

IMPACT OF TECHNOLOGY USE ON STUDENTS' ACADEMIC PERFORMANCE IN SECONDARY SCHOOLS IN AGBANI EDUCATIONAL ZONE

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Abstract

Today, there is growing use of technology by students. This study aimed to analyze the use of technology tools in secondary schools and determine the impact of time spent on technology tools on students' academic performance. The results show that although students are conversant with all the considered technology tools (Google, Wikipedia, WhatsApp and Podcasts), the purpose of use varies. Specifically, the results indicate that 9 in every 10 students in secondary school conducted internet searches for information on Google and Wikipedia, and chat and communicate with friends on WhatsApp instant messaging applications, suggesting that students are seriously into technology use. On the impact, this study shows that technology use hours per day have a negative impact on academic performance, owing to the associated distractions. This study therefore recommends that teachers and parents/guardians should be mindful of time students spend on the use of technology and discourage unnecessary use and ensure adequate and effective use so as not to undermine their academic performance.

Keywords: Technology use; Secondary school; Academic performance; Educational zone

Introduction

In the recent years, there is tremendous incorporation of technologies in schools (Timotheou et al., 2022; Zou et al., 2025). This has reflected in the communication revolution that bridges communication gaps regardless of geographical boundaries. Hence, technology use becomes one of the variables that have been included in relation to academic performance, especially those that correspond to the institutional technology environment, accessibility and internet use. Thus, technology use is viewed as new determinant of academic performance since they affect student work at different levels and in different ways (Han & Shin, 2016; Torres-Díaz et al., 2016). Technology provides students with new opportunities and modern tools that earlier generations of students did not have. It promotes independent and collaborative learning. Thus, has the ability to improve students' academic performance (Adeniran 2013). Within the past decades, scholars have examined students' use of technologies and the impact of these tools on their academic performance (Junco, 2015; Noshahr et al., 2014; Wentworth & Middleton, 2014). Particularly, technology tools such as Wikipedia are a widely used resource among students (Soler-Adillon et al., 2018), instant messaging, which facilitates direct personal communication and thus increases trust and a sense of intimacy among students (Cetinkaya, 2017; Noshahr et al., 2014). However, despite the importance of technology use in students' performance, the quality and frequency of use matters. It is argued that not all technology uses are constructive and helpful. For example, Burbules and Callister (2000) noted that technologies can be useful or detrimental and thus, so the key issue concerning technology use is how it is used, by whom, and for what purposes.

Students' success in school is measured by their academic performance. Academic performance reflects the level of achievement of students' academic goals. Ogunbodede and Oribhabor, (2022) explain that academic performance refers to a student's overall academic achievement or the amount to which he or she has met his or her educational objectives. To assess students' academic performance, several tools are employed, including tests, examinations, field work, assignments, etc. The increasing rise in the use of technology today tends to assist and improve students' learning and performance. However, inadequate

technology uses and internet access in our secondary school hampers substantial benefit of technology. Thus, the rise in the low students' academic performance in our secondary schools calls for worry and requires further examination and further research. This study therefore examines the impact of technology use and students' academic performance in secondary school in Agbani educational zone.

Review of related literature

There are scholarly works that have examined the effect of technology use on students' academic performance. Their findings show mixed results, with some researchers finding that technology use have positive effect on academic performance. Others found no effect while others have found negative effects on academic performance. There are variety of studies that show positive effect of technology on academic performance as technology tends to improve learning via communication and interaction s (Ndege, et al., 2015; Tabatabai & Shore, 2005; and Jonassen & Kwon, 2001). Various studies have shown that balanced use of technologies in terms of computer and the type of engaged activity significantly contributes to greater academic performance of students (Torres-Díaz & al., 2016 and Gil, 2012). In contrast, some studies have shown that there is no relationship between academic performance and technology use, that is, reports no significant correlation between student's marks and the time students spend using technologies (Noshahr et al., 2014). Other studies show selective impact of technology use. For example, Wittwer & Senkbeil, (2008) and Antonijevic, (2007) found no correlation between computer use and academic performance in mathematics but found a correlation between computer use and academic performance in science related subjects.

