A Transformative Shift From Desktop Computers To Smartphones In Carrying Out ICT Related Task

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Abstract

The study used the McCoy College of Education as a case study to examine how smartphones and ICT resources affect students' learning. It aimed to determine how smartphones and ICT resources and student learning are related, paying particular attention to the accessibility of smartphones and ICT resources at McCoy College of Education. The investigation was driven by recurrent reports that McCoy College of Education students are struggling academically as a result of restricted access to smartphones and ICT resources. It was carried out using a cross-sectional survey approach, and information was gathered in the months of June and July 2022 from a sample of 275 respondents out of an overall parent population of 812. The researcher employed the Pearson correlation analysis approach to see whether student learning was linearly connected with Smartphones and ICT resources in order to test the hypotheses. The analysis found that the College's access to smartphones and other ICT tools is still severely lacking and woefully inadequate for student use. Accessibility is timed due to the limited number of smartphones, working computers, and the computer lab. The discovery that contextual training of students on how to utilize smartphones and ICT resources in learning was not in practice revealed that training was primarily restricted to introduction to basic principles of information technology, some application programs, particularly Ms. Office Suite and the internet. The study concluded that smartphones and ICT resources had a substantial impact on student learning at McCoy College of Education in terms of accessibility. The study suggests that the College increase its investment in access to smartphones, computers, and associated technology in light of the aforementioned. ICT resource centers should be established so that access to ICT tools is not restricted to the labs and libraries. Instead than focusing just on Microsoft Office programs, ICT training can teach students how to use smartphones and ICT resources for learning.

Keywords: *Smartphone, ICT, Accessibility, Computer Lab, Students Learning, ICT Resources, Students, Learning.*

I. Introduction

In recent years, the landscape of Information and Communication Technology (ICT) usage has undergone a transformative shift, marked by the steady transition from traditional desktop computers to the widespread adoption of smartphones (Gamage et al, 2021). This evolution is particularly evident in educational institutions, where the demand for flexible, accessible, and user-friendly ICT tools continues to grow (Fitton, 2020). At McCoy College of Education, this shift is reshaping how students, faculty, and administrative staff interact with digital resources, access educational content, and perform academic or administrative ICT-related tasks. The accessibility of smartphones characterized by their affordability, portability, internet connectivity, and multifunctional capabilities has positioned them as the preferred device for carrying out day-to-day ICT functions within the college community (Enge, 2021). As digital learning platforms, communication tools, and cloud-based services become increasingly optimized for mobile use, the reliance on desktop computers is diminishing, paving the way for a more mobile and inclusive ICT environment at McCoy College of Education.

The study is to determine the transformative shift from traditional desktop computers to smartphones in carrying out ICT related tasks in McCoy College of Education, Nadowli and to bring out strategies on how smartphones and ICT resources can be used by Teacher trainee students and lecturers to enhance teaching and learning. In this study, ICT refers to the gadgets' accessibility. Accessibility refers to how easily these smartphones and ICT resources are accessible to as many individuals as possible (Drenoyianni, 2004).

"A Smartphone is a portable device that combines mobile telephone and computing functions into one unit"(Fitton, 2020). They are distinguished from feature phones by their stronger hardware capabilities and extensive mobile operating systems which facilitate wider software, internet (including web browsing over mobile broadband), and multimedia functionality (including music, video, cameras and gaming), alongside core phone functions such as voice calls and text messaging (Dunaway, 2016).

Teachers and students must be able to display high cognitive flexibility in order to use and produce ICT products that promote teaching and learning (Spiro et al, 1992). This emphasizes the importance of learning transfer. The extent to which performance in one scenario, such as a multimedia lesson, is mirrored in another situation, such as working on the job or in a following session, is referred to as transfer of learning (Allessi et al, 2001). As a result, instruction is frequently a prerequisite for students in the classrooms to apply or use that knowledge in the actual world (Darko-Adjei, 2019).

ICT comprises a collection of activities that enable the processing, transmission, and presentation of information via electronic methods (Becta, 2000). Information and Communication Technologies (ICTs) are tools used by individuals to disseminate, distribute, acquire knowledge, and engage via computers and computer networks, as defined by the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP). This research defines information and communication technology (ICT) as a collection of tools used to process, acquire, and utilize information and communication services or goods (Bakkabulindi, 2007).

