Maximizing e-Learning Opportunities in Secondary Education: insights from use pattern and perceived effectiveness of Opon Imo Tablet PC among students in Osun State Nigeria.

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Abstract
The use of ICT devices for e-learning in secondary schools provides students and teachers with opportunities to explore numerous educative information that can enhance learning. Opon Imo was the name given to a tablet personal computer (PC) distributed to finalist students of public secondary schools in Osun State Nigeria, to assist them in preparation for their school-leaving examinations. The study was carried out to determine if the students used the tablet for expected learning activities, and the perceived effectiveness of the tablet for learning among the students. The descriptive survey method was used to gather data from 249 students from three selected secondary schools in the three senatorial districts of the State. Findings from the study showed that the students regularly used Opon Imo for curricular activities such as preparing for examinations and tests, assignments, watching video tutorials and practicing past questions. Overall, the students perceived Opon Imo to be an effective tool for learning. Nevertheless, in similar future projects, inadequate orientation and training could militate against maximal utilisation of such tablets for learning and extracurricular studies among secondary school students.

Keywords: *e-learning, Tablet PC, Opon Imo, Osun State Nigeria, mobile learning, secondary education*

Introduction

Advancements in Information and Communication Technology (ICT) have paved the way for electronic learning and teaching in secondary schools. Presently, ICTs are vital for keeping abreast with rapidly changing information in different fields of knowledge. Consequently, in order to

enhance learning effectiveness, educational institutions around the globe are implementing e-learning facilities for their students (Mailizar & Fan, 2020). This is evident in the use of technological tools such as tablet PCs, mobile phones, interactive boards, internet and other computing tools for knowledge acquisition and information exchange among secondary school teachers and students.

ICT in education is a system that enriches information gathering, management, manipulation and communication in various forms (Kamorudeen, 2021). The use of e-learning ICT devices in secondary schools provides students and teachers with varying media to explore educative information that can enhance the process of learning. The effectiveness of these tools has notable importance in improving the overall learning quality. According to Fu (2013), students can derive three important benefits from the use of ICTs for e-learning purposes; these benefits include autonomy, capability and creativity.

ICT use in learning among secondary school students potentially stimulates students' ability to learn better and discover relevant solutions to the assignments and questions raised during classroom interaction (Punch Newspaper, 2014). Several ICT tools, such as computers and the internet are presently indispensable parts of educational activities (Supiandi & Lisa, 2018). Consequently, many countries are investing heavily in educational technologies. Governments at different levels, having realised the effectiveness of ICT in education, are therefore making efforts to ensure that secondary school students make the best use of computer technologies in their learning activities.

Alongside the traditional types of learning, the present era is dominated by the use of educational technologies, with resultant electronic and multimedia learning. Mayer (2017) asserted that electronic and multimedia learning are highly relevant especially in modern education to facilitate teaching and learning. Electronic learning or e-learning is a general term that refers to computer-mediated or digital learning. This can be achieved through specific types of e-learning, such as mobile learning (m-learning), which involves the use of different mobile telecommunication devices, such as cellular phones, tablet PCs, and other internet-enhanced mobile devices for learning. On the other hand, multimedia learning occurs when students use both auditory and visual senses to learn from electronic devices. Thus, the integration of ICT in secondary school education provides an opportunity for both electronic and multimedia learning to be adopted to enhance the students' learning experience.

Tablet PCs are mobile computing devices used to perform various functions of personal computers (PCs). Tablets are used as small-form computers and telephones, which makes it easy to connect the device to the internet through mobile

telecommunication or other wireless networks and use from anywhere. Tablet PCs provide storage capacities and higher processing capabilities than conventional mobile phones; this makes them desirable as educational tools, which can be used to store, retrieve and process information. Several mobile applications exist to operate tablets and among these are e-learning platforms that enable online, asynchronous education to be possible (Van Oostveen, Muirhead & Goodman, 2011). The mobility advantages of tablet PCs have also made them desirable as digital libraries for individuals using them.

Following recommendations from the Educational Summit held in Osun State, Nigeria in 2013, the government of the State distributed tablet PCs named "Opon Imo" to all the finalist (senior secondary school 3 (SS3) students in public secondary schools in the State. The aim was to assist the students to prepare better for their school-leaving examinations. Opon Imo is a Yoruba language phrase that means "Tablet of Knowledge." It was a 7-inch tablet computer pre-loaded with educational materials for the students. According to Vanguard Newspaper (2013), Opon Imo was preloaded with lesson notes in seventeen subjects offered by the students in the Senior School Certificate Examination (SSCE), 63 e-textbooks covering the 17 subjects, 51 video tutorials, and more than 1,000 past examination questions. These materials were collated for students' use to aid private practices towards the SSCE and the Unified Tertiary Matriculation Examination (UTME). Opon Imo also contained extra-curricular content covering topics on sex education, Yoruba history, Yoruba traditional religion, the Quran and the Bible.

With the distribution of Opon Imo to the students of Osun State's public secondary schools, the finalists were expected to use the device as a replacement for textbooks and also to serve as a mobile library that can be accessible anytime. The distribution of the devices followed the need to develop the youths in preparation for a technologically-based, knowledge-driven economy for the State. However, it is not known if the students used the tablet for their various learning activities as expected. Nevertheless, understanding the pattern of use of the devices among the students could offer insights into the adoption of electronic and mobile learning among secondary school students in Nigeria. Therefore, this study was designed to answer the following questions:

(I) Did the secondary school students in Osun State used Opon Imo to prepare for exams and tests?
(ii) Were the students using Opon Imo for assignment activities?
(iii) Were the students making use of e-books and video tutorials on Opon Imo for learning?
(iv) How frequently did the students used the past questions pre-loaded on Opon Imo?
(v) Did the students use Opon Imo to play games?
(vi) Were the students using Opon Imo for internet browsing?
(vii) Were the students using Opon

Imo for extracurricular studies?

(viii) What is the perceived effectiveness of Opon Imo for learning among secondary school students in Osun State?

