

A review of thematic growth of International Journal of Education and Development using ICT

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ABSTRACT

The growth in education, research, and development in developing economies cannot be compared with their developed counterparts. Information and Communication Technologies (ICTs), which have played a key role in nations' socio-economic development, can leverage developing economies. The International Journal of Education and Development using Information and Communication Technology (IJEDICT) emerged to promote research and development using ICT in developing nations. The emergence has, over the years, churned out significant scientific publications. This review intends to commemorate the late IJEDICT founding editor and investigate the contribution of academic papers published in the journal to develop education using ICT in developing countries and the thematic growth of the publication forum. The paper presents a bibliometric content analysis of 692 studies published in IJEDICT from inception, 2005 until January 2021. Findings from this review suggest useful implications for researchers, ICT managers, institutions, policymakers, and nations.

Keywords: Developing nations; IJEDICT; bibliometric; R&D; developed country; education; ICT.

INTRODUCTION

Research and development (R&D) has played a tremendous role in fostering nations' development in terms of economy (Akinwale et al., 2012), industry and business (Langerak et al., 1999), and innovations (Mairesse and Mohnen, 2004). According to Mansfield (1972), *"although the uncertainties of measurement preclude definite quantitative estimates on the value of R&D to our economy, all significant studies show that technological change is a significant contributor to national economic growth and to increasing our productivity"* (1972). Based on the excerpts from Mansfield, it is noteworthy that information and communication technology (ICT) has played a key role in the socio-economic development of nations. Owing to this background, the emergence of the International Journal of Education and Development using Information and Communication Technology (IJEDICT) founded in 2005 (approximately 16 years ago) is apt as the main objective, according to the founding and chief editors is to serve as a leading outlet to hoist studies conducted to foster R&D using ICT (IJEDICT, n.d.). Mainly, the IJEDICT thematic focus is geared towards

strengthening education using ICT in developing nations. The founding editor of the IJEDICT journal had envisioned a platform where scholars and industrial practitioners can collaboratively explore ideas to foster the development of nations.

Over the years, the IJEDICT seems to have opened up an immersed opportunity for the research community to disseminate their research ideas and findings through theoretical, empirical, conceptual, and even review studies. Scholars worldwide have widely leveraged this opportunity as a free and open-access platform where all publications can be accessed under the Creative Common License (CC License, n.d.). Therefore, researchers can collaborate and disseminate scholarly outputs quickly. Despite the open access opportunity created by IJEDICT, it is not yet a member of International Scientific Indexing (ISI), but the journal is regularly indexed by The Learning and Technology Library (EdITlib), ProQuest, EBSCO, SOCO@R, and Open Archives Harvester. IJEDICT is progressive in research output and impactful as the journal recorded 58 published issues and 430 peer-reviewed published articles. IJEDICT has 4243 registered authors, while 1287 sign up for notification, and also record a generous 50.35% acceptance rate.

Drawing from the main objective of IJEDICT, it is essential to investigate how this publication outlet has prospered over the years in terms of the thematic focus in education and development using ICT. It will also be essential to see what aspects and sectors of the educational development scholars have been researching and contributing. It would also be good to investigate the type of study that dominates papers published by IJEDICT from inception, and what issues (if any) are reported in studies conducted in this regard. Moreover, this kind of review will not only enunciate the performance of the IJEDICT as enshrined in the vision of the founding editor and maintained by the succeeding editors but will also unravel insights to motivate scholars in several ways. First, the developmental aspects of education using ICT can be presented. Second, areas that may not have received adequate attention in development through R&D could be unraveled. Therefore, this study seeks to approach the issue presented by providing answers to the following research questions:

RQ1. How have developing nations prospered in education and development using ICT between 2005 to 2021?

RQ2. What are scholars and practitioners doing to improve education and development using ICT between 2005 to 2021?

RQ3. What type of research dominates the papers published by IJEDICT between 2005 to 2021?

The remaining part of this article consists of a brief background section that describes education in developing nations, the impact of ICT on education, and an overview of IJEDICT's emergence and its activities. The methodology section provides information on how the study data was collected, analyzed, and presented. The finding and discussion section provides details on the results focusing on addressing the research questions and discusses the insights from the findings. Finally, the study concludes with implications and recommendations to scholars and practitioners.

