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Towards Quality Education: Physical Notes VS Digital Notes in Health Expectancy, Eco-Friendly Environment and Notes Accessibility Conditions

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Abstract: Due to the pandemic of COVID-19, students have started using digital technology in learning and note-taking. However, for early adopters, this method might be challenging. Thus, this study objectively examines the preferences of students' physical or digital note-taking styles. Convenience sampling among 125 students in Universiti Teknologi MARA (UiTM) Selangor branch, Puncak Alam Campus has been used as part of the methodology. Three main variables are selected in assessing the student's preferences for notes based on the previous study which are Health Expectancy, Eco-Friendly Environment, and Notes Accessibility Conditions. The analysis done is descriptive statistics and correlation analysis using SPSS and SMARTPLS 4. The findings show that the students still prefer physical notes over digital notes. The percentage of preferences is almost the same, and it is expected that in the future the percentage of digital notes taking will shift from physical notes to digital notes. Notes accessibility condition is a significant variable while the other variables are not significant towards student's preferences for notes. The students are still in the transition process from the era before the pandemic and the post-pandemic era. Thus, it is recommended that the learning style and note-taking style might adopt the combination of physical and digital notes.

Keywords: *Digital notes, physical notes, student's preferences, health expectancy, eco-friendly environment, notes accessibility condition.*

1. Introduction and Background

In this era of technology, nowadays students have the option of choosing between the physical method or the digital method. The physical method is using the traditional way which is using handwriting. Students need to use paper to jot down their notes while for digital notes students just need a tablet to do all of the notes in their study. Students can choose any method that is suitable for them and easy for them to note-taking. The usage of technological devices is expanding, and traditional handwriting is becoming less common. Many professionals use computers in their daily jobs, and electronic devices are used as learning tools for academic reasons throughout the entire educational cycle (to study, to complete assignments, to take classroom notes and to search for information)(Aragón-Mendizábal et al., 2016). Due to the COVID-19 pandemic, many changes have occurred. All activities must stop due to the Movement Control Order (MCO) implemented by the government to reduce the spread of the virus. The MCO has restricted all movement activities, including travel, business, industry, government, and even educational institutions.

During this order, physical lectures have turned into online platforms such as Google Meet, Webex, and others. Most students depend fully on digital devices such as laptops, computers, and smartphones. This has led to a new norm. Students started to use tablets to take notes on their online lectures. This new norm has facilitated their online learning. During this period, students can only access their reading material online. Students cannot print their reading material because most bookshops are closed due to MCO. Therefore, there is an increase in the use of tablets among students during this period. Due to the event, UiTM gave the lecturers orders to conduct lectures online. UiTM has prepared online platforms such as UFUTURE for lecturers and students for their online classes. Students can choose their note-taking method based on their comfort and preferences. It also can depend on the subject and topic that you learn for your study. For digital notes, it is easier for them to attach the media. Some study does not need any media as their references, so it is also one of the factors why students choose physical notes compared to digital notes. There are pros and cons to the method that students will choose for their note-taking.

They need to consider many aspects before choosing their preferred method because this can influence their revision style and preparation for exams. Students need to choose their note-taking method wisely to ease their study journey. Nowadays, we have many approaches to help students study. Students need to write notes for their lesson to revise what they are studying. In addition, note-taking is important to help students prepare for their exams. For student note taking, it depends on their creativity in how to make their notes effective for themselves. Before the era of technology, all of us were using traditional ways of writing notes which used physical notes such as printing notes and jotting down on paper but now we already live in the era of high-tech technology, which allows us to feel easier with the help of technology such as electronic devices. Students have various options to write their notes. Students can choose whatever method they want based on their comfort. Furthermore, there are some pros and cons for every method they use for note taking either using physical notes or digital notes. Some of the students would prefer physical notes compared to digital notes because they said that using this method, is faster in note-taking while some of the students do not agree with the statement. They choose to use digital notes in note-taking because it is so much easier. After all, electronic devices have apps that they can use for their study, so it is easy for them to refer to them.

Based on a study in 2011 of University of Michigan students, 53% of the respondents stated that their laptops helped them in their studies, with 25% strongly agreeing that. The students believe that" laptops help them a lot in note-taking". This shows they chose digital electronics in their study because Digital note-taking has everything in one app, so it will save time for the student to look into it. Moreover, digital notes are more convenient because it is easy for students to carry the load and save their effort to carry the notes. For example, in comparison to three different notebooks and a bag full of pencils, highlighters and sticky notes, it is more convenient to carry only one laptop, phone, or tablet. Having only a tablet can save students time to print out the notes and save their expenses on note printing. Based on the study from dental education programs in the United States, Puerto Rico, and Canada, the surveys stated that all of their learning education is based on their e-textbooks which are already included in their study fees, so with the digital notes, they can have full access to it. Lastly, the research conducted is to ensure the opinion of the student which method they prefer either digital notes or physical notes that have more durability to preserve the notes for a long time and which method can have a positive impact on their health. Three variables are selected in this study which are Health Expectancy, Eco-friendly Environment and Notes Accessibility Condition.

