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Cross-Sectional Study on the Influence of iPad or Tablet Usage on Student Engagement, Learning Outcomes, and Attitudes Toward Technology among University of Cyberjaya Students

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Abstract

In the 21st century, the integration of technology in education has become increasingly prevalent, with iPads and tablets transforming learning experiences. While some view these devices as distractions, others recognize their potential to enhance educational outcomes by fostering engagement and supporting diverse learning approaches. This study assessed the impact of iPad and tablet-based activities on students' attitudes towards technology, engagement levels, and perceived learning outcomes at the University of Cyberjaya, examining the relationship between the frequency of iPad use and these educational metrics. A cross-sectional study was done among 369 undergraduate students using iPads or tablets at the University of Cyberjaya from 2023 to 2024 collected data via online questionnaires on demographics, feelings about technology, performance expectations, perceived learning, and engagement. Statistical analyses, including descriptive statistics and regression analysis, were used to analyze the data. Most respondents were female (63.4%), Malay (40.9%), MBBS students (54.5%), with high frequencies of daily technology use (61.5%) and in-class tablet use (51.2%) reported. Significant percentages indicated positive feelings about technology (86.7%), high performance expectations (80.5%), perceived learning benefits (82.7%), and effectiveness in meeting course objectives (88.6%). Regression analysis confirmed significant but weak correlations between iPad use and attitudes towards technology, perceived learning, and engagement. The study underscores the positive impact of iPads on students' educational experiences, highlighting their role in enhancing engagement, learning outcomes, and attitudes towards technology, though the impact on academic performance may still be influenced by other factors.

Keywords: iPads, student perceptions, educational technology

1. Introduction

The 21st century has seen technology use becoming an inevitable part of life and it has revolutionized the study method especially among university students. One of the inventions that are especially popular

among students are portable devices such as iPads and tablets, replacing traditional textbooks and bulky laptops. These days, iPads and tablets are a fantastic piece of technology that allows us to get whatever information we require fast and easily, along with the ability to write notes in just one device. The versatility of these devices causes their increased usage in class. University students that use iPads or tablets for educational purposes increased yearly, as they can study the curriculum using a variety of approaches.

However, there were no report on the causal link between the usage of iPads or tablets and their learning. In view of the increased use of these technologies especially by university students in their daily learning activities, this study was conducted with an objective to assess the influence of iPad or tablet usage on students' attitudes towards technology, engagement, and perceived learning among University of Cyberjaya undergraduates. This study is vital as it can shed a light on the importance of using these technologies for educational purposes, and how they can be adopted into the curriculum to enhance students' understanding of their syllabus.

2. Materials and Methods

Study Location

The study was carried out at the University of Cyberjaya, Cyberjaya, Selangor.

Study Design

A cross-sectional study was designed and conducted among undergraduate students at theUniversity of Cyberjaya from 2023 to 2024 who use tablets or iPads.

Participants

Participants were enrolled undergraduate students at the University of Cyberjaya from 2023 to 2024 who use tablets or iPads. The selection of participants was based on their ownership and regular use of tablets or iPads, as these devices were the independent variable in this study.

Inclusion Criteria:

- Students who own a tablet or iPad.
- Undergraduate students from all faculties at the University of Cyberjaya.
- Ability to understand English, as the survey was conducted in English.
- Ability to provide informed consent.

Exclusion Criteria:

- Students who do not own or use gadgets like tablets or iPads.

Sample Size

A large sample size was aimed for accuracy, utilizing data from all students at the University of Cyberjaya. Reference was made to "A study of the introduction of iPads at Longfield Academy, Kent" (Heinrich, 2012). A sample size of 365 participants was calculated for a 95% confidence interval with a 5% margin of error, adjusted to 329 participants after including a 10% non-respondent rate.

Formula to calculate sample size,

$$n = \left(\frac{Z}{m}\right)^2 \times p(1-p)$$

$p = Anticipated\ population\ proportion - From\ previous\ study$

$Z = Confidence\ level - 95\%$

$m = Margin\ of\ error$

$Non-respondent\ will\ be\ set\ at\ 10\%$

Using the formula given,

$$n = \left(\frac{1.96}{0.05}\right)^2 \times 0.613(1 - 0.613)$$

$$n = 364.5$$

$$n = 365$$

With non – respondent rate set at 10% , $n = 329$

Sampling Method

Simple Random Sampling was employed, ensuring every participant meeting the inclusion criteria had an equal chance of selection.

