

Using Technology as a Strategy for Instructional Method in Higher Education for Post COVID-19 in Nigeria

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Article DOI: 10.48028/iiprds/esjprcd.v10.i1.09

Abstract

This study examines the role of technology-based instructional method to achieve the goals of higher education in the face of COVID-19 pandemic. This paper aimed at investigating the effectiveness of instructional technology in higher education institutions in relation to the role and usage of Information Communication Technology (ICT), its effectiveness in faculty teaching and its impact on student learning in universities in the post- COVID-19 in Nigeria. This study applied the Need Assessment Approach (NAA). A self-designed questionnaire, that employed benchmarks from similar studies conducted in the West, was used to collect data for this study. One hundred and twenty-five (n = 125) respondents participated in the study. The results suggest that there are significant relationships between the impact of instructional technology, the usage of instructional technology and students' academic achievement. An absence of ICT instructional materials, ineffective policy implementation and a lack of other resources (infrastructures) to aid teaching and learning are responsible for short comings in the effective implementation of ICT in education in the post- COVID-19. Even though technology presents higher education with challenges - ranging from planning of technological enhancements to educational programmes as technology changes so quickly and unpredictably; and especially for a nation like Nigeria that will be venturing into the use of technology for education newly; and also, the challenge of funding of technologies for educational applications for higher institutions of learning in the post- COVID-19. The paper concluded that the inability of government tertiary institutions to teach students remotely during the pandemic will have effects that will take some time to eradicate. The study recommended that the government need to increase funding for higher education in the post- COVID-19. Management of higher education need to glean insights from other climes to be able to develop a suitable technological tool for teaching and learning in the nation's higher education system such that our higher education could once again become a springboard for achieving an effective system that will produce employable graduates.

Keywords: *Higher Education, Instructional methods, Technology*

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Background to the Study

Coronavirus termed as COVID-19 was declared as pandemic by WHO officially on March 12, 2020 (WHO, 2020). COVID-19 is a severe acute respiratory syndrome and the COVID-19 outbreak spreads rapidly not only in China, but also worldwide. The pandemic hit the Nigerian Nation on 27th February, 2020 when the index case was recorded in Lagos State. Several governmental measures have been taken to counteract the risk of disease spreading in Nigeria. These measures include travel restrictions, mandatory quarantines for travelers, social distancing, bans on public gatherings, schools and universities closure, business closures, self-isolation, asking people to work at home, curfews, and lockdown (UNICEF, 2020). Authorities in Nigeria have declared either lockdown or curfew as a measure to break the fast spread of virus infection. These measures have a negative effect on the business, education, health, and tourism (Nganga and Siu, 2020).

COVID-19 pandemic has affected all levels of the education system (UNICEF, 2020). Higher educational institutions in Nigeria have either postponed or canceled all campus activities to minimize gatherings and hence decrease the transmission of virus. However, these measures lead to higher economical, medical, and social implications on both undergraduate and postgraduate communities (Andersen and Nielsen, 2019). Due to the suspension of classroom teaching in many colleges and institutions, a switch to the technology as an instrument of teaching for undergraduate and graduate students becomes effective. This form of learning provides an alternative way to minimize either the contact between students themselves or between the students and lecturers. However, many students have no access to the online teaching due to lack of either the means or the instruments due to economical and digital divide (Murphy and Wyness, 2020).

The Nigerian educational system was worst hit because there was no plan prior to the pandemic to teach via any other media other than the classroom, face-to-face system of passing educational instruction; as a result, even though, majority of Nigerian students have in their care and carry about high level cell phones, it became only instruments for pleasure – carrying smart phones without putting them to smart uses. This is partly due to the fact that there were no existing platforms to ensure that the teachers/lecturers were able to pass educational instructions virtually. The crisis created by the COVID19 has changed the face and future of education. In the words of the UN Secretary-General António Guterres “the COVID 19 pandemic has created the most severe disruption in the world's education systems in history and is threatening a loss of learning that may stretch beyond one generation of students; he further lamented that school closures are also likely to erase decades of progress. Even though some of the private tertiary institutions in Nigeria were able to teach their students remotely during the pandemic, a vast majority of them and almost all government tertiary institutions could not.

