Indonesian Journal of Educational Research and Technology

Journal homepage: http://ejournal.upi.edu/index.php/IJERT/

Information Communication Technology (ICT) on Implementation of Higher Education

Amos Otieno Wanjara[1,*], *Paul Okeyo Ogembo*[2]

[1] Kaimosi Friends University, Kenya
[2] Paul Okeyo Ogembo, Kenya
*Correspondence: E-mail: awanjara78@gmail.com

ABSTRACT

Information Communication and Technology (ICT) has taken center stage in educational delivery globally. However, its implementation remains scanty in Kenya. The purpose of this paper was to establish the impact of ICT in the implementation of Higher Education in Kenya. The specific objectives of the study were to determine the level of ICT integration into the implementation of higher education in Kenya's Public Universities, the impact of ICT on students' access to academic programs, and the impact of ICT on Public university students' academic performance. The study adopted a critical literature review and meta-analyses of the relevant information. The study established that there is a strong positive correlation between ICT use in universities and student performance in academic programs, that ICT enhances students' access to academic programs across diverse geographic spaces, and that there are varied levels of adoption of ICT in running the universities' academic programs.

ARTICLE INFO

Article History:
Submitted/Received 11 Dec 2023
First Revised 02 Feb 2024
Accepted 18 Apr 2024
First Available online 23 Apr 2024
Publication Date 01 Dec 2024

Keyword:
Implementation of higher education,
Information communication Technology,
Kenya,
Public Universities.

1. INTRODUCTION

Contemporary society is currently going digitized and the fact that digital literacy is globally recognized as one of the 21st literacy skills. It necessitates cost-effective, efficient, learner-centered, quality effectiveness, upscaling, and accountability scenarios. It is needed to put the use of Information Communication and Technology (ICT) at a central position in the current educational implementation, whether at the basic education level or in the tertiary institutions nearly in every country in modern society. Studies have been carried out related to ICT integration in education and its effects on educational implementation. ICT is today fashioned as a global standard requirement in educational dispensation. The degree of its embracement varies from one country to another with higher scores in its adoption in developed nations. Adoption is still in the infancy stage in less developed countries. The significance of ICT in ensuring effective and efficient learning processes need not be overlooked (Vilkonis *et al*. 2013). This would guarantee the availability of the electrical infrastructure that brings into play a critical step in providing an enabling environment for the implementation of eLearning. The desire for learning has been on the rise whether in physical attendance, distance, or online.

Previous works explained the profiles of online students and the impact of their university experiences in several countries. They maintained that Open and Distance and E-learning (ODEL) have often been described as formalized learning. The student can be in a location outside the university campus or school. The students and the instructors are expected to have minimal face-to-face contact, while mostly relying on electronic communication and individual independent study. ODEL is an educational program designed for those who could not be for social, family, financial, or some other reasons. They attend existing institutions to get learning without necessarily becoming regular or physical students of such institutions. The ODEL in the recent past has gained popularity.

Ebner *et al*. (2020) reported the COVID-19 Epidemic as an E-Learning Boost. Chronological development and effects at an Australian University against the background of the concept of E-Learning readiness. E-learning has to do with all appertains to the electronically channeled learning. It involves the use of computers, the internet, teleconferencing, videos, video-conferencing, as well as PowerPoint overheard projectiles and other gadgets. It enhances learning in that domain. The question of e-learning is focused on whether the faculties, students, instructors, and universities are sufficiently prepared to integrate and use e-learning models in their teaching /learning process. E-learning boosts student satisfaction and motivation and seriously engages the student in the learning process and their interaction with the content more so online. This would guarantee quality learning.

Al-Azawei *et al*. (2016) reported barriers and opportunities for e-learning implementation in Iraq. They reported a case of public universities. They argued that even though the implementation of e-learning initiatives in higher educational institutions has reached higher levels in developed nations, it is still at the childhood stage in less developed nations and the Middle East in particular. In the recent past, a few public universities in Iraq have taken the initiative towards adopting e-learning as the main mode of content delivery. However, this noble initiative has been bedeviled by multiple challenges towards the realization of its success. This study therefore highlights the challenges that hinder the effective implementation of e-learning in Iraq and recommends possible remedies for them. A total of 108 voluntarily responded were distributed as follows: Academic staff (74 persons), Undergraduate students (31 persons), and professors (3 persons). The methodology herewith

DOI: http://dx.doi.org/10. 17509/xxxx.xxxx
p- ISSN 2775-8419 e- ISSN 2775-8427

used were semi-structured interviews and focus group discussions. Quantitative and qualitative data were also collected.