Data Collection, Research Tool, and Parameters of Interest

Data Collection

Data were gathered via online questionnaires distributed through Google Forms to students at the University of Cyberjaya. To maintain anonymity, personal details were not collected. Data access was restricted to the researchers, and all data will be destroyed five years' post-collection.

Research Tool

The questionnaire, adapted from Diemer et al. (2017), consisted of six parts:

1. **Sociodemographic:**

Gender, ethnicity, faculty, year of study, technology usage for education, and technology use during class.

2. **Feelings About Technology:**

3 items assessing feelings about technology usage (Likert scale).

3. **Performance Expectations:**

5 items regarding expectations of using iPads or tablets during study (Likert scale).

4. **Perceived Learning:**

5 items focusing on perceived learning ability when using iPads or tablets (Likert scale).

5. **Meet Course Objectives:**

3 items regarding the impact of iPads on understanding and learning course objectives (Likert scale).

6. **Perceived Engagement:**

6 items on engagement when using iPads in their study (Likert scale).

Statistical Analysis

Data analysis was performed using JASP statistical software. Descriptive statistics (mean, standard deviation, frequencies, percentages) were calculated. Regression analysis was conducted to examine the relationship between the frequency of iPad or tablet-based activities and students' perceived learning. The independent variable was the frequency of iPad activities, and the dependent variable was perceived learning. Coefficients were estimated, their significance assessed, and the coefficient of determination (R-squared) calculated to evaluate the relationship's strength.

3. Results

Table 3.1: Sociodemographic information

No.	Sociodemographic Factors		Frequency	Percentage (%)
1.	Gender	Female	234	63.4

		Male	135	36.6
2.	Ethnicity	Malay	151	40.9
		Indian	118	32.0
		Chinese	86	23.3
		Others	14	3.8
3.	Undergraduate	MBBS	201	54.5
		Pharmacy	90	24.4
		Occupational Safety & Health	53	14.4
		Others	115	6.7
4.	Current year of studying	1	66	17.9
		2	74	20.1
		3	73	19.8
		4	100	27.1
		5	56	15.2
5.	Technology usage for education	Daily	227	61.5
		4-6 times per week	90	24.4
		1-3 times per week	52	14.1
6.	Technology usage during class	Every class	189	51.2
		Most classes	100	27.1
		Some classes	74	20.1

		Never	6	1.6

The total number of respondents obtained from this study is 369 which satisfies the required sample size of 365. Based on Table 4.1, the majority of respondents were female (63.4%). Most respondents were Malay (40.9%) and MBBS students (54.5%). However, respondents are spread out more uniformly according to the current year of studying, with year 4 students being the highest (27.1%). Most respondents use technology for education daily (61.5%) and 51.2% of respondents use technology during class.

Table 3.2: Feelings about Technology

Questions	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Overall, technology makes my life easier	250	92	20	2	5
I feel I accomplish more in my student life because of technology	185	135	36	9	5
Given my use of all technologies at my disposal, on average I feel I am an expert (5), advanced (4), intermediate (3), basic (2), or non-technology user (1).	166	120	68	11	4

Table 3.3: Scoring for Feelings about Technology

Total score	Frequency	Percentage (%)
Low (0-5)	3	0.8
Moderate (6-10)	46	12.5
High (11-15)	320	86.7

Regarding the respondents' feelings about technology, Table 4.3 shows the majority of respondents had a high score (86.7%) while 12.5% and 0.8% of respondents had moderate and low scores respectively. Descriptive statistics revealed the mean score of all respondents for feelings about technology to be 13.06 which is high and the standard deviation is 2.07.