On the other hand, in Taiwan, Chou (2001), used a sample of Taiwanese students to show that sleep deprivation due to heavy internet use is correlated with poor academic performance. Others reveal that the negative influence of technology and social media on students' academic performance occurs when students use the technologies mostly during class time (Junco and Cotten, 2012; Wood et al., 2011). A similar quantitative study was conducted by Chen and Peng (2008) with Taiwanese students using a large sample size of over 26,000 found that heavy users of the internet (over 34 h per week) had lower grades and lower learning satisfaction than non-heavy users. Anand (2007) focused specifically on the relationship between video game usage and student academic performance in sample of U.S. college students and found an inverse trend in the student academic performance and daily video game usage, that is, the result shows that as the total time increases, students' performance decreases. In order to determine whether the use of technology impacts secondary students' academic performance, this study therefore investigates: Students' use of four technology tools (Google, Wikipedia, WhatsApp and Podcasts) and, the impact of technology use on students' academic performance.

Research Questions

The research questions are as follows:

1. What are students' patterns of use of technology tools (Google, Wikipedia, WhatsApp and Podcasts)?
2. Does the time spent of technology tools impact students' academic performance?

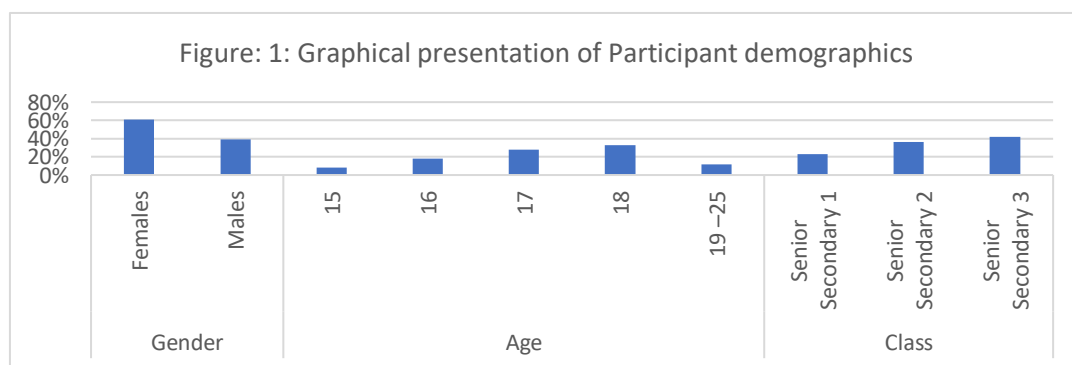
Methods

The target participants in this study were all 35 secondary schools in Agbani education zone. According to Kombo and Tromp (2006), a sample is the set of respondent selected from a larger population for the purpose of a survey. In these schools, five (5) schools were randomly sampled from which the respondents were drawn. Accordingly, Krishnaswami (1998) stated that a sample should not be less than 10% of the population, a strategy he called 1/10th rule. The sample also comprised the students which were drawn randomly from each school. One

hundred and twenty students in different senior classes from five secondary schools in Agbani education zone were selected randomly to participate in this research, using a simple random technique. To avoid bias, pieces of paper labelled: “Yes and No” were placed in a box and shaken thoroughly. Every student was asked to pick up a piece of paper from the box for a chance to participate in the study. In the random sampling procedure, each member of the population has an equal chance of being selected (Cohen *et al.*, 2000). Participants' gender, age and the class from which the participants were drawn are provided in Table 1. All students were enrolled in either in senior secondary 1 (22%), senior secondary 2 (36%) or senior secondary 3 (42%). There were majority women in the sample (61%) and majority was traditional high school age (88%). Ages 19 – 25 were few (12%) (see figure 1 & table 1). A survey was designed, consisting of three different parts. The first part consisted of three questions about students' personal details: age, gender and educational class level. The second part included specific questions about use, frequency, time spent, purpose and place of use for four technology tools, and the other part consisted of questions about academic performance, the most recent marks in three core compulsory subjects (English, mathematics and science). The selected secondary schools were visited and were informed about the study and consent obtained. The instrument was administered in the school during lecture free period in order to minimize interference with students' study and the questionnaire administration required a maximum of 20 min for each group of students. To ensure that the questions in the survey measures the research topic consistently and reliably, and are inter-related to each other, Cronbach's alpha was run on the entire sample size. Internal consistency and reliability was assessed using Cronbach's alpha with preferred values between 0.7 and 1. The Cronbach's alpha value is 0.81, which indicates that the survey-items are internally consistent and thus the survey is reliable.

