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Do types of gadgets used for online learning have a bearing on student academic performance?

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ABSTRACT

This paper explores the impacts of using smartphones vs laptops on students' academic achievement in their English courses and their satisfaction in learning English via open distance learning (ODL). Experiments were conducted in authentic teaching sessions with a total of 304 undergraduates from a local university. The methodology applied is a quasi-experimental design with post-test-only. Results indicate that the relationship between the grade obtained and level of satisfaction with gadget is low and not significant at 5% level of significance. However, there is a significant relationship between the level of satisfaction towards gadgets used for learning English courses and learning English via ODL classes since the p-value is significant with a correlation value of 0.455. Finally, there is a low correlation between the grade obtained and level of satisfaction in learning English during ODL classes. Future research should be conducted to further check on the effects of using mobile phones against other mobile devices on other subjects learnt in the universities.

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1. INTRODUCTION

In 2021, the percentage of households' access to mobile phones stood at 99.6% [1]. The same report also showed that the most popular internet usage activity, which stood at 99.0%, was participating in social networks. This indicates that smartphones have been widely used for social purposes. Were smartphones used widely by students when ODL was implemented during the COVID-19 pandemic?

Malaysia's higher learning institutions had jump-started the open and distance learning (ODL) practices when education was disrupted during the COVID-19 pandemic. Soon ODL became an emerging trend for students to access education and for universities to provide a conducive learning environment for their communities. Via ODL, students were able to attend tutorials and online lectures, besides engaging in self-directed online learning [2]. Regarded as economical and cost-effective, technology-driven distance learning ODL became an important medium of learning for undergraduates during the COVID-19 pandemic [3]. ODL requires both the instructors and the students to have access to electronic media and devices which are used as tools for teaching and learning. Although many have personal computers or laptops, there are still some students who could only afford a smartphone as their learning tools. A smartphone is a mobile phone with advanced features such as having a high-resolution touch screen display, Wi-Fi connectivity, Web browsing capabilities, can be used to make voice and video calls, and even for navigation with GPS [4].

The apparent difference between a laptop and a smartphone is the size of the screen and the comfort when using them. Since laptops naturally have a wider screen, it is assumed that they are better learning tools than smartphones. Besides that, some features of smartphones do not exist on laptops, and vice versa. For example, 'pull down to refresh' is available on smartphones only, but laptops have proper full keyboards. We believe even small changes in how a device works can affect students' engagement with the content.

Alternatively, it could also be a personal choice that students prefer to learn English using their smartphones. Whichever the choice is, does it make a difference if a student learns via a laptop or a smartphone? Students mostly use smartphones on social media platforms such as Facebook, WhatsApp, Instagram, Twitter, and online shopping applications [5]. The same study pointed out that some students use smartphones to follow virtual lectures and complete assignments that require them to record their presentations. The study concluded that students use smartphones more for social than educational purposes.

Against this backdrop, it is imperative to explore the perception and satisfaction level of online learners regarding the usage of smartphones for learning. This study focuses on undergraduates taking up English courses in ODL. Accordingly, a systematic review was undertaken to seek a response to the following hypotheses: i) There is a positive association between the grade obtained for English courses and the gadget used during ODL classes in English courses; ii) There is a positive relationship between the gadget used for learning English and students' level of satisfaction in learning English during ODL classes; and iii) There is a positive relationship between the overall grade obtained for English courses and the level of satisfaction in learning English during ODL classes.

When technology sets in, teaching and learning at higher education institutions are no longer confined to the traditional method or face-to-face teaching within the four walls of a classroom [6], and this brought about ODL which entails students learning via interactive videos and completing exercises or assessments uploaded on online platforms such as Google Classroom or Microsoft Teams. In the ODL environment, there is "no physical, social interaction with lecturer and groupmates to perform course assessment" [7]. In ODL, students can obtain course materials, participate in lessons, and take tests without having to be in any physical classes [8]. This virtual classroom could function almost like a normal classroom – both teachers and students are gathered in a same learning environment; students can hear their teachers and ask questions; teachers can pass the virtual microphone to students for them to voice opinions as well as present information virtually [9]. However, most students were dissatisfied and uncomfortable learning English in a complete online learning environment and favored a blended learning mode whereby they can have the best of both worlds – online learning and the real in-person classroom teacher [5]. Blended learning is a beneficial learning mode that incorporates the strengths of both face-to-face and online learning experiences [10]. In blended learning, students are found to be more self-disciplined and responsible for their learning, as well as are able to take charge of their own learning plans and goals [11].