Table 3.4: Performance Expectations

Questions	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
The iPad will encourage exploration of syllabus topics	216	104	31	8	5
The iPad will provide functions/tools that are not possible with a traditional textbook.	203	128	22	6	5
The iPad lacks important functions/ tools that are available with traditional textbooks.	148	89	59	50	18
I will learn more in depth as a result of the iPad	188	116	43	12	5
I would learn more in any class by using the iPad.	209	95	42	11	7

Table 3.5: Scoring for Performance Expectations

Total score	Frequency	Percentage (%)
Low (0-8)	8	2.2
Moderate (9-17)	64	17.3
High (18-25)	297	80.5

The majority of respondents, approximately 80.5%, displayed a high level of performance expectations regarding the use of iPads or tablets for educational purposes, shown in Table 4.5. This reflects a strong confidence among students in the potential of these devices to enhance syllabus exploration, offer unique functionalities, and foster deeper learning experiences across academic subjects. With a mean total score of 21.301 and a standard deviation of 3.738, students consistently anticipate significant benefits from integrating iPads or tablets into their learning environments.

Table 3.6: Perceived Learning

Questions	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
The iPad activities will help me apply	203	106	42	12	6

course content critically					
The iPad activities will help me to learn course content	197	125	33	9	5
The iPad activities will help me connect ideas in new ways	197	127	38	2	6
The iPad activities will help me participate in the course activity in ways that enhance my learning	204	118	35	7	5
The iPad activities will help me develop confidence in the topic.	194	104	52	15	4

Table 3.7: Scoring for Perceived Learning

Total score	Frequency	Percentage (%)
Low (0-8)	6	1.6
Moderate (9-17)	58	15.7
High (18-25)	305	82.7

Table 4.7 describes individuals' perceived learning levels, categorized as low, moderate, and high. Notably, 82.7% of 305 respondents acknowledge the positive effects of gadget use. These effects include aiding in applying course content to problem-solving, critical thinking, learning, connecting ideas, and building confidence in the subject matter. The mean total score for perceived learning is high at 21.699, with a standard deviation of 3.952. These findings suggest that iPads indeed contribute to achieving academic objectives.

Table 3.8: Meet Course Objectives

Questions	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Use of the iPad will help me to gain factual knowledge of the syllabus.	208	113	37	6	5
Use of the iPad will help me to learn fundamental principles, generalizations, or theories.	180	142	34	8	5

Use of the iPad will help me to learn to apply this course material.	205	117	34	7	6

Table 3.9: Scoring for Meet Course Objectives

Total score	Frequency	Percentage (%)
Low (0-5)	5	1.4
Moderate (6-10)	37	10.0
High (11-15)	327	88.6

Based on Table 4.9 above, a significant 88.6% of respondents indicated a high level of agreement that iPads assist in achieving course objectives, including gaining factual knowledge, understanding fundamental principles, and applying course material. The mean score of 13.079 and a standard deviation of 2.388 demonstrate a consistent perception among students that iPads are effective tools for enhancing their educational experience.

Table 3.10: Perceived Engagement

Questions	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
IPad activities will motivate me to learn the course material more than not using iPad	190	114	43	13	10
I will participate more in class during the iPad activities than during activities that did not use an iPad.	181	101	58	15	14
My attention to the task will be greater using the iPad.	177	98	55	27	12
The iPad will be more convenient compared to a desktop or laptop	212	103	37	4	13
It will be easier to work in a group using the iPad than in other group activities.	185	111	57	9	7
IPad activities will be an important	197	105	52	6	9

supplement to this class.					

Table 3.11: Scoring for Perceived Engagement

Total score	Frequency	Percentage (%)
Low (0-9)	9	2.4
Moderate (10-19)	52	14.1
High (20-30)	308	83.5

For the perceived engagement of the students when they are using iPads or tablets based on table 4.11, most students have a highly positive perceived engagement (83.5%), indicating that they were more motivated and the participation in class were also higher due to iPad or tablet usage. Only 14.1% of the students with moderate and 2.4% have a low perceived engagement regarding the usage of iPad or tablet for learning activities.