BACKGROUND OF THE STUDY

This section presents a brief review of literature related to the focus of the study. The reviewed literature is composed under three subheadings; *Education in the developing nations, Impact of ICT on education, and Emergence of IJEDICT to foster education and development.*

Education in the developing nations

Globally, irrespective of the context, education is positioned as a socially progressive phenomenon that enhances economic growth and productivity, promotes social, political, and personal development, and reduces poverty (Rowell, 2020). Despite this, UNESCO (2017) reported that 264

million children and young people do not attend school, with sharp and notable divisions and distinctions about equity, access, and quality across both the Global North and Global South. Developing countries have invested a considerable and rising portion of their GDP in education over the past two decades, which does not translate to resource abundance for many classrooms (Mbiti, 2016).

Mbiti (2016) asserts that education-related visions, plans, and promises often dominate public debates and politicians' promises in developing countries. The author further stressed that there is little overlap between the campaign promises and the effectiveness of the policies in research papers. Obvious education investments or inputs such as school buildings, school fees reduction, ICT tools purchase, and teacher's salary increase are the primary focus of promises across these countries (Harding, and Stasavage, 2014; Mbiti, 2016). Meanwhile, the less visible and more effective reforms that increase learning through improved accountability and pedagogy have received less attention.

While developing nations are faced with a myriad of challenges in educational development, several studies and research output suggest an increase in quality of education and output across the educational system from K-12 to Higher Education Institutions (HEIs). For instance, the study of Sanusi et al. (2017) found the use of technology compelling while exploring the impact of tablet devices on students and teachers on teaching and learning in Nigeria. Agbo et al. (2020) found a positive relationship between social media usage for computing education and perceived learning outcomes. Sanusi et al. (2020) also indicate that learning with technology is possible in Africa utilizing Nigerian samples, hence the contribution to education in developing countries owing to the impact of ICT in education (Sanusi et al., 2017).

Impact of ICT on education

The impact of ICTs on education cannot be overemphasized and has, without doubt, affected the teaching and learning process, as well as research. Several studies have shown and proven the benefits to the quality of education globally. Developed countries have also amassed some significant volumes of literature on the influence of ICT on education. Studies such as Olaleye et al. (2018), Olaleye et al. (2020a) and Olaleye, et al. (2020b) investigated the use of ICT tools in Higher Education Institutions (HEIs), which shows the significant contribution to the quality of education in HEIs. Similarly, research has also shown an improved teaching and learning process using ICT tools in K-12 settings (Sanusi et al., 2017;), and Bindu (2016) asserts the application of ICT is creating significant changes in the teaching and learning process.

According to Bindu (2016), education has broad objectives, goals, and concepts other than merely teaching students based on the prescribed syllabus in the brick and mortar classes. It was stressed that the new education system should be classrooms without borders with ICT as the driving force. This development will, in turn, deliver education anytime and from anywhere (Gupta and Gupta, 2014; Pegu, 2014; Oyelere et al., 2016; Sanusi et al., 2020).

The emergence of IJEDICT to foster education and development

The IJEDICT is an e-journal that provides free and open access to all of its content, strengthening links between research and practice in ICT in education and development in developing economies (especially the small states) (IJEDICT, n.d.). The journal, which started operation in March 2005, has published fifty-eight issues, as shown in Table 1, and ensures that research articles are accepted internationally as "refereed articles." IJEDICT is listed/indexed in EdITLib, ProQuest, EBSCO, SOCOL@R₁ and Open Archives Harvester.

Table 1: IJEDICT statistics

Items	Frequency
Number of issues published	58
Number of peer-reviewed submissions published	430
Number of registered authors	4243
Acceptance rate (peer-reviewed submissions)	50.41%
Number of signed up for notification	1287

Retrieved on 24.04.2021 from <http://ijedict.dec.uwi.edu/statistics.php>

The IJEDICT publishes papers that are classified into six sections. Table 2 contains the six sections and the corresponding description of papers in each section.

Table 2: Scope and sections of papers published in IJEDICT

Section	Descriptions
Research articles	Research articles are academic and peer-reviewed articles
Studies from the field	Studies from the field refer to case studies and descriptive article that are subjected to editorial review and peer comment, but not peer-reviewed
Research in progress	Research in progress are descriptions of research not yet completed
Project sheets	Project sheets refer to brief descriptions of relevant project
Notes from the field	Notes from the field are working papers and other commentaries on relevant topics
Book/media review	Books/media contain books, software, and other media reviews

Topics covered by the IJEDICT include, but are not limited to

- ICT enabled distance education;
- Mobile learning, e-learning and online learning in developing contexts;
- Flexible learning and delivery for development;
- Open learning, open access, open educational resources;
- E-literacy, enabling the use of ICT for capacity building.