Learning is a deliberate action that develops students' capacity and willingness to learn and use new knowledge and abilities, as well as to grow, mature, and successfully adjust to changes and obstacles (Warschaure, 1996). Learning will be defined in this study as the process by which students acquire and master knowledge and skills imparted by the instructor, as well as their interaction with technological tools, in relation to their academic performance, workplace readiness, and application of the acquired skills and knowledge (Assabi, 2012).

McCoy College, a young and freshly established college, was founded in 2014 in Nadowli with the goal of offering knowledge, skills, and promoting innovations in education, technology, economic improvement, and social development. The College, on the other hand, faces numerous obstacles in terms of teaching and learning. Traditional instructional approaches have been and continue to be employed in the teaching and learning process, with their limitations varied based on the demands of the student and instructor.

Problem Statement

Smartphones have emerged as the key instrument for accessing digital resources as a result of the fast progress of mobile technology, which has dramatically affected the manner in which activities linked to information and communications technology are conducted (Alessi, 1985). When it comes to academic, administrative, and communication purposes, students, lecturers, and staff at McCoy College of Education are increasingly relying on smartphones rather than traditional desktop computers. This trend is becoming increasingly visible at the college. Concerns have been raised over whether or not the institution has the information and communication technology (ICT) resources, infrastructure, and support systems to correspond with the accessibility of smartphones, despite the fact that smartphones provide major benefits such as mobility, affordability, and rapid internet access (APAU, 2016). When it comes to information and communications technology (ICT), some activities may be more difficult to carry out effectively due to limitations such as smaller screen sizes, lower processing power in comparison to desktop computers, restricted access to specialist software, and unreliable internet connection (Davis, 2000). In addition, it is not yet obvious how much of an impact this transition has on productivity, learning outcomes, and equal access to information and communication technology resources (Greenleaf, 1994). It is possible for the institution to ignore potential gaps in digital inclusion, resource optimization, and technical efficiency if it does not have a complete awareness of how accessible smartphones really are and whether or not they sufficiently satisfy the information and communication technology needs of the college community via the use of smartphones (Réginald et al, 1996).

Despite the enormous advocacy of smartphone and ICT resources aided teaching and learning, investment and donation of smartphones and ICT resources to McCoy College of Education, the College still faces the challenge of how to transform students learning process to provide students with the skills to function effectively in this dynamic, information-rich, and continuously ever changing environment. The cause of concern is that unless this problem is addressed, investment in the development of smartphones and ICT resources in the College is going to be put to waste and improvement in the quality of teaching and learning is going to be sluggish. This may make the College fail to achieve its mission and to produce graduates who are ready for the world of work which is increasingly reliant on smartphone and ICT resource aided generation and dissemination of knowledge. In view of this discrepancy, there is need to examine the particular effects of accessibility of smartphones and ICT resources on teaching and learning in McCoy College of Education. Are smartphones and ICT resources accessibly? and how does that affect students learning in McCoy College of Education? The above questions are investigated.

Aims/ Purpose of the study

The purpose of the study is to identify the challenges that hinder McCoy College of Education from adapting this transformative shift from desktop computers to smartphones in carrying out ICT related tasks and to outline strategies for increasing the rate of adoption of smartphones and ICT resources for teaching and learning. It will further identify the perceived effect of accessibility of smartphones and ICT resources on

student's learning in McCoy College of Education using cross-sectional survey design with a view to provide relevant recommendations.

Objective of the study
1) To evaluate the influence of smartphones and ICT resources access on teaching and learning in McCoy College of Education.

Research Hypothesis
The study was guided by this hypothesis:
1) Access to smartphones and ICT resources affects students learning in McCoy College of Education.

Scope
At McCoy College of Education in the Nadowli/Kaleo District, a study was carried out between March 2021 and July 2022 on the influence of smartphones and ICT resources on students' learning. The purpose of the study was to determine how the accessibility of smartphones and other ICT tools affected students' learning at McCoy College of Education.