Learning via technology has its share of advantages and disadvantages. Apart from lacking technological know-how, students also have problems identifying the proper gadgets for effective online learning [12]. With the sudden switch to online ODL due to COVID-19, many students have no other alternatives but to use their smartphones as a learning tool. Unexpectedly, students discovered that they could access their lecture materials on their smartphones and quickly access information online to meet their information needs via learning management systems, academic databases, and related websites. A study [13] claimed that "…smartphone has also made students' lives easier, as they can access their class information on the gadget for ODL classes." Educators and students have positive acceptance of using smartphone applications for virtual learning [14]. The educators in the study [14] also stated that learning virtually is "very worthy", and that mobile applications are effective in enhancing learning motivation among students.

Smartphones are multi-functional and are widely used by students, and thus enable them to be connected and stay updated with learning materials. Besides that, a smartphone has more functions compared to a laptop, such as a camcorder or excellent camera [15]. Smartphones support learning either offline or online. Users of smartphones can access and download any forms of learning materials such as pictures, videos, animations, and documents in the forms of PDFs, PowerPoint, Word, or Excel [16] irrespective of their geographical location if there is Internet access. They can also visit websites that meet their information needs. The use of smartphones has changed the dynamics of student learning activities. It is refreshing to note that students can carry a whole semester's learning materials on a small smartphone, giving them the latitude to learn in an area that, in a normal circumstance, will require a laptop or other related form of a computer. For instance, students can access their lecture materials in a car, train, or restaurant. It also enables students to take a quiz or sit for a test using an assigned or registered learning management system besides having a group discussion digitally.

The use of smartphones as a learning tool is beneficial as it enhances students' cognitive capacity and confidence, motivates them to study in formal and informal settings, and promotes personalized learning [17]. In terms of language learning, students could utilize smartphones applications to improve their pronunciation and spelling, listen to authentic dialogues of native speakers, and assist them in knowledge

retention [18]. A study by Chua *et al.* [18] also discovered that smartphone applications could enhance students' pronunciation in learning Mandarin as a foreign language.

It has been assumed that smartphones have constraints and are far from being able to create equitable virtual learning environments that can produce good grades for learning. According to a study [19], students did worse on a test when they used their phones to answer a reading test. Another study showed that mobile phones have the potential to encourage distraction and multitasking, which is bad for learning [20]. In yet another study conducted in Jakarta, Indonesia [21], students who used a desktop environment scored higher in learnability than those who used a mobile app version. The same study found that students using the desktop version were more satisfied because desktops were more efficient as they were more compatible with the different platforms used for ODL. In another study, the researchers reported that students did not find learning using smartphones comfortable because they found that the screen was too small to read [22].

Laptops with keyboards tend to be preferred over touchscreen smartphones when typing [23], [24]. A plus point of using the laptop for academic purposes is that references in MLA, APA, or other formats can be easily done and this helps students to easily format references and assignments. Learners' satisfaction regarding their learning experience differed based on the screen size – students' responses tended to be positive when using large screens of laptops, but not in the case of small screens of mobile phones, and this suggested that screen size is critical to the success of effective learning [22]. However, in the study on a group of 51 medical students, there is no significant difference in the factual and recall scores for laptop and tablet note-taking [25]. This could mean that screen size does not affect factual and retention capability. A study conducted among undergraduates in Indonesia [26], found that there was no difference in the level of satisfaction with learning physics online using smartphones and laptops.

Some studies, however, have shown that with learning devices such as smartphones and tablets at hand, there is an increase in students' time-on-task completion, and thus students' academic achievement improved [27]. In a study on the effects of using tablets versus desktop PCs in Extensive Reading Programs, the students who used mobile devices performed better in online activities and reading achievements [28]. In another study on the use of mobile devices in learning [29], the usage of mobile devices could also increase students' learning interest and concentration. In addition, smartphones are known to have long-lasting batteries and easy access to the internet with built-in 4G and Wi-Fi. This means that during the lockdown, with low preparedness, mobile phones could have been the most versatile tool to access online lectures and be up-to-date with learning. Although smartphone usage is prevalent among university students, the contribution of technology in academic achievement among them is still inconclusive.

With the advancement of technology and the rise in ODL, language learning classrooms are being redefined and remodeled to meet the needs of modern digital learners. Technology tools used in the teaching and learning of English have been found to encourage teachers to be more "active, proactive, and creative" as well as provide "a more active and effective way of learning" for students [30]. Several studies have concluded that the usage of digital tools in an English as a foreign language classroom is beneficial for the pupils' English language learning [31], [32]. Thus, it is important to incorporate technology in English language courses so that students can connect to the real world to enrich their learning experience.