METHODOLOGY

This section presents the methodology adopted for data collection, screening, and synthesis, as demonstrated in similar studies (Agbo et al., 2021a; Agbo et al., 2021b). Figure 1 presents the details of the procedure followed to arrive at the analyzed data. The first phase of the procedure focused on identifying relevant data sources and outlining search strings that fit the domain of this research. The data source used for this study was ProQuest. As earlier presented, the data sources where IJEDICT is indexed include the Learning and Technology Library (EdITlib), ProQuest, EBSCO, SOCO@R, and Open Archives Harvester. However, our experience with these databases shows that most of them lack data extraction functions that fit bibliometric study. Some of the databases did not make provision for downloading bibliometric data. Therefore, authors limited their search to only ProQuest databases. Besides, the authors consider the ProQuest database sufficient for the data collection since the journal claimed it is one of the databases where all journals published are indexed (IJEDICT. n.d.).

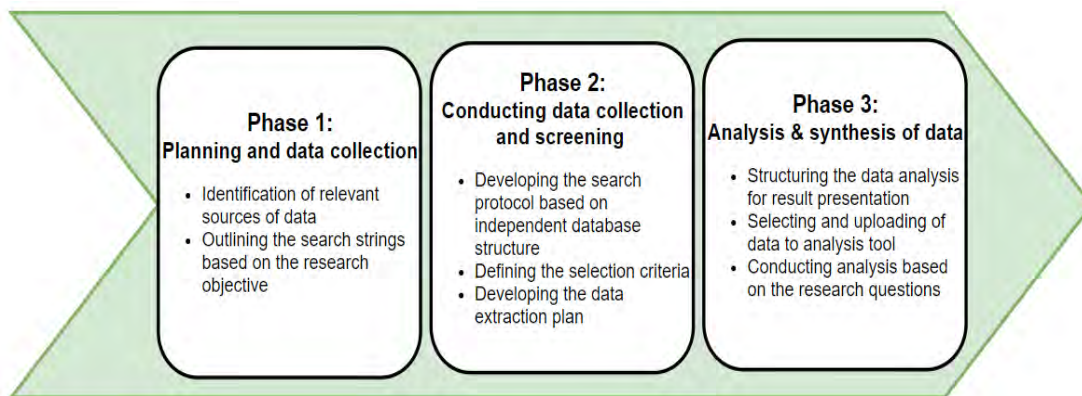


Figure 1: Procedure for data collection, screening, and analysis

In particular, the authors explored two categories of ProQuest databases (ERIC and Education Database). Our experience shows that while the Education database of ProQuest has a higher number of indexed articles published by IJEDICT, ERIC ProQuest has only about half of the number. Table 3 presents details of the result obtained from the searches conducted on these two categories of databases.

The second phase of the procedure focused on conducting the data collection based on the defined search strings. In this study, the main data string includes *"International Journal of Education and Development using Information and Communication Technology."* The search was conducted to query only the publication title (i.e., the source journal where the articles are published). The only criterion for the data screening is that the publication source must be IJEDICT. In the ProQuest Education Database category, provisions to download all results in a bibliometric format such as RIS (Research Information Systems), TXT (Plain text), and RTF (Rich Text Format). This convenient way of downloads makes it flexible to collect all the 692 data collected from ProQuest (Education Database), used for the data analysis.

Table 3: Data search strategy, search keywords, and results obtained

Databases	Search strings	Result	Remark
ProQuest (Education Database)	<i>Pub("International Journal of Education and Development using Information and Communication Technology")</i>	692	Downloaded and used for the analysis.
ProQuest (ERIC)	<i>Pub("International Journal of Education and Development using Information and Communication Technology")</i>	339	Not downloaded since the data is grossly insufficient and did not reflect the true number of articles published by IJEDICT.
EdITLib	<i>Keyword search with all the words("International Journal of Education and Development using Information and Communication Technology")</i>	729	Not downloadable because the provisions for bibliometric download were lacking. Besides, a few outliers of data from other publication sources were found.
EBSCO	No advanced search function is provided.		
SOCOL@R	Database language is not in the English language.		
Open Archives Harvester	No advanced search function is provided.		

In the third stage, the authors cleaned the data to ensure that it can be uploaded into the data analysis tool. This study utilized VOSviewer version 1.6.16¹ to perform the authors, keywords, title, and abstract thematic analysis. VOSviewer is an open-source statistical analysis tool developed by Nees Jan van Eck and Ludo Waltman at Leiden University, the Netherlands, for bibliometric data visualization (Van Eck and Waltman, 2014). Aside from the visualization analysis conducted, the authors synthesized the 692 data collected by skimming through the abstract and keywords to extract relevant information such as the aim of the study, the type of study conducted, the country and region where the study was conducted, and educational level or focus. All these data extracted are used to present our findings in the next section.

