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# OPTIMIZATION OF DIGITAL ERGONOMICS OF MOBILE INTERNET IN TEACHING AND LEARNING IN POST-PRIMARY EDUCATION IN NIGERIA

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**Abstract**

The paper explores the use of digital ergonomics of mobile internet in the teaching-learning situation in Nigerian post primary schools. Worrisomely, the emergence of internet and social media has evolved arrays of digital vices and abuses among students, prompting the neglect of the academic digital efficacy of mobile internet among secondary schools in Nigeria. On this premise, this paper examines the academic potentials embedded in digital ergonomics of mobile internet as opposed to digital misuses. The hypotheses focused on content accessibility, discovery learning and innovative learning as variables for the study. Adopting a descriptive survey research design, a questionnaire through stratified random was administered on two hundred respondents. Findings revealled that the students are generally aware of the educational efficacy of digital ergonomics. However, the trend is gross digital misuse of mobile internet devices negating the exploration of academic potential embedded in digital ergonomics of mobile internet. This paper established the urgent need for optimization of digital ergonomics of mobile internet in teaching and learning among secondary school students in Nigeria. Recommendation suggest that to ensure global competitiveness, practical and result-driven steps to ensure the successful adoption and implementation of digital ergonomics in teaching and learning in Nigerian post-primary education. These measures include ensuring that teachers and administrators are adequately trained on the concept of digital ergonomics and its applications. Pertinently, the need to continuously create an awareness on the importance of digital ergonomics among students, teachers and parents becomes eminent. This will assist to eradicate digital misuses thereby promoting optimization and academic efficacy of mobile internet.
**Keywords:** Optimization, digital ergonomics, mobile internet, teaching and learning, students

## Introduction

An essential tool Information and Communication Technology (ICT) in the 21st century, is perceived to learning enhanced and supported through the use of digital technologies. The utilization of ICT entails facilities such as internet, computer, mobile internet devices and computerized knowledge content such as simulations backing teaching and learning practice (Hawkins, Barbour, & Graham, 2012). Information and communication technology in education has fundamental keys, ICT usually is an instrument for addressing challenges in teaching and learning, a change agent, and a central force in economic competitiveness (Culp, Honey & Mandinach 2003). Significantly, educational practice that optimizes ICT usage will enhance teachers‘ level of proficiency and development fostering students‘ academic performance and academic quality (Owen, Mustian and Liles, 2000). To achieve this lofty academic goal, governments at the various level in Nigeria has been striving to ameliorate the deficiencies in quality of curricular offered in secondary education. Which has been frequently characterized by poor teaching approach, negative teachers‘ attitude, students non-challant attitude to learning and school works, insufficient school amenities and unequal access to quality education.

Consequently, at the state level, an ICT curriculum workshop for 600 public secondary school teachers with the aim of assisting them on effective use of ICT facilities in instructional delivery by the Lagos State Government in 2009 was organized (Lagos Ministry of Information, 2011). Furthermore, through the assistance of World Bank launched

VOL. 3, NO. 2 DECEMBER, 2023
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the Lagos Eko Project was lauched‖ in 2009 in order to reinforce the knowledge based and content delivery of teacher. Facilities like laboratories and ICT facilities such as computer sets and e-tutor software were provided in 639 secondary schools with students' population of 620,120 as beneficiaries (Eko, 2010; 2011). In the same vein, Osun State Government introduces an ICT initiative tagged Tablet of Knowledge (Opon Imo). The Opon Imo‖ (PC tablets) has 56 e-books covering 17 subject offerings, 17 tutorial questions for the 17 subjects, 1000 past questions, six extra-curricular subjects and educational games. This ICT initiative provided mobile learning PC tablets for 150,000 senior secondary school students in the state with the aim of enhancing flexibility and efficient learning (Osun, 2014).

