

DIGITAL NOTE-TAKING APPLICATIONS FOR DIGITAL NATIVE LEARNERS

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Abstract

Note-taking is an indispensable skill to ensure success in learning. Note-taking can be done traditionally by pen and paper or digitally using ICT devices. Digital notes can be done using certain digital notetaking applications, which can be obtained freely or commercially. This paper intends to discover the university students' perception of the use of digital note-taking apps for their study during online learning sessions and their preferences for note-taking methods which are suitable for them. The data were taken from the online questionnaire distributed to 64 university students at a private university who were conveniently chosen as the participants for this study. The results showed that the students preferred making digital notes using their digital devices to writing them on paper. However, they did not use any specific note-taking apps, typing the notes using Microsoft Word instead. It was more practical and easier to use for them. The findings implied that note-taking is important no matter the device used to do it.

Keywords: Digital devices; digital note-taking; e learning; notetaking apps

INTRODUCTION

Note-taking has been dubbed as an important skill that should be mastered by learners to ensure their success in learning. Since our cognitive ability is limited, note-taking can help learners to record information during learning and retrieve that information for review before the exam. Experts on note-taking stated that note-taking has two important functions: encoding and external storage (Kiewra, 1985). Encoding function affects the learners' cognitive processing and working memory, while external storage function is used for reviewing purposes. Students who take notes will learn and remember the information better when they are taking notes, and later they will also retrieve the information easier (Anderson & Armbruster, 1986; Kobayashi, 2005; Ward & Tatsukawa, 2003). In another study, Kiewra and Frank (1988) stated that note-taking tasks assist learners in the process of concentrating, thinking, memorizing, recalling, and enhancing performance. Similarly, note-taking also improves the ability to learn, integrate, and capture knowledge (Salame & Thompson, 2020), as well as to improve learning achievement and academic performance (Van-Meter et al., 1994).

Notwithstanding the benefits of note-taking, the issue of note-taking currently focused on the methods for taking notes. Previously, students were taking notes using pen and paper in the classroom. However, students nowadays have to manage a large amount of information with different formats from various resources to complete their academic tasks; thus, a traditional note-taking method using pen and paper was deemed insufficient to meet these challenges (Sun & Li, 2019). In response to these challenges, students began to use digital note-taking method. Digital note-taking means taking notes using a mobile terminal (Sun & Li, 2019) or digital devices (Artz et al., 2020) such as phones, tablets, laptops, or computers.

The different methods of note-taking also affect the type of notes produced. Compared to handwritten notes, digital documents (notes produced by digital devices) have several advantages. They can be stored, transported, shared, computable, reproducible, legible, easily retrieved, printed, and secured (Sun & Li, 2019). In contrast, handwritten documents are sometimes illegible. It is sometimes difficult to find specific information in handwritten notes. Moreover, written notes are not always structured. In contrast, taking notes using digital devices allows note-taker to store more information since it is faster to type than to write (Brown, 1988). Since taking notes using computer is faster, it causes a tendency for the students to write more verbatim notes (Mueller & Oppenheimer, 2014). Verbatim here means that students tend to record notes word by word from teachers' presentation. Verbatim notes, therefore, are considered not too beneficial for cognitive processing.

Nevertheless, both notetaking methods are still practiced until now since each method has its own merit. A large body of research, however, show a different propensity towards one method over the other. Some prominent

researchers tend to support longhand note-taking or taking notes by pen and paper compared to computer notetaking (Mueller & Oppenheimer, 2014; Patterson & Patterson, 2017; Steimle & Mulhauser, 2007). They reasoned that handwritten notes are associated with better recall than notes taken on a computer or other devices. Other researchers show their preferences towards the computer note-taking (Bui et al., 2013; Olive & Piolat, 2002). They believe that digital note-taking can increase the information being recorded and as a result, it will also improve students' achievement (Biggers & Luo, 2020).

Because of this, in the past decade, many researchers have promoted the use of computers and electronic notetaking systems for recording and storing information and important concepts in students' learning (Luo et al., 2018; Kim et al., 2009). Besides, some researchers also claimed that many students are turning to laptop, tablet, or other forms of portable computers to maximize their note-taking efficiency. Digital note-taking is also believed to increase students' performance. For example, Sun and Li (2019) found that students who recorded notes digitally scored significantly higher than those who recorded notes conventionally.