Significance of the study
The study should be of considerable interest to McCoy College of Education policymakers and administrators, as it will assist them in appreciating the value of accessibility of smartphones and ICT resources in learning and developing policies that support accessibility of smartphones and ICT resources in learning. The study's findings and recommendations on the use of smartphone and ICT resources to improve learning should be of interest to McCoy College of Education administrators and other lecturers at higher educational institutions. The researcher expects that the study's findings would be valuable to future academics who want to understand more about the effects of accessibility of smartphone and ICT resources on students learning. This should result in the emergence of fresh ideas for better integrating of smartphones and ICT resources into the educational process (Jackson, 2003).

Limitations of the study
The study is only available to students, lecturers, and administrators at McCoy College of Education. The research focused only on public teacher training institutes in the Nadowli/Kaleo area of Ghana's Upper West Region. Private and secondary schools will be excluded from the research, notwithstanding the presence of other institutions in the selected region. Students, lecturers, and administrators from the other public schools in the same region will not participate in the research.

II.   Literature Review

Mobile learning (m-learning) is a mode of learning whereby mobile computing coupled with wireless technology help learning to take place anywhere and anytime (Tearle, P. 2005). Globally, people are using smartphones that are constantly connected instead of fixed, shared desktop PCs (Gunter, 2001). This change in education is being driven by cost, mobility, and the thriving app ecosystem, which now includes learning management, productivity, collaboration, and multimedia production (Hannafin et al, 1993). Smartphones provide for on-demand access to peer networks, coursework, and institutional services, whereas PC access has historically needed labs, booking systems, and set timetables (Huang et al, 2020). The ability to access information at any time and from any location has changed how staff and students organize, complete, and evaluate ICT-related work.

With more people owning smartphones, the traditional digital divide access to a device and connection has shrunk (Jackson et al, 2003). Quality of access (screen size, input modality, data prices, power and Wi-Fi dependability) and third-level results (what individuals can meaningfully accomplish) continue to be areas of second-level division (Jonassen, 2000). The pricing of data bundles, campus Wi-Fi connectivity, device lifespan, and repair ecosystems all have a direct impact on whether smartphones result in fair learning outcomes in teacher education settings like McCoy College of Education. Additionally, accessibility encompasses adherence to universal design, which provides features like keyboard/navigation alternatives, legible contrast, alt text, media captioning, and screen reader compatibility areas where the quality of many mobile applications and institution-hosted services still varies (Joy et al, 2000).

Effects of Access of smartphone and ICT resources on students learning
Students and teachers need reliable Internet access to meet their information needs, and smartphones have reshaped learning activities (Darko-Adjei, 2019). Effective integration of smartphones and ICT resources requires a fully networked institution, enabling access to multimedia materials via intranet and Internet both on

and off campus. Adequate smartphones, computer labs, and classroom ICT resources are essential for timely access across subjects. Tools like video conferencing and presentation facilities support teaching and learning (School Net Africa, 2004). However, many African institutions struggle due to inadequate infrastructure, especially poor laboratory conditions that limit access (Singh, 1993).

Instructional multimedia developers, in both commercial and academic settings, have emphasized availability and presentation of information (Singh, 1993). Though multimedia enhances vividness and accessibility, obstacles to learning rarely stem from locating material or presentation quality but from the information itself (Fleming-McCormick et al., 1995). Access to smartphones and ICT resources allows students to investigate real-world issues more comprehensively (Russell et al, 2000). They can use external sources, analytical tools, and data logging systems to improve comprehension. Smartphones now mitigate past logistical challenges, facilitating feedback, expanding learning, and bridging educational and non-educational contexts (Committee on Developments in the Science of Learning, 2000).

Instructors have limited control over physical barriers to integrating smartphones and ICT resources (Loveless, 1996). These include accessibility, infrastructure, purchasing decisions, wire drop locations, and whether devices are placed in centralized labs or classroom pods. While centralized labs provide equal access, they restrict classroom use, limiting instructors' ability to decide when technology is applied and implying that smartphones and ICT resources are nonessential (Loveless, 1996). Classroom constraints, such as desk size and arrangement, further restrict layout options and hinder installation of smartphone or ICT pods as functional technology hubs.

The ICT policy of Makerere University, established in 2002, indicates that governments and educational institutions acknowledge the importance of smartphones and ICT resources in education and training. Students and staff require continuous training in modern skills to effectively utilize smartphones and ICT resources in their respective roles (Makerere, 2002). However, mere awareness skills may be insufficient; consistent access to smartphones and ICT resources is advantageous.