According to UNICEF survey, 2020 there are huge variations between and within countries that are able to teach remotely. Unsurprisingly, digital and broadcast remote learning have a higher potential reach in wealthier countries than in poorer ones, as well as in wealthier and/or urban segments of the population. The digital and broadcast remote learning coverage in low-

and middle-income countries varies significantly, from almost zero per cent to 100 per cent. Partial and ongoing school closures mean that remote learning will continue to be an essential education platform for the foreseeable future. Therefore, blended learning approaches that combine in-person and remote instruction will be a key to ensure students can continue to learn in the years ahead. This study intends to look into technology as a means of passing instruction in higher education in Nigeria's higher institutions of learning which has not been researched on widely; this is the gap the study intends to fill. This study becomes crucial in order to draw attention of all stakeholders to this problem as it concerns the Nigerian tertiary institutions. The Purpose of the study is to examine the effectiveness of instructional technology in higher education institutions in relation to the role and usage of ICTs, its effectiveness in teaching and its impact on students' academic achievements in the post COVID-19 Era.

Literature Review

Conceptualization

Educational technology is a complex, integrated process involving people, procedures, ideas, devices and organization for analyzing problems and devising, implementing, evaluating and managing solutions to those problems involved in all aspects of human learning. Education Technology (ET) is defined as “the study and ethical practice of facilitating learning and improving performance by creating, using and managing appropriate technological processes and resources” (Richey, 2018). ET can be used by all educators who want to incorporate technology in their teaching as well as educational administrators. The emergence of different educational tools and software has motivated many learning organizations to integrate them into the curriculum as they can have a great impact on student learning (Hawkins et al., 1996). Recently, Educational Technologies have been considered as a crucial factor in improving the quality of education and enhancing the level of student educational learning performance (Bialo et al., 2015). ET has demonstrated a significant positive effect on student achievement and the teaching and learning processes as a whole (Bialo et al., 2015). Instructional technology is the theory and practice of design, development, utilization, management and evaluation of processes and resources for learning. Richey, Silber and Ely (2018) defines educational technology as a variation of ways of dealing with learning processes. Escueta et al. (2017), reviews such studies and divides the educational technology into four categories: access to technology, computer-assisted learning, technology-based behavioral intervention, and online instruction.

Method, education-wise, can be described as “a way consciously employed in order to realize identified instructional and educational goals (Andersen and Nielsen, 2019).” These ways may vary according to the target, time, and level of the student, modern approaches, and practices in educational sciences. Specifying an appropriate teaching method for the goals of the instructional program and applying them during the classes can be seen as one of the teaching skills. The teaching method is a concept that should be considered together with model, strategy, and technique. There is a hierarchical relation among these concepts. Model and approach rank highest in terms of hierarchy. In this respect, the instructional model can be deemed as an umbrella term. As for terminological hierarchy, techniques are embodied into

methods that are subordinated by approaches. Ocak (2018), states that some educators feel like employing methods when using materials, studying on reading passages, conducting activities, and doing exercises.

According to him, the concept of method has a different meaning than the others such as a course of activities that help the learners to achieve their objectives at the earliest and in the shortest way. Within this scope, a method is a total of activities that are conducted and is a path or a situation that these activities refer to. Accomplishing instructional goals also depends on the goal, student, teacher, subject, as well as finding and conducting an appropriate method for the available materials. As an indispensable component of the process, the instructional method should be considered within the educational aspect of the program. Asserting that a method is the best to reach all kinds of educational goals, or claiming that one is better than the other would technically be misleading (Richey, 2018). Rather than thinking that a method is good, it is better to look for compatibility among the target, students' features, and other factors. Therefore, teachers have to have a rich and large command of experience so as to determine the suitable method and technique. A teacher utilizing different but correlated and compatible instructional methods in one lesson will be more able to support his/her students in achieving effective, permanent, and meaningful learning (Fer and Cırık, 2011).

Gözütok (2017), reports that literature hosts different classifications regarding instructional methods. Some sources group instructional methods in terms of the size of the class, some do it according to the type of the roles that teachers and students bear, some categorize them with respect to the physical setting (labs, studios, in or outside the class), and still some others classify them in accordance with the skills and behaviors (cognitive, affective, and kinetic) to be infused on students. In this sense, teachers should know the properties, limitations, and contributions of all methods. One of the classifications concerning instructional methods was done by Fer (2011), who noted that some of the methods are categorized as techniques and some of the techniques are recorded as methods in the literature due to the closeness and interwoven nature of the two terms. So, she categorized instructional methods as teacher-centered, individual-centered, and interaction-centered.