The purpose of this study was to establish the impact of ICT in the implementation of Higher Education in Kenya. The specific objectives of the study were to determine the level of ICT integration into the implementation of higher education in Kenya's Public Universities, the impact of ICT on students' access to academic programs, and the impact of ICT on Public university students' academic performance. The study adopted a critical literature review and meta-analyses of the relevant information. The study was underpinned by the Technology Acceptance Model by Davis (1989), and Sahin and Rogers's implementation of the Diffusion Model (2006). The study is presented in the order of introduction, materials and methods, Findings and discussions, Conclusions and implications of the findings.

2. METHOD

2.1. Study Location

Figure 1 is a map of Kenya showing the geospatial locales of higher institutions of learning in Kenya.

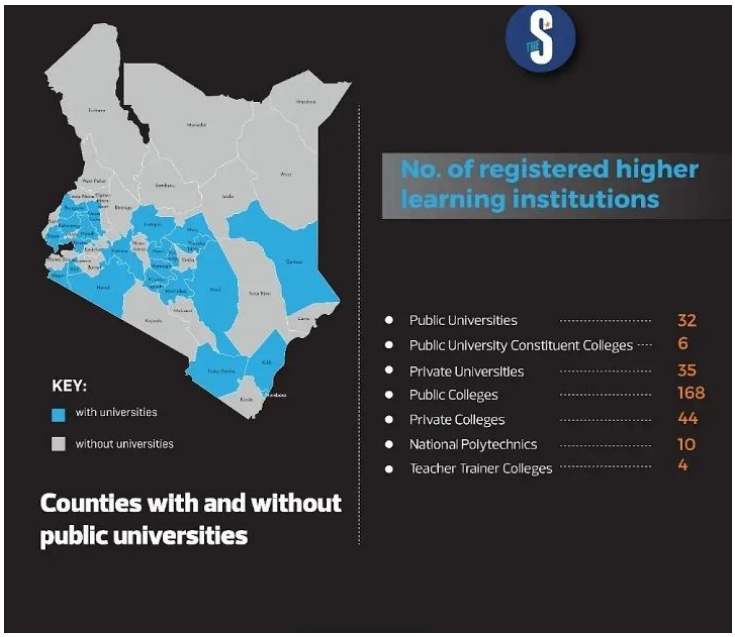

Figure 1. Map of Kenya showing the institutions of higher learning.

2.2. Summary of the Methods

The central issues of the study were underpinned by Sahin and Rogers's Implementation Diffusion Model (2006). The technology acceptance model developed by Davis (1989) has three essential components namely; Perceived ease of Use (PEU); Perceived Usefulness (PU) and Intention to use (IU) also came in handy.

The research methodology also involved the use of meta-analysis through which the data from several independent studies that used different tools and approaches but addressing the same theme were utilized to determine the overall trends. The main reason for using the meta-analysis technique is to help combine the results of many different reports addressing a single common theme to create a more precise estimate of an effect (Ferrer, 1998).

Some of the methods used by various researchers whose work was analyzed include Descriptive survey design, Descriptive statistics and Heckman Probit Model, Mixed method approach, Heckman Sample selective model, Focus group discussions, Participatory and

DOI: http://dx.doi.org/10.17509/xxxx.xxxx
p- ISSN 2775-8419 e- ISSN 2775-8427

Epidemiological methods, Consensus model, Qualitative and quantitative approaches, and Literature review design (see **Figures 2** and **3**).

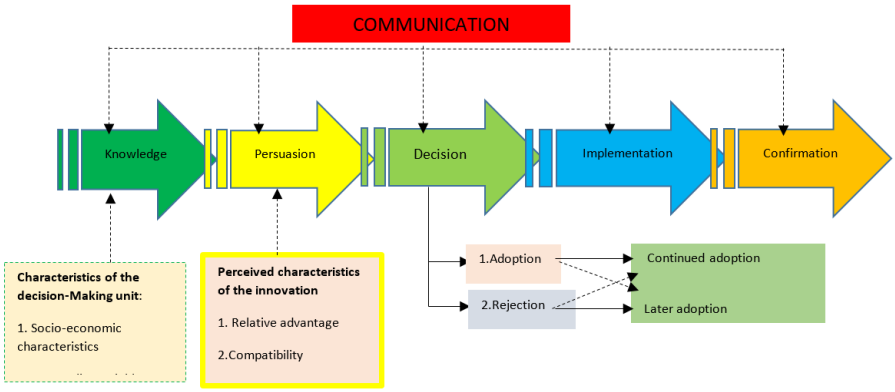

Figure 2. Showing innovation diffusion theory by Sahin & Rogers, 2006.