Regular access to smartphones and ICT tools enhances instructors' confidence in their classroom use and motivates them to experiment, facilitating successful integration into courses. Numerous studies indicate that increased utilization of smartphones and ICT resources by instructors and students correlates with enhanced learning outcomes (Swedish National Association for School Improvement, 2008). Information that is available yet infrequently utilized can be challenging to recall and apply when required (Dewey, 1989). It is equally important to ensure that target learners employ technology in beneficial ways (Salomon, 1994). The study evaluated the accessibility of smartphones and ICT resources in educational institutions; however, it did not consider access to libraries, laboratories, and residence halls, nor the frequency of access by students and staff.

III. Methodology

Research Design

Descriptive research design was used to carry out the research. A cross-sectional research design was used in this study. The cross-sectional design allowed for the study of the population at a single point in time, as well as the comparison of differences between individual groups within the population. It also allowed for a study of the relationship between Smartphones and ICT resources and students learning at McCoy College, as well as gathering feedback from students and instructor. Furthermore, it allowed for the study of the effects of accessibility of smartphones and ICT resources on students learning. Because of the nature of the study variables, this design was chosen.

Sample Selection

The study was conducted at the McCoy College of Education. With the help of a table for sample selection from Sekaran (2003) Tables of sample, a sample of 275 respondents is selected. Table 1.1 shows the different types of respondents and their sizes who took part in the survey.

Table 1.1: Sample Selection and Categories of Respondent Involved

Categories	Number	Sample	Percentage
Students	812	249	90.5%
Lecturers	33	17	6.2%
Administrators	57	9	3.3%
Total	**902**	**275**	**100.0%**

Because lecturers are involved in the teaching and learning process, they are being included in the study. The administrators are viewed as policy implementers who are intimately involved with the impact of smartphones on learning. Because the students are the focus of the inquiry, they are considered the real representative population.

The method of document analysis was used to acquire secondary data. Official records, newspaper accounts, reports, and published statistics utilized in the examination of outstanding literature were among the papers to be examined. On the other hand, primary data was obtained directly from the field through observation, self-administered questionnaires, and interviews.

Validity

The instruments were examined by two experts to determine their validity. They assessed the relevance of each item in the instruments to the objectives. On a scale of one to ten, the experts ranked each item. Their suggestions were eventually used to change the questions and the format of the instruments that would collect the expected data. Students, tutors, administrators, and heads of departments were among the participants who were given questionnaires, observed, and/or interviewed. Relevant documents were collected from the college library. The Content Validity Index (CVI) was calculated after the questionnaires were to be prepared and scored.

$$CVI = \frac{Agreed\ items\ by\ both\ judges\ as\ suitable}{Total\ number\ of\ items\ being\ judged}$$

Table 1.2: Questionnaires Ratings

	Relevant items	Not relevant items	Total
Rater 1	45	7	46
Rater 2	34	6	46
Total	79	13	92

$$CVI = \frac{79}{92} = 0.86$$

The instrument was legitimate, as evidenced by the established CVI of 0.86.

Reliability

After the validity has been established, a pre-test was undertaken. The pre-test used twenty respondents from Nasarat Jahan College of Education to answer the questionnaire. Nasarat Jahan College of Education shares many of the same traits as McCoy College of Education. Their responses were subjected to a Cronbach"s Alpha Coefficient reliability test using the following formula:

$$\alpha = \left(\frac{K}{K-1}\right)\left(1 - \frac{\Sigma SDt^{-2}1}{SDt^2}\right)$$

Where α = Reliability
ΣSDt² = Sum of the variance of individual item in the questionnaire
SDt² = Variance of the entire questionnaire
K = Number of the items in the questionnaire
α was equivalent to 0.76, demonstrating the high reliability of the survey.

Using the computer program SPSS and the Cronbach Alpha method of internal consistency measurement, additional reliability of the instrument was established.

IV.   Presentation, Analysis And Interpretation Of Results
Respondents' opinions on accessibility of smartphones and ICT resources

The respondents were questioned about how frequently they access smartphones and other ICT resources at various College sites. The results are shown in Table 4.1:

Table 4.1: Distribution of Respondents by Opinion on Accessibility Of Smartphone and ICT Resources.