Tertiary education broadly refers to all post-secondary education, including but not limited to universities. Universities are clearly a key part of all tertiary systems, but the diverse and growing set of public and private tertiary institutions in every country colleges, technical training institutes, community colleges, nursing schools, research laboratories, centres of excellence, distance learning centres, and many more forms a network of institutions that support the production of the higher-order capacity necessary for development (World Bank 2020). In the Caribbean the term, tertiary education is routinely used interchangeably with higher education but both are intended to be inclusive and reflect a recognition “that education and training provisions in these third level institutions may and in fact do include non-university and university level programmes, technical and vocational education and training, professional and paraprofessional training, and continuing education programmes” (Howe, 2017). The teaching and learning process that occurs following the completion of secondary education and provides academic credits and competencies that lead to certificates, diplomas and degrees from universities, university colleges, polytechnics, community colleges and similar institutions (UNESCO, 2018).

ET and its Effect on the Teaching and Learning Processes

ET has been defined as solutions to instructional problems that involve social as well as machine technologies with concern for improving the effectiveness and efficiency of learning in educational contexts (Escueta et al., 2017). Richey, Silber and Ely (2018) perceive ET as a means of media with four different focuses: media for enquiry, media for communication, media for construction, and media for expression. Richey (2018) show that many educators perceive technology as a tool for improving the presentation of material for making lessons more fun for the learners and for making administration more efficient. There is a widespread belief that ET can enhance teaching and learning practices and create an "ideal" learning environment (Fer and Cırık, 2011). Hence, it becomes an integral part of both the teaching and learning process. ET can have the greatest impact on improving student learning and achieving measurable educational objectives (Howe, 2017).

In addition, it can empower teachers and learners, transforming teaching and learning processes from being highly teacher dominated to student centred. This transformation will increase the teaching gain for students and improve the quality of learning. Moreover, ET may provide students with valuable skills that are recommended by the market. Thus, ET creates opportunities for learners to develop their cognitive, critical thinking, information reasoning and communication skills (Chigona and Chigona, 2010). It can also help learners to explore education beyond classrooms by providing access to a wide range of resources and information, promoting scientific inquiry and discovery and allowing students to communicate with experts.

World Bank (2013), stated that effective technology empowers learners and helps them take responsibility for their own learning. Escueta et al. (2017), communicated the output of a forum wherein 70 US educational decision-makers and practitioners met, discussed and prioritized the benefits and issues related to educational networking. The conclusion was that networking technology is a powerful communications tool, which when utilized can support innovative teaching, encourage active learning, help relieve the professional isolation of teachers and can enable users to become active researchers and learners.

The Effects of ET on Achievement and Performance of Students

Previous studies revealed the positive impact of technology on enhancing the achievement and performance of students and in gaining significant improvement and changes in all areas (Rutz et al., 2018; Sivin-Kachla, 2018; Baker et al., 2017). For instance, Kulik (2019) aggregated 500 individual research studies of computer-based instruction students. The results of the aggregation demonstrated that students who used computer-based instruction scored better than those in the control condition without a computer. Students also gained more knowledge in less time because the classes became more enjoyable and interesting after the introduction of computers.

Similarly, Sivin-Kachla (2018), found that students studying in a technology rich environment achieved higher marks in all subject areas, gained a positive attitude towards learning, were able to generate new ideas and built self-confidence. The US Department of Education conducted a scientific study in 2001 to assess the impact of technology using two

types of student achievement measures – measure assessed reading achievement and assessed mathematics achievement. A significant impact was revealed in the students' scores. Moreover, in a study conducted in Pittsburgh, in which an intelligent tutor – software used to support the curriculum – was used as part of the regular curriculum for ninth-grade algebra (Koedinger et al., 2019). The results of the study demonstrated that 470 students in the experimental class's outperformed students in compression classes by 15% on a standardized test and 100% on test targeting the curriculum focused objectives (Koedinger et al., 2019).

Recent studies conducted by Richey (2018) found that by integrating the mathematics curriculum with ET, the mathematics scores of the fourth-grade students in Vadodara, India were increased. In addition, Bialo et al., (2015) analysed the effect of an instructional pre-algebra and algebra program on student's test scores in the US. Richey, Silber and Ely (2018) examined the impact of using instructional technology on optimizing the learning styles and process types. They found that using web-based material to supplement the in-class experience can improve student achievement.