2. Literature Review

Preference for Digital Notes or Physical Notes: Learning in the 21st century is omnipresent with computers and technology and is gaining momentum in the lives of the young and becoming a part of education at schools. Students use technology daily and this has an impact on their education. The technology used effectively in the classroom enables students to be innovative while developing new skills and provides students with futuristic information (Himmelsbach, 2022). Digital note-taking is a combination of techniques that allow you to take and store your notes electronically. This approach to education was further intensified when the Covid-19 pandemic hit. In 2020, universities shut down, forcing educators to rely on the Internet and electronic devices to facilitate classes. As more universities acclimate to this setup, it seems that many have also realized its benefits with research suggesting that online learning promises increased information retention and that it could be here to stay (Darkwa & Antwi, 2021).

Meanwhile, the number of technologies used for educational purposes has been increasing in addition to the level of comfort both instructors and students have with using such technologies (Khan, 2009). Course materials are an integral part of the learning experience for students. As such it is important for educators to be aware of the types of materials that will be most helpful for students' success in their courses because it has been shown that different technologies used in teaching environments directly influence student performance (Diaz & Cartnal, 1999). This is partly due to the differences in learning styles and personal characteristics of the students themselves. Previous research has shown that students' decisions to use different types of technologies vary greatly based on their individual preferences (Grasha & Yangarber-Hicks, 2010). This in turn influences a student's preferences for using digital notes or physical notes. It is possible for a student who has a preference toward what they choose. Also, Sun & Li (2019) in their study has mentioned that students with preferences in digital note-taking strived in their academics more than students with traditional note-taking.

Physical Notes VS Digital Notes and Health Expectancy: Suri et al. (2020) have included twenty-two studies that met the inclusion criteria were included in the study. A study conducted in Japan comprised 1,159 participants ranging in age from 7 to 27. Carrying a backpack creates additional strain on internal tissues and probably causes significant spinal stresses due to the added weight and changes in spinal position. The results included information about trunk kinematics, spine posture, and trunk muscle activity during upright standing, walking, and stair climbing and descending, as well as information about the effects of backpack weight and position. Carrying heavy backpacks is a major contributor to the rising prevalence of back pain in children and young adults. Future solutions and increased safety measures for students could, however, assist in reducing this issue. Unsurprisingly, given that the preferred manner of carrying a bag is a backpack-style bag with carriage on the back and two straps over the shoulders, the Dublin study found that 65% of discomfort was recorded in the shoulders. The backache was reportedly 30% uncomfortable. Spinal tension and potential pain and discomfort are some of the initial impacts. Yet, tissue damage is not often accompanied by conscious discomfort, so it may go undetected. Long-term postural alignment imbalances they may acquire could have an impact on the neurological system's health. Communication between the brain and the body is significantly impacted when the position of the spine is uneven (Priyanka Kumbhare, 2018). Another issue related to health matters is reading an electronic book before bed reduced the generation of melatonin, a key sleep hormone, according to a new Harvard University study. As a result, it took people far longer to fall asleep, they had less deep sleep, and they woke up feeling more tired (Bushak, 2015).
H1: Health expectancy influences the student's preferences for digital notes vs physical notes**.**

Physical Notes VS Digital Notes and Eco-Friendly Environment: Cohen (2018) has mentioned that there are 4 undeniable benefits of going paperless in school or education centers. The first one is reducing waste and creating a sustainable future, then saving time for teachers and administration, and at the same time it will reduce the cost, last but not least it can bring the classroom into the digital age. This proves that besides being eco-environment friendly, paperless notes can move the students also educators into the digital era. Oladeji (2023) has mentioned in the article that technology in education can reduce the cost of learning. Although embarking on digitalization and technology is costly at the beginning, however, it saves for overall usage. By adopting technology, the cost of printing on paper, buying nooks, and commuting to class can be reduced. Thus, at the same time can lead to the eco-environment friendly. Recycling is said to be the most efficient way to protect the ecology of our planet. We can decrease the amount of waste materials generated and protect future natural resources by simply reusing the items rather than throwing them away. In this approach, landfill trash will be decreased to save water and air from pollution. In addition to producing economic benefits, recycling solid waste has sufficient advantages for the environment and health (Lamma, 2021). The use of digital notes can help reduce the usage of paper and conserve the environment through the reduction of waste material.
H2: Eco-environment friendly influences the student's preferences for digital notes vs physical notes.