FINDINGS AND DISCUSSION

This section provides our findings and discussion based on the data collected which are connected to the research questions.

¹ <https://www.vosviewer.com/>

RQ1. *How have developing nations prospered in education and development using ICT between 2005 to 2020?*

To provide answers to the first research question on how developing nations have prospered using ICT, we investigated the annual scientific production of articles published in IJEDICT between 2005 to 2021. As seen in Figure 2, the analysis shows that in 2005 when Professor Stewart Marshall founded the journal, about 50 articles were published.

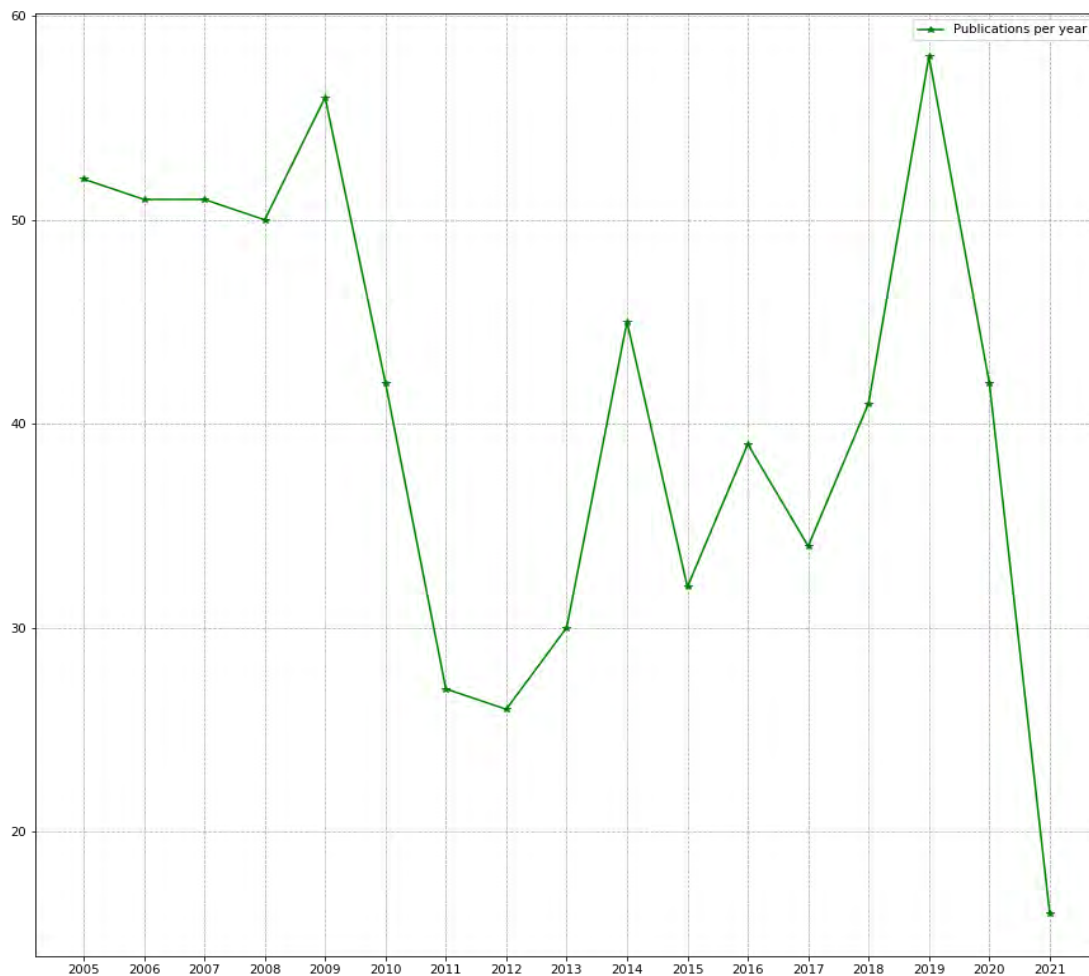


Figure 2: Annual scientific production of IJEDICT between 2005-2021

Between 2006 and 2008, the number of productions by the IJEDICT dwindled. However, in 2009, the number of publications increased since the journal published five issues annually. Surprisingly, the IJEDICT witnessed the lowest number of scientific productions in 2012. Reasons for this low productivity in 2012 could not be traced since the journal had published three issues as done in other neighboring years (that is, 2011 and 2013). On the other hand, the highest annual scientific production of articles by IJEDICT since the inception was 2019. One way to explain this highest number of productions in 2019 could be that the journal had published four issues in that year, whereas the preceding years had only witnessed three issues. Usually, the International Journal of Education and Development using ICT publishes between three to five issues per year as shown

in their history (IJEDICT. n.d.). At the time of conducting this study, the IJEDICT had only published one issue, hence the low production reflected for 2021.