To gain ICT global relevance the Nigerian federal government, apart from being a signatory to a number of pacts and treaties like world declaration on education, Education for All (EFA) and Millennium Development Goal (MDG) was committed to the advancement of quality education through Information and Communication Technology (ICT). The National policy for ICT was articulated in 2001, with a vision to make Nigeria proficient in Africa and a key player in ICT for sustainable development and global effectiveness (Federal Ministry of Science and Technology, 2001). This mission proclamation acknowledged the incorporation of ICT into the mainstream education and training with a strategy to streamline educational system at all levels (Yusuf, 2005). As reckoned by Owhotu (2006), some wits through the partnerships with the government by development partners, non-governmental organisations (NGOs, Local and International) and private sectors launched the SchoolNet in September, 2001 and funded by Education Trust Fund. SchoolNet was engaged in the effective sustainable development and use of Information and Communication Technologies (ICT) to enhance teaching and learning in primary and secondary schools. Another effort was Education Trust Fund (ETF), enforcing Education tax of 2% of company's profit to be distributed by the Education Trust Fund for education purpose. Besides working with Schoolnet, ETF also works on the Education Resource Centre project, which aims to create science laboratories, ICT laboratories, libraries and multi-purpose halls in schools and institutions of higher learning. In addition was Computers-in-schools project of 2002 and One-laptop-per-child (OLPC) of 2006 these initiatives aimed at developing comprehensive ICT literacy through the introduction of computers in secondary schools, taking a clue from countries like Turkey and Morocco.

In June 2003, at the African Summit of the World Economic Forum held in Durban, South Africa, the New Partnership for African Development (NEPAD) launched the e-Schools Initiative, intended to equip all African high schools with Information and communication technology equipment including computers, radio and television sets, phones and fax machines, communication equipment, scanners, digital cameras, and copiers, among other things. It is also meant to connect African students to the Internet. The NEPAD capacity-building initiative will be executed over a ten-year period, with the high school component being completed in the first five years. Three phases are envisaged, with fifteen to twenty countries in each phase. The phases are to be staggered, and an estimated 600,100 schools are expected to benefit. However, with OLPC however and the above initiatives, Okafor and Edet (2008) identified some barriers to proper implementation of ICT in Nigeria schools. This includes limited ICT infrastructures, poor internet connectivity; inadequate learning sources (educational tools, course curriculum), lack of maintenance and technical support, inadequate funding of education on the part of corrupt Nigerian leaders and most importantly poor power supply, a problem peculiar to Nigeria. Ololube (2006) also attributes these barriers to the cause of low standard of education due to economic disadvantages and government policies.

Aduwaogu Ogiegbaen and Iyamu (2005) concludes that computer is not part of classroom technology in more than 90 percent of Nigerian public schools. This implies that the chalkboard and textbook continue to dominate classroom activities in Nigeria secondary school. NEPAD has scored the level of African continent students' experience with Information and communication technologies and their proficiency in using them very low. Fifty-five percent of

VOL. 3, NO. 2 DECEMBER, 2023
ISSN 2756-4444
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students within the continent, including Nigeria, Algeria, Burkina Faso, Cameroon, Republic of Congo, Egypt, Gabon, Lesotho, Mali, Mauritius, Mozambique, Rwanda, Senegal, South Africa, and Uganda (who are participating in the first phase of the NEPAD e-Schools initiative), stated they had no experience at all in using computers. These pedagogical challenges call for an urgent approach most especially adoption of mobile internet device as a considerable alternative instructional tool.

**Conceptual Anchorage of Digital Ergonomics**

The need for information determined economy pitched by globalization and constant scientific advancement, prompted the 21st century skills necessitating the need for manpower creation. Achieving this lofty aim requires Information and media technology skills enhancing access to information efficiently, effectively and evaluating it critically and competently (P21 Framework Definitions, 2009). The ergonomics of mobile internet as observes by Komolafe-Opadeji (2011), students frequently access the Internet and preferred sourcing for electronic resources sometimes through mobile internet devices rather than the laptop computer, this observed preference can best explained the ergonomics of mobile internet in terms of the mobility, flexibility, ease of use and portability qualities. Conceptually, mobile internet device can be described as a handheld electronic device which is capable of storing and retrieving information generally needed by scholars regardless of space and time constraints affording learners the advantages of mobile technologies (O'Malley,Vavoula, Glew, Taylor & Sharples, 2005). Mobile internet devices if used appropriately is potentially endowed to improve the learning setting in extensive ways (Bradford, 2010). A deviation from academic endowment of digital ergonomic as asserted by Ball State's Hanley Institute for mobile media research on students' use of mobile devices revealled other usages such as accessing e-mail, sending text, download and listen to music and access social media sites(Park, 2005). Contemporarily, in Nigerian context Puberty characteristics of students spur them to crave for more independent and have more self-control at the expense of parental and teacher control. However the, analogue nature of most teachers and parents make them feel uncertain and unease about their teenage children's actions and experiences on the Internet, but lacks digital efficiency to curb this excesses (Lin, C. H., Lin, S. L., & Wu, 2009). Digital ergonomics suffers challenges from the overwhelming space at which technologies is trending, many teachers and parents have far trailing behind in curbing excesses due to inadequate knowledge of internet usage compared students (Livingstone, 2002).