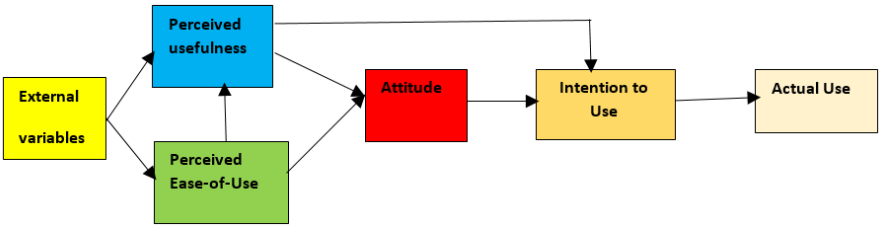

Figure 3. Technology acceptance model.

3. RESULTS AND DISCUSSION

3.1. On the Extent of ICT Integration into the Public University Programs in Kenya

Kibor and Tumuti (2020) reported on ICT Bintegration and the performance of tertiary institutions in Nairobi County, Kenya. They adopted a descriptive survey design, in which 60 respondents were sampled for the study from amongst ICT specialists in academic institutions in tertiary organizations. Questionnaires were administered to gather data on the extent and effect of ICT infrastructure and proficiency on the performance of tertiary institutions in Nairobi County, Kenya. The finding showed that ICT infrastructure and proficiency impact the performance of tertiary educational institutions in Nairobi County, Kenya.

Barui *et al*. (2022) reported the influence of teachers' competencies on ICT implementation in Kenyan Universities adopted secondary data analysis. They admitted that technology is becoming an essential ingredient of teachers' practice in academic transactions. The study explored the improvement of teachers' competence in ICT integration in universities. The study surveyed 475 teachers who were randomly sampled from among the universities' faculties. Teachers' ICT skills and knowledge were explored. Descriptive study results indicated that mean of 4.279 and a Spearman Correlation of 0.0618 between teachers' competencies and the use of software tools, implying teachers' level of competencies increase as they use software tools in their teaching transactions. The Chi-square (X^2) test statistics indicated results of 288.498 and a significance of the value less than the value of beta =0.05. Test independence on teachers' competency on ICT implementation implied that Null hypothesis H_0 was rejected at a 95% degree of confidence. Implications of the findings from key stakeholders like the university management to provide an enabling environment and relevant training interventions for the faculty staff towards effectiveness in integration of ICT into their day-to-day teaching/learning transactions. It is then that the digitization of education and the goodies that come with it must be achieved.

DOI: http://dx.doi.org/10. 17509/xxxx.xxxx
p- ISSN 2775-8419 e- ISSN 2775-8427

Abila and Anselmo (2017) reported ICT integration Indexing Levels. The study was on Kenyan-selected universities in information technology and teaching professionals. They adopted secondary data and agreed that with integration ICT indexing levels can influence graduate's ICT knowledge and skills and integration. The ICT integration index level of university teaching professionals reveals that they would still not integrate ICT at transformative levels. Situational analysis of UITTPs for the ICT integration index is a foundation of continuous improvement. It ensures continuous integration using the Mann-Kendall correlation coefficient for UITTPs to integrate ICT at level III. Despite the existence of a conducive environment, lecturers still do integrate ICT at transformative levels. The UITTPs can improve the graduates' ability to effectively embrace and use ICT.

Karanja *et al*. (2017) reported the influence of the integration of ICT on Academic Management in Kenyan Public universities. ICT is a critical tool in coordinating university management in the modern globalized society. It enhances efficient information flow. Despite efforts towards the private sector, stakeholders, and government for the leverage on using ICT, fewer aspects have been done to enhance ICT integration. It is also towards efficient corporate management. A descriptive study design was adopted that targeted university students of the 2012/2013 academic year, especially senior administrators in public universities totaling 47112. The three oldest public universities were selected for the study: the University of Nairobi, Kenyatta University, and Moi University. Participants included all academic registrars, 132 students from the University of Nairobi, 123 students from Kenyatta University, 119 students from Moi University, and 100 lectures drawn from the three selected universities were surveyed. The influence of teachers' attitudes on ICT implementation in Kenyan Universities. They agree that ICT integration is one form of global educational reform. ICT enhances education access, efficiency, effectiveness, and quality. 475 teachers from Kenyan universities were surveyed. Findings showed that the participants had positive attitudes toward ICT integration into university programs. Teachers gave positive attitudes towards ICT integration. ICT is highly likely to integrate the technology into their day-to-day teaching. Support for teachers towards ICT integration would become handy for key stakeholders including the university management.