Computer note-taking is commonly done by typing the notes on computer programs such as Microsoft Word or Google Document. Students usually type their notes from the teachers' oral presentation. Hence, as information is of many formats, such as audio, pictures, graphic, and many others, students need to create notes that can include all those materials in their notes. Typing notes using computer keyboard will produce written documents only. The notes needed, in contrast, can contain written text, pictures, audio, etc. This kind of notes is believed to be more useful for students' learning, especially for reviewing purpose before exam.

Notes that can integrate or contain different formats can be created by using notetaking application. Some researchers have developed a new type of recording system that integrates writing on the blackboard dan images using camera (Itamiya et al., 2017) which can produce notes in multiple formats. While researchers are still developing their note taking apparatus that will be suitable for classroom use, some commercial note-taking apps have been developed or available in the market.

There are many applications which are developed specifically for taking and storing notes such as Evernote or One Note. These applications can be installed in many devices and their contents can be synched across those devices. Therefore, the portability and practicality of these note taking apps will enable students to learn and review their lessons anywhere and anytime.

These note-taking apps are designed to facilitate note taking activities. Existing note taking tools varied from simple tool to full applications. Some existing tools are described below.

Microsoft OneNote is a note-taking program for free form information gathering and multiuser collaboration. OneNote can capture anything: users' notes, drawings, screen captures, and audio commentaries. This tool offers an alternative method for inputting data, either by typing on keyboard or using a stylus (digital pen) depending on the devices used (PC, Tablet, or Phone). This app uses virtual notebooks for organizing content and has a design similar to a physical three ring binder. The sections can be color-coded, and each section can have multiple pages. The notes can also be revised using highlights and ink annotation (Microsoft, nd)

Evernote is an app designed for note-taking, organizing, task management, and archiving. The users can create notes which can be in various formats, such as text, drawings, photographs, audio, or web page clippings, and many more. Notes are stored in virtual "notebooks", and they can be tagged, annotated, edited, searched, given attachment, and also exported. Using smartphone's camera, this app can scan and digitize everything from documents to business cards in an instant. Evernote is available as a web application with full feature in desktop as well as for mobile devices to allow users to capture and find information easily in any environment (McCracken, nd.).

Simplenote is probably the simplest note-taking app. This app provides an easy way to maintain notes, lists and ideas. Its main quality is about speed and efficiency. The notes can be typed, edited, tagged, and organized using pins. Its lightning-fast search functionality makes it easy to quickly find any entries. The notes can also be synchronized across multiple devices, such as from PC, tablet, or phone. Moreover, it works on every platform, including iOS, Android, MacOS, Window and Linux, or even via the Web.

Apple Notes is a note-taking app that is pre-installed in all Apple devices, be it computer, tablet, or phone. The notes can be synchronized on every Apple device with the same account. The note can be typed, handwritten using Apple pencil (on iPad) or spoken (using Siri). The app's camera also makes it easy to add photos, or can paper documents to digitize them into notes (The balancesmb.com)

Even though note-taking applications have various features and based on advanced technology, some experts think that they are not enough to fulfil learning needs or meet some learning criteria (Mosleh et al., 2016). They further claimed that note-taking software fail in supporting note-taking functions as well as suffer in usability, mentality, and knowledge capture. The most notable failure of notetaking apps is that they have some major learning deficiencies that will negatively affect the learning process (Mosleh et al., 2016) since most note-taking apps were developed without learning consideration (Kim et al., 2009) In other words, note taking apps were built with limited functionality but not specifically for students' learning purposes (Gathercole & Alloway, 2008)

Mosleh et al. (2016) classified four major issues regarding the note-taking apps: complexity challenges, inefficiency issue, integrability challenge, and technology learning dilemma. Complexity challenges occur since notetaking is a complex process from comprehension and selection of information to written productions, and this process is more difficult to be represented digitally. Secondly, inefficiency issue occurs when taking notes in digital devices due to their linearity, weak interface design, and limitations of the free form tools. Integrability challenge happens because of the difficulty of integrating the wide diversity of current technology (both hardware and software) within a typical notetaking application. Finally, improper usages of technology can lead to negative impact on learner. For example, the use copy paste function on note-taking applications can reduce the learner's ability to memorize knowledge and hinder retention.