Literature review

The introduction of tablet computers into education is a relatively recent phenomenon in Africa. This makes academic literature on the use of tablet PCs in education, especially in the African context to be relatively scanty. However, some earlier studies have reported on the use of Opon Imo for learning in Osun State. In their study to examine the three-year impact of Opon Imo on students' academic performance, Fashiku (2019) reported that the tablet did not significantly improve the academic performance of the students. This finding was irrespective of an earlier report by Adeniyi (2019) who confirmed that Osun State teachers believed that the textbooks on the tablet were relevant for the students. The report of Jegede et al (2015) however provided further understanding that Osun State students underutilised the tablet for academic purposes.

In a survey on the suitability of 50 iPads, a brand of tablet PC, for learning in Scotland by Burden (2012) in two schools (primary and secondary) located in urban and rural areas, it was found that primary school pupils who were allowed to go home with the iPad make better use of the devices than those in secondary schools as revealed in their learning outcomes. A similar study by Churchill and Fox (2012) on the affordance and benefits of iPads in teenage schools in England identified a set of benefits of tablet PC use in teenage study. The reported benefits included, use of tablet for e-reading with ability to help students with literacy difficulties, reduction in teachers' workload because of the ability to collect and mark of assignments digitally, and providing easy content production and delivery to students.

Dhir and Gahwaji (2013) also reviewed the literature on the role of tablet PC in education and reported the benefits to include: ease of use, suitability for "anytime and anywhere learning," support for interactive and collaborative learning, and increased communication between secondary school students and teachers. A similar report by Karsenti and Fievez (2013) in their study of over 6,000 primary and secondary school students in Quebec, Canada highlighted the benefits of using tablet PC among the students to include: constant access to information and communication, increased collaboration between teachers and students; increased motivation to learn; improved quality of students' and teachers' presentations; a greater variety of resources and types of learning materials, more creativity; development of both teachers' and students' information technology skills; and a more personalized learning experienced where students were able to work at their own pace.

Similarly, in the study by Burden (2012) with sample of 365 students across eight schools in Scotland

(mention where the school is), it was revealed that the fact that each student in the study had access to a tablet altered the dynamic of their response in the classroom and enabled a wider range of learning activities. The study reported that the use of the tablet PC enabled more collaboration between the teachers and students, encouraged students to coach their peers, enhanced creativity and group learning, and led to the development and extension of homework with better feedback from the students. Furthermore, Heinrich, Darling-Aduana and Martin (2020) showed that certain subjects favoured the use of tablet PCs, notably English Language, Mathematics and Science. This was partly explained by the availability of suitable applications such as 3D graphing and e-books that make learning of those subjects fascinating.

Meanwhile, Ogechukwu and Osuagwu (2009) noted that one vital condition for such a shift to tablet PC integration in teaching and learning was that each student had their own device. Yusuff (2005) also noted that funding always constitutes a challenge in the integration and use of information technology in educational activities. The author found in a survey of 225 secondary school students and teachers in the South-South states of Nigeria that 57% of the respondents chose "no budget to purchase information technology devices". Another similar study by Adam (2010) noted that constraints to the use of tablet PCs in learning include funding and training deficits.

Methods

This study adopted the descriptive survey research design. Respondents for the study were SS3 at the most populous secondary school where the students received Opon Imo in each of the three senatorial districts in Osun State. The study population comprised 713 SS3 students at the three secondary schools. This study utilised the simple random sampling technique, at a 35% sampling fraction, to arrive at 250 students as the sample size for the study. The research instrument used for the study was a structured questionnaire. The questionnaire was self-developed by the researchers following a comprehensive review of literature. The instrument was divided into four sections. Section A was used to elicit information on the demographic data of respondents. Section B contains questions on the frequency of use of "Opon Imo". Section C focused on the perceived effectiveness of Opon Imo for learning, which is based on a four-point Likert scale ranging from "not effective" to "very effective." Section D of the questionnaire contains questions on the opinion of the respondents about the value of "Opon Imo" for learning, while section E was used to ask the respondents about the challenges involved in the use of Opon Imo for learning.

Results

Demographic information of respondents

Table 1: demographic characteristics of respondents

Variables/schools	Anglican High School, Osogbo		Ilesa High School, Ilesa		Ayedaade High School, Ikire		Total	
	No	%	No	%	No	%	No	%
Department: Science	37	45.7	34	38.6	23	28.8	94	37.8
Commercial	25	30.9	26	29.5	30	37.5	81	32.5
Arts	19	23.5	28	31.8	27	33.8	74	29.7
Gender:								
Male	37	45.7	38	43.2	31	38.8	106	42.6
Female	44	54.3	50	56.8	49	61.2	143	57.4
Age Range (yrs):								
12-14	9	11.1	2	2.3	11	13.8	22	8.8
15-17	32	39.5	49	55.7	39	48.8	120	48.2
18-20	38	46.9	36	40.9	24	30.0	98	39.4
21 and above	2	2.5	1	1.1	6	7.5	9	3.6

The respondents' demographical data for the study was analyzed using a frequency table (Table 1). There were 249 respondents in total. Results showed that, overall, there were more respondents from the Science Department 94(38.7%) than the Commercial and Arts departments. Also, the majority of the students were females 143(57.4%). Being students from the most senior class in secondary school, the study also found that the majority of the respondents were within the 15-17 years age group 120(48.2%).