Chamwei *et al*. (2017) reported an assessment of ICT Integration in teacher education institutions in Kenya. They adopted a survey design. They agree that there is remarkable access to ICT by teachers training institutions in Kenya. Efforts towards ICT integration are on course however, gaps in the integration are still imminent due to organizational factors such as a lack of sufficient investment in the ICT infrastructure, and adequate training opportunities for the tutors towards ICT literacy and pedagogy. Implications for the stakeholders to adequately support ICT venture materially, financially, and sufficient training of the implementers towards its effective realizations and continuous support for the teacher trainees. The integration of ICT in teaching and learning mathematics. They used a descriptive design using questionnaires and interviews to gather data. In addition, an observation schedule was also used to survey for example the status of ICT Infrastructure for teaching and learning mathematics in secondary schools in Nairobi County, Kenya. The study established among others that mathematics teachers lacked the requisite skills and knowledge in ICT for its integration into teaching and learning mathematics. Consequently, there is laxity in integrating ICT. Twelve secondary schools were surveyed in the study. However, the current study intends to look at the integration of ICT into geography instruction in public secondary schools in Migori County, Kenya to fill the knowledge gap left by the previous study. The data collected were analyzed and reported according to this order within the framework of the study objectives herein stated into relevant themes. Regarding organizational factors

DOI: http://dx.doi.org/10.17509/xxxx.xxxx
p- ISSN 2775-8419 e- ISSN 2775-8427

influencing ICT integration into geography instruction, it was established that many factors contributed to the level of ICT integration in the units of analysis including the existence of ICT infrastructure in terms of amounts, conditions, availability of electricity connections, availability of ICT Technicians to provide directions and be in-charge of ICT laboratory and other equipment under the oversight of the head teacher, the organizational ICT Policy Framework and necessary support for the program.

The study established that in terms of ICT infrastructure, most schools analyzed (60%) had never attempted nor did they have computers for Geography teaching in their schools. Three schools (15%) reported their schools having. Five schools forming (20%) of the units of analysis reported having reasonable levels of ICT integration into Geography teaching. These reports were drawn from the responses of Geography Teachers. The Head of the Department of Humanities on the above question reported that there are mild attempts by their school administrations to implement ICT integration into teaching in schools. This was reported by 15 heads of humanities (75%), while 5 heads of departments (25%) reported that there was virtually no arrangement by their schools towards integrating ICT into geography teaching. This demonstrates a lack of institutional commitments towards ICT integration into schools' instruction agenda. One hundred of three Geography students reported on institutional factors influencing ICT integration. They reported in the following manner: 70% reported having not been introduced to even the basic computer literacy skills in Geography, while 30% reported having been mildly taken to the computer laboratories but not been taught using computers. This report showed the wanting scenario in the adoption of ICT into Geography Pedagogy and therefore achievement of this noble task is very far. Of the 20 heads of schools of the 20 schools, 50% reported that attempts to integrate ICT into schools' pedagogical practice are in the pipeline. Even though they would wish it implemented, there are constraints of finances towards the attainment of adequate ICT infrastructure to make the program a success. 25% of head teachers reported having made some investment in ICT infrastructure, however not sufficient enough towards pedagogy. All indicators about ICT integration into Kenya's Public secondary schools are still agape. Five heads of schools in this study would wish to have vibrant ICT programs integrated into teaching and learning, however, resources more specifically finances are so scarce that this dream appears like a nightmare although the world has gone digital. It was reported of a gap in ICT infrastructure in most schools. Also, it is a lack of ICT technicians to handle the few available computers/laptops, and very few computers that cannot sustain ICT pedagogy. It lacks schools' ICT policies that could provide a springboard for the achievement of the program; It lacks school-facilitated requisite ICT training programs to equip them with requisite knowledge and skills that would otherwise guarantee successful ICT integrated pedagogy. This demonstrates a serious gap in the main curriculum agenda drivers and implementers.

The report showed a review of literature maintains that a lack of computers and relevant software handicaps what teachers can do in the classroom. However, the current study examined the integration of ICT into geography instruction in public secondary schools in Migori County, Kenya to fill the study gap left by the previous studies. It together with sufficient maintenance of hardware and site support was a necessity.

