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The use of personal Computing devices for self-directed learning

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Abstract

Covid 19 pandemic has disrupted education worldwide, affecting over 94% of the student population. One strategy to ensure seamless learning is the adoption of self-directed learning and personal computing devices. A survey was carried out in four public Universities in Kenya to assess the computing devices used by learners for self-directed learning. Five hundred seventy-two students pursuing either information technology or computer science students participated in the study. The findings revealed that over 90% of the students own a personal computing device. The most popular device was a smartphone, followed by a Laptop, a Personal computer and finally a Tablet. The majority of the students prefer using a laptop for self-directed because of the convenience of use. Over 90 % of students prefer using their computing devices to university-provided devices. Over 80% of the students are using their computing devices for learning. The findings will inform policy in the domain of technology-enhanced self-directed learning.

Keywords: *Personal computing device, Self-directed learning, Technology-enhanced self-directed learning.*

1. Introduction

The COVID-19 pandemic has disrupted the education system worldwide, affecting over 94% of the world's student population [1]. An almost uniform response to school closures brought about by Covid 19 pandemic has been establishing online learning systems to help instructors, students and their families [2]. This teaching and learning approach requires learners to be self-directed and use computing devices and internet technologies to access and share information.

Desktop, laptops, smartphones, and tablets are all electronic equipment controlled by a central processing unit. In contrast to a specific unit of equipment such as a network switch or router, it generally refers to a general-purpose device that may receive software for a variety of functions [3]. The use of mobile devices

such as smartphones and tablets is profoundly rooted in Generation Z college students [4]. A quick peek into every average classroom would show that computing devices are available to most students today. As a result, personal computing devices drive the learning of the 21st century characterized by self-directed learning anytime, anywhere.

Knowles [5, p. 18] defined self-directed learning as a "process in which individuals take the initiative, with or without the help from others, in diagnosing their learning needs, formulating goals, identifying human and material resources, choosing and implementing appropriate learning strategies, and evaluating learning outcomes".

The convergence of technology and self-directed learning brings about technology-enhanced learning expected to usher in 21st-century learning and, more specifically, enhance seamless learning during and after the covid 19 pandemic. However, not all pupils have the same access to information and communication technologies (ICTs), which varies considerably between nations [2].

Therefore, this study aimed to establish the computing devices and their use towards self-directed learning in Kenyan public Universities. The findings will inform policy formulation in the domain of technology-enhanced self-directed learning.

2. Literature Review

This section presents a literature review on self-directed learning, Technology use in self-directed learning, and personal computing devices for self-directed learning.

2.1 Self Directed Learning

Learners today are expected to be self-directed in their learning since they have access to more information than earlier generations [6]–[8]. Learner engagement, choice, and decision-making are all emphasized in self-directed learning (SDL).

According to Knowles [9], self-directed learning is the capacity of an individual to take the initiative, define a learning goal, evaluate learning requirements, select materials needed to assist learning, and track progress toward a goal. In essence, self-directed learning is a method of learning that puts the student in control. Learners determine the why, what, how, and where of their learning with this method [10].

In an increasingly complex and uncertain environment, self-directed learning is an essential skill for living and working. For instance, self-directed learning was cited by global education leaders as one of the education responses towards the COVID 19 pandemic [11].

2.2 Use of Technology in self-directed learning

The potential of technology to promote self-directed learning has arisen in education during the previous two decades, as Francis [12]points out. Historically, schools have depended on technology to assist a variety of teaching and learning initiatives. Rapid technological advancements have displaced the personal computer as the dominating technology fixture in classrooms, with laptops, tablets, and smartphones becoming more widely available and affordable. When combined with widespread broadband internet access, introducing these gadgets has allowed teachers more freedom in how they help their students.

Because of the extensive usage of technology among today's college and university students, higher education institutions throughout the world have recognized the need to use it in teaching and learning for specific reasons [13]. The growth in popularity of YouTube and dozens of other websites dedicated to providing users with online lessons and other relevant material has influenced how today's learners learn [14]. These online and other self-directed educational options have exploded in popularity in recent years, with a possibility of most courses being undertaken online in a self-directed learning format—Mwebi [15]

highlighted areas of learning critical for acquiring 21st-century knowledge and skills. Core topic knowledge, cross-disciplinary understanding, digital literacy, and problem-solving are among these abilities.