ICT Resources Location Category	Response	Frequency	Percentage
Library	Never at all	41	23.4%
	Not sure	8	4.6%
	Sometime	107	61.1%
	Always	19	10.9%
Total		175	100.0%

Computer Lab	Never at all	10	5.7%
	Not sure	9	5.2%
	Sometime	104	59.8%
	Always	51	29.3%
Total		**174**	**100.0%**
Lecture Halls	Never at all	75	43.2%
	Not sure	3	1.7%
	Sometime	50	28.7%
	Always	46	26.4%
Total		**174**	**100.0%**
Resource Centre's	Never at all	70	40.3%
	Not sure	38	21.8%
	Sometime	54	31.0%
	Always	12	6.9%
Total		**174**	**100.0%**
Hall of residence	Never at all	117	67.2%
	Not sure	13	7.5%
	Sometime	28	16.1%
	Always	16	9.2%
Total		**174**	**100.0%**
Internet kiosk	Never at all	65	37.4%
	Not sure	20	11.5%
	Sometime	67	38.5%
	Always	22	12.6%
Total		**174**	**100.0%**

The College library and computer lab are the most common locations for students to access ICT resources for general use, according to Table 4.6. In particular, 29.3 % always accessed ICT resources in the computer lab, and 59.8 % acknowledged that they occasionally do so. A majority (61.1 %) of respondents who said they occasionally used library ICT resources confirmed this finding. This access was not used frequently, according to conversations the researcher had with certain responders. This was further supported by the Head of Department (HOD) of ICT, who claimed that non-IT students could only visit the one computer lab when it was free, which is not often. Only 5.2% of the respondents said they were unsure, while 5.7% said they had never used any of the ICT facilities in the computer lab.

This shows that students may not explore ICT resources to get the knowledge and information they need for their academic endeavors due to restricted access to ICT facilities in both the computer lab and library.

According to Table 4.6's findings, just 26.4 % said they always used ICT in lecture halls, and roughly 28.7 % said they occasionally did so. Only a tiny percentage of respondents (1.7%) were unsure whether there were any ICT resources available in the lecture rooms, while the majority (43.2%) said they never used any of these tools. The results show that there is still a lack of access to ICT resources in lecture halls. If lecture halls are a typical learning environment, then access to ICT resources needs to be improved so that both students and instructors can access and create resource materials related to the teaching and learning processes.

The following responses were given regarding how frequently students used ICT resources from resource centers: At least 6.9 % claimed to use the resource centers exclusively to access ICT resources. About 31.0 % said they occasionally use ICT resources from resource centers, while 21.8 % were unsure. A large percentage of respondents (40.3%) claimed they had never used any ICT resources from the resource centers. The researcher learned from the aforementioned response that both students and teachers were unaware of ICT resource centers, which meant that the college lacked ICT resource centers where students could go for research and practice using a variety of ICT applications. The researcher unable to locate any resource center in the area even while collecting data and doing observations.

According to Table 4.6, just 9.2% of respondents agreed that they always access ICT services in the residence hall, while 16.1 % claimed that they do so occasionally and 7.5% were doubtful. The majority of respondents (67.2%) never used any ICT resources available in the resident hall. After speaking with a few students, the researcher learned that the college lacks housing and must rent homes off campus for some of the students to stay. However, even those staying in the hostels connected to the college claimed that although internet connection points were in existence, they were inaccessible from the hostels. The results imply that students' access to ICT resources from their various residences is constrained, which hinders their use of these resources for communication and information-seeking and consequently interferes with their ability to learn.

Table 4.6's findings also reveal that just 12.6% of students often used internet kiosks to access ICT resources. However, a sizable portion (38.5%) of them concurred that they occasionally used the internet kiosk to access ICT resources.

Only 11.5 % were unsure, and 37.4 % said they never used the kiosks' ICT facilities. The cost of visiting a commercial internet kiosk was cited by the students, and this expense appears to prevent them from having easy

access to ICT resources for communication and educational purposes. In addition, the researcher noted that there was no free internet kiosk at the campus where students could use the internet.

