, such as students' low interest in learning, lack of learning action, and failure to meet students' needs in terms of teaching methods and learning platform technology. A total of 131 diploma students were selected for this research, with data collected between March and August of the 2023 academic semester to evaluate their levels of satisfaction. The collected data was analyzed using descriptive analysis techniques. The outcomes of the analysis indicate that the extent to which students agree with the teaching dimension positively correlates with their satisfaction on blended learning. However, learning dimension which is attitude and behavior of student in learning very affected their average satisfaction which indicates very low compared to other factors. To enhance the growth of blended learning and improve teaching effectiveness, it is imperative to delve into further exploration and engage in proactive problem-solving efforts.*

**Keywords:** Blended Learning, Online Learning, Mathematics Course.

## **1. Introduction**

The 21st century of learning has brought about even more rapid and transformative changes to the education landscape, driven largely by increased use of technology, the rise of online education, an emphasis on innovation and creative learning, and blended or known as hybrid learning. Blended learning has been the subject of extensive research, with several studies dedicated to analyzing its effectiveness and impact on education (Bozkurt, 2022; Castro-Rodríguez et al., 2021; Platonova et al., 2022). Blended learning has been found to be an effective mode of teaching and learning, providing a balance between face-to-face interactions and online learning opportunities (Imran et al., 2023; Platonova et al., 2022).

Like many other universities, UiTM would likely have integrated technology into its teaching and learning processes. At Universiti Teknologi MARA (UiTM), a blended learning approach was initiated in 2009. This approach involves merging traditional face-to-face lectures with online sessions. The university's objective was to transition 30% of courses across different programs to online delivery by June 2013 (Ahmad Zaini et al., 2013). However, there are certain difficulties when it comes to designing a mathematics course for blended learning, particularly when incorporating online sessions. The mathematics lecturer has received complaints from their students, indicating that they find it challenging to grasp the concepts and struggle to stay engaged in online learning. To effectively teach mathematics in an online setting, it's necessary to adjust instructional approaches and materials. Certain students might face difficulties grasping intricate mathematical concepts when they lack direct lecturer guidance (Bringula et al., 2021).

Hence, this study is conducted to assess the extent of diploma student satisfaction with learning mathematics courses through a blended learning approach. The study has important implications for the design and delivery of blended learning programs for diploma students, which can ultimately lead to improved learning outcomes and increased student satisfaction in mathematics courses.

## **2. Literature Review**

The successful implementation of the online learning agenda in higher education institutions, as outlined by the Ministry of Higher Education and the National Higher Education Strategic Plan (2011–2015), aligns with Malaysia's educational goals. This effort is in accordance with the Malaysian Education Blueprint 2013–2025, emphasizing the integration of technology to ensure education's sustainability. Preparing students for the Fourth Industrial Revolution (Industry 4.0) is now crucial, and this is being addressed through blended learning to transform education comprehensively (Kintu et al., 2017; Ramalingam et al., 2021).

Blended learning is a pedagogical approach which integration of the face-to-face teaching with information technology (Alwadood et al., 2018; Casinillo, 2019). Meanwhile, Kintu et al., (2017) proposes that blended learning can be categorized into five main components, including face-to-face instructor-led, face-to-face collaboration, online instructor-led, online collaboration, and online self-paced. This is supported by previous research showing that blended learning provides students with access to a range of learning environments and allows them to engage in more active learning opportunities and receive more targeted instruction when learning outside of the traditional classroom setting. Therefore, Linder (2017) emphasized that the implementation of blended learning, which combines face-to-face activities with technology-mediated activities, allows students to engage in more active

learning opportunities and receive more targeted instruction when learning outside of the traditional classroom setting.

The implementation of blended learning has tremendously grown across all online learning, including the mathematics courses (Alsalhi et al., 2021; Lyakhova & Joubert, 2022; Soto & Soto, 2023; Yimer, 2022). The previous study highlighted that traditional teacher-centered instruction in mathematics often lacks an active-collaborative learning environment and hands-on practices, which can lead to challenges in students' concept learning and affective processes. Therefore, its findings showed blended learning as an intervention to enhance the learning outcomes of calculus students (Yimer, 2022). Numerous studies discuss the impact of blended learning on education. However, (Cheng et al., 2023) mentioned there is a lack of research on the factors that influence students' satisfaction with blended learning. In light of the concerning records indicating alarming outcomes among students enrolled in a university-level mathematics course (Alwadood et al., 2018; Casinillo, 2019; Hassim & Zainal Abidin, 2020), it is crucial that we initiate a thorough evaluation of the factors that influence students' satisfaction with blended learning.