2.3 The use of Personal Computing Devices for self-directed learning

A computing device can be a device that provides a specific set of functions, such as a phone or a personal organizer, or more general functions such as a laptop or desktop computer [16]. Most computing devices use technology that provides continuous access to users anytime, anywhere, transmit data, or communicate with others using the Internet. Technology-enhanced self-directed learning can thus be defined as any educational provision where the student is in control of learning anytime anywhere using Internet-connected computing devices to organize, search and transmit information. The usage of computer devices allows learners to be more self-directed in their learning. Learning is increasingly occurring outside of conventional classroom settings as today's learners' learning experiences and preferences change [17], and with the growing availability of computers, computing devices, and the Internet, learning may happen practically anywhere. Today's learners frequently participate in this learning via computer devices while on the road, away from home, or in other settings (e.g., cellular phones, tablets, and other handheld devices connected to the Internet) [18]. The notion of employing computer devices for learning is commonly referred to as "mobile learning" in the literature. However, there is a multitude of alternative words that are used (e.g., "m-learning," one-to-one learning," and "handheld learning"). The words "mobile learning" and "computing devices," as well as their use in education, are often misunderstood.
This study aimed to learn about the many types of computing devices utilized by self-directed learners; this is especially important because more than half of the world's population already has a computing device, and university students are one of the world's fastest-growing sectors of mobile technology users [19]. Since 2005, mobile device ownership among students has increased by double digits [20], and this trend is anticipated to continue.

In their analysis of mobile and ubiquitous learning research trends, Hwang & Tsai [21] highlighted many topics. With a sample of 567 respondents, the study used a descriptive survey methodology, a correlation survey design and focused group discussions and key informant interview guides. The following are some of the study's findings: The study of mobile and ubiquitous learning has progressed significantly (32 articles during 2001-2005 versus 122 articles during 2006-2010). The majority of the research was conducted with higher education and elementary school pupils and were not specific to any learning area. Instead, they concentrated on studying students' motives, perceptions, and attitudes toward mobile and ubiquitous learning. Most mobile learning research has been carried out outside of the United States, especially in Taiwan. The authors point to Taiwan's national e-Learning initiative as a possible reason for the discrepancy.

Kavuta [22] investigated smartphone usage among learners in Tanzania higher education. A sample of 185 students was picked randomly from diverse programs - at different stages of study. The statistics reveal that 89% of all respondents own Smartphones. These findings indicated that most students spend their time on social media using their smartphones to communicate with friends, post comments, upload images to Facebook, take pictures, and listen to music. The survey also looked at how frequently students used their smartphones for educational purposes. Students use their Smartphones to check the course schedule, read announcements, download course materials, and read lecture notes. Pew's results back with other recent research studies that show that teen mobile device use is on the rise [23], [24]. With so many computational gadgets in the hands of today's children, the study suggests that the way we approach education and learning may need to alter. "Mobile phones are part of the student's life," say proponents of allowing computers in the classroom. "Rather than prohibiting cell phones, schools and instructors can tap into the potential of these technologies and use them as instructional tools."

3. Methodology

This study employed a survey research design. Survey research is a detailed field study incorporating data from a sample of components drawn from a remarkably much-described populace using a questionnaire

[25]. The geographical location of this study was Kenya. The study was carried out in public universities in Kenya. The study targeted public university students taking a course in either information technology or computer science.
The sample size for this study was 572 obtained using a simplified formula for proportions Yaname(1967:886) formula $n = \frac{N}{1+N(e^2)}$. A 95% (0.95) confidence level corresponds to a 5% (0.05) level of precision, and N as the target population was adopted.

Before embarking on data collection, permission to collect data was granted by the school of graduate studies at Kibabii University, the National Council for science technology and innovation (NACOSTI), and the respective Universities. An online questionnaire was the primary data collection instrument. An online questionnaire was preferred over the physical questionnaire in order to comply with covid-19 pandemic containment measures. Out of the 572 online questionnaires sent out, 350 (61%) were duly filled and returned for analysis. Babbie (2004) reiterates that return rates of 50% are acceptable to analyze and publish, 60% is good, and 70% is excellent. Data were analyzed using descriptive statistics.

4. Results and discussions

This section provides results and discussions on ownership of computing devices, types of computing devices, reasons why a Laptop is the most preferred device, most effective category of computing devices, the use of personal computing devices for self-directed learning.