Use of Opon Imo to prepare for exams and tests

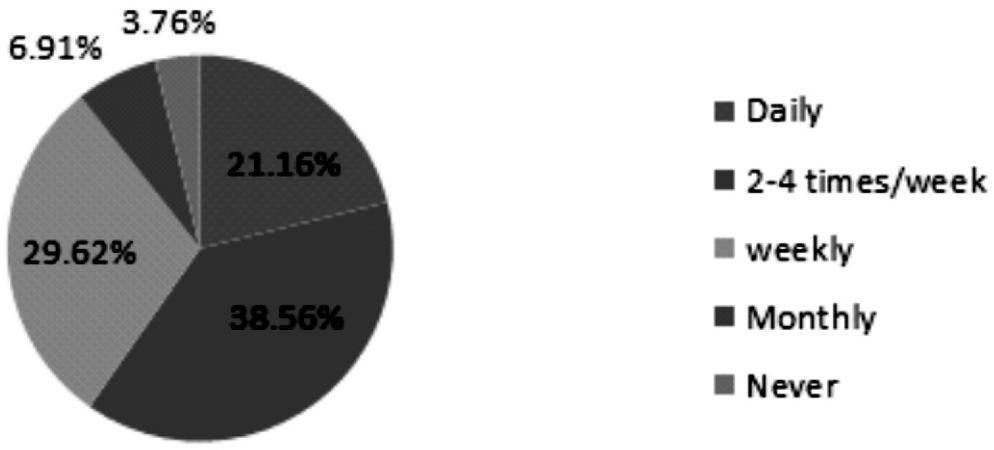

Fig. 1a: Overall frequency of use of Opon Imo to prepare for exams and test

Findings from the study, as shown in the overall use of Opon Imo to prepare for exams in Figure 1a, revealed that the majority of the students make use of Opon Imo 2-4 times per week. However, more students from Ayedaade High School (5.1%) (Figure 1b) never used the tablet to prepare for exams and tests.

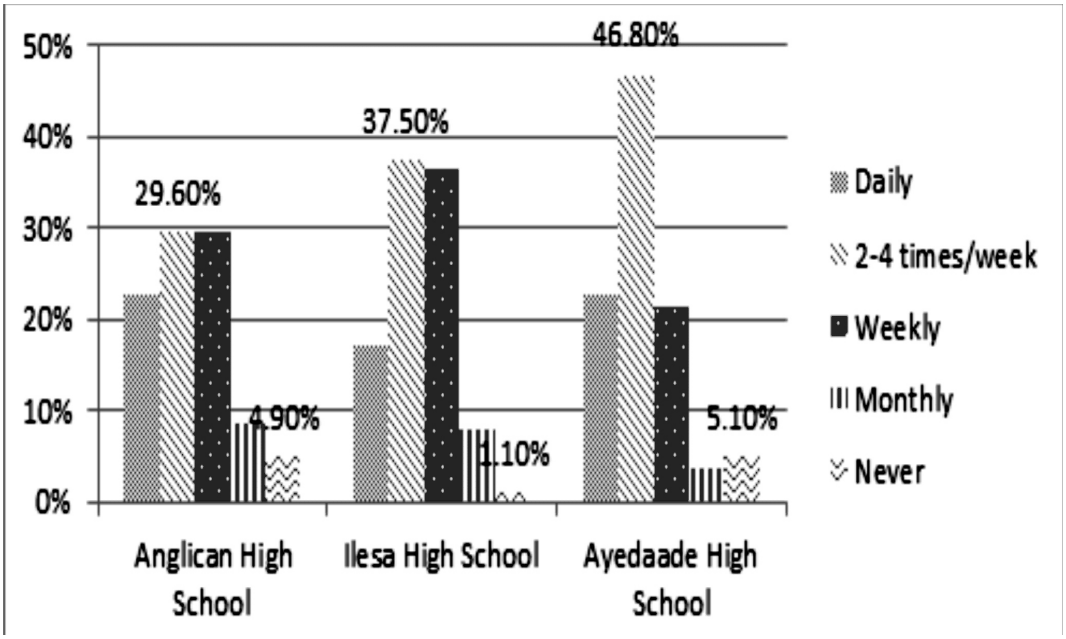

Figure 1b: Frequency of use of Opon Imo in the three secondary schools

Use of Opon Imo for assignment activities?

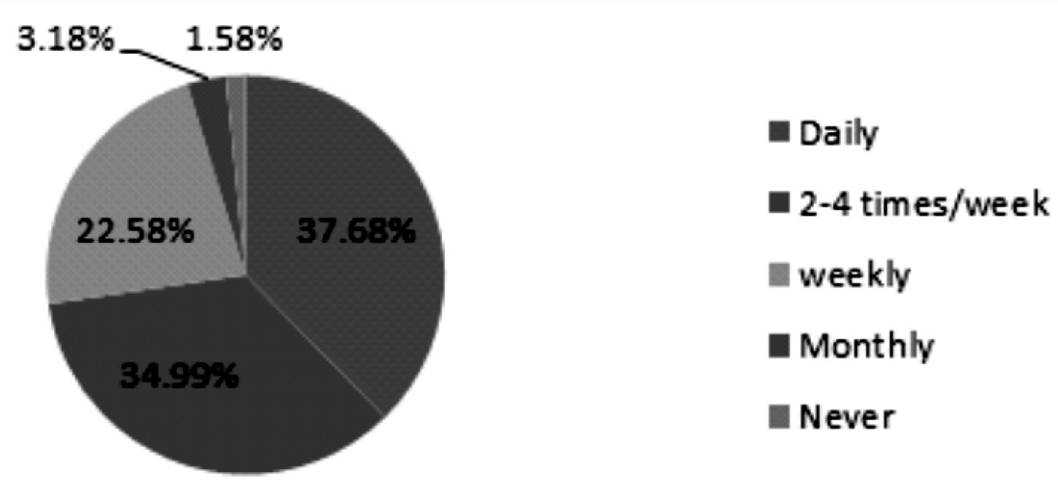

Fig. 2a: overall use of *Opon Imo* for assignment activities among the students

As revealed in Figure 2a, the majority of the students (37.2%) used *Opon Imo* daily to attend to their school assignments. Only about 2.5% of Ayedaade High School students and 2.3% of Ilesa High School students never used the tablet PC for this academic purpose (Fig. 2b).