Despite their downsides for educational purpose, the note-taking apps are not too popular among the students. University students nowadays can be considered as digital natives, who are surrounded by technology in every aspect of their life (Prensky, 2001). Yet, when taking notes, they either do it by writing with pen or typing on computer keyboard.

The existing body of research on note-taking is mostly focused on the difference of students' academic achievements from longhand note-taking and computer note-taking (Igo et al., 2005) even though there have been inconclusive results on which method is better (Morehead et al., 2019). Moreover, some other published studies focus on students' preference towards longhand or computer note-taking.

So far, however, there have been little attempts to examine the students' perceptions on the use of notetaking applications in their study. Although they can be called digital natives, it is still unknown whether they are willing to integrate technology in their learning, especially by using notetaking apps to take their study notes and use them for their study success.

Following this question, the researcher tried to formulate two research questions:

1. How do students perceive the use of note-taking apps for digital notetaking?
2. What are the reasons for using or not using the note-taking apps for taking notes?

METHODS

This research applied a descriptive quantitative method using a survey design. The purpose of this study was to describe the students' perceptions on notetaking and notetaking applications. A survey was chosen to find a numeric description of trends, attitudes, or opinions of a population by studying a sample of that population (Creswell & Creswell, 2017).

The participants of this study were 64 Binus University students (35.9% male students and 64.1% female students) who were selected from the researcher's classes of Seminar on Research, by way of purposive sampling method. This method basically allowed the researcher to choose the participants who could provide the best information to achieve the objectives of their study (Kumar, 2014) Thus, the researcher assigned all her students in Seminar on Research class to be the participants of this study. Their responses were calculated as one of the course assignment scores. This course basically consisted of the students presenting their research proposal for their undergraduate thesis. In this course, the students were obliged to take notes of their fellow students' presentations.

To gather the data, the researcher spread an online questionnaire regarding their note-taking activity and devices used for note-taking. The questionnaires consisted of five questions in Likert scale format, with five choices of frequency from always to never and open-ended questions, asking about the notetaking apps they used and the reasons for using or not using the apps. The data from the questionnaire were then calculated using descriptive statistics and presented in tables and charts.

FINDINGS AND DISCUSSION

The results of this study are presented and discussed in separate sub sections. The responses to questions in the questionnaire are displayed in subsequent order.

Findings

The first question asked whether the respondents take notes for their college courses. Their responses are presented in Table 1.

Table 1
Students' notetaking frequency

Responses	Frequency	Percentage
Always	6	9.38
Often	15	23.44
Sometimes	36	56.52
Rarely	7	10.94
Never	0	0.00
Total Mean = 3.3	N=64	66.00

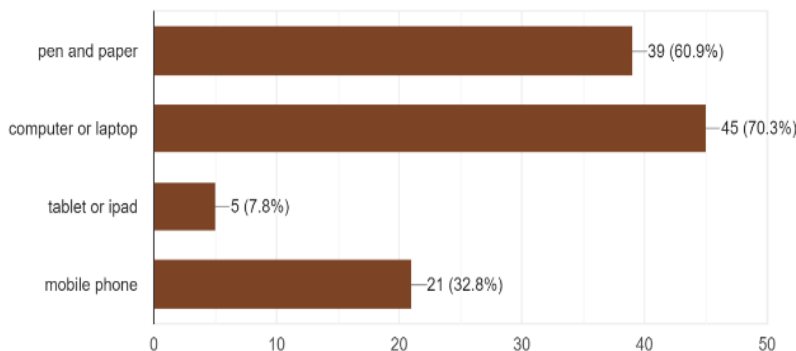
From table 1, all students took notes during their lessons, although the frequency of note-taking differed. Only 10.94% said they rarely took notes. These students probably only took notes for the course that they were obliged to take notes. Yet it indicates that they were still taking notes even though they were 'forced' to do it. The total mean score of all students is 3.3 out of 5. That means around 66% of the students did take notes for their study. The results suggest that students were aware that note taking could improve their chances of success in their study. In their study, Salame and Thompson (2020) also found that taking note is good to improve students' achievement.