4.1 Ownership of a personal computing Device

The study sought to determine whether the respondents owned computing devices such as smartphones, tablets, laptops, personal computers, and other computing devices. Findings revealed that 99.35% (306) of the respondents owned a computing device, while 0.65% did not own a computing device. It implies that over 99% of University students own a computing device.

4.2 Types of computing devices owned by students

The study further wanted to find out the types of computing devices owned by Respondents. Table 1 shows the summary.

Table 1: types of computing devices

	DEVICE OWNERSHIP			MOST PREFERED DEVICE
	YES	**NO**	**TOTAL**	
Smartphone	90.9% (280)	9.1% (28)	100% (308)	35.1% (108)
Tablet	3.2% (10)	96.8% (298)	100% (308)	1.9% (6)
Laptop	68.5% (211)	31.5% (97)	100% (308)	55.8%(172)
Personal computer	7.5% (23)	92.5% (285)	100% (308)	7.1% (22)

Table 1 indicates that Students who owned a Smartphone were 90.9% (280), while 9.1% (28) did not own a Smartphone. It implies that the majority of University students own a Smartphone.
Students who owned a tablet were 3.2% (10), while those who did not own it were 96.8% (298). It implies that most students did not own a tablet. It may be due to a Tablet having almost similar features to a Smartphone. Students who owned a Laptop were 68.5% (211), while those who did not own it was 31.5%. It is a clear indication that most University students own a laptop. When asked whether they own a personal computer, 7.5% (23) responded yes, while 92.5% (285) responded no. It shows that majority of the students

do not own a personal computer. A Smartphone is the most owned computing device at 90.9%, while a Tablet is the least owned at 3.2%. Most students who own a Laptop also own a Smartphone.

From the findings, 35.1% (108) of the respondents preferred using a Smartphone, 1.9% (6) preferred a Tablet, and 55.8% (172) preferred a Laptop, while 7.1% (22) preferred using a personal computer. It implies that a Laptop is the most preferred computing device (55.8) for self-directed learning, followed by a Smartphone (35.1%).

4.3 Reasons why a Laptop is the most preferred computing device

Students who preferred using a Laptop for learning gave the following reasons as summarized in Table 2.

Table 2: why Laptop was the most preferred device

	Frequency	**Percent**
Portable	63	30
Affordable	3	1
Ease of use	80	38
Efficiency	36	17
Large display screen	29	14
Total	**211**	**100.0**

From table 2, 30% (63) responded that a Laptop is portable and can be used anytime anywhere, 1% (3) responded that it is affordable, 38% (80) responded that it is easy to use, 17% (36) responded that a Laptop is efficient while 14% (29) responded that it has a large display screen.
Over 10% of the respondents prefer a laptop for learning because of its efficiency, large display screen, portability and ease of use.

4.4 Most effective computing devices for self-directed learning

93.8% (289) of the respondents considered personal computing devices to be the most effective, followed by University computers at 6.2% (19). It implies that over 90% of students prefer using their computing devices to university computers. Students gave the following reasons: 3% (10) said that personal computers were affordable, 5% (14) responded that they were easy to use, 10% (30) responded that personal computers had more safety and privacy, 7% (19) said that they are efficient while 75% (216) said that personal computing devices were convenient to use. It implies that personal computing devices are more preferred than University computers because they are convenient to use.

4.5 The use of personal computing devices for self-directed learning

Respondents were asked their degree of agreement with statements on a scale of 1 to 5, having 1=Strongly Disagree (SD), 2=Disagree (D), 3=Undecided (U), 4=Agree (A), and 5=Strongly Agree (SA). Table 3 summarizes the findings.