We also analyzed active authors. These authors have contributed to research and development through studies published in IJEDICT between 2005 to 2021. Figure 3 delineates authors' names that have published at least three articles in IJEDICT within the period under review. The result revealed that the founding editor of IJEDICT, Professor Stewart Marshall remains the giant among the authors. Similarly, Professor Wal Taylor was also seen as one of the prolific authors in publishing with IJEDICT. One reason why Marshall and Taylor are the most prominent authors in this finding could be that both scholars have been manning the editorials of IJEDICT from the inception and had written at least three editorial reviews in a year based on the publication plan of the journal.

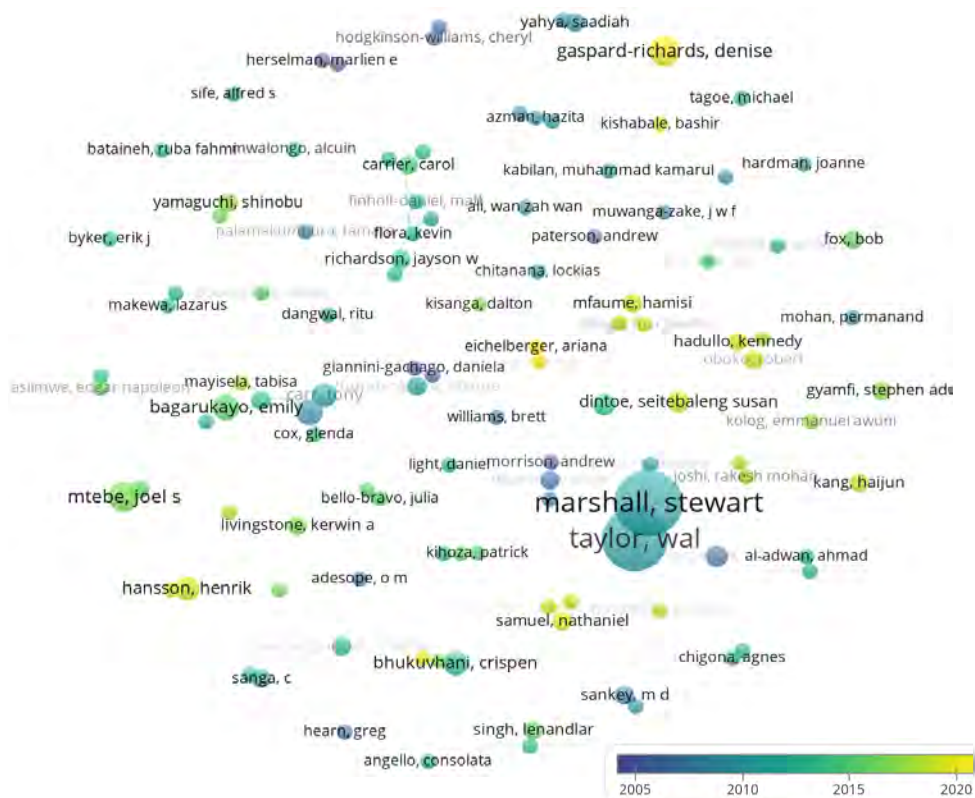


Figure 3: Active authors contributing to research and development studies published in IJEDICT between 2005 to 2021

The authors' mapping reveals that some authors are active in co-authoring with strong presence while other authors do not collaborate and have weak presence. Authors' productivity of quality of academic papers is crucial for the journal visibility, citations, and accelerated journal impact factor. Besides, this academic involvement will pave the way for the IJEDICT Altmetric, which caters to other IJEDICT academic papers indicators such as downloads, page views, and social media mentions. Altmetric complements the traditional metrics of scholarly impact, and IJEDICT should aspire to get better results from these indicators than the success it has recorded in the past.

Furthermore, we investigated scientific studies published by IJEDICT from different nations between 2005 to 2020. This analysis which intends to unravel information regarding how authors have used R&D to impact their nations' development, utilized the authors' keywords which defines the thematic focus of their studies. As presented in Figure 4, the result revealed that "developing countries" remain the focal region of IJEDICT. Within the scope of the developing regions, Africa was seen to be prominent and Tanzania is the leading African country that has prospered using ICT in R&D. Despite the leapfrog of Tanzania in ICT related issues; the statistics show that one decade ago, Tanzania was rated poorly on the World Economic Forum's (WEF) Networked Readiness Index (NRI) as the worst in East Africa. Tanzania was ranked 118 (NRI), 104 (Environment Sub-Index), 124 (Readiness Sub-Index), but in 2012 Tanzania scored 36% ahead of Rwanda (24%) and Ethiopia (18%) in mobile penetration (Esselaar and Adam, 2013).