Table 3.12: Association between student's usage of technology for education with the attitude towards technology, perceived learning and perceived engagement

	Mean score	Standard Deviation	R-value	P-value
Attitude towards technology	13.06	2.07	0.167	0.001
Perceived Learning	21.70	3.95	0.120	0.004
Perceived Engagement	25.35	5.29	0.138	0.008

We then studied the relationship between the usage of iPad or tablets for education with the students' attitude towards technology, perceived learning, and perceived engagement using a linear regression analysis. From the results shown in table 4.12, it was shown that iPad and tablet-based activities significantly influence the students' attitudes towards technology ($F(1,367) = 10.52$, $p=0.001$), perceived engagement $F(1,367) =7.152$, $p=0.008$), and perceived learning ($F(1,367) =8.60$, $p=0.004$). From the analysis, we also saw that there was a weak correlation between the usage of iPad or tablet with the students' attitude towards technology ($R=0.167$), perceived learning ($R=0.120$), and perceived engagement ($R=0.138$).

4. Discussion

Our study explored the impact of iPad and tablet usage on student engagement, learning outcomes, and attitudes toward technology among students at the University of Cyberjaya. The findings indicate that these devices are often used and generally perceived positively by students, enhancing their perceived learning and engagement. However, the relationship between tablet use and actual academic performance is complex and influenced by a range of factors.

The high frequency of iPad and tablet usage among students, with a majority using these devices daily and during every class, suggests a significant integration of technology in their educational routines. Students reported positive attitudes toward technology and high levels of engagement, highlighting the potential of iPads to enhance the educational experience. Despite these positive perceptions, the associations between the frequency of iPad use and students' perceived learning and attitudes toward technology, although statistically significant, were weak. This suggests that while iPads contribute positively to the learning environment, other factors also play a crucial role in determining academic outcomes.

Several key mechanisms can explain the positive perceptions and high engagement levels observed in the study. First, tablets provide immediate access to a wide range of educational resources, including textbooks, research articles, and multimedia content. This instant access facilitates a more comprehensive understanding of course material. Second, the use of interactive textbooks, educational apps, and multimedia content makes learning more engaging and effective, promoting active learning and critical thinking. Third, tablets enable real-time communication and collaboration with peers and instructors, enhancing group work, peer learning, and immediate feedback. These mechanisms suggest that iPads and tablets can transform traditional learning environments into more dynamic and interactive spaces, fostering greater student engagement and potentially improving learning outcomes.

Our findings align with previous studies, such as those by Ormancı and Çepni (2019) and Arief Syaiful Rachman (2019), which highlighted the role of tablets in boosting student performance and motivation. Similarly, Scibora et al. (2018) noted significant reliance on laptops and positive perceptions of technological tools in academic settings, supporting our observation of predominantly positive attitudes toward tablet use.

However, several limitations of our study should be considered. The cross-sectional design limits the ability to draw causal inferences regarding the impact of iPads and tablets on academic performance. Additionally, the use of self-reported data may be subject to biases such as social desirability or recall bias. Conducting the study at a single institution may also limit the generalizability of the results to other settings or populations. Furthermore, non-technological factors such as mental health, time management skills, family support, and previous academic achievements, which also play significant roles in shaping academic success, were not exhaustively explored.

Future research should focus on conducting longitudinal studies to better understand the causal relationships between tablet usage and academic performance. Additionally, exploring the role of individual differences in technology proficiency and the quality of instructional design can help maximize the benefits of tablet use in education. Investigating comprehensive approaches to integrate tablets into educational and clinical training programs can further enhance learning experiences and prepare students for technology-rich environments.

In conclusion, iPads and tablets are positively perceived by students at the University of Cyberjaya and are seen as valuable tools for enhancing learning and engagement. While their impact on academic performance is nuanced and influenced by a range of factors, our study highlights the potential of these devices to enrich educational experiences. A holistic approach to technology integration, considering both technological and non-technological factors, is essential for maximizing the benefits of digital devices in education.