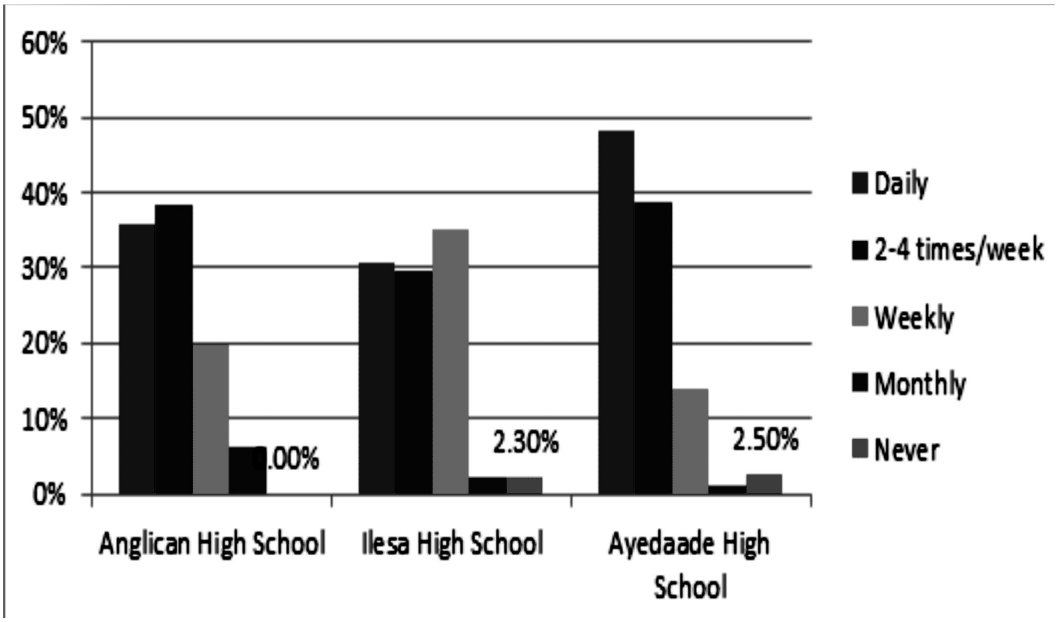

Fig. 2b: use of Opon Imo for assignment activities in the three secondary schools

Use of e-books and video tutorials on Opon Imo for learning

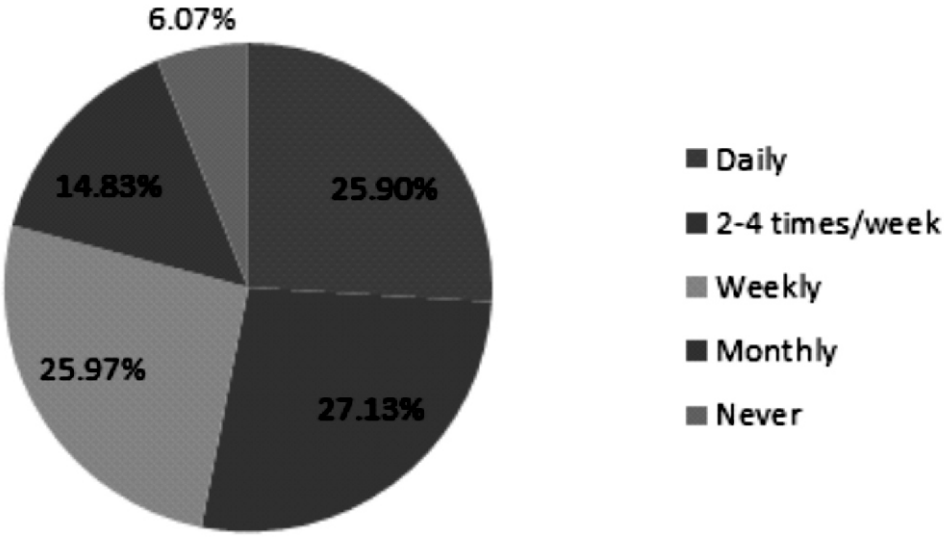

Fig. 3a: overall use of video tutorials for learning

Results from the study – presented in Fig 3a and 3b – show that majority of the students used the e-books (38.9%) and video tutorials (27.13%) on Opon Imo for learning 2-4 times per week.

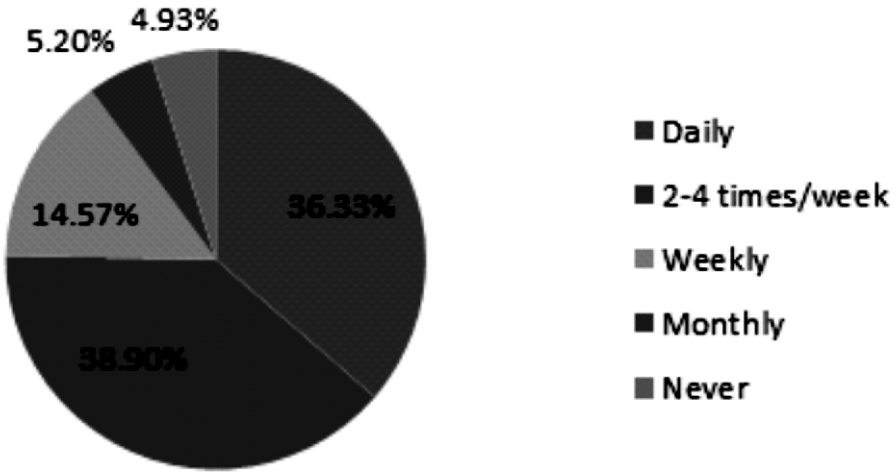

Fig. 3b: overall use of e-book reading for learning

Use of past questions pre-loaded on Opon Imo for learning

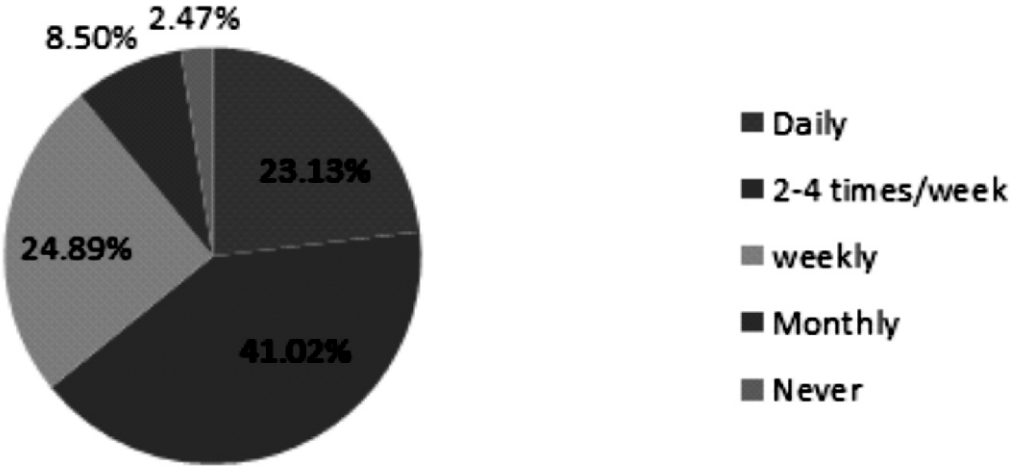

Fig. 4a: overall use of pre-loaded past questions on Opon Imo

As revealed in Fig 4b, majority of the students surveyed practiced with the pre-loaded past questions on Opon Imo 2-4 times per week (41.02%). However, the trend in Figure 4b showed that more students from Ayedaade High School (3.80%) have never used the device for this purpose.