Method and Practices

This study applied the Need Assessment Approach (NAA). The NAA was used to determine if gaps exist in the current state of ICT in Nigeria, the causes of these gaps, the ideal implementation scenarios for ICT in higher education institutions and how to achieve these ideals. NAA is aimed at problem eradication or the amelioration of a gap where one exists. This approach measures the discrepancies between the current and desired result or the differences between the current situation and the ideal. In this case, the Need Assessment Approach was used to examine the effectiveness of instructional technology in higher institutions in relation to the role and usage of ICTs, its effectiveness in teaching and its impact on student learning in Nigeria. The assessment sought to ascertain the factors that hinder effective instructional technology implementation and its impact on students' educational achievement in the post-COVID-19.

One hundred and twenty-five ($n = 125$) respondents participated in the study (60 [48%] from Universities and 65 [52%] from other tertiary institutions). Forty-five faculty (36%) and 80 students (64%) were randomly selected. The faculty was between 35 and 61 years of age, while the students were between 22 and 35 years old. Seventy-five (60%) were female, and 50 (40%) were male (see Figure 2). A self-designed questionnaire, that employed benchmarks from similar studies conducted in the West, was used to collect data for this study and the instrument was validated with the assistance of experienced faculty and institution researchers. To further validate the instrument, a pre-test for this study was performed in the first three weeks, and responses from participants were used to make changes and modifications. The post-test was conducted in the last week of April 2020. The data collection instrument was made up of 25 items and employed a four-point Likert-type scale response pattern. The scale consisted of: strongly agree, agree, disagree and strongly disagree. These answer options were weighted 4, 3, 2 and 1 respectively. The researchers conducted a Cronbach's alpha coefficient measurement to appraise the reliability of the research instrument, and the instrument was found to have a reliability coefficient of 0.843. The data collected was analyzed using simple percentages, t-test and chi-square of the Statistical Packages for Social Sciences (SPSS) version 23.

Data Analysis and Discussion

The impact of instructional technology and students' academic achievements

Chi-square analysis was employed to test if significant relationships exist in respondents' opinions on the impact of instructional technology and students' academic achievements. The results of the chi-square analysis for the five variables tested are as shown in Table 1. The table demonstrates that there are significant relationships between the impact of instructional technology, usage of instructional technology and students' academic achievement. Consequently, the null hypothesis is rejected. The findings of this study reveal that ICT, when applied to education, enhances effective knowledge delivery, enhances access to knowledge, produces richer learning outcomes, encourages effective critical thinking and generally improves the quality of teaching and learning in the post-COVID-19. The results show that there is a positive and significant correlation between instructional technology and its effectiveness in augmenting educational offerings in higher education. The results thus confirm the observation made by Escueta et al. (2017) that ICT-aided teaching assists in effective delivery of knowledge and reaching educational goals in less time. However, Ocaik (2018) and Richey, Silber and Ely (2018) have argued that the diffusion of modern technology in teaching and learning depends on the degree to which a large segment of students and faculty have acquired the knowledge and skills required for the usage of ICT.

Table 1: Effectiveness of Instructional Technology in Higher Education

Variables	N	SD	Mean	X ²	DF	Sig. (2-tailed)
ICT/Effective knowledge delivery	125	.69912	2.94400	27.080	3	.000
ICT/Access to knowledge	125	.83882	2.50400	33.375	3	.000
ICT/Produces effective learning outcome	125	.62238	3.08800	45.473	3	.000
ICT/Encourages critical thinking 125	125	.62816	3.02400	33.823	2	.000
ICT/Quality of teaching and learning	125	.71238	3.02400	37.460	3	.000

Source: Authors' computation, 2020

Student attitudes and anxiety towards ICT in teaching and learning

The findings of this study also suggest that faculty and student attitudes and anxiety towards ICT in teaching and learning relate to prior experience received during early years of high school education. The study recognizes that these facilities were not available to many students from day one of their educational endeavors (kindergarten). This data is in line with the findings of Gözütok (2017), who suggest a correlation (85.2%) between the unpleasantness of prior experience and current attitudes and anxiety toward ICT usage in instruction in the post-COVID-19. The result shows a positive relationship between prior experience with ICTs and attitude and anxiety and support the documented slow rate of use and integration of ICTs amongst Nigerian faculty and higher education students. Faculty and students with early access to ICTs do not have significant technology phobias in the post-COVID-19. In general, female faculty and students (63%) had more negative attitudes and greater anxiety than did male faculty and students (37%). This is in line with the studies of Fer (2011), (Howe, 2017) and Chigona and Chigona, 2010).