3.2. On the Impact of ICT Integration on Access to Students' Academic Programs

Factors influencing the integration of ICT in teaching and learning in Public Secondary Schools in Kenya. This study focused on a case of Tigania West Sub-County targeting a population of 14,444. In short, there are 44 head teachers, 400 teachers, and 14000 students.

DOI: http://dx.doi.org/10. 17509/xxxx.xxxx
p- ISSN 2775-8419 e- ISSN 2775-8427

A sample size of 100 respondents is acceptable as long as none of the sub-groups in the same sample is less than 20. Data were collected through survey instruments namely questionnaires and interview guides. Regression analysis was used to determine the influence of dependent variables on independent variables. Qualitative data were analyzed qualitatively in their merit. The study established that schools demonstrated a gap in ICT infrastructural availability, teachers lacked ICT competence, and a lack of ICT technical support at the school. The factors influencing ICT integration in schools include: teacher competency in ICT, Institutional factors related to ICT infrastructure and technological factors, teachers' training, knowledge, and skills influence the use of ICT infrastructure, old or poorly maintained hardware, lack of suitable education software, limited access to ICT, lack or unreliable internet connectivity, frequent power outages in the schools were found to be widening ICT integration. Concerning ICT technical support, the study established that schools generally lacked computer technicians. The study findings had implications on strategies identifying weaknesses and strengths of results to adopt ICT in the process of teaching and learning. Implications on schools' fostering partnerships towards investing in ICT infrastructure.

Opati (2013) reported the use of ICT in teaching and Learning at Makerere University: the case of the College of Education and external studies underscores the value placed on ICT and educational access and delivery and hence the orientation towards many universities in the world today embracing technology as the mode of teaching and learning that is technically efficient, convenient, enable ng access, effective and economical to students by saving them time and costs of the motion to on-campus learning transactions but the instead online approach has enhanced students' access to the academic programs on offer and hence open university approach is becoming handy in wide achievement of this innovative academic venture that is also technologically up scalable.

Fook and Sidhri (2009) focused on the integration of ICT into university teaching and learning and adopted an exploratory design. They explored the academic integration of ICT in Malaysian higher education. They adopted secondary data. The findings showed that many universities in Malaysia by the time had not adequately integrated technology into their teaching and learning. Most universities still prefer face-to-face programs (lecturer and students' contact). Some faculties still lack ICT technical. They must know how the realization of ICT integration into teaching and learning. It also gaps in the pedagogical approach. Online is wanting. Hence, the constraints towards the realization of this technologically enhanced educational access that is efficient and effective. It enhances wider access to students across diverse geospatial locales and teaching/learning taking place anytime and anywhere. Hence, it can get flexibility in the transactional scheme.

A path model for technology integration in elementary schools in Turkey adopted a Three-phased sequential mixed methodology design to propose and test the research model while explaining relationships between technology integration into teaching in elementary schools and defined test of teacher-related factors. Phase one had 20 teachers identify critical factors influencing their ICT use. The qualitative findings guided the development of survey instruments in the second phase. The survey instruments were administered to 1030 classroom teachers in 8 districts of Ankara Province, Turkey. The direct and indirect effects of these factors on technology integration were explored. The factors included teaching experience, support, and attitudes. This Model of Technology integration into elementary education will become useful especially to the education practitioners and researchers in developing countries as they are bedeviled with the challenges of adopting technology in their ever-evolving curricula and education systems.

DOI: http://dx.doi.org/10.17509/xxxx.xxxx
p- ISSN 2775-8419 e- ISSN 2775-8427

3.3. On the ICT Integration and Students' Academic Performance in Public Universities in Kenya

Karamiti (2016) reported measuring the impact of ICT on academic performance. It showed evidence that higher education in Tunisia adopted a survey design to address the question of ICT and academic performance. Data were collected from a sample of university students and a teacher's population of 377. A multi-level analysis was done to establish the impact of ICT access and use with other students in the university, and teachers' attitudes that may impact academic performance. Findings revealed that to find evidence about the effectiveness of educational policies in the Tunisian higher education sector.

Digital Academe is cognizant of the fact that foundations of the academia were generally centered around the library as a source of curriculum materials both for teachers, and students to access books, encyclopedias, and other academic materials. However, technological revolution in the manner of ICT has had profound reforms in the manner of learning and teaching and access to online materials that have not only enhanced wide access to education by different consumers from diverse spatial-geographical locales anywhere and anytime on learner-centered efficient, and effective efficient techniques. The United Kingdom's open university has revolutionized wider access to learning across the globe enhanced through ICT and today's globalized digitized teaching and learning is at the forefront of the reforms in higher educational delivery. E-learning ODel and many other technological brands of educational enterprise have so enabled ready access, but also an efficient and effective approach to doing things in today's technological interface which is positively embraced by many countries however the levels of integration vary from one country to another with the less developed countries like those of Sub-Saharan Africa lagging in the pace of adoption compared to their developed nations counterparts.