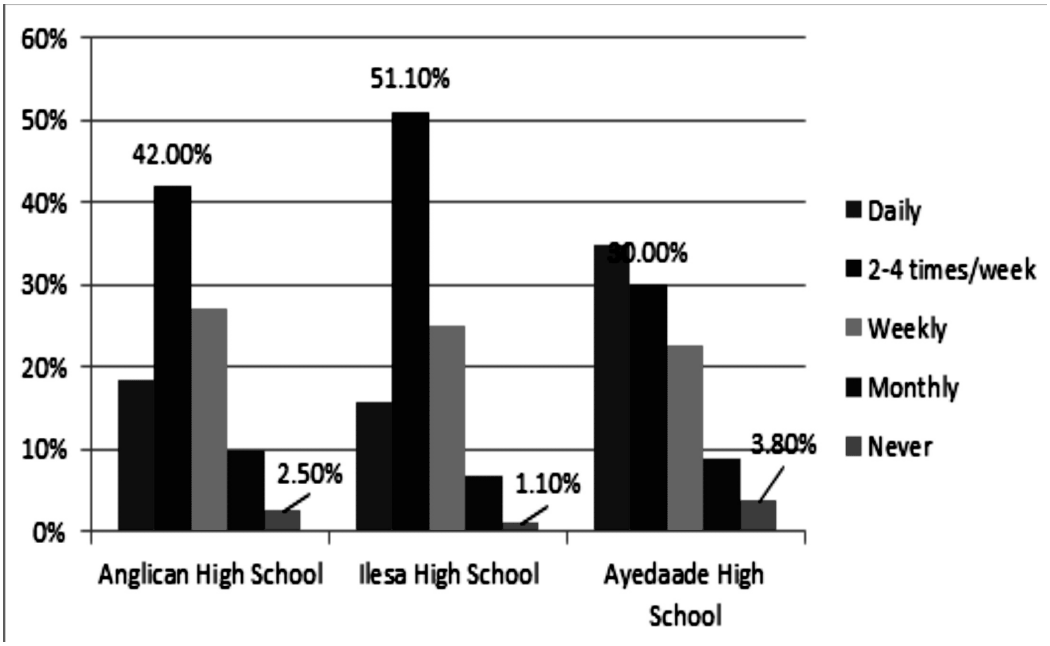

Fig 4b: use of pre-loaded past questions in the three secondary schools

Use of Opon Imo to play games

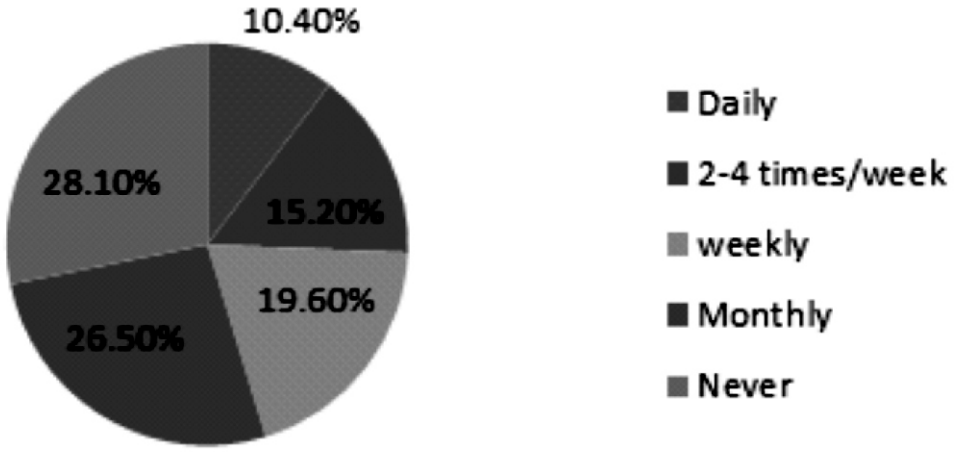

Fig. 5b: overall use of Opon Imo to play games

From the results of the data collected in this study, majority of the students (28.1%) reported that they have never used the device to play game (Fig. 5a). However, at Anglican High School, the students who are using the device to play game monthly (33.3%) are more than those who have never used it to play games (24.7%) (Fig. 5b).