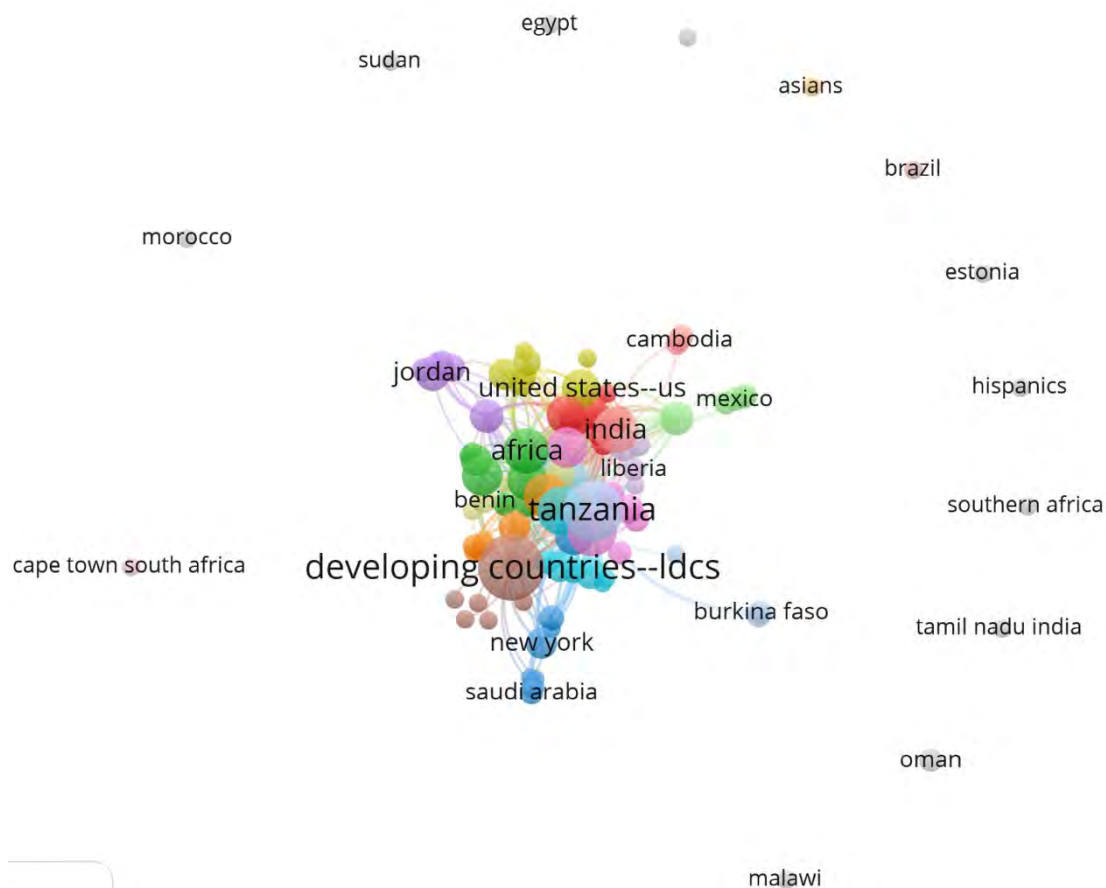


Figure 4: Analysis of regions and nations' development using ICT based on IJEDICT data

One way to explain this revelation of Tanzania as the leading African nation using ICT could be linked to the dynamics of Tanzania's infrastructure and the market structure that orchestrates National ICT Broadband Backbone (NICTBB). The introduction of a competitive mobile retail sector, robust national ICT policy formulation, implementation plan, and appropriate regulatory environment (NICTP, 2016). Inferring from Tanzania Ministry of Works, Transport and Communication National Information and Communications Technology Policy (Mbarawa, 2016, p.vi), Tanzania envisioned in the next four years to pay more attention to ICT as central to competitive social and economic transformation and stated that:

"These technologies are a major driving force for the realization of the Vision. They should be harnessed persistently in all sectors of the economy... This task demands that adequate investments are made to improve the quality of science-based education and to create a knowledge-based society in general" (Mbarawa, 2016, p.vi).