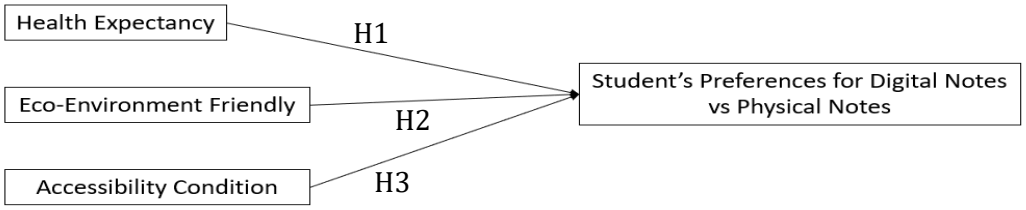
Physical Notes VS Digital and Notes Accessibility Condition: Tablets and iPads have been overestimated as 'revolutionary' devices that hold great potential for transforming learning (Goodwin, 2012). One of the chief benefits of these mobile devices is that they enable learning anywhere and anytime. This allows a shift away from the traditional model where the classroom is the central place of learning driven by the teacher and limited to instruction within the school day. In deploying mobile devices, the teacher is no longer at the center of the learning process and the instructional time can surpass the school day. As digital environments increasingly affect higher education, we should consider the evolving interplay between note-taking, information management, and lifelong learning. The first decades of the digital age have introduced society to a variety of paradigm shifts including how we view the concepts of information storage and retrieval. Educators may need to rethink what it means to take notes and how those notes carry forward into future careers (Stacy & Cain, 2015). In a paper-based society, it was challenging, but not impossible, for students to carry all their notes with them.

In addition, this made it potentially more challenging to sort through notes to review a particular concept. Now, not only can learning materials be stored on a phone or tablet, but students can find a phrase or concept in seconds. Cognitive and conceptual links can be made within and across courses. Organize and search for important information to manage to sort all of those loose pages into the right places Eventually, it will settle

the problems that end up with hundreds of pages at the end of the semester, which makes it almost impossible to review them when preparing for the finals. The only chance was to use and desperately try to keep track of your organization's system. Recently organize the notes and use digital bookmarks to quickly jump to the relevant pages. The best thing is that the Good Notes application can even search for our digital notes, so we can look up information in a second, by typing in keywords (Stacy & Cain, 2015).
H3: Accessibility conditions influence the student's preferences for digital notes vs physical notes.

Conceptual Framework: Figure 1 shows the theoretical framework for the study. There are three (3) independent variables which are health expectancy, eco-environment friendly, and accessibility condition whereas the dependent variable is students' preferences for digital notes vs physical notes.

Figure 1: Research Framework



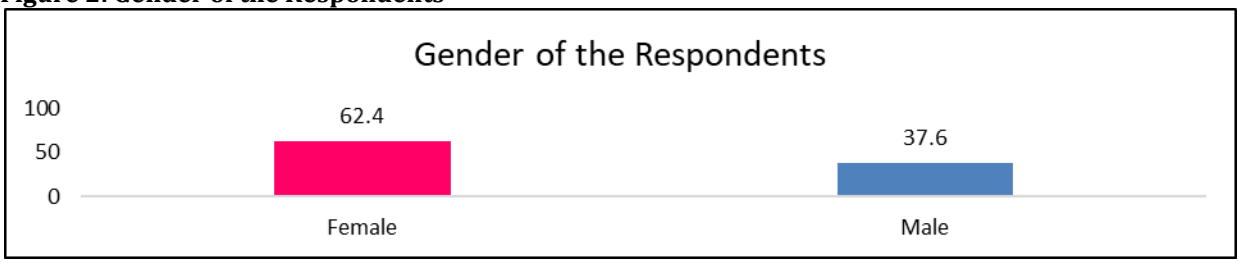
These three variables (Health Expectancy, Eco-friendly environment, and Notes Accessibility Condition) are tested for the student's preferences for digital notes or physical notes. The next section will explain the methodology used to achieve the objectives of the study.

3. Research Methodology

The methodology used in this study is a quantitative research method using a survey questionnaire. The questionnaire is distributed among the students objectively to know the preferences of note-taking either hand note-taking or digital note-taking. The quantitative research approach is utilized to collect information in a quantified manner. It is also suitable for the objective of the research which is to identify how many students preferred traditional note-taking and how many students preferred digital note-taking. The instruments in the questionnaire are based on previous literature reviews, and adopted in the questionnaire design. The analysis used in this study is descriptive, regression, and correlation through PLS-SEM to prove each of the hypotheses stated.