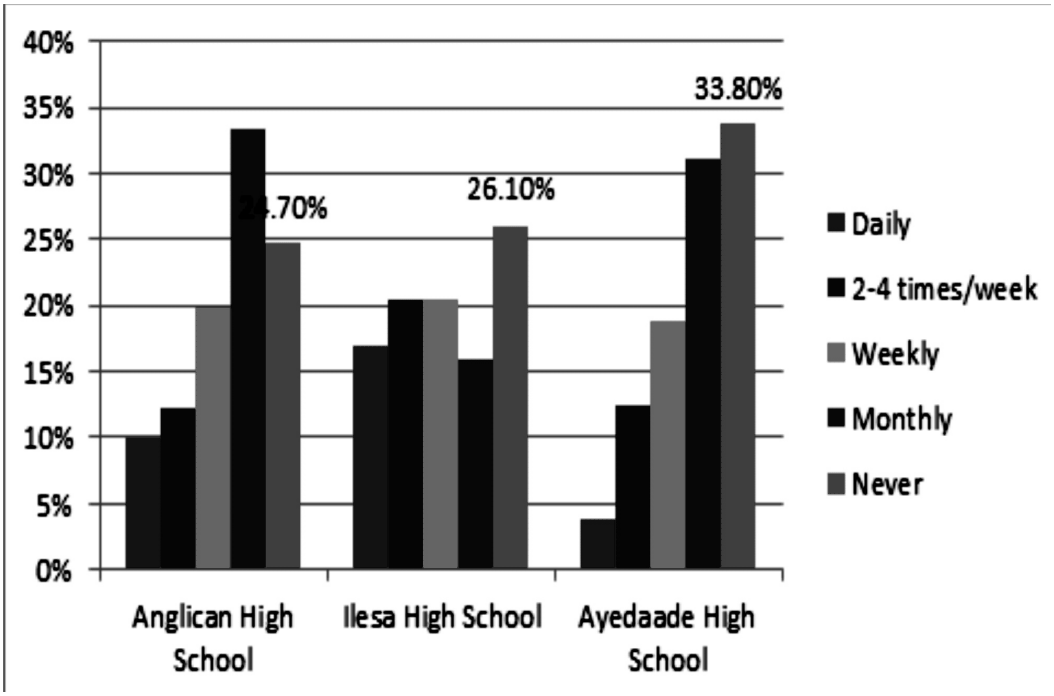

Fig 5a: use of Opon Imo for playing games among students in the three schools

Use of Opon Imo for internet browsing

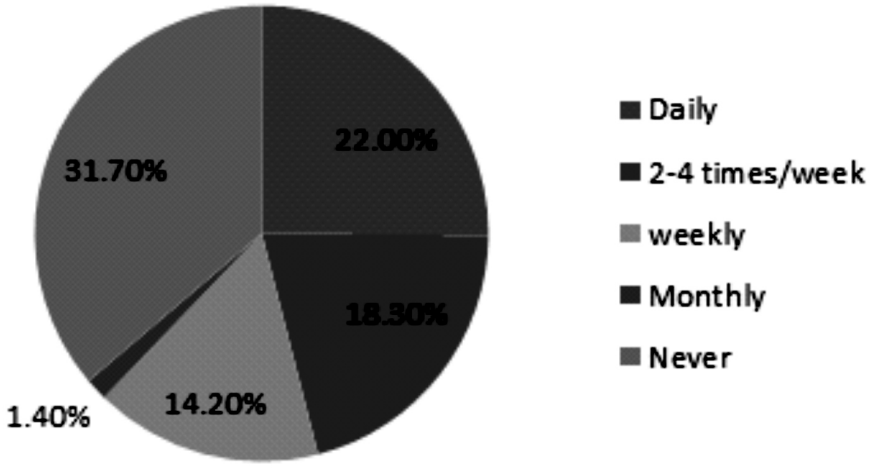

Fig 6a: overall use of Opon Imo for Internet Browsing

Results from the study – presented in Fig 6a – show that 31.7% (the majority) of the students never used Opon Imo for internet browsing. However, majority of the students at Anglican High School (27.2%) use the device to surf the internet (Fig. 6a)

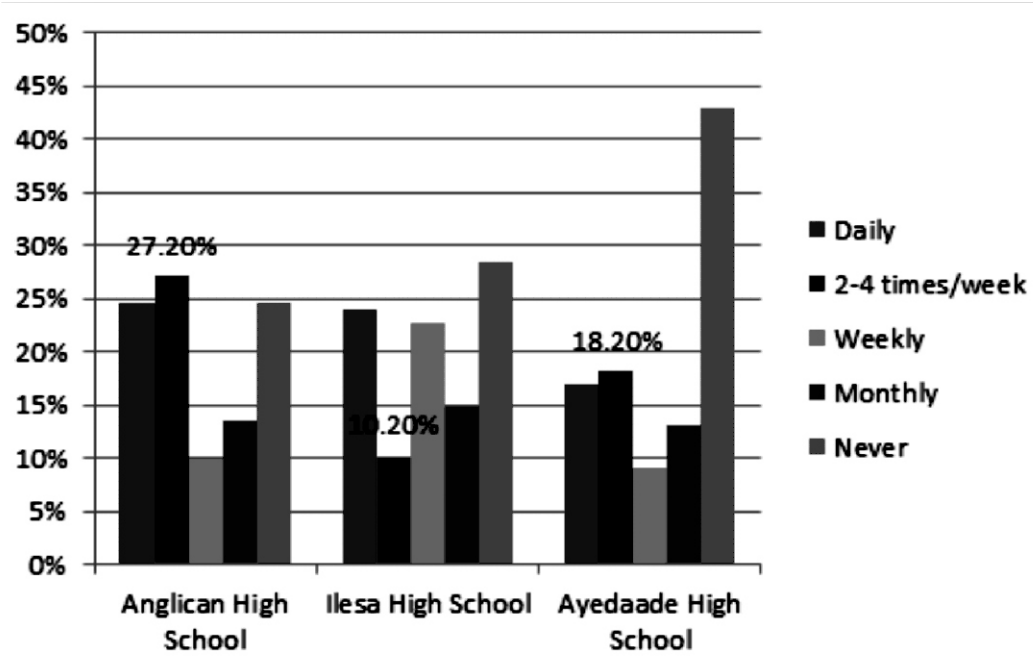

Fig. 6b: use of Opon Imo for Internet browsing among stuents in the three schools

Use of Opon Imo for extracurricular studies

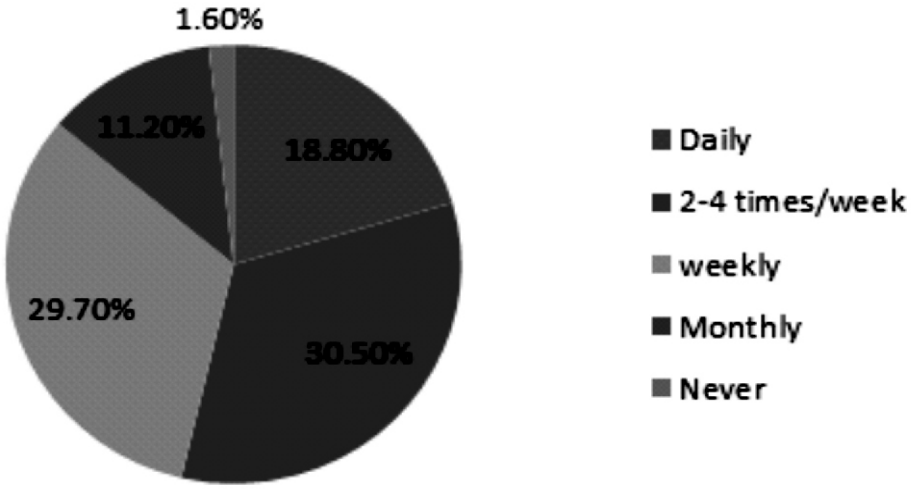

Fig. 7a: overall use of Opon Imo for extra-curricular studies

As revealed in Figure 7a, majority of the students surveyed made use of Opon Imo for extra-curricular studies 2-4times per week (30.5%). Meanwhile, about 3.9% of Ayedaade High School students (Fig. 7b) have never used the tablet PC for such purpose.