Regarding students' satisfaction, past studies have presented a variety of opinions. A study proposed a conceptual model of satisfaction in blended learning (Batista-Toledo & Gavilan, 2023). The model shows the social-behavioural, affective-cognitive, sensory, and formative experience dimensions, as well as the resultant satisfaction and, in turn, normative and affective commitment. Meanwhile, the research investigating TEFL (Teaching English as a Foreign Language) students' attitudes, interactions, and relationships with blended learning quality found that students were most satisfied with teacher-student interaction in blended learning, which had the largest impact coefficient on teaching quality and satisfaction (Taghizadeh & Hajhosseini, 2021). Moreover, the study supports the notion that students' learning attitudes, curriculum design, and teachers' teaching methods are the most important factors influencing satisfaction with blended learning in universities (Cheng et al., 2023). The study also revealed that there are substantial disparities in the evaluation of satisfaction with blended learning with various online resources, online teaching forms, and offline teaching methods. By understanding the key factors that contribute to learning satisfaction with blended learning, educators can optimize teaching quality and improve students' learning outcomes in higher education, especially in mathematics courses.

### **3. Methodology**

This study aims to evaluate the contentment of students enrolled in the Diploma in Mathematical Sciences program at UiTM, Perak Branch, Tapah Campus, regarding their experience with blended learning in mathematics courses. The courses included in the blended learning approach encompass Geometry (MAT123), Logic Mathematics (MAT222), Introduction to Mechanics (MAT272), and Ordinary Differential Equations (MAT300).

The survey included a compilation of question combinations and an adjusted format inspired by the concepts discussed in references (Cheng et al., 2023). The study's participant group encompasses 131 diploma students spanning from semester 1 to semester 6. These students were enrolled in mathematics courses at UiTM, Tapah Campus, during the March to August 2023 session.

Table 1 presented the student questionnaire was divided into four main sections. Firstly, Section A collected personal information, such as gender, current semester level, blended learning code, and study intensity. Secondly, Section B aimed to understand students' satisfaction on blended learning. Thirdly, Section C was divided into three segments, each addressing distinct dimensions: learning, teaching, and curriculum. Within the learning dimension, it was further subdivided into two parts, focusing on learning attitude and learning behaviour. The teaching dimension encompassed teaching attitude, teaching method, and teaching ability. The curriculum dimension was divided into two components: course design and platform design. Lastly, Section D provided insights into the current status of the blended course, specifically gathering information about the learning platform, online teaching format, and offline teaching format.

**Table 1: Questionnaire Structure of Student Satisfaction and Influencing Factors of Blended Learning**

Dimension	Indicator	
Section A	Student Information	
Section B	Satisfaction on blended learning	
Section C	Learning dimension	Learning attitude Learning behaviour
	Teaching dimensions	Teaching attitude Teaching method Teaching ability
	Curriculum dimensions	Course design Platform design
Section D	Current situation of blended learning	Learning platform Online teaching format Offline teaching format

#### 4. Result and Discussions

The results start with an analysis of the reliability of the tools used in this study. Therefore, Cronbach's Alpha analysis is important to measure each item tested in the questionnaire, as it is a useful tool in instrument development and evaluation (Taber, 2018). Table 2 shows the Cronbach's alpha for every sub-section in the questionnaire. In total, there are 47 questions used to measure the students' satisfaction with blended learning for mathematics courses in UiTM Tapah, Perak. 29 items are used to measure reliability. For Section B, the Cronbach's Alpha for satisfaction with blended learning is 0.784. The coefficients in the range of 0.7 to 0.8 are regarded as acceptable (Nazeranah et al., 2023), which indicates that six of the tested questionnaire items are reliable. Meanwhile, Cronbach's Alpha of the learning, teaching and curriculum dimensions equal to 0.947. The coefficients in the range of 0.8 to 0.9 are considered as good result (Nazeranah et al., 2023), respectively the 18 items are reliable.