Kimani *et al*. (2013) reported ICT Uptake and use as a tool for personal and academic pursuit amongst undergraduate students of Kenyatta University, Kenya adopted critical literature review and are cognizant of the fact that proficiency in ICT as an important tool for university studies and efficiency in the social, networks cannot be overlooked. The ICT adoption has enabled students access to learning anywhere anytime has impacted students' academic performance and is quite efficient. Basri *et al*. (2018) reported ICT adoption on students' academic performance. They also performed evidence of Sand University's adopted secondary data analytical framework and explored the adoption of ICT by the university and its impacts on students' academic performance. It also examines the moderator effect of gender, GPA, and students' majors in the relationship between ICT and academic performance through administering questionnaires to 1000 students drawn from 4 Saudi Universities. Structural Equation Modelling was used to determine the validity of the model when applied on the subject in question. Pathways analysis was employed as a tool alongside structural equation modeling. The findings demonstrated a strong positive relationship between ICT and students' academic performance in the Sand Universities and that ICT resulted in improved students' academic performance. Implications of the findings for university management and key stakeholders including the government to emphasize and materially support and through policy framework ensure successful integration of ICT and full embracement of the ICT-supported academic programs towards the attainment of efficient effective and learner-centered services. ICT especially through e-learning has enhanced access to academic programs and made learning flexible. Thus, it can take place anytime, anywhere reducing the cost of students' motion to a campus approach to learning. Learning and teaching can be offered online to different students across diverse geospatial locales and

DOI: http://dx.doi.org/10. 17509/xxxx.xxxx
p- ISSN 2775-8419 e- ISSN 2775-8427

hence a great widened access that comes with this great technological innovation and hence revolutionized educational delivery in higher education.

The extent of ICT adoption among Secondary School Teachers in Malaysia. ICT has become a necessity in the educational dispensation in the modern society. Research on ICT integration into teaching mathematics and Science throughout schools in Malaysia and observed extra efforts in some schools where investments in ICT infrastructure such as Wi-Fi connections and other infrastructure towards achieving goals of education with teacher competencies at the center of concern. Findings indicated that elderly teachers were more eager to adopt ICT in their day-to-day pedagogy and had relatively high positive attitudes towards ICT adoption in Malaysian schools. Interestingly teachers who reported daily use of ICT in their day-to-day functions still expressed a desire for ICT pedagogical training to make them better practitioners in ICT use in teaching/learning. The findings have implications for ICT integration through joint efforts from the schools while working in partnerships with public/private sectors towards funding the ICT project towards its effectiveness.

The pragmatic framework for integrating ICT into education in South Africa was based on the fact that South Africa through its Ministry of Education set a goal that stated school learners should be ICT literate by 2013 so that e-Education could be made a reality, the current study focuses on integrating ICT into geography instruction in public secondary schools in Migori County, Kenya to fill the study gap. Another study in South Africa showed non-teacher practice and integration of ICT. They reported the reason South African teachers in using ICT in classrooms. Constructs were hypothesized to influence ICT integration in schools in South Africa. The current study focused on the integration of ICT into teaching geography in public secondary schools in Migori County, Kenya to fill the knowledge gap. The current study will examine the integration of ICT into geography instructions in Kenya's public secondary schools mythical or reality: a case of Migori County to bridge the knowledge gap left by the previous study. Scholars have underscored the need for integrating ICT into teaching and learning in developing nations. According to these scholars, computers needed to be integrated into teaching/learning in schools of the developing world due to parents' demand for it as a way of making their children computer literate.

The factors influencing ICT integration according to the teachers' level of pedagogical integration in the USA and adopted a descriptive survey design. Participants consisted of elementary school teachers. The findings established attained high level of ICT in teaching than elementary school teachers in lower grade levels. The current study seeks to examine the Integration of ICT into geography instruction in public secondary schools in Migori County, Kenya to fill the study gap left by the previous research. Factors influencing the integration of ICT in Higher Education in Vietnam. They used multiple regression analysis it establish differences between teacher training institutions in Vietnam concerning ICT training and skills. The current study is focused on the integration of ICT into geography instruction in public secondary schools in Migori County, Kenya to fill the knowledge gap because the study targeted higher institutions of learning while the current study will focus on Secondary schools, hence filling the knowledge gap left by the previous study.