Problems Opposing with Technology in Nigerian Higher Institution in the Post COVID-19

Despite the keen interest of some institutions of higher learning in Nigeria to establish effective ICT education programmes, they are confronted with enormous problems that stand as hindrance to the proper implementation of the programmes, which is indirectly affecting counselling practice, because some problems would have been alleviated with the help of ICT.

1. It is not an understatement to say that poor electricity supply has been a clog in the wheel of growth of ICT in Nigeria's post-COVID-19. It is a major hindrance in carrying out researches in the nation universities. Only a trickle of daily electricity production dribbles erratically into the country's universities and other tertiary institutions, rendering systems dysfunctional, which resulted to diesel -propelled generators that are expensive and environmentally unfriendly. Ocaik (2018) opined that attempts are being made to find alternative energy source such as solar energy to accelerate ICT provision in Nigeria's post-COVID-19. But the question is how many tertiary institutions would be able to afford the cost?
2. There is lack of access to much needed infrastructures which could be as a result of insufficient funds. The poor economic conditions and their effects on middle level manpower stand as a major barrier to the implementation of ICTs in higher education in Nigeria's post-COVID-19.
3. The available ICT infrastructure are inadequate. Infrastructures such as satellite, VST, Internet service providers (ISP), Integrated Digital systems Network (ISDN), and computer and printing devices are in short supply in Nigerian Universities. This constitutes impediment to full utilization of ICT for higher education objectives in Nigeria's post-COVID-19.
4. There is also low awareness of internet uses and on line learning. Many people hold on to computer without making appropriate uses of it. Many students and lecturers are not aware of its complement to conventional face to face learning. Hence, the low awareness constitutes impediments too.
5. Inability to make adequate and maximum use of ICT at the tertiary institutions is a problem. The objectives of management information system (MIS) found in Nigeria universities are not clearly achieved. The common uses of MIS are word processing maintaining staff and student record printing of identity cards which are far below expectation in attaining the goal of higher and qualitative education in the tertiary level of education in Nigeria's post-COVID-19.
6. Lack of appropriate and timely training users on emergency ICT tool is another problem facing ICT in Nigerian tertiary institution. ICT is constantly in evolutionary trends; new ICT hardware are being introduced into the market virtually on a daily basis. New software needs to be introduced and existing ones upgraded. Therefore, regular training and retraining is needed to bridge up the gap in Nigeria's post-COVID-19.

Conclusion and Recommendation

This article has examined the effectiveness of instructional technology in higher education institutions in relation to the role and usage of Information Communication Technologies (ICTs), its effectiveness in faculty teaching and its impact on student learning in the post-COVID-19. It has also looked at attitudes and anxiety towards instructional technology amongst higher education faculty and students in a developing economy. Instructional technologies constitute an important force in the efforts to build an information technology society and to join the international community in meeting the sustainable development goals in the post-COVID-19. This study suggests that higher education worldwide is valuable in providing faculty and students with some of the resources needed for their continuing development; higher education institutions are enduring entities that ensure and foster the diffusion of knowledge for national advancement in Nigeria's post-COVID-19. Transferring technology to Nigeria and other Sub-Saharan African countries is necessary and overdue. An overhaul of the technology transfer process is essential, including stipulations for the acquisition of skills, knowledge and abilities. Although, these requirements appear daunting, especially in view of the human and material resources needed to successfully implement them, they are central to the development of the region. Over 70% of Nigeria's public universities and Nigerians themselves depend on the government to provide ICT materials in tertiary institutions. This overwhelming dependence on the government has often left higher education institutions poorly equipped. ICT capacity building through the management of information systems and staff training are critical; and a failure to address these issues may lead to aims and objectives displacement, which in turn will allow higher education institutions to deviate from their primary role of teaching and research in Nigeria's post-COVID-19.

This research suggests several possible implications for future research and practice in the post-COVID-19. These implications pertain most directly to higher education institutions, faculty, students and researchers. At a management level, this case study calls for effective policies to make balanced investments and increase funding in higher education programs that will provide resources needed to effectively implement the use, integration and diffusion of ICT in the post-COVID-19. Following the design of this investigation, which was based on a small sample size, the researchers suggest larger studies based on a more widespread survey, which may also involve multiple case studies. These limitations need to be considered when evaluating the findings of this study as they raise the possibility that some differences in opinion may be more a function of research design and contextual factors than a result of any differences in higher education studies. As with many other case studies, the findings should not be regarded as definitive but as offering faculty, educators, researchers, planners and administrators a view of the authors' reality.

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