**Table 2: Cronbach Alpha for Sub Sections**

Sub Section	Cronbach Alpha	No. of item
B. Satisfaction on Blended learning	0.784	6
C. Learning, teaching and curriculum dimensions	0.947	18

Table 3 show the demographic profile of the 131 students in this study. Majority of the students was female where 71.8% compared to male only 28.2%. Half of the student is from MAT123 class which is 50.4%, the rest was MAT 300 with 24.4%, MAT 272 with 13.7% and MAT 222 with 11.5%. Based on Table 2, this study involves all semester of the students. There are two students in semester 6 and the highest number of students was semester 2 with 45 students. Mostly, student in Diploma in Mathematical Science program spend between 1 to 9 hours weekly for mathematic courses.

**Table 3: Demographic Profile of Diploma in Mathematical Sciences Program, UiTM Tapah**

<b>Profile</b>	<b>Detail</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Gender	Male	37	28.2
	Female	94	71.8
Campus	Tapah	131	100
Subject	MAT 123	66	50.4
	MAT 222	15	11.5
	MAT 272	18	13.7
	MAT 300	32	24.4
Semester	1	20	15.3
	2	45	34.4
	3	15	11.5
	4	16	12.2
	5	33	25.2
	6	2	1.5
Self-Learning Time (weekly)	>39 hours	1	0.8
	30-39 hours	5	3.8
	20-29 hours	23	17.6
	10-19 hours	41	31.3
	1-9 hours	60	45.8
	Never study	1	0.8

Table 4 illustrates the Sub Section B on satisfaction on blended learning. There are obviously most of the students satisfied with the blended learning method as one of the learning approaches for their process of learning in Mathematics courses.

**Table 4: Descriptive Statistic Of Student’s Satisfaction on Blended Learning (Sub Section B)**

<b>Sub Section B</b>	<b>Strongly Disagree</b>	<b>Disagree</b>	<b>Neutral</b>	<b>Agree</b>	<b>Strongly Agree</b>	<b>Mean</b>	<b>SD</b>
In general, I am satisfied with the blended learning	16.8% (2)	9.2% (12)	22.9% (30)	49.6% (65)	16.8% (22)		
If possible, I will choose blended learning for learning	3.1% (4)	13.7% (18)	22.9% (30)	41.2% (54)	19.1% (25)		
I would recommend this blended course and its instructor to others	1.5% (2)	9.9% (13)	32.8% (43)	38.9% (51)	16.8% (22)		
Compared with traditional learning and online learning alone, blended learning g has more advantages	1.5% (2)	3.8% (5)	40.5% (53)	38.9% (51)	15.3% (20)	<b>3.8702</b>	<b>0.5999</b>
By studying this course, I have completed the expected learning objectives or tasks	0.8% (1)	1.5% (2)	23.7% (31)	60.3% (79)	13.7% (18)		

Table 5 to Table 7 display the satisfaction rates for each indicator of the three dimensions. The results showed that most of the students rated “agree” in teaching dimensions. Students are generally happier with how their lecturers act during blended learning compared to the methods and skills they use for teaching. This might mean that lecturers could make their teaching methods and skills even better. In contrast, subsection for learning dimension has lowest mean score. This indicates that their learning attitude and learning behavior need to be improve. In terms of curriculum, the design of teaching content, hours, and frequency of instruction are unable to fully meet the students' needs.

**Table 5: Descriptive Statistic of Student’s Satisfaction on Learning Dimension (Sub Section C)**

Sub Section C	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Mean	
Learning attitude	I have some interest in blended learning courses.	0.8% (1)	2.3% (3)	26.7% (35)	55% (72)	15.3% (20)	3.82
	This course is very important for my future development.	0.8% (1)	0.8% (1)	17.6% (23)	54.2% (71)	26.7% (35)	4.05
	Before the course, I will set learning goals and be confident that I will be able to complete this course.	0.8% (1)	1.5% (2)	28.2% (37)	52.7% (69)	16.8% (22)	3.80
Learning behavior	I am more focused in online or offline courses alone.	1.5% (2)	8.4% (11)	35.1% (46)	39.7% (52)	15.3% (20)	3.42
	I often reflect on my studies in my spare time, judging my mastery of the course.	0.8% (1)	0.8% (1)	31.3% (41)	54.2% (71)	13% (17)	3.76
	During blended learning, I will have active communication and interactions with teachers and classmates in various ways.	1.5% (2)	6.1% (8)	36.6% (38)	46.6% (61)	9.2% (12)	3.44