Table 1: Participant demographics

Demographic variable		N	Percent
Gender	Females	73	61%
	Males	47	39%
Age	15	10	8%
	16	22	18%
	17	34	28%
	18	40	34%
	19 –25	14	12%
Class	Senior Secondary 1	27	22%
	Senior Secondary 2	43	36%
	Senior Secondary 3	50	42%

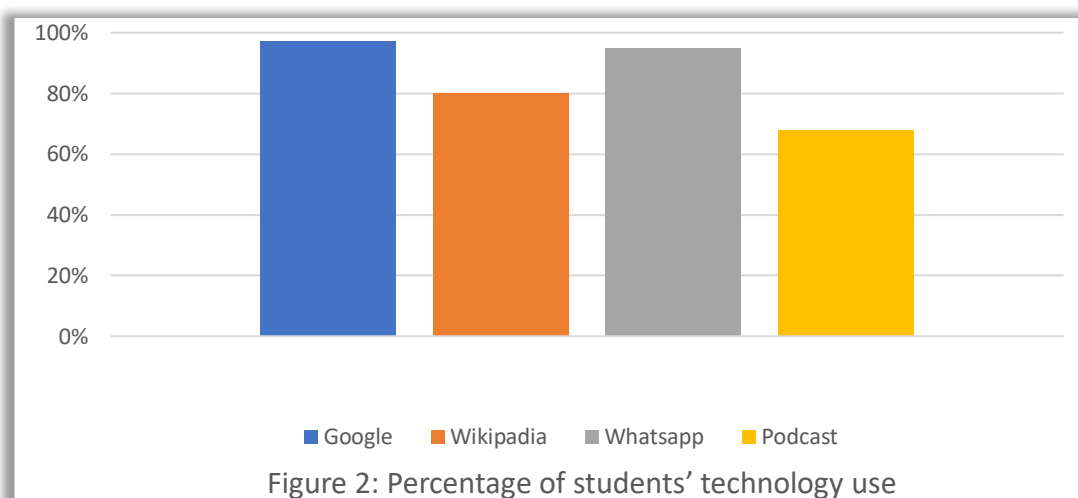


Results

To address the research question 1 on secondary students' pattern of use of technology tools, we use the following variable items: use, frequency, time spent, purpose and place of use for four technology tools (Google, Wikipedia, WhatsApp and Podcasts) and present the analyzed descriptive statistics. First, with respect to technology use, figure 2 shows the percentage of use of technology. As we can observe, 97% and 95% of students reported use of Google search engine and WhatsApp instant messaging, respectively, indicating that almost all the senior secondary school students use Google search engine and WhatsApp instant messaging tools. 80% and 68% reported use of Wikipedia and Podcast, respectively. With respect to frequency, students indicated that they used WhatsApp (90%) and Google search engine (70%) every day, with Podcast (30%) and Wikipedia (35%) many times a week. For time spent, 60% and 50% of students showed that they spend total of between one hour and four hours a day using WhatsApp instant messaging and Google search engine, respectively, while they spend less than a total of one hour a day using Wikipedia (45%) and Podcast (30). For purpose of use, 92% reported using Google search engine and Wikipedia to execute their school homework and assignments. [e.g. $F_{homework}=115$ versus $F_{social\ interaction}=31$; $p<.001$] [e.g. $F_{homework}=116$ versus $F_{social\ interaction}=23$; $p<.001$]. However, 85% reported that they use WhatsApp instant messaging to interact and communicate with friends [e.g. $F_{social\ interaction}=106$ versus $F_{homework}=31$; $p<.001$], and 62% use podcasts for entertainment [e.g. $F_{entertainment}=77$ versus $F_{homework}=19$; $p<.001$] (see table 2). For the place of use, students indicated that the technology items were mostly used in their homes. Specifically, 96%, 90%, 87% and 70% reported use of Google search engine, WhatsApp instant messaging, Wikipedia and Podcast at home, respectively.