Challenges affecting students' accessibility of smartphones and ICT resources

Figure 1.0 shows the respondents' responses to a question asking for their opinions on the difficulties students face in using ICT resources:
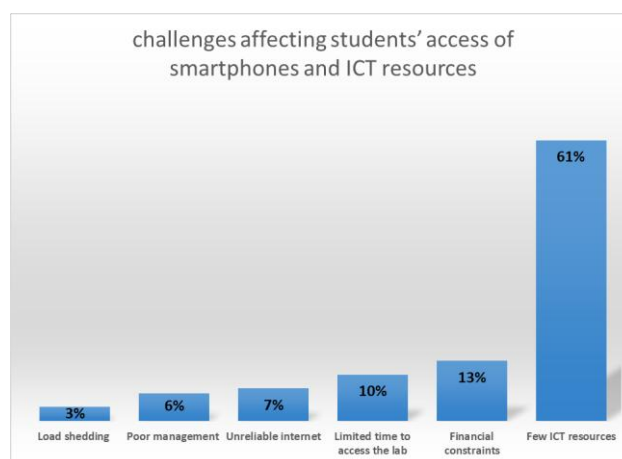

Figure 1.0 Illustrates how respondents were distributed according to how they felt about the obstacles to students' access to ICT resources.

According to the results of the open-ended question in Fig. 1, a majority of respondents (61 %) stated that the college's lack of ICT resources continues to be the biggest obstacle to accessing its ICT services. According to the answers, there isn't much time for pupils to practice because there is constant competition for the computer lab among students from other courses. Math and information technology students are always given preference because the majority of College departments lack computer labs. The 10% of respondents who said that restricted access to the computer lab continues to be the major barrier to ICT access in the College provide additional support for this. As a result, students' access to smartphones and other ICT tools for academic purposes is constantly restricted.

The findings in figure 1 also showed that one of the main obstacles to having access to smartphones and ICT resources is the College's financial limitations. One person remarked that because McCoy College of Education is still a young institution with limited funding, smartphones and computers in the lecture halls are not essential. These kinds of attitudes have prevented pupils from realizing the importance of ICT in their education. In order to enhance the number of technological accessories in the College, more ICT facilitation is required, according to the researchers' interaction with the administrators.

A little over 7% and 6% of respondents cited bad management and unreliable internet as barriers to accessibility, respectively, while 3% cited power load shedding. The aforementioned data show that students' ability to use various technology tools to enhance their learning is seriously hampered by the accessibility of smartphones and computers.

Hypothesis

The null hypothesis was stated as: "Accessibility of smartphones and ICT resources are not correlated with students learning". A Pearson product correlation coefficient was used to test this hypothesis and the results are summarized in Table 4.2 below:

Table 4.2: The relationship between students' learning and the accessibility of smartphones and ICT resources

		Students' learning	accessibility of smartphones and ICT resources
Students' learning	Pearson correlation	1	.558
	Sig.(2-tailed)		.000
	N	175	175
Accessibility of smartphones and ICT resources	Pearson correlation	.558	1
	Sig.(2-tailed)	.000	
	N	175	175

The analysis's findings indicate a positive connection (.558) between students' learning and the availability of smartphones and ICT resources. The alternative hypothesis was accepted in place of the null hypothesis, which stated that "accessibility of smartphones and ICT resources is not connected with students learning." The results point to a potential improvement in student learning at McCoy College of Education as student access to smartphones and ICT tools increases.

V.   Conclusion And Recommendation
A discussion of how students' learning is impacted by accessibility of smartphones and ICT resources

Access to various smartphones and ICT resources is a barrier to adopting ICT for learning. Accessibility was highlighted by Bardwell (2002) as a component of ICT integration into teaching and learning processes. The analysis shows that the computer lab was timetabled and that access to it is restricted due to the low number of working computers and laboratories. The separate departments' lecturers and students are expected to follow set schedules that discourage accessibility at convenient times. The majority of respondents believed that there is access in the College, albeit insufficiently, and that timetabling is intended to improve organization and management of the limited resources.

According to the study, there was an issue with easy access to smartphones and ICT resources throughout the entire college sector. The majority of students, it was discovered, scarcely ever used smartphones and ICT resources located in residential halls. There were no resource centers in place, and there were no smartphone and ICT resource for students to utilize in public libraries. Students were not given any opportunity to practice in the computer lab. Additionally, students and lectures compete for space in the computer lab. The report also reveals that the college library and computer lab continue to be the two most frequented locations to access smartphones and ICT resources. It is crucial to highlight that not all areas of the institution have fully adopted internet accessibility, which is one of the key indicators of ICT in learning, particularly the residence halls, lecture rooms, and resource centers. Alessi and Trollip (2002) give a clear indication that many activities, including teaching and learning, will change as a result of the internet. As a result, ICT in education only exists in computer labs and libraries. The limit to places is not a good practice because learning on the internet adheres to the constructivist approach to instruction (Jonassen, 2002).