The widen gap has featured some digital parenting crisis reflecting Internet slangs, Excessive usages of video games and Internet fraud drastically affecting student study habit culminating into e-cheating. The need to illustrate this crisis is pertinent so as to indicate its impact on parenting. The inability of teachers and parents to digitally curb internet excesses of teenagers culminating into digital vices as internet slangs, internet fraud, excessive use of video games and e-cheating are growing digital trend adversely affecting education. However, the of ergonomic mobile internet devices is geometrical as indicated by digital facts. Nigeria among West and Central Africa asserted by Olaleye (2016) was placed number one in Africa and eight in the world in terms of internet usage with about 63 million internet users in the country as at 2016. This can be attributed to inexpensive, functional, and convenient nature of mobile internet devices. This avails students prospects to access course materials and online information, learn in a collaborative environment, and obtain formative evaluation and feedback from teachers. As observed by Egunjobi (2011), mobile devices appears popular among Nigerian students, young adult learners, because it is affordable, flexible, and compatible and facilitate accessing relevant academic information. Adjourning, positivity, Morgan, (2012) asserts mobile internet devices as a key research components to teachers and students, due to its usage in completing individual and group assignments. It serve as supportive teaching tool for teacher quick search on a topic in classroom instruction. As observed by Bellarmine University study many teachers use mobile internet devices as teaching tools via text with students, sending reminders and students ask questions and receive instant feedback. Numerous English

VOL. 3, NO. 2 DECEMBER, 2023
ISSN 2756-4444
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teachers adopt text messages to teach literature, mentoring students to write fictional text message conversations between literary characters (Morgan, 2012).

The pedagogical potentials and academic potency of mobile internet devices as asserted by Wang (2008) have been neglected thereby debarring academic learning optimization. Scrutinizing digital ergonomic among students and teachers, Koole (2006) further summarized that optimal usage in education will promote Content Accessibility (CA) prompting quick access to knowledge and information needed for effective teaching and learning. CA would further facilitates Discovery learning (DL), enabling students to comprehensively learn beyond classroom setting. DL likely provide Innovative Learning (IL) that promote active student activity and passive teacher activity which is a construct of innovative teaching and creative learning. This approach will facilitate a shift in paradigm from the traditional classroom teaching and learning to the digital ergonomic enhancing effective teaching and learning in 21$^{st}$ century required in Nigerian post-primary education.

With the strategies enumerated above, it is obvious that the cost of procuring mobile internet devices is significantly low compared to the running cost of procuring a new or second-hand computer and modem for internet browsing for all secondary school students in Nigeria. Currently, most students in Lagos now have access to mobile internet devices having the features like SMS, voice mail, recorders, still camera video games, audio music, radio play back, colour screen and web browser that are capable of accessing the internet and e-mail (Olayinka, 2008). The bane of this study is optimisation of ergonomic of mobile internet devices in classroom teaching and learning, necessary to acquit students with the academic and pedagogical potentials. Undeniably, among Nigerian students abounds disgusting, immoral and non-academic usage of mobile internet devices, such as playing video games, excessive chatting, internet fraud and watching of immoral pornographic sites via mobile internet, all done at the expense of their academics.

**Research Questions**

The following questions would be focused upon as the research questions for this study.

1. Is there any significant relationship between ergonomic of mobile internet devices and Content Accessibility (CA) in Nigeria post-primary education?
2. Is there any significant relationship between ergonomic of mobile internet devices and Discovery learning (DL) in Nigeria post-primary education?
3. Is there any significant relationship between ergonomic of mobile internet devices and Innovative Learning (IL) in Nigeria post-primary education?

**Research hypotheses**

$H_{01}$: There is no significant relationship between Discovery Learning (DL) and Ergonomic of Mobile Internet Devices

$H_{02}$: There is no significant relationship between Content Accessibility (CA) and Ergonomic of Mobile Internet Devices

$H_{03}$: There is no significant relationship between Innovative learning (IL) and Ergonomic of Mobile Internet Devices

**Methodology**

The research design is a descriptive survey. The Digital Ergonomics Questionnaire for learning\Teaching effectiveness (MAQLTE) is the only instrument used for this study. The 15 item questionnaire was drawn in line with the hypotheses