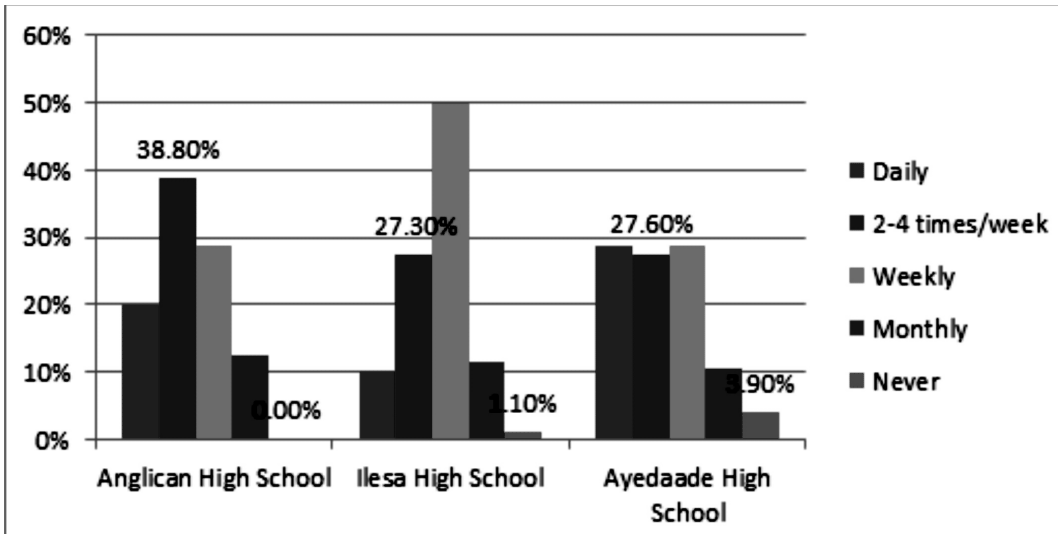

Fig. 7b: use of Opon Imo for extra-curricular studies in the three schools

Perceived effectiveness of Opon Imo tablet as a tool for learning?

Table 2: perceived effectiveness of Opon Imo tablet by secondary school students in Osun State

Learning Activities Effectiveness	Very effective		Moderately effective		Fairly effective		Not effective		Mean
	No	%	No	%	No	%	No	%	
Reading textbook	171	68.6	70	28.1	6	2.4	-	-	3.6
School assignment	89	35.7	133	53.4	22	8.8	2	0.8	3.2
Preparing for tests and exams	101	40.5	97	38.9	47	18.8	1	0.4	3.2
Home Study	95	38.1	102	40.9	40	16.0	9	3.6	3.1
Learning Mathematics	95	38.1	86	34.5	57	22.8	8	3.2	3.1
Learning English Language	95	38.1	99	39.7	48	19.2	4	1.6	3.1
Learning Yoruba Language	70	28.1	118	47.3	51	20.4	7	2.8	3.0
Learning other subjects	79	31.7	107	42.9	48	19.2	5	2.0	3.0
Studying past questions	95	38.1	118	47.3	46	18.4	6	2.4	3.3
Mobile learning	88	35.3	109	43.7	41	16.4	8	3.2	3.1
Extra-Curricular studies	65	26.1	97	38.9	68	27.3	15	6.0	2.8

As shown in Table 3, on a Likert scale from not effective (scored 1) to very effective (scored 4), the students considered Opon Imo to be most effective for reading textbooks (mean = 3.6), studying past questions (mean = 3.3), attending to school assignments (mean = 3.2), and preparing for tests and exams (mean = 3.2).

Challenges with the use of Opon Imo for learning

Table 3: challenges encountered in the use of Opon Imo tablet for learning by secondary school students in Osun State

Challenges	Agree		Disagree	
	No	%	No	%
Inadequate Power Supply	162	65.1	87	34.9
Insufficient Training	133	53.4	116	46.6
Frequent Breakdown	117	46.9	132	53.1
Insufficient Educational Material	72	28.9	177	71.1
Physical Characteristics	101	40.6	148	59.4
Technological Anxiety	79	31.7	170	68.3
Battery Problem	127	51.0	122	49.0
Difficult to Operate	39	15.7	210	84.3

Table 3 shows the response of the students to the challenges encountered with the use of Opon Imo for learning. The results indicate that the most prevailing challenge is related to keeping the tablet powered for use due to inadequate power supply (162; 65.1%) and insufficient training on the use of the tablet for learning (133; 53.4%).

Discussion of Findings

This study was carried out to find out if secondary school students in Osun State Nigeria were utilising Opon Imo, a tablet PC distributed by Osun State government to the students, for academic activities. If properly utilised, tablet PCs could be an important e-learning device that will enhance the educational prowess of Osun State students due to the massive amount of academic contents that have been

preloaded on the device to make it a useful mobile library.

Findings from the study showed that the students used the tablet several 2-4 times in a week, while preparing for examination, to watch video tutorials, read e-books and past questions. This showed that the students find Opon Imo useful but did not use it solely (all the time) in the preparation for their school leaving examinations. This is contrary to the report of Jegede et al (2015) that the students underutilised the deviced. However, a similar study by Cuhadar and Kuram (2014) noted regular use of tablet PC among students. Majority of the students agree that they make use of Opon Imo daily for assignment purposes and this confirms the usefulness of the contents preloaded on the tablet to foster understanding in students learning.