Sample and Procedure: The study investigated the association among three variables which are health expectancy, eco-environment friendly, and accessibility conditions towards students' preferences for digital notes vs physical notes through correlation research design. A survey questionnaire was developed with measurement scales to test the research model. An online survey was distributed through Google Forms and it took about three weeks to complete the data collection, using convenience sampling. The participants were able to answer the survey through their smart devices anytime and anywhere within the time frame stipulated. A total of 125 completed questionnaires were gathered and usable for further analysis. The demographic section covered the gender of the respondent and the semester taken by the respondents. The finding shows that out of 125 respondents, 62.4% were female, and 37.6% were male. Most respondents (56.0%) come from Semester 5, followed by Semester 3 and Semester 4 with 12.8% each. The lowest participation in this survey came from Semester 1 with 7.2%. Figure 2 shows the distribution of the respondents.

Figure 2: Gender of the Respondents



Questionnaire Items: The survey questionnaire consists of 30 questions, which have five (5) parts utilized to achieve the research objectives. These parts are divided by following the type of questions. Looking at the Google form, Part A is the 'Demographic information' question part and Part B contains the 'Preference among students to use digital notes or physical notes' part. Meanwhile, Part C is 'Digital notes and physical notes do affect students' health' and Part D is 'Digital notes positively impact the eco-environment question part. The last part is Part E. This part contains the 'Factors why students decided to use digital notes in lectures' question part. For the measures in the Statistical Package for Social Sciences (SPSS), since Part A only has gender and semester selection questions, it is a nominal question. Furthermore, seven (7) over nine (9) questions in Part B is the nominal type of measure as all those questions are 'multiple answers' kind of questions. In addition, the ordinal type of measure starts from question 8, Part B until the end of Part E. This is because all questions are Likert-type questions. This type of question consists of five (5) types of scales which are 1- Strongly Disagree 2- Disagree 3-Neutral 4- Agree and 5- Strongly Agree. All questions in all parts are basically related to students' lives about their preferences for taking notes inside or outside the lectures.

4. Results

Preferences on Types of Notes: The finding has shown that the majority (60%) of the respondents still prefer physical notes rather than digital notes (40%) in Figure 3. The reason behind this selection is that by handwriting, the students can memorize better than digital notes. Besides that, the students mentioned that by handwriting, it was faster to note down as compared with digital notes. Ito et al. (2020) anticipated that since typed letters are frequently difficult to read and do not have a consistent shape, handwriting would aid with memorization. The findings showed that handwritten characters have a higher likelihood of being remembered than fonts. Particularly, it is easier to remember handwritten characters that are familiar to you. However, in terms of convenience, students are more preferred digital notes because it's easier and more readable than physical notes (Figure 4). Meanwhile, the students also mentioned that taking digital notes, is faster (54.4%) than physical notes (45.6%) because by using smart devices e.g. Smart phone and tablet, it is easier and faster to note down (Figure 5). Studies have indicated that students who take notes on laptops in class do lower academically than students who take notes by hand on conceptual exam problems(Mueller & Oppenheimer, 2014). The findings also show that students frequently copy the lecture verbatim even if they can type more on computers. As opposed to taking notes on paper, this deprives them of the chance to analyze and comprehend material in a way that allows them to reframe it in their own terms.