5. Figures

Figure 1: Feelings about technology scoring

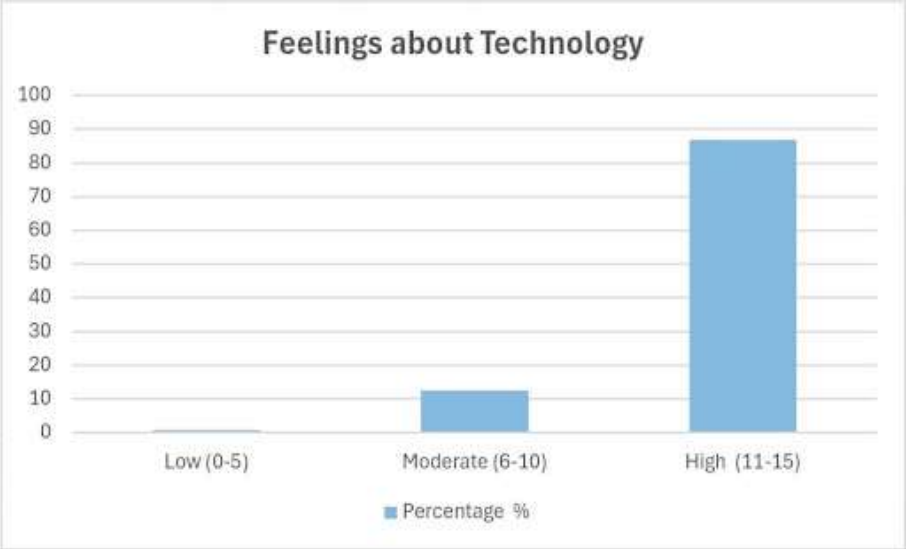


Figure 2: Perceived engagement scoring

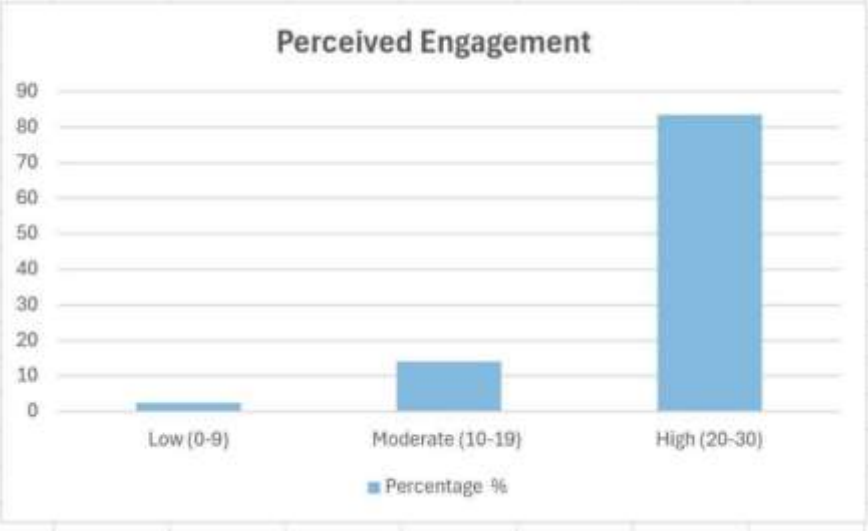
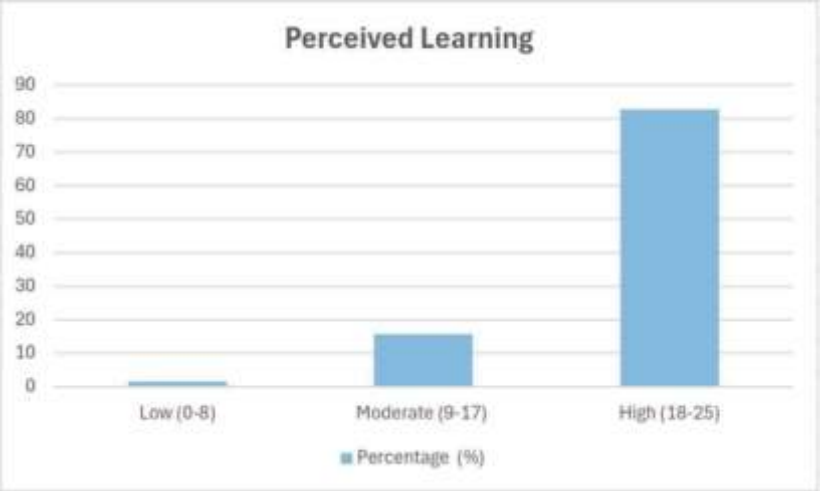