The study further found out that majority of the students have never used the device to play games. Although, Yildrim (2007) already reported that secondary school students enjoy playing games on tablet PCs, the pre-loaded games on Opon Imo are mostly educational and may not appeal to an entertainment-savvy generation. The low utilisation of this function on the tablet could also be because of inadequate orientation on the use of the tablet.

Similarly, the study revealed that majority of the students did not use the tablet to surf the internet. Opon Imo was programed not to be able to access the internet to reduce distraction among the students. Blocking the tablet from accessing the internet was a decision of the State government hinged on the fact that the misuse of social media and other internet facilities among Nigerian youths is worrisome. However, it is surprising that about 22% of the students surveyed have been able to unlock or hack into the tablet and use it to surf the internet. This confirms the findings of Yunus and Sulaiman (2014) that secondary school students do not often use internet for learning purposes.

Overall, the students considered Opon Imo tablet PC to be an effective tool for learning. This indicates that the students find the tablet useful in their pursuit for knowledge and in preparation for their examinations. Earlier findings by Heinrich, Darling-Aduana and Martin (2020) that the use of tablet PCs favoured students' learning in English Language Mathematics and Science was also corroborated by the findings that the students find the tablet effective for learning English language and Mathematics.

Conclusion

Opon Imo tablet PC was an effective tool for learning among the final year secondary school students in Osun State Nigeria. If properly implemented, such laudable initiative by Osun State government could be used to enhance learning among secondary school students in Nigeria. Most students used the device regularly, thus the students demonstrated acceptance and readiness to utilize tablet PC as a mobile learning facility. However, the challenge of inadequate orientation still appears to be

militating against maximal utilization of the tablet. Students and their teachers must be proper trained on the contents and use of tablet PCs for learning wherever similar initiates are implemented.

Recommendation

(i) Educational technology researchers are encouraged to carry out further studies to evaluate learning outcomes and factors influencing the use of tablet PCs as a learning tool among secondary school students in Nigeria.

(ii) Contents of the tablet PCs provided to secondary school students should be regularly revised to ensure continued conformity with the curriculum.

References

Adeniyi, W. O. 2019. Assessment of effectiveness of e-learning tablet (opon-imo): a package for teaching-learning in senior secondary schools in Osun State. American Journal of Education and Learning, 4(2), 339-348.

Burden, K. 2012. Ipad Scotland Evaluation: A case study of the adoption of mobile technology in eight schools in Scotland. http://www.2hull.ac.uk/ifl/ipadresearchinschool.aspx.

Churchill, D.B and Fox, S.E. 2012. Study of Affordances of iPads and Teachers' Private Theories. International Journal of Information and Education Technology.2.3:4

Cuhadar, C. and Kuram, U. 2014. Information Technology Pre-service Teacher's Acceptance of Tablet PC as an Innovative Learning Tool. Theory and Practice, 14.2:741-753.

Dhir, A. and Gahwaji, N.M. 2013. 'The Role of iPad in the Hands of Learner'. Journal of Universal Computer Science.19.5:12

Fashiku, C. O. 2019. ICT in Schools, the Politics of Laptop Distribution: Implication on Students' Academic Performance in Osun State Secondary Schools, Nigeria. Journal of Teaching & Teacher Education, 7(2).

Fu, Y. 2013. Shanghai schools readies for ipad trial: The China Post. http://www.chinapost.com.tw/china/local-news/shanghai/2011/10/03/318524/shanghaischool.html

Heinrich, C. J., Darling-Aduana, J., & Martin, C. 2020. The potential and prerequisites of effective tablet integration in rural Kenya. British Journal of Educational Technology, 51(2), 498-514.

Jegede, P. O., Adeleke, M. A., Jegede, M. O., & Ayanlade, S. O. 2015. Assessment of technology innovations in Nigerian classroom: a case study of “opon imo” in Osun State, Nigeria. Education and Science Journal of Policy Review and Curriculum Development, 5(1), 189-195.

Kamorudeen, B. 2021. The Impact of Information and Communication Technology on the Teaching and Learning of Arabic in Nigeria. Journal of Muslim Minority Affairs, 41(4), 608-614.

Karsenti, T. and Fievez, A. 2013. The iPad in Education: Uses, Benefits and Challenges. A Survey of 6,057 Students and 302 Teachers in Quebec, Canada. Montreal, CRIFPE.

Mailizar, M., & Fan, L. (2020). Indonesian Teachers' Knowledge of ICT and the Use of ICT in Secondary Mathematics Teaching. Eurasia Journal of Mathematics, Science and Technology Education, 16(1).

Mayer, R. E. (2017). Using multimedia for e-learning. Journal of computer assisted learning, 33(5), 403-423.

Ogechukwu, N.I and Osuagwu, C.C 2009. ICT in education. Achievement so far.

Supiandi, M. I., & Lisa, Y. 2018. The utilization of information and communication technology (ICT) on learning in the 21st century. International Journal of Academic Research and Development, 3(2), 869-875.

Van Oostveen, R., Muirhead, W., & Goodman, W. M. (2011). Tablet PCs and reconceptualizing learning with technology: a case study in higher education. Interactive Technology and Smart Education, 8(2), 78-93.

Vanguard Newspaper. 2013. Osun educational rumpus, October 18, 2013. http://www.vanguardngr.com/201/10/osun-educational-rumpus.

Yildrim, S. 2007. Current Utilization of ICT in Turkish Basic Education Schools: A review of Teacher ICT use and Barrier to Integration. International Journal of Instructional Media. 34.2:171-186.

Yunus, M.M and Sulaiman, A. 2014. Information and Communication Technology in Teaching and Learning Literature component in Malaysian Secondary Schools. Asian Social Science Journal.10.7:136-152.

Yussuff, M.O. 2005. Information and Communication Technology in Education: Analyzing the Nigerian National Policy for Information Technology. International Educational Journal.6.3:316-321

Comments

This study is nice research that focuses on opon imo. The topic is okay and the introduction is fine. However, some old references are noticed and few comments.

The paper is publishable with minor corrections. Attend to all raised suggestions.