According to UNESCO (2000), the degree to which students and teachers have access to smartphones and ICT resources will determine how well ICT is used in the teaching and learning process in higher education. The main obstacle preventing students from having access to smartphones and ICT facilities, according to survey results, is a lack of ICT resources (61%). Financial restrictions, mentioned by 13% of the respondents, came in second place. The researcher's discussion with the administrators reveals the need for increment in smartphones and ICT resources so as to increase on the number of technology accessories in the College. Limited time to access the computer lab (10%), Internet connectivity (7%) and power fluctuation (3%) were some of the other reasons cited as affecting student's access to smartphone and ICT resources.

Justification and Contribution

Both lecturers and students in the various College sectors did not have good access to smartphones and ICT resources. The major barrier to simple access to smartphone and ICT resources in the College continues to be the small number of smartphones and other ICT resources that do not keep up with the steadily growing student body. However, there was at least a foundation upon which to develop, even if it was still restricted to smartphones and ICT resources.

Recommendation

The college needs to keep its internet connection up and more students' personal smartphones need to be connected to it. The College should then open up internet access within the campus by creating ICT resource centers where all software, student packages, and modern technology may be accessed. Overall, it will take time for the college to be able to provide students with 1:1 access to smartphone and ICT resources, thus students should also make an effort to buy what they can afford or go to a commercial ICT provider like an internet café to obtain smartphones and ICT resources.

References

[1].   Alessi, S.M. & Trollip S.R. (1985). Computer Based Instruction, Methods And Development. New York: Englewood Cliffs, Prentice Hall.

[2].   Assabi 2012, Quist And Quarshie 2016 Https://Www.Academia.Edu/81795216/The_Use_And_Effect_Of_Smartphones_In_Students_Learning_Activities_Evidence_From _The_University_Of_Ghana_Legon?F_Ri=1695

[3].   Apau, S. K. (2016). Technological Pedagogical Content Knowledge Preparedness Of Student-Teachers Of The Department Of Arts And Social Sciences Education (Dasse) Of University Of Cape Coast. University Of Cape Coast.

[4].   Bakkabulindi, F.E.K, (2007). Social Correlation Of Innovation Adaption In Education Organization:A Case Study Of Ict In Makerere University. An Unpublished Phd Thesis.

[5]. Committee On Developments In The Science Of Learning. (1999). Technology To Support Learning. In J. Bransford, A. Brown, & R. Cocking (Eds.), How People Learn: Brain, Mind, Experience, And School. Washington, Dc: National Research Council. [On Line] Available Http://Books.Nap.Edu/Html/Howpeople1/Ch9.Html

[6]. Darko-Adjei, N. (2019). The Use And Effect Of Smartphones In Students' Learning Activities: Evidence From The University Of Ghana, Legon. Library Philosophy And Practice, 2019.

[7]. Davis, N. (2000). International Contrasts Of Information Technology In Teacher Education: Multiple Perspectives On Change. Journal Of Information Technology For Teacher Education, Vol. 9, No. 2, 2000 Available At Http://Www.Triangle.Co.Uk

[8]. Davis, N. (2003). Technology In Teacher Education In The Usa: What Makes For 69

[9]. Dewey, J. (1989) The Development Of American Pragmatism" In Pragmatism: The Classic Writings, Thayer, H S, Ed, (Indianapolis, Indiana: Hackett). First Published 1931

[10]. Drenoyianni, H. (2004). Designing And Implementing A Project-Based Ict Course In A Teacher Education Setting: Rewards And Pitfalls. Education And Information Technologies, 9(4).