VOL. 3, NO. 2 DECEMBER, 2023
ISSN 2756-4444
E-ISSN 2756-4452

and research questions. Respondents were requested to indicate their level of agreement with the questionnaire items by High, Moderate or Low. A test re-test method was used to determine the co-efficient of reliability of the instrument. The correlation co-efficient was computed and it gave reliability co-efficient of 0.87 which was considered high enough to be used. The questionnaire was personally administered by the researcher. The respondents were drawn from four (4) senior secondary schools within the neighbourhood of the researchers in Badagry and Ojo local government area of Lagos State. A sample of 200 students were purposefully based on their versatility of mobile internet device usage selected from:

i. Sito-Gbetrome Secondary School, Badagry, Lagos State;
ii. Royal Spry Secondary School, Badagry, Lagos State;
iii. Lagos State Model College, Ojo, Lagos State; and
iv. Adeniyi Goodwill School, Ijanikin, Lagos State.

The analyses of findings in the study was made with use of frequency counts, percentages and Person Product Moment Correlation Co-efficient (PPMC).

**Results**

**Table 1:**
Descriptive Statistics Showing Mean d Standard deviation of Variables

**Descriptive Statistics**

| | Mean | Std. Deviation | N |
|---|---|---|---|
| Discovery learning | 2.8500 | .94622 | 200 |
| Content Accessibility | 2.8000 | .93449 | 200 |
| Innovative learning | 2.9200 | .95431 | 200 |
| Ergonomic of mobile internet devices | 3.0500 | .97344 | 200 |

From table 1 above it shows that 200 students were captured in this study as “discovery learning”, “content accessibility” and “Innovative Learning” are regarded as independent variables while “Ergonomic of mobile internal devices” is regarded as the dependent variable in this study. The attribute of these variables by way of weight is discussed on mean and standard deviation. Content Accessibility recorded the lowest in terms of mean and standard deviation values as 2.80 and 0.934, closely followed by Discovery learning which recorded 2.85 and 0.946 and Innovative Learning approach having 2.92 and 0.954 respectively. Meanwhile, for the dependent variable, “Ergonomic of mobile internal devices” it recorded a relatively higher mean and standard deviation value as 3.05 and 0.973 respectively.

**Table 2:**
Pearson Product Moment Correlation Analysis showing relationship between Independent and Dependent Variable

Correlations

| | | Discovery Learning | Content Accessibility | Innovative Learning | Ergonomic of Mobile Internet Devices |
|---|---|---|---|---|---|
| Discovery Learning | Pearson Correlation | 1 | .589 | .890 | .632** |
| | Sig. (2-tailed) | | .212 | .203 | .001 |
| | N | 200 | 200 | 200 | 200 |
| Content Accessibility | Pearson Correlation | .589 | 1 | .688 | .781** |
| | Sig. (2-tailed) | .212 | | .216 | .000 |
| | N | 200 | 200 | 200 | 200 |
| Innovative Learning | Pearson Correlation | .890 | .688 | 1 | .705 |

VOL. 3, NO. 2 DECEMBER, 2023
ISSN 2756-4444
E-ISSN 2756-4452

| | | | | | |
|---|---|---|---|---|---|
| | Sig. (2-tailed) | .203 | .216 | | .003 |
| | N | 200 | 200 | 200 | 200 |
| Ergonomic of Mobile Internet Devices | Pearson Correlation | .632** | .781** | .705 | 1 |
| | Sig. (2-tailed) | .001 | .000 | .003 | |
| | N | 200 | 200 | 200 | 200 |

**. Correlation is significant at the 0.05 level (2-tailed).

From table 2 above, it shows the degree of relationship that exists between the Independent variables and Dependent variable. For discovery learning and Ergonomic of mobile Internet Devices, a correlate value of *0.632 was obtained meaning a positively strong relationship exists between them. At P-value of 0.05, Sig. value of 0.001 is obtained meaning "Not Significant". Statistically, it implies that there is a significant relationship between Discovery learning and Ergonomic of Mobile Internet Devices. In same table 2 above it shows that between Content Accessibility and Ergonomic of Mobile Internet Devices, a correlate value of *0.781 was obtained meaning a positively strong relationship exists between them. At P-value of 0.05, Sig. value of 0.000 is obtained meaning "Not Significant". Statistically, it implies that there is a significant relationship between Content Accessibility and Ergonomic of Mobile Internet Devices. In same table 2 above it shows the degree of relationship that exists between Innovative learning and Ergonomic of Mobile Internet Devices, a correlate value of *0.705 was obtained meaning a positively strong relationship exists between them. At P-value of 0.05, Sig. value of 0.003 is obtained meaning "Not Significant". Statistically, it implies that there is a significant relationship between Innovative learning and Ergonomic of Mobile Internet Devices.