There is a connection between the academic contribution of Tanzania in the field of ICT and its National ICT Policy. Tanzania is gradually becoming a technology-driven information and knowledge society in Africa. Tanzania's ICT frontier is a wake up call to all the African countries that are lagging in the area of ICT.

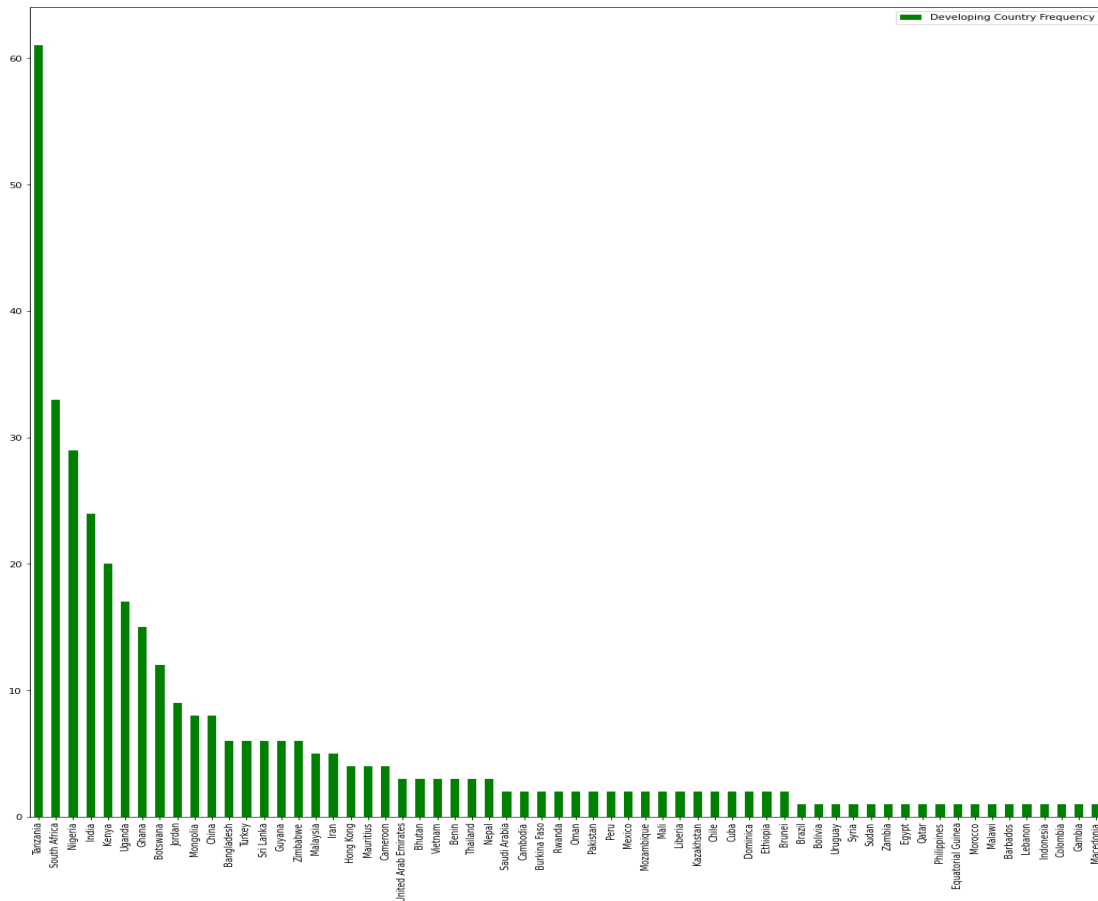


Figure 5: Developing countries publishing in IJEDICT

Figure 5 details developing countries' publication in IJEDICT from 2005 to 2021 based on our search approach described in the methodology section. Tanzania emerged as the country with the highest publications, followed by South Africa and then Nigeria. While countries in Africa dominate the publication forum, countries from the Asian continent are well represented in the published papers. The developing countries' chart is curvilinear, and the frequency of the country's productivity tilt from left to right, showing consistency and inconsistency of the country's research output. It is supposed that the ICT use in these countries depends on assets, actions, and attitudes. The study grouped the countries involved as *Connectors*, *Productivity Enhancers*, *Inexperienced Experimenters*, and *Lacklustre*. The developing countries that did not reflect in the chart are *off the network* and *indifferent* to ICT advancement.