Figure 3: Preferences on Types of Notes

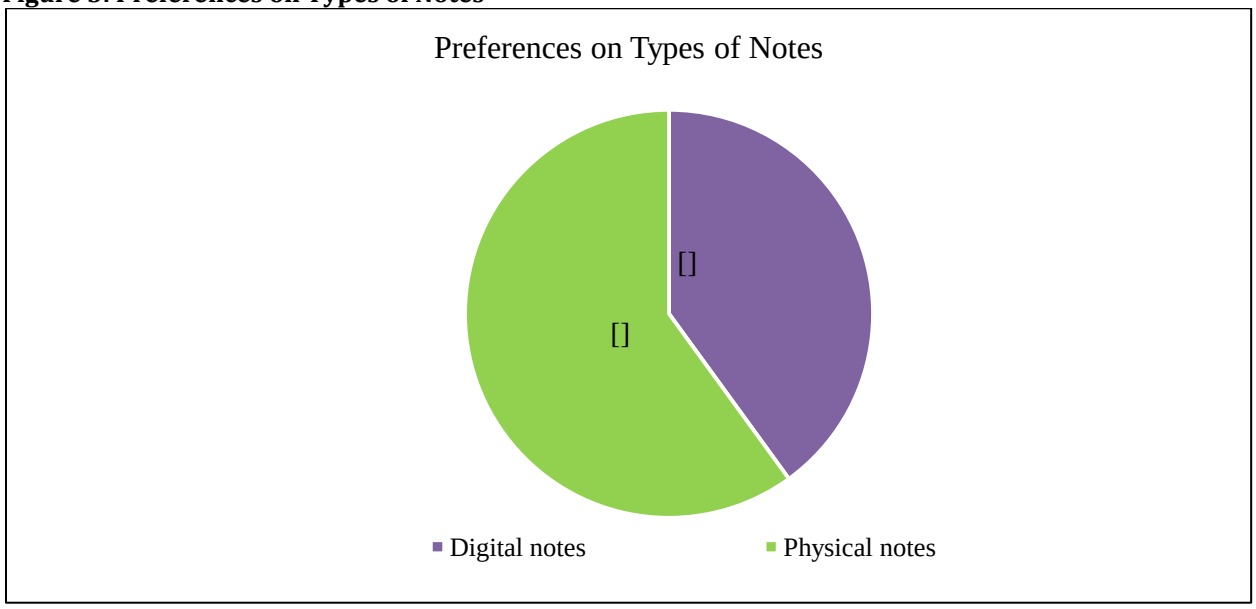


Figure 4: Types of Notes for Convenient

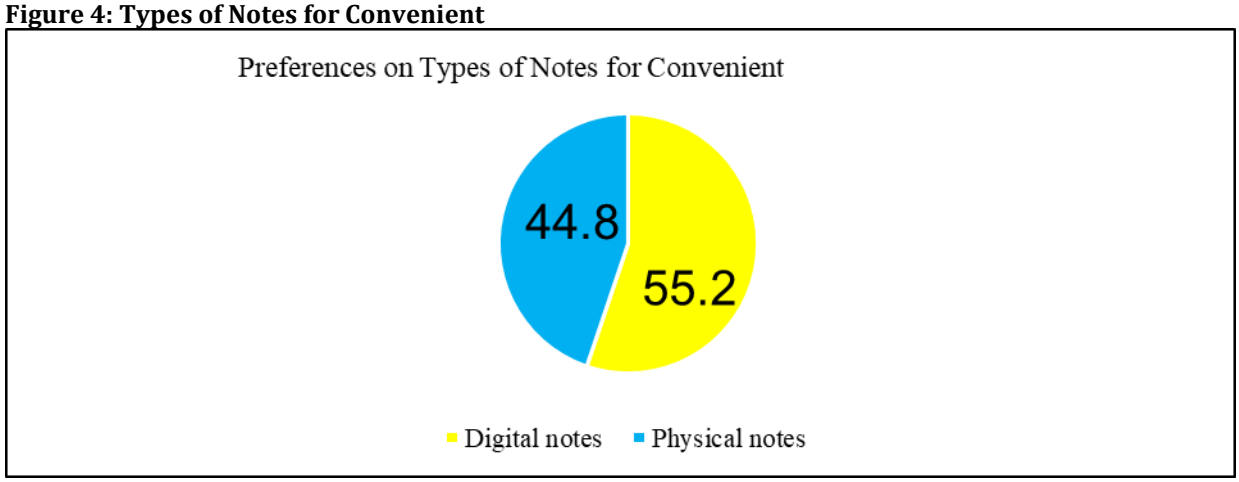
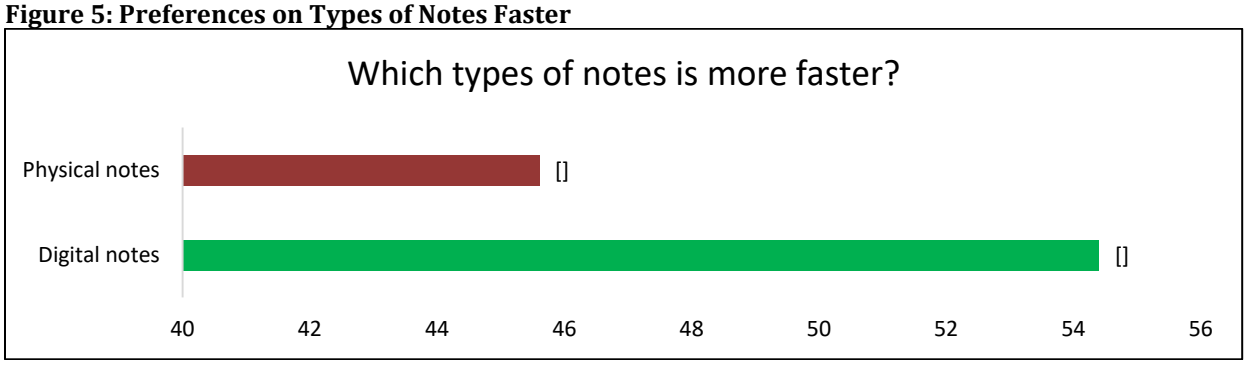