The use of ICT for Academic performance and psychosocial disturbances in university students' analysis of the use of ICT by students of a Spanish university adopted review of related literature. The study purposed to explore the effects of its use on students' academic activities and their performance as well as their psychosocial adjustments. The results showed that 14% of students made excessive use of ICT and spent 4 hours /per day on ICT from their studies. It was established that the younger students allowed the higher frequency in the use of ICT. Then, it resulted the poorer academic performance and greater psychosocial

DOI: http://dx.doi.org/10.17509/xxxx.xxxx
p- ISSN 2775-8419 e- ISSN 2775-8427

maladjustments. ICT integration in modern society in today's digital generations has grown under ubiquitous influence through media use, Primary data were collected through the administration of questionnaires to 1323 students enrolled in three French universities. Four main findings were as follows poor investment in ICT affects students' results, secondly, the ICT training programs offered by the universities have little impact on students' lessons, thirdly students 'performance improves with innovation and collaboration use of ICT and the acquisition of digital skills increases students' academic performance. Findings were that the digital divide still exists and this raises the question about the effectiveness of educational policy in France. They also proposed organizational change in the universities is essential in ensuring the exploitation of ICT in the educational enterprise.

Onyia (2013) reported on the impact of ICT on university students' academic performance: exploring the digital divide adopted a descriptive survey design in which 300 students drawn from a University of Nigeria-Nsukka to investigate the impact of ICT on student's academic performance in social science university of Nigeria-Nsukka. Questionnaires were administered to collect data. The study established that ICT highly impact on university students' academic performance and also that university students used ICT to support their academic programs at the University of Nsukka.

Amporisat *et al*. (2017) reported on examining students' experience with the use of some selected ICT devices and applications for learning and their effect on academic performance and explored a literature review on the direct effect of students' experience with the use of informal and ICT devices application and their academic performance in Sub-Saharan Africa. The global empirical literature on the topic provides mixed findings. A population of 320 undergraduate students at the University of Professional Studies in Accra Ghana. Cumulative Grade Point Average was used as a proxy of academic performance. The ordinary Least Square was used to estimate the effects of ICT on students' academic performance. Overall the study found a significant positive relationship between expenditure on some selected ICT tools and application for teaching and academic performance. Also, the use of emails was found to exert a positive effect on academic performance.

Talukeler *et al*. (2015) reported the impact of ICT on students' performance in a case study on undergraduate university students utilized secondary data and maintained that ICT is part and parcel of day-to-day life in a globalized society. The study establishes the topic in question amongst the undergraduate students drawn from both private and public universities in Bangladesh. Findings were that there was no significant positive relationship between ICT integration and students' academic performance among university students in Bangladesh

Islam and Fouji (2010) focused on the impact of ICT on students' performance. The study focused on a case study of ASA University, Bangladesh. They adopted a literature review and are cognizant that modern-day global students should not be over-dependent on the eye-to-eye classroom approach but too to embrace the ICT approach that is not only efficient, flexible, up scalable, and very effective and makes learning take place anytime and anywhere. The findings were that ICT impacts students' academic performance in the named university in Bangladesh. Most students are aware of the great potential that ICT has on academics and therefore has implications for the key stakeholders and university management and the ICT Departments to invest heavily in IOCT ventures towards improved education and service delivery in the university.

3.4. Implications/Value/Urgency of the Study

Globalization of education and the reforms therein put at the forefront the embracement of technology in education towards efficiency and effectiveness and the cost-effectiveness

DOI: http://dx.doi.org/10. 17509/xxxx.xxxx
p- ISSN 2775-8419 e- ISSN 2775-8427

that characterizes information communication and technology make this study novel and necessarily urgent. The study of this magnitude as to the effect of ICT on the implementation of higher education in Kenyan Public universities is scanty empirically and hence will go along with filling the knowledge gap in the area. The findings of the study will give additional information on policy direction regarding the integration of technology in teaching/learning and research in higher education as a modern practice towards educational delivery. Therefore, the study is of substance in the modern educational scenario requirements and when viewed.

4. CONCLUSION

ICT embracement in higher education institutions is ongoing and the level of its adoption varies from one university to another. That it is more well-embraced in developed nations than in less developed countries. It is becoming the new model for higher educational programs' dispensation. CT enhances access to quality higher education. It is cost-saving and convenient not only for university personnel but for the students too. It enhances students' retrieval of the most current information through e-library or other e-fora like social media. ICT is a powerful digitized tool for globalization and necessary e-transactions. ICT is well-meaning for tertiary education in Kenya which has been made efficient through the adoption of e-learning. ICT is therefore a novel approach to educational dispensation in the 21st century world. However, there are hitches here and there in the acceptance of ICT by the consumers like the student community and the entire university community.

5. AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. The authors confirmed that the paper was free of plagiarism.

6. REFERENCES

Abila, J.O. and Anselmo, P. (2017). ICT indexing levels: A study of selected Kenyan Universities information technology teaching professionals. *International Journal of Computer Science and Telecommunications*, *3*(1), 12-25.

Al-Azawei, A., Parslow, P., and Lundqvist, K. (2016). Barriers and opportunities of e learning implementation in Iraq: A case of public universities. *International Review of Open and distributive Learning, 17*(5), 51-59.

Amporisat, E.N., Moses, K. A. and Willean, A. (2017). Examining students' experience with the use of some selected ICT devices and applications for learning and their effects on academic performance. *Journal of Computers in Education*, *4*(2), 441-460.

Anderson, T. and Drone, J. (2011) Three generations of distance education pedagogy. *The International Review of Research in Open and Distance Learning*, *12*(3), 80-97.

Barui, T., Chun, X., and Azzxedie, R., R., R., R. (2022). Influence of teachers' competencies on ICT implementation in Kenyan Universities. *Educational Research International*, *5*(1), 7-15.

Basri, W. S., Alandejani A. A., and Almadani, F. M. (2018). ICT adoption and impact on students' academic performance: evidence from Saudi Arabian Universities. *Educational Research International*, *2*(1), 1-9.

DOI: http://dx.doi.org/10.17509/xxxx.xxxx
p- ISSN 2775-8419 e- ISSN 2775-8427

Chamwei, B., Njagi, K., and Kigoli, J. S. (2017). Assessment of ICT integration in teacher educational institutions in Kenya. *WvP Journals*, *5*(1), 10-20.

Davis (1989). Technology acceptance model. *International Journal of Innovative Research and Development*, *1*(1), 8-16.

Ebner, M., Schön, S., Braun, C., Ebner, M., Grigoriadis, Y., Haas, M., and Taraghi, B. (2020). COVID-19 epidemic as E-learning boost? Chronological development and effects at an Austrian university against the background of the concept of "E-Learning Readiness". *Future Internet*, *12*(6), 94.

Ferrer, R. L. (1998). Graphical methods for detecting bias in Meta-analysis. *Family Medicine-Kansas City*, *30*(2), 579-583.

Fook, C.Y., and Sidhri, G.K. (2009). Integration of ICT into university teaching and Learning. *Asean Journal University Education*, *5*(1), 71-94.

Islam, M. S., and Fouji, M. H. (2010). The impact of ICT on students' performance: A case study of ASA University Bangladesh. *ASA University Review*, *4*(2), 101-106.

Karamiti, C. (2016). Measuring impact of ICT on Academic performance: Evidence from higher education in Tunisiia. *Journal of Research on Technology in Education*, *48*(4), 322-337.

Karanja, D., Ndrangu, M., and Sang, A.K. (2017). Influence of ICT Integration on academic management in Public Universities in Kenya. *International Journal of Innovative Research and Development, 6*(12), 18-26.

Kibor, J.J., and Tumuti, J. (2020). ICT integration and performance of Tertiary institutions in Nairobi County, Kenya. *Journal of Information Technology*, *2*(1), 1-7.

Kimani, E., Wangeri, T., and Mutweleli, S. M. (2013). ICT uptake and use as a tool for personal adjustment and academic pursuit among undergraduate students at Kenyatta University. *International Journal of Economy, Management and Social Sciences*, *2*(6), 291-303.

Onyia, M.N. (2013). The impact of ICT on university students' academic studies. *Journal of Education and Social Science Research*, *3*(8), 105-109.

Opati, O. D. (2013). The use of ICT in teaching and learning at makerere university: A case of college of education and external studies. *Journal of Education and Social Science Research*, *3*(8), 225-235.

Talukeler, S., Jahangir, Alam, and Arifu, I. A. (2015). The impact of ICT on students 'performance a case study of undergraduate university students. *Manarat International University*, *4*(1), 137-147.

Vilkonis, R., Bakanoviene, T., and Turskiene, S. (2013). Readiness of Adults to use E-Learning-Learning and T-Learning technology. *Informatics in Education*, *12*(2), 181-190.

DOI: http://dx.doi.org/10. 17509/xxxx.xxxx
p- ISSN 2775-8419 e- ISSN 2775-8427