Through activities such as blogging, video editing, and online presentation, the use of digital technology in an English course improves students' linguistic competence [33]. When students are given the opportunity to create and share contents in English, it increases their impact and visibility in the digital world and makes them feel like digital heroes of their time. Digital technology also creates opportunities for students to acquire the language beyond the walls of the classroom through unlimited activities. Creating original multimedia products can be highly motivating to students as they learn the vocabulary and grammar needed to communicate their messages to an audience outside of their classroom, ideally to a real audience and for a real purpose. Students might make a mini documentary to show to another class or create a PowerPoint presentation about diabetes for members of the community [34]. By giving them a chance to be in the director's chair, students have opportunities to use various digital tools to showcase their use of language in fun and creative ways and this gives them some control over their own learning.

2. RESEARCH METHOD

To respond to the hypotheses, participants were recruited using non-probability sampling based on convenience that allows for easier data collection. Students who had enrolled in English courses offered by the Academy of Language Studies from a local university were chosen as samples. The survey was conducted towards the end of January 2022 (during the final week of their current semester). This was when they had completed an entire 14-week course learning English via ODL. Using a Google Form, the undergraduates were provided documents electronically which included a consent form (to use their final

English grade for the study) and a questionnaire. The researchers shared the link to the questionnaire via class WhatsApp groups. Students were allocated two weeks to submit the completed questionnaire.

The researchers always wish to know if the measurement tool employed measures the intended research concept or construct (Is it valid or a true measure?) or if the measurement tools used to quantify the variables provide stable or consistent responses (Is it reliable or repeatable?). External validity refers to how accurately the measures obtained from the study sample described the reference population from which the study sample was drawn [35]. For this study, all the students (412 in total) who were attending the English Course, "English for Critical Academic Reading" were selected as samples for the study. Of the 412 students, 304 students responded by answering and returning the online questionnaire (Google Form). The return rate was 73.8%.

3. RESULTS AND DISCUSSION

3.1. Gadgets used and grades obtained

As seen in Figure 1, 228 respondents (75.0%) said that they used laptops. This is followed by 65 respondents (21.4%) who used smartphones, 6 students who used tablets (2.0%) and finally 5 students who used personal computers (1.6%). Collectively, a total of 233 students (76.6%) followed their English courses using desktops (laptops and personal computers) and 71 students (23.4%) used mobile devices (smartphones and tablets/iPads).

Next, with the students' permission, their final English course score was obtained from the student's academic affairs department at the university. As presented in Table 1, 188 students (61.8%) obtained grade B (total of B+, B, and B-). This is followed by 95 students (31.3%) obtaining grade A (total of A+, A and A-). Only 21 students (6.9%) obtained grade C (total of C+, C, and C-).

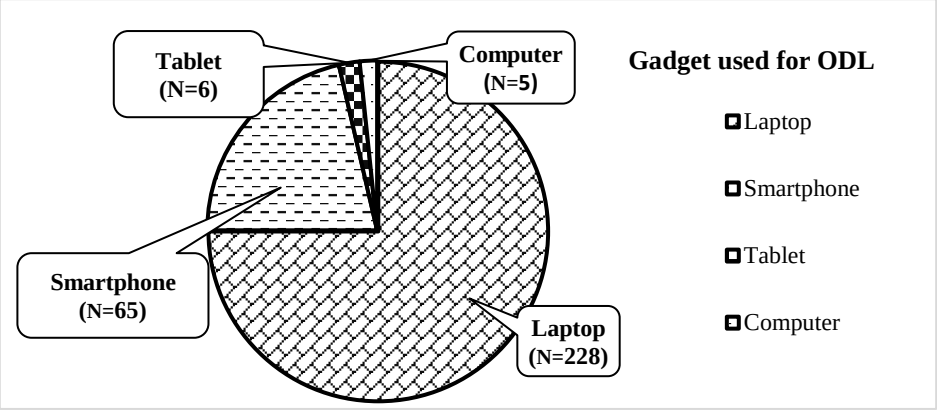

Figure 1. Gadget used for English course ODL

Table 1. Students' English course grade

Grade	Count (Percentage)
A (A+, A, A-)	95 (31.3)
B (B+, B, B-)	188 (61.8)
C (C+, C, C-)	21 (6.9)
D	0 (0.0)

3.2. Results of Chi-square test for hypothesis 1

Table 2 depicts the grade distribution for the English course and the type of gadget used in ODL. The weight of the distribution shows that most English course students fall in the grade B category, irrespective of the gadget used. Of students who used mobile devices (smartphones and tablets/iPads) to learn English, 25 of them (52.1%) got a grade B, and for students who used desktops (laptops and personal computers) to learn English, 177 (69.1%) of them also got a B.