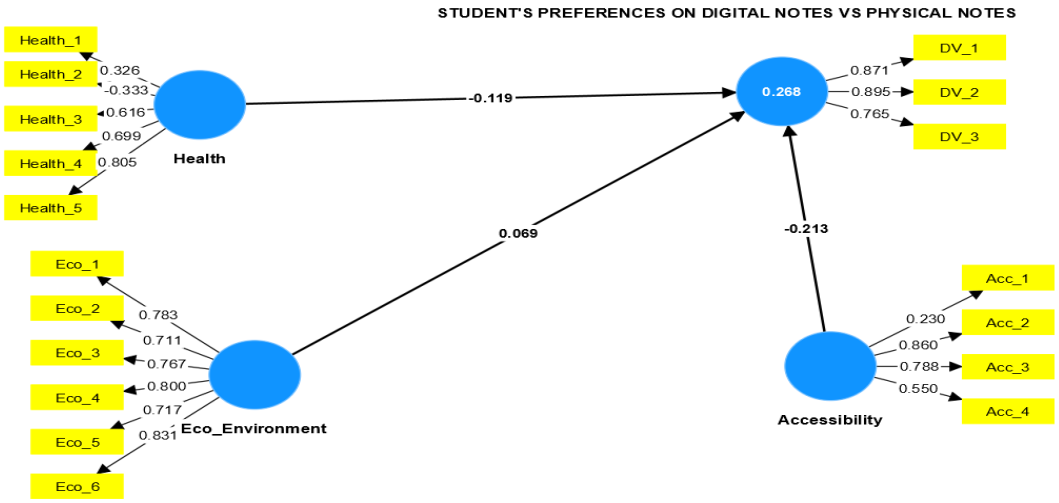
Figure 5: Preferences on Types of Notes Faster



Measurement Model: Figure 6 shows the original model of the model which comprises three independent variables of Health Expectancy, Eco-Environment Friendly and Accessibility Conditions towards students' preferences for Digital notes vs physical notes. The independent variable of Health Expectancy consists of five (5) questions, Eco-Environment Friendly has six (6) questions and Accessibility Condition has four (4) questions. From the figure, the R^2 of the model is 0.268 indicating that 26.8% of the independent variables

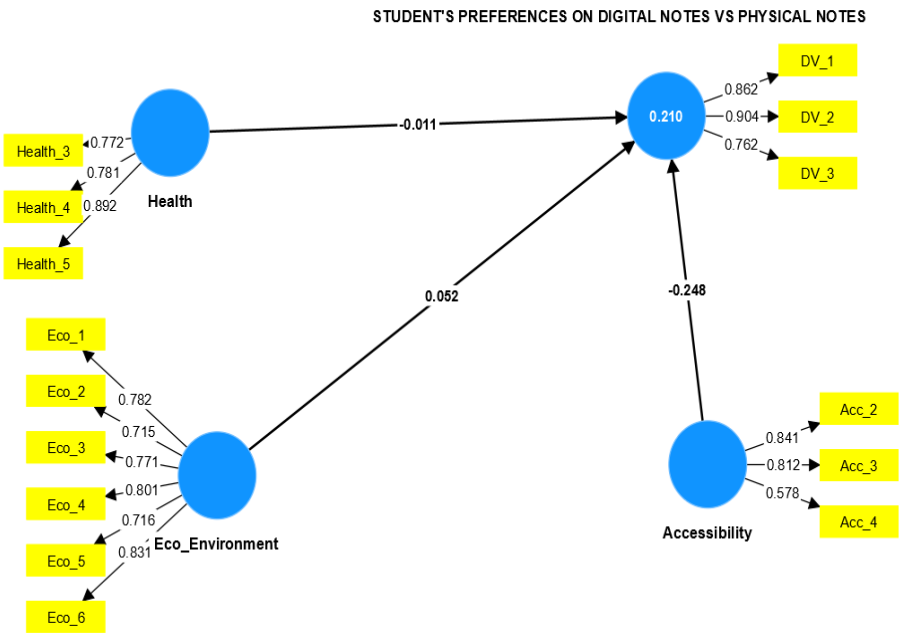
(Health Expectancy, Eco-Environment Friendly and Accessibility Condition) are explained to the dependent variable (student's preferences for digital notes vs physical notes), while other variables remain constant.