The second question asked about the respondents' familiarity with note-taking apps such as Evernote or One Note. For this question, 40.6% answered Yes, while 59.4% answered No. Their responses indicated that note-taking apps were not too popular among students albeit they took notes in their study. Students thought they did not really need an app to make notes, since the notes that they were making were quite simple, just textual notes. Thus, note-taking apps with a lot of features were not really necessary. Complexity challenges can be one of reasons why students are reluctance to use notetaking apps (Mosleh et al., 2016)

The third question, then, asked the devices they used to take notes. For this question, there were four choices, which are pen and paper, computer, tablet, and phone.

Figure 1
The third question

3. What devices do you use to take notes?
 64 responses



For question 3, respondents could choose more than one answer, so it was possible that they used multiple devices for taking notes. For example, they could make notes on paper as well as typing on computer. However, we can see that 70.3% of the students chose to take notes on computer, compared to 60.9% who wrote their notes on paper. If the devices were combined, those who chose to take notes using digital devices were bigger than those who chose conventional pen and paper note-taking. Regarding this preference, this result confirms Artz et al. (2020) and Peveryly and Wolf's (2019) studies that millennial students prefer computer notetaking to traditional one. However, since this study was done during the online learning period, it was also possible that the preference for digital note-taking, especially using computer, was because they attended the lesson via zoom meeting on their laptop or computer, so taking notes directly when learning was more practical by using the same device.

As a follow-up to the second question, students who were familiar with note-taking apps were asked, which note-taking apps they used. Their responses were shown in Figure 2.

Figure 2
Notetaking tool used

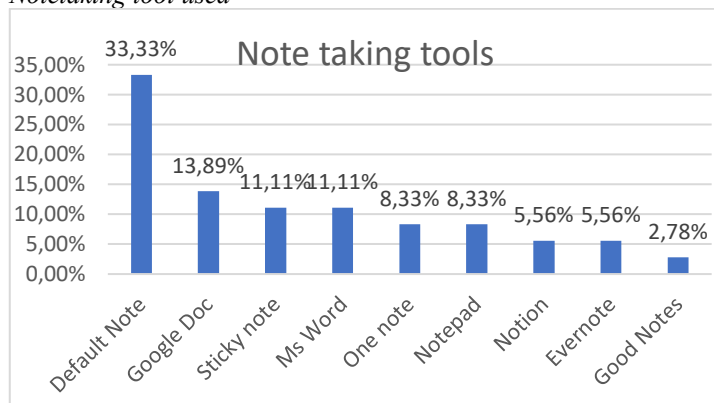
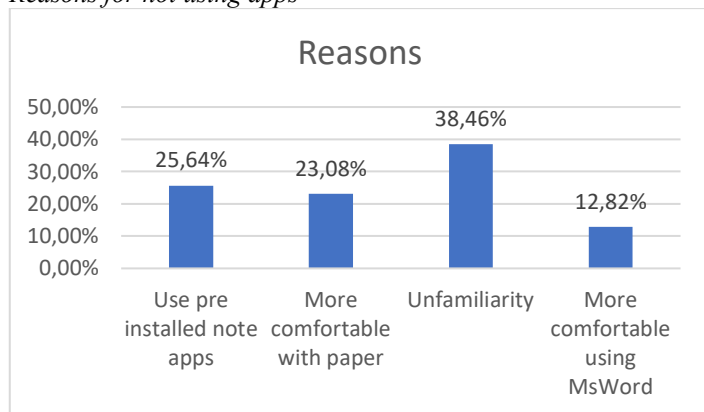


Figure 2 shows that 33.3% of the students who were familiar with the note-taking apps used the default note or the apps that were already installed in their devices. For example, Apple Notes is already installed in all Apple devices (iPhone, iPad, and Mac). Similarly, Samsung users also use pre-installed notes apps. 13.89% used Google Docs and 11.11% used Microsoft Word as an alternative for note-taking apps, even though Google Docs and Microsoft Word could be categorized as computer software not an app. The next, around 11.11% used Sticky note, which was also pre-installed in many digital devices. The rest of the participants used note-taking apps such as One note, Notepad, Notion, and Evernote. Being the best note-taking application in 2022 according to <https://www.thebalancesmb.com>, Evernote was only used by 5.56% of the students.

Finally, the reasons for the unpopularity of note-taking apps among the students were shown in the following chart.