A Chi-square test for independence normally used to test whether two variables are independent or not [36] was used to check whether the use of different gadgets (mobile devices vs desktops) and students' final English course grades are related. The p-value of the chi-square test is 0.309, indicating no association between the grade obtained and gadget used for learning English in ODL. The student's performance in English does not relate to the gadget used in online learning. With this, hypothesis 1 is rejected.

Table 2. Distribution of respondents by grade and type of gadget used in ODL

Grade		Gadget	
		Mobile devices	Desktop
A	Count (% within gadget)	19 (39.6)	66 (25.8)
B	Count (% within gadget)	25 (52.1)	177 (69.1)
C	Count (% within gadget)	4 (8.3)	13 (5.1)
Total	Count (Percentage)	48 (100.0)	256 (100.0)

Note: Mobile devices comprise smartphones and tablets/iPads and desktops comprise laptops and personal computers

3.3. Hypotheses 1, 2, and 3

In this paper, the relationship between the grades obtained and the level of satisfaction with learning English courses online is explored using Kendall's Tau Correlation coefficient. Kendall's Tau is a nonparametric measure of the strength and direction of association between two variables measured on at least an ordinal scale. A brief discussion on the relationships between the variables mentioned in each of the hypotheses is presented.

Hypothesis 1: There is a positive association between the grade obtained for English courses and the gadget used during ODL classes in English courses. Previous studies in this area have yielded opposing results. Several studies [37]–[40] claimed that appropriate use of electronic gadgets may improve academic performance of students. Among the postulated reasons are students found learning enjoyable with the use of these gadgets [41], [42] and an increase in learning motivation among students [43], [44]. However, several researchers [45], [46] discovered that mobile phones could be a distraction and caused students to fall behind in their studies. In this study, the correlation coefficient and p-value between grade and satisfaction with gadgets used for online learning are 0.016 and 0.797, respectively as presented in Table 3. This indicates that the relationship between the two variables is low and not significant at a 5% level of significance. Based on this result, we decided to reject hypothesis 1.

Hypothesis 2: There is a positive relationship between the gadget used for learning English and students' level of satisfaction in learning English during ODL classes. Referring to Table 3, there is a significant relationship between the level of satisfaction toward learning English courses online and the level of satisfaction towards gadgets used for online learning since the p-value (0.000) is significant and the correlation value is 0.455. With these outcomes, hypothesis 2 is accepted. The finding of this study concurs with those of [43], [44]. Students can have 'better access to fast and convenient learning' [47], and this increases their satisfaction in learning.

Hypothesis 3: There is a positive relationship between the overall grade obtained for English courses and the level of satisfaction in learning English during ODL classes. The correlation coefficient and p-value stand at 0.126 and 0.048, respectively indicating that the relationship between the grade obtained and the level of satisfaction with learning English courses online is significant but with a low correlation value. Therefore, hypothesis 3 is accepted. This finding agrees with previous studies [48], [49].

Table 3. Relationship between grade, level of satisfaction towards learning English course via ODL and gadgets used for online learning

	Grade	Level of satisfaction towards learning English course via ODL	Level of satisfaction towards gadgets used for online learning
Grade	1	-0.126 (0.048)	0.016 (0.797)
Level of satisfaction towards learning English course via ODL		1	0.455** (0.000)
Level of satisfaction towards gadgets used for online learning			1

**significant at 5% level of significance

4. CONCLUSION

In conclusion, more students prefer to use laptops compared to smartphones to attend their English courses. This study found that students' achievement in English courses is not affected by the gadget they use to learn the subject in ODL. Further, the study also noted an association between students' satisfaction with learning English and their gadgets. The students seem to be satisfied using the gadgets they are presently using, whether a laptop or a mobile phone, for learning English in ODL. Finally, the study also found that there is a weak relationship between the level of satisfaction in learning English via ODL and students'

achievement. So, in online virtual learning, students who use smartphones and laptops get almost the same satisfaction, with the level of satisfaction categorized as satisfied.

This study only highlighted the students' perceptions regarding the impacts of using smartphones or laptops on their academic achievement in their English courses and their satisfaction in learning English via ODL and may not represent the general concept. The observations are limited to a single institution only. The involvement of other institutions can be utilized for generalized statements. For future research, we suggest expanding the current study to include students from other institutions of learning to make the data more reliable and examine how device choice can influence concentration and attention. There is a need for primary research in this area to examine the impact of device choice on students' concentration and attention when viewing recorded video lectures and participating in other learning activities. More studies in this area may uncover new dimensions, which is a challenge for this study.

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