Figure 6: Original Model Smart PLS



The updated model was then produced due to some variables having low loadings. Overall, three items are deleted because the loadings are less than 0.50 which are Health_1, Health_2 and Acc_1. The R^2 value is then revised and results 0.210 indicating that 21% of the independent variables variables (Health Expectancy, Eco-Environment Friendly and Accessibility Condition) explained the dependent variables (student's preferences for digital notes vs physical notes), while other variables remain constant. The revised value is shown in Figure 7.

Figure 7: Updated Model- deleted low loadings less than 0.50 (Health_1, Health_2 &Acc_1)



Structural Equation Modelling (SEM) analysis with SMARTPLS 4 was utilized to estimate the model in two stages which are measurement and structural model for measurement quality and model fit. Measurement quality was judged by examining the Average Variance Extracted (AVE), Composite Reliability (CR) and loadings. Good measurement quality is exhibited when loadings ≥ 0.7, AVE ≥ 0.5 and CR ≥ 0.7 (Ramayah,

Cheah, Chuah, Ting, Memon, 2018). As shown in Table 1, the result shows that all loadings were more than 0.7 (except one item = Acc_3), AVE more than 0.5, and CR more than 0.7. Therefore, the convergent validity and the reliability of the measurement items were acceptable.

Table 1: The results of Construct Validity and Reliability

Construct (s)	Item (s)	Loadings	Composite Reliability (CR)	Average Variance Extracted (AVE)
Health Expectancy	Health_3	0.772	0.801	0.668
	Health_4	0.781		
	Health_5	0.892		
Eco-Environment Friendly	Eco_1	0.782	0.88	0.594
	Eco_2	0.715		
	Eco_3	0.771		
	Eco_4	0.801		
	Eco_5	0.716		
	Eco_6	0.831		
Accessibility Condition	Acc_1	0.841	0.712	0.567
	Acc_2	0.812		
	Acc_3	0.578		

In measuring the discriminant validity, it is suggested to adopt the Heterotrait-Monotrait (HTMT) ratio (Henseler et al., 2015). Table 2 displays the result of discriminant validity using Heterotrait-Monotrait (HTMT) ratio. The result indicated that all the ratios were lower than 0.90; thus, the measures used in this study are discriminant.

Table 2: The Result of Discriminant Validity Using the Heterotrait-Monotrait (Htmt) Ratio

No.	Construct (s)	1	2	3	4
1	Accessibility Condition				
2	Eco Environment Friendly	0.744			
3	Health Expectancy	0.702	0.465		
4	Student's Preference for Digital Notes vs Physical Notes	0.527	0.188	0.29	

Structural Model: 21% of the variation in Health Expectancy, Eco-Environment Friendly, and Accessibility Conditions explained in the student's preferences for digital notes vs physical notes, while other variables remain constant. Based on the p-value, 0.000 is less than 0.05 significant value, indicating that the overall model is valid.

Table 3: The Result of R^2, T-Value, and P-Value

R^2	Standard Deviation (STDEV)	T-Statistics	P-Values
0.21	0.061	3.467	0.000

Overall, based on the result (Table 4), only one variable, the Accessibility Condition is significant with p-value (0.000) less than a significant value of 0.05 towards students' preferences for digital notes vs physical notes. Meanwhile, the other two variables (Health Expectancy and Eco-Environment Friendly) are not significant due to the p-values more than 0.05 (0.400 and 0.193). Thus, H3 is supported.

Table 4: The Result of Hypothesis Testing

Hypothesis	Path	Lower Limit	Upper Limit	Std. Deviation	T-Values	P-Values
H1	HE → SP	-0.075	0.072	0.044	0.254	0.400
H2	EF → SP	0.004	0.219	0.060	0.869	0.193
H3	AC → SP	-0.335	-0.178	0.050	4.960	0.000

Note: Health Expectancy (HE), Eco-Environment Friendly (EF), Accessibility Condition (AC), Students' Preferences (SP).

The findings are also supported by correlation analysis as in Table 5. Only variable accessibility is significant as compared to the other two factors with significant values less than 0.05. According to Hair (1998), a value less than 0.30 can be considered a negligible correlation. The findings show that health expectancy and eco-friendliness have negligible correlation towards students' preferences for digital notes while for the variable accessibility; there is a negative low correlation towards the students' preferences for digital notes.