Table 3 The use of personal computing devices for self-directed learning

SNO	**VARIABLE**	**SD**	**D**	**U**	**A**	**SA**	**TOTAL**
1	I use my computing device for personal and academic work	9% (28)	1% (3)	2%(7)	32% (98)	56% (172)	100% (308)

2	I prefer using my computing device than university computing devices	9% (27)	3% (8)	6% (18)	27% (82)	56% (173)	100% (308)
3	With my computing device, I can learn anytime anywhere	8% (24)	5% (14)	3% (9)	16% (50)	69% (211)	100% (308)
4	I **gain** more when I use my computing device than the University devices	10% (32)	7% (21)	9% (28)	28% (86)	46% (141)	100% (308)
5	I feel satisfied while using my own computing device	9% (29)	3% (10)	5% (16)	22% (67)	60% (186)	100% (308)
6	I spent less time in carrying out tasks while using my computing device	9% (29)	9% (28)	9% (29)	22% (68)	50% (154)	100% (308)

To establish whether students use their computing devices for academic and personal work, 9% (28) strongly agreed, 1% (3) disagreed, 2%(7) were undecided, 32% (98) agreed, while 56% (172) strongly agreed. The majority of students (88%) use their computing devices for personal and academic work.

In establishing whether students prefer using their computing devices to university computers, 9%(27) strongly disagreed, 3% (8) disagreed, 6% (18) were undecided, 27% (82) agreed, while 56% (173) strongly agreed. Thus, 83% of the students prefer using their computing devices to university computing devices.

To establish whether students can learn anytime, anywhere using their computing devices, 8% (24) strongly disagreed, 5% (14) disagreed, 3% (9) were undecided, 16% (50) agreed, while 69% (211) strongly agreed. The majority of the students (85%) can learn anytime, anywhere using their computing devices.
Furthermore, to establish whether students gain more when they use their computing devices than the university computers, 10% (32) strongly disagreed, 7%(21) disagreed, 9% (28) were undecided, 28% (86) agreed, while 46% (141) strongly agreed. 74% (227) of the students agreed that they gain more when using their computing devices than university devices.

In addition, to establish whether students feel satisfied while using their own computing devices, 9% (29) strongly disagreed, 3% (10) disagreed, 5% (16) were undecided, 22% (67) agreed, while 60% (186) strongly agreed. Generally, most students (82%) agree that they feel satisfied while using their own computing devices.

To establish whether students spent less time in carrying out tasks while using their computing device, 9% (29strongly disagreed, 9% (29) disagreed, 9% (29) were undecided, 22% (68) agreed, while 50% (154) strongly agreed. A majority of students (72%) agreed that they spent less time carrying out tasks using their computing devices.

The overall mean of the use of computing devices for self-directed learning was 4.14. On a scale of one to five, this implies that 83% of students use their computing devices for self-directed learning.

5. Conclusions

Public University students in Kenya use various computing devices such as their computing devices, university computer laboratories, commercial computers and some borrow from friends. The majority of university students own a computing device. A Smartphone is the most owned computing device. A

Laptop followed comes second. Then a personal computer. A Tablet is the least owned computing device. Most students owned both a Smartphone and a Laptop. However, most students prefer using a Laptop because a laptop is more efficient, has a larger display screen, and is portable and easy to use. Overall, most students consider personal computing devices more effective for self-directed learning than university computer labs because they are convenient to use anytime, anywhere.

The majority of students use their computing devices for personal and academic work. The majority of the students prefer using their computing devices to university computing devices for self-directed learning. Generally, most students feel satisfied and spend less time carrying out tasks while using their own computing devices.

Universities in Kenya and beyond can take advantage of the availability of computing devices owned by students to enhance self-directed learning, especially during this period of covid 19. The universities can place supportive infrastructures such as compatible e-learning systems and the Internet, train lecturers and students on technology-enhanced self-directed learning.

The Universities can also formalize the Bring your own device (BYOD) policy; this can be achieved by developing guidelines and policies to permit students to access the university network securely. If proper policies are not put in place, BYOD can threaten the universities network security. On the other hand, the Adoption of BYOD will go a long way to reduce costs incurred by the university to buy and maintain computers. Students will also be able to learn anytime anywhere as opposed to the restricted computer Laboratories.

The universities and other partners can introduce a Laptop Loaning program with a flexible payment schedule to enhance computing device equity since some students cannot afford a Laptop. This will go a long way to ensure all students have access to quality education.

This study was carried among students pursuing Information technology or computer science in public universities in Kenya. Future research can be replicated in other contexts, such as considering how websites may affect the accessibility of information. Mukanda et al. [26] argues that "Thousands of higher education websites exist, each with its own style and form. They have become the most crucial public communication portal for most universities. Websites are designed to provide content and services that serve various stakeholders' requirements, including prospective students, continuing students, faculty members, alumni, researchers, and the public. Hence there is a need to carry out further research on this aspect.

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