Figure 3: Perceived learning scoring



6. Conclusion

The findings of this study illustrate the nuanced role of iPad and tablet usage in shaping students' engagement and attitudes towards technology at the University of Cyberjaya. While the observed correlations were statistically significant, they also indicate the complexity of these relationships, suggesting that other factors may contribute to students' learning experiences. Future research should broaden the scope to include a more diverse student demographic and investigate additional aspects of technology use, such as its impact on mental health and academic behaviors. Understanding these dynamics is essential for effectively integrating educational technology into curricula, ultimately enhancing the academic success and overall development of students in higher education.

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9. References

1. Aldossry B., "The impact of using an iPad on the achievements of secondary school students in Saudi Arabia", INTED Proc., April 2020, 2020, 1412–1416. https://doi.org/10.21125/inted.2020.0468
2. Amandeep D., Nahla G., Göte N., "The role of the iPad in the hands of the learner", J Univers Comput Sci., May 2013, 19(5), 706–727. http://www.jucs.org/jucs_19_5/the_role_of_the
3. Bagdasarov Z., Luo Y., Wu W., "The influence of tablet-based technology on the development of communication and critical thinking skills: An interdisciplinary study", J Res Technol Educ., January 2017, 49(1-2), 55–72. https://doi.org/10.1080/15391523.2017.1293576
4. Chu T., Liu X., Takayanagi S., Matsushita T., Kishimoto H., "Association between mental health and academic performance among university undergraduates: The interacting role of lifestyle behaviors", Int J Methods Psychiatr Res., April 2022, 33(2), 123–134. https://pubmed.ncbi.nlm.nih.gov/36087035/
5. Diemer T.T., Fernandez E., Streepey J.W., "Student perceptions of classroom engagement and learning using iPads", J Teach Learn Technol., December 2013, 1(2), 13–22. https://scholarworks.iu.edu/journals/index.php/jotlt/article/view/3084
6. Liu X., "The effects of tablet use on student learning achievements, participation, and motivation at different levels", Int J Technol Enhanc Educ., June 2022, 1(1), 1–17. https://doi.org/10.4018/ijtee.304819
7. Nguyen L., Barton S.M., Nguyen L.T., "iPads in higher education-Hype and hope", Br J Educ Technol., January 2014, 46(1), 190–203. https://doi.org/10.1111/bjet.12137
8. Ormanci U., Cepni S., "A thematic review of tablet-based science education studies", J Educ Sci Environ Health., January 2019, 5(1), 36–54. https://doi.org/10.21891/jeseh.502498
9. Rachman A.S., Khb M.A., Setianingsih E.S., "An analysis of the use of gadget on students' learning outcomes (Case study)", Int J Elem Educ., December 2020, 4(4), 558–565.

https://doi.org/10.23887/ijee.v4i4.31917
10. Scibora L.M., Mead T., Larson C., "The influence of iPads on course performance and student perceptions of learning in human anatomy", J Teach Learn Technol., March 2018, 7(1), 108–124. https://doi.org/10.14434/jotlt.v7n1.23973
11. Shukra'Am N.N.S.A., Hasuni P.D.H., Shafie N.A., "Factors affecting academic performance among bachelor computer and mathematical sciences students", Int J Acad Res Bus Soc Sci., April 2022, 12(4), 316–325. https://hrmars.com/index.php/IJARBSS/article/view/12937/Factors-Affecting-Academic-Performance-among-Bachelor-Computer-and-Mathematical-Sciences-Students
12. Tamim R.M., Borokhovski E., Pickup D., Bernard R.M., El Saadi L., "Tablets for teaching and learning: A systematic review and meta-analysis", Commonw Learn., March 2015, 2015, 39–40. https://doi.org/10.13140/RG.2.1.3670.5042
13. Yousuf N.S.A., Ahmad Shukor N.S., "Factors affecting students' academic performance: A review", Res Militaris., June 2022, 12(6), 284–294. https://resmilitaris.net/index.php/resmilitaris/article/view/2215