**Discussion**

It could therefore be deduced that the significant relationship established between digital ergonomics of mobile internet device and variables like content accessibility, discovery learning and innovative learning can prompt effective teaching and learning. The import of the research was hinged on premise that optimization of by students and teachers can facilitate effective teaching and learning. First, content accessibility can be enhanced by digital ergonomic for topic taught in class by and for assignments by students. Second, prompt usage of mobile internet devices will enhance discovery learning by students and teachers. Finally, ideas acquire through content accessibility and discovery learning will promote innovative learning. This enable student to be active in classroom teaching and learning while teacher is passive due to prior learning by the students. Notably, the 21st century teacher is expected to be a mentor and facilitator of knowledge as opposed to the traditional classroom teaching that is teacher-centred. To further corroborate the findings of this study, Ola & Ojo (2006) asserts that digital ergonomic of mobile internet device is the modern form of information and communication technology (ICT) that education needs adopt to enhance qualitative content delivery services. The digital versatility is advancing so much ground in Nigeria as opposed to the traditional chalk and talk analogue method of teaching. These new trends in ICT have impacted on the use of materials and academic information. As a supportive instructional tool in classroom settings Buczynski (2008) opined that optimal and positive engagement mobile internet device such as web browsers search engines will impact on the accessibility and delivery in teaching and learning process. As further asserted Buczynski, proper attention and optimal usage of mobile internet device can serve as a supportive instructional tool in classroom settings due to academic and instructional potential of mobile internet device.

Consequently, the necessity to explore the academic potentials of mobile internet device to support classroom teaching and learning is essential to provision of qualitative post-primary education in Nigeria. Further validation of the result of this study hinged on Said (2015) which revealed that proportion of post-primary students frequently, utilised mobile internet device, for example, workstations, recording assignments, looking the web for study, getting to the college's LMS, understanding books and scholastic papers, and speaking with partners on informal communities. In essence, students should re-direct their drive from the unproductive and derogatory usage of mobile internet device to the

VOL. 3, NO. 2 DECEMBER, 2023
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educative and informative usage, which enhances academic potential as regards teaching and learning. However, in Nigeria post-primary schools, optimum utilization of digital ergonomic has been hindered by some issues has asserted by Robinson and Latchem (2003) despite teachers being are aware of the benefits inherent in integrating mobile internet device into teaching and learning activities, but they are hindered by non-versatility of internet usage. This was further emphasized by Salehi and Salehi (2012) affirming that teachers believed that insufficient technical supports in Nigerian schools and little access to internet and ICT prevent uncomfortable and confident of use ICT in the classroom.

**Conclusion and Recommendations**

Mobile internet devices are universal and easily portable, students and teachers are expected to maximise the benefits in acclimatizing them as instructional materials and learners must be exposed to practices and application in learning with Mobile internet devices. This paper explored the background to digital ergonomics of mobile internet devices in Nigeria. Attempt was made to xray the positive and negative usage of mobile internet usage in relation social and academic sphere. The study established that mobile internet devices cannot be excluded from effective and efficient pedagogy disassociated from the stereotyped and old-rugged traditional method of teaching. Digital ergonomics of mobile internet device undoubtedly serves as a virtual teaching and learning space for teachers in Nigerian post-primary education. The study justifies the need to tap academic potentials of mobile internet devices and its potency in the realization of qualitative education in post-primary education in Nigeria so as to cope with the current global drive for ICT. More importantly, since students are teachers are acquainted with the applications and functions of mobile internet devices. Obviously, mobile internet devices accompanied by ergonomics do efficiently facilitate learning both within and outside classroom, thereby, promoting student-centred and activity-based learning, which are embedded in content accessibility, discovery and innovative learning strategies. This study posit need for stakeholders and policy makers in education sector to propel a goal-driven steps to incorporate the ergonomics of mobile internet devices into Nigerian post-primary school. The recommendations offered hereafter are carefully developed from the tenacity of the discussion and findings and structured to align and fit into the existing senior secondary school curricula, so as to reflect the support which mobile devices provide for learning and pedagogical values. Recommended therefore posit that mobile internet device to be utilised to facilitate and provide opportunities for students to promote learning both within and outside the classroom environment. The need to pertinently promote a conducive, relaxed and convenient learning environment that is more academically productive. This should be geared to virtually facilitate differentiation, content accessibility, discovery and innovative learning, of which all learner are fully involved in learning.

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