**Table 6: Descriptive Statistic of Student's Satisfaction on Teaching Dimension (Sub Section C)**

Sub Section C		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Mean
Teaching attitude	In blended learning, lecturers carefully prepare lessons before class and are responsible after class.	0.8% (1)	0% (0)	16% (21)	55.7% (73)	27.5% (36)	4.09
	Timely feedback on questions, discussions and assignments are provided by the lecturer during blended learning.	0.8% (1)	0% (0)	22.1% (29)	48.9% (64)	28.2% (37)	4.04
Teaching method	Lecturers frequently develop interactive environments and interactive scenarios during blended learning.	0.8% (1)	0% (0)	22.9% (30)	52.7% (69)	23.7% (31)	3.98
	In blended learning, lecturers adopt various teaching methods such as lecture, case study, discussion, and practice.	0.8% (1)	0.8% (1)	18.3% (24)	50.4% (66)	29.8% (39)	4.08
Teaching ability	Lecturers integrate information technology deeply with the subjects in blended learning and have good IT skills.	0.8% (1)	0.8% (1)	16% (21)	59.5% (78)	22.9% (30)	4.03
	In blended learning, the lecturers are knowledgeable and have good teaching ability.	1.5% (2)	0.8% (1)	17.6% (23)	51.9% (68)	28.2% (37)	4.04



**Table 7: Descriptive Statistic of Student’s Satisfaction on Curriculum Dimension (Sub Section C)**

	Sub Section C	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Mean
Course design	The content and resources of both online and offline learning are rich and interesting and can satisfy my desire to learn.	0.8% (1)	0.8% (1)	26% (34)	51.1% (67)	21.4% (28)	3.91
	The objectives of both online and offline learning are well designed	0.8% (1)	2.3% (3)	30.5% (40)	44.3% (58)	22.1% (29)	3.84
	Appropriate design of both online and offline learning (including the hours, frequency, interaction and connection of online and offline learning, etc.).	0.8% (1)	1.5% (2)	29% (38)	50.4% (66)	18.3% (24)	3.84
	The evaluation and assessment of the course is designed in a scientific way.	0.8% (1)	1.5% (2)	26% (34)	55% (72)	16.8% (22)	3.85
Platform design	Great convenience and ease of learning with the learning platform.	0% (0)	2.3% (3)	26,7% (35)	54.2% (71)	16.8% (72)	3.85
	The various functions of the learning platform (such as notes, tests and interactions, etc.) are complete, and I can make good use of them	0.8% (1)	1.5% (2)	22.9% (30)	55% (72)	19.8% (26)	3.91

Table 8 indicate the frequency on current situation of blended learning in Mathematic course offered for blended learning.

**Table 8: Student’s Satisfaction on Current Situation of Blended Learning**

<b>Sub Section</b>	<b>Items</b>	<b>Yes</b>	<b>No</b>
Platform	MOOC	93	38
	Ufuture	116	15
	Telegram/WhatsApp’s	128	3
	Online lecture (gmeet/teams/etc)	112	19
	Recorded video	117	14
	Unfixed time, unfixed location	50	81
Time and Location	Fixed time, unfixed location	79	52
	Fixed time, fixed location	101	30
Offline teaching method	Lecturer led lecture	122	9
	Mutual discussion	127	4
	Student led lecture	83	48

## 5. Conclusion

The conclusion of the study is that blended learning can be an effective teaching mode in diploma students, but its success depends on several factors that influence students' satisfaction with this mode of learning. The study found that the most significant factors affecting students' satisfaction with blended learning were the lecturer’s attitude. The study also found that student' demographic characteristics, such as gender, course code, and level of semester had a significant impact on their satisfaction with blended learning. However, there are issues such as low student interest in learning, lack of learning actions, and failure to meet students' needs in terms of teaching methods and learning platform technology. The study recommends that diploma students should focus on improving the quality of teaching method, providing adequate more interactive learning content, and promoting interaction between students and instructors to enhance students' satisfaction with blended learning. The study also suggests that future research should explore the effectiveness of different blended learning models and investigate the impact of other factors, such as students' learning styles and preferences, on their satisfaction with blended learning.

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