Table 2: Purpose for students use of Technology

Technology tool	Specific purpose	Frequency	Percentage of participants (%)
Google	Do my homework; Research information for my school work	$F_{homework}=115$ versus $F_{social\ interaction}=31$; $p<.001$	92
Wikipedia	Do my homework; Research information for my school work	$F_{homework}=116$ versus $F_{socialinteraction}=23$; $p<.001$	92
WhatsApp	Send and receive messages; communicate online	$F_{socialinteraction}=106$ versus $F_{homework}=31$; $p<.001$	85
Podcast	Search general information; Entertainment	$F_{entertainment}=77$ versus $F_{homework}=19$; $p<.001$	62



To address the second question on the impact of time spent on technology tools on students' academic performance, stepwise multiple regression analysis was adopted, using the average reported scores in the three core subject as dependent variable and time spent on technology tools (measured by technology use hours per day), gender, and age as predictor variables. The regression results show that technology use hours per day ($\beta = -.34$, $t = -3.21$), gender ($\beta = .22$, $t = 4.33$), and age ($\beta = .25$, $t = 2.77$) accounted for 19% of the variance in the grade score ($F(3,118) = 9.36$, $p < .01$).

Discussion

The aim of this study was to analyze students' use of technologies and determine the impact of technology use on their academic performance. First, the results show that students are conversant with and use all the considered technology tools. Specifically, the results indicate that 9 in every 10 students in secondary school conducted Internet searches on Google and use Wikipedia for information, and chat and communicate with friends on instant messaging applications, suggesting that students are seriously into technology use. This result is in line with the findings of Valkenburg & Peter, (2007) and Gross et al. (2002). Again, with respect to place of use, the result shows that students mostly use these technology tools at home, suggesting that although policy efforts gear towards use of technology in classroom to enhance learning, there is evidence that students tend to use technology outside the school.

Similarly, the purpose of technology use by students vary. this study show that students use technology tools such as google search engine and Wikipedia to source information for their homework and academic assignment; WhatsApp to communicate and interact with others and podcast for leisure and entertainment. This finding is in line with Garcia-Martin & Garcia-Sanchez, (2013) who conclude that purpose of technology use by students is determined by the broad functional knowledge of these tools. In relation to impact of time spent of technology tools on academic performance, this study shows that technology use hours per day, gender (female) and age accounted for 19% of the variance in the grade score which is significant. Thus, the study shows that the measure of technology use captured by technology use hours per day significantly but negatively influenced students' academic performance in the secondary school. This suggests that students who spend more time on technology tools, compared to those who spend less time, had lower grade score. Thus, the amount of time student spend on technology tools reduces the amount of time they invest in their study (less study time) thereby negatively impacting their academic performance. This finding is in line with several other

studies (Karamti, 2016; Wentworth and Middleton, 2014; Junco and Cotten, 2012; Kirschner and Karpinski, 2010) who found negative influence of technology and social media on students' academic performance. Similarly, the result shows that gender (female) impacts academic performance. This lends credence to the fact that boys are more distracted and are less engaged in academics than their counterpart. This further reflects the growing trend of women enrolling and pursuing education more than men and earning better grades in school (DiPrete & Buchmann, 2013; Sheard, 2009; Cerezo & Casanova, 2004). Thus, this study establishes the need for girl-child education. In terms of age, the result shows that age impacts academic performance. This finding coincides with the findings of other studies (Sheard, 2009), that older adolescence students perform better than their younger counterpart.

Conclusion

This study therefore adds to the literature on the use of technology and students' academic performance. This study first establishes various purpose of technology use by students and choice place of use; and further shows how technology use exert impact on students' academic performance.

Recommendation

The study recommends that teachers and parents/guardians should be mindful of time students and wards spend on the use of technology and to discourage unnecessary use and ensure adequate and effective use so as not to undermine their academic performance. A close monitoring is required to ensure that the time they spend in the use of technology do not constitute distraction from reading and studying. However, it worth noting that this study has some limitations. First, the data is drawn from five secondary school in Agbani education zone and may not guarantee generalizability. Further study should include large sample and diverse education zones. Similarly, other means of technology use or measure of technology use can be included.

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