Figure 3
Reasons for not using apps



The most dominant reason for not using note-taking apps is the unfamiliarity of the apps, which was stated by 38.46% of the students. One of the participants even said, “This is the first time I heard about Evernote and One Note.” The second notable reason is that they used pre-installed note apps (25.64%) as discussed in the previous question. Because of this, they did not need to download or use any other applications that were sometimes not freely available. One participant explained the reason, “I use the note app that comes with my phone (not downloaded in App store) because it has quick accessibility and doesn’t take much memory space.” Another student said, “I don’t use other notetaking apps. In PC I use either notepad or Word and, in my phone, I use Samsung notes or I write it down in my Discord server that I made to keep any information.” Interestingly, 23.08% stated that they felt more comfortable writing on paper. The reason for this is stated in this statement, “I mainly do my note taking using pen and paper. It makes it easier for me to remember what I write, and easier access for when I need to revisit the notes.” A similar answer is given in this statement, “I don’t use any mobile or desktop applications for taking notes since I prefer to directly write on my notebook, because it will help me understand the material easier.” Finally, they did not need an app since they were more comfortable using Microsoft Word (12.82%) for typing their notes. One explanation is given, “I usually write my notes in Ms. Word

or in a notepad file. I'm more familiar with those programs, though I would give Evernote a try." Microsoft Word is most practical for them, as one student claimed it is already convenient enough for note-taking.

Discussion

Taking notes can be done conventionally using pen and paper and digitally using digital devices. Thus, digital note-taking in this study refers to the method of writing (typing), recording, storing, and sharing notes on digital devices such as phones, tablets, laptops, or desktop computers. The finding of this study found that 35.5% of the participants prefer conventional note-taking method, while the other 64.5% chose digital note-taking. The results are in line with the

Students who chose conventional note-taking reasoned that longhand writing had several advantages. They said that writing notes could help them understand the material better and recall it easier. Handwritten notes also read like a book, could be accessed quickly and they were not easily lost or misplaced. In short, students claimed that conventional notes worked better for them. In literature, it is found that handwritten notes are associated with better recall than computer notes (Olive & Barbier, 2007; Patterson & Patterson, 2017; Peverly et al., 2014).

On the contrary, supporters of digital note-taking emphasized that digital notes are easily accessible from any device and easy to use. They also said that sometimes they do not have to type but they can screenshot the materials and compile them as notes. However, some students admitted that taking notes using digital devices was not so effective because it caused so much distraction. Distraction caused by computers has been discussed by (Nakayama et al., 2014) since they detract from class discussions and student learning. Note-taking using computer during learning is cognitively demanding and may become one source of distraction (Fang, 2020).

Notwithstanding the reasons from the supporters of both methods, previous studies showed diverse results regarding the students' preference of digital or conventional notes. For example, Artz et al., (2020) found that 92.1% of the students preferred to take notes on paper, but after a series of experiment of digital note taking, no one want to switch to paper and pencil anymore. Meanwhile Murtafi'ah et al. (2020) reported that students' use of digital or traditional note-taking depended on the situation. This is also supported by Morehead (2019) who reported that students liked the flexibility of notetaking method.

The present study confirms that university students prefer to take digital notes. However, digital notes do not necessarily be made using certain notetaking applications, such as Evernote. This study found that only 40.6% of the participants were aware of the note-taking applications. Most of them admitted that they prefer to use ordinary software such as Microsoft Word or Google Docs to make notes, or the default note apps which are already pre-installed in their devices. The findings suggest that note-taking apps are not too essential for the students. Probably, the main reason is the inefficiency challenge as stated by (Mosleh et al., 2016). Opening several apps while learning requires students to do multitasking, which will impair their learning. Thus, students chose to take notes using more practical method.

CONCLUSION

The findings from the present study suggest that most students do take notes in their study albeit they do not take notes all the time. For the note-taking mode, 64.5% of the students prefer to take notes using digital devices while the rest still chose conventional method using pen and paper. Moreover, this study found that note-taking applications are not too popular among university students since they are considered impractical and taking too much space. As the alternative, students use default notes and software like Microsoft Word to make their notes. The findings indicate that the current note-taking tools are still inadequate and inefficient to be used for college notetaking purposes. The current available note-taking tools have already been equipped with many sophisticated features, but they should be further improved by considering the learners needs. However, this study only discussed the students' preference regarding the digital note-taking method, not particularly focused on the features of the notetaking apps. Thus, future researchers can do a more comprehensive study to discover how note-taking apps features can be used to improve students' note-taking ability.

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