[11]. Dunaway, J. (2016). Mobile Vs. Computer: Implications For News Audiences And Outlets. Shorenstein Center On Media, Politics And Public Policy, Spring, 30 August. Https://Shorensteincenter.Org/Mobile-Vs-Computer-News-Audiences-And-Outlets/

[12]. Enge, E. (2021). Mobile Vs. Desktop Usage In 2020 / Perficient, Inc. Perficient. Https://Www.Perficient.Com/Insights/Research-Hub/Mobile-Vs-Desktop-Usage

[13]. Fleming-Mccormick, T., Nyre, G., Schwager, M. And Tushnet, N. (1995). District Response To The Demonstration: The Practice Of Technology. San Francisco, Ca: Far West Lab. For Educational Research And Development. (Eric_No- Ed388311)

[14]. Fitton, O. (2020). The Future Of Mobile Devices Security And Mobility.

[15]. Gamage, K. A. A., & Perera, E. (2021). Undergraduate Students' Device Preferences In The Transition To Online Learning. Social Sciences, 10(8), 288. Https://Doi.Org/10.3390/Socsci10080288

[16]. Greenleaf F, C. (1994) Technological Indeterminacy : The Role Of Classroom Writing Practices And Pedagogy In Shaping Student Use Of The Computer. Written Communication, 11 (1), 85-130.

[17]. Gunter, H. (2001). Leaders And Leadership In Education. London: Paul Chapman Publishing.

[18]. Hannafin, R. D., & Savenye, W. C. (1993). Technology In The Classroom: The Teacher's New Role And Resistance To It. Educational Technology, 33(6), 26-31.

[19]. Huang Et Al, 2020. Https://Scholar.Google.Com/Scholar?Q=1.+(Huang+Et+Al,+2020).&Hl=En&As_Sdt=0&As_Vis=1&Oi=Scholart

[20]. Jackson, D., B. Edwards And C. Berger (2003) The Design Of Software Tools For 70

[21]. Jonassen, D. (2000). Designing Hypertext On Transfusion Medicine Using Cognitive Flexibility Theory. Journal Of Educational Multimedia And Hypermedia, 1(3), 309-322.

[22]. Joy, E. H., & Garcia, F. E. (2000). Measuring Learning Effectiveness: A New Look At No- Significantdifferencefindings. Journal Of Asynchronous Learning Networks, 4(1), 33-39 Jung, I. S. (2005). A Comparative Study On The Cost-Effectiveness Of Three Approaches To Ict Teacher Training.Journal Of Korean Association Of Educational Information And Broadcasting, 9 (2). 39-70.

[23]. Loveless A. (1996). The Interaction Between Primary Teachers" Perceptions Of Ict And Their Pedagogy.Education And Information Technologies, 8(4), Pp. 313-326.

[24]. Makerere University Ict Policy (2002): Downloaded On The 14th June 2008 Available At: Http://Www.Makerere.Ac.Ug/Makict/Documents/Policydoc/Contents.Htm

[25]. Russell, M., Bebell, D., Dwyer, L And O"Connor,K. (2000) Examining Teacher Technology Use Implications For Preservice And Inservice Teacher Preparation, Journal Of Teacher Education, 54(4) September/ October, 297 – 310.

[26]. Singh, R. P. (1993). Challenges Of Tomorrow: Profile Of Future Teacher Education. New Delhi: Sterling Publishers Private Limited

[27]. Spiro, R.J., Feltovich, P.J., Jacobson, M.J., & Coulson, R.L. (1992). Cognitive Flexibility, Constructivism And Hypertext: Random Access Instruction For Advanced Knowledge Acquisition In Ill-Structured Domains. In T. Duffy & D. Jonassen (Eds.), Constructivism And The Technology Of Instruction. Hillsdale, Nj: Erlbaum

[28]. Tearle, P. (2003). Enabling Teachers To Use Information And Communications Technology For Teaching And Learning Through Professional Development: Influential Factors. Teacher Development, 7(3).

[29]. Unesco. (2002b). Information And Communication Technology In Education: A Curriculum Guide For Schools And Programs Of Teacher Development. Division Of Higher Education. Available Online At Http://Unesdoc.Unesco.Org/Images/0012/001295/129538e.Pdf.

[30]. Unesco. (2003). Manual For Pilot Testing The Use Of Indicators To Assess Impact Of Ict Use In Education [Online]. Http://Www.Unescobkk.Org/Education/Ict/Resource

[31]. Warschauere, M. (1996) Computer- Assisted Language Learning. Intro-Ductions. In S. Fotos (Ed) Multimedia Language Teaching. Tokyo: Logos International, Pp. 3 – 20