Table 5: Correlations Analysis

Correlations

		Health Expectancy	Ecofriendly Environment	Notes Accessibility Condition	Preferences Notes
Health Expectancy	Pearson Correlation	1	.486**	.586**	-.128
	Sig. (2-tailed)		.000	.000	.154
	N	125	125	125	125
Ecofriendly Environment	Pearson Correlation	.486**	1	.625**	-.128
	Sig. (2-tailed)	.000		.000	.154
	N	125	125	125	125
Notes Accessibility Condition	Pearson Correlation	.586**	.625**	1	-.310**
	Sig. (2-tailed)	.000	.000		.000
	N	125	125	125	125
Preferences Notes	Pearson Correlation	-.128	-.128	-.310**	1
	Sig. (2-tailed)	.154	.154	.000	
	N	125	125	125	125

**. Correlation is significant at the 0.01 level (2-tailed).

Discussion: This section focuses on the study's primary findings and discusses the research objectives. Three variables have been used to measure the students' preferences towards digital notes which are Health Expectancy (HE), Eco-friendly Environment (EF), Notes Accessibility Condition (AC), and Students' Preferences (SP). Based on the results, only one variable is significant which is the Accessibility Condition, while the other two variable is insignificant for Health Expectancy (HE) and Eco-Environment Friendly (EF). It is supported by correlation analysis that only the accessibility variable is significant with a negative low correlation to students' preferences towards digital notes. This result shows that by using digital notes, it is easier to access the notes without referring to the hard copy. This statement is supported by Sun & Li (2019) the students benefitted from digital note-taking and could improve their score in the academic. Moving towards a digital era for almost all industries in Malaysia, the education sector shall also consider the adoption of technology in the classroom for example note-taking. These three variables are not only the variables that should be looked at. Other variables related to the social, environmental and other factors should be considered to be added for future research. Overall, in terms of the adoption of technology, the students are still not prepared to go fully digital notes. To get students prepared for digital notes, clear instructions, and a manual shall be prepared for the students to get a clearer picture.

5. Managerial Implications and Recommendations

The implication of the results, the limitation, and directions for future research is discussed in this section. This paper offered a framework for evaluating the factors influencing the student's preferences for digital notes vs physical notes. Three variables are expected to influence the student's preferences which are health

expectancy, eco-environment friendly and accessibility conditions. However, the findings show that only one variable is associated with the student's preferences which are the accessibility condition. Haleem et al. (2022) agree that physical and social constraints allow students to collaborate from anywhere and at any time. The other two variables which are health expectancy and eco-friendly environment are expected to shift to the positive side of digital notes in the future. In terms of societal impacts, this study is expected to benefit the students, educators (lecturer and teacher), and the education system (Ministry of Education and Ministry of Higher Institution). This study has a broad knowledge of the health impact and quality of education impact. A combination of technology and traditional note-taking methods can be adopted in the first phase of note-taking after the pandemic situation to maximize the impact on the students, also to educators. It can be said that this study has long-term impacts since technology is widely used and going further.

The adoption of technology in education has been widely used around the world, especially after the COVID-19 embarkment. In tandem with the wave of technology, some of the parties such as students and educators are still struggling to get used to the current technology adoption. The process is believed to shift positively towards digital adoption in education. The use of digital notes is proven can reduce the use of paper, thus increasing the awareness of eco-environment friendly. Northeast Recycling Council (NERC) (2011) has discussed this issue into four (4) main measurements which are paper measurements, financial measurements, other measurements, and environmental measurements. Paper measurement is incorporated into decreasing paper purchasing, increasing paper recycling, reducing waste generation and increasing recycled content paper purchasing., Another factor is financial measurements consisting of reduced paper purchasing costs, and reduced toner and ink cartridge costs. Reduced printing costs, reduced disposal costs, and led to total annual savings. Another measurement also included reducing the storage needs and reduced copy and printer wear and repairs. Besides that, there is also environmental measurement which includes saving more energy through digital adoption, reducing greenhouse gas emissions, saving gallons of water, and saving landfill space.

Conclusion: In conclusion, this study has identified the accessibility condition that influences the student's preferences for digital notes vs physical notes. Surprisingly, the other two factors health expectancy and eco-environment do not support influencing the student's preferences. The study's findings have several implications for students and educators and point the way for future research. These results support the recommendation of using a combination of physical and digital notes. This method will slowly shift into fully digital utilization in the future. Supporting one of the goals in the Sustainable Development Goal (SDG), in Goal 4, Quality Education, it is hoped that digitalization can help students, also educators in achieving quality education over time.

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