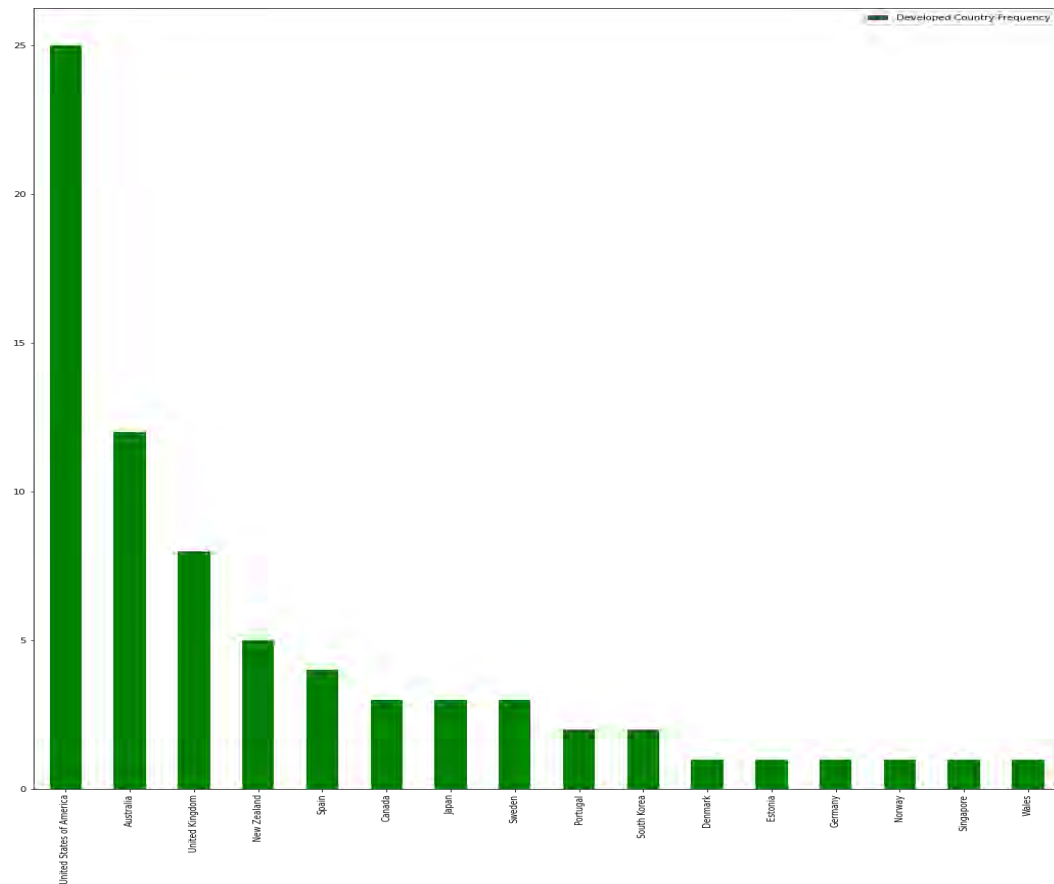


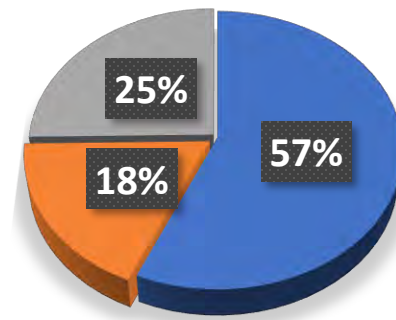
Figure 6: Chart of developed countries patronizing IJEDICT

While IJEDICT focuses on developing economies, especially small states, our data, as shown in Figure 6 suggests that researchers in some developed economies publish their research findings in IJEDICT. The United States of America takes the lead, followed by Australia and the United Kingdom, with some few European countries represented. This finding also depicts that IJEDICT is recognized globally as one of the growing publication outlets with an outstanding potential of becoming one of the leading journals publishing within the scope of ICT4D in the nearest future. It is noteworthy to mention, that we deduced some of the authors of the scientific papers published in IJEDICT are affiliated with developed institutions which may contribute to the frequency of developed countries represented in Figure 6. Hence, future studies may develop different classification schemes, and therefore may alter their findings differently from this study.

RQ2. *What are scholars and practitioners doing to improve education and development using ICT between 2005 to 2020?*

Analysis of the thematic area of the study conducted and published by IJEDICT is presented in this section to answer the research question seeking what exactly scholars and practitioners are doing to advance development through R&D.

Figure 9 shows the analysis of the level of education that dominates the articles published in IJEDICT. As shown in the pie diagram, the majority (57%) of the studies conducted and published in the IJEDICT focus on the higher education institution (HEI). A few of these studies (25%) were reported to be focusing on all levels, i.e., from K-levels to HEI. Moreover, only 18 % of the studies published in IJEDICT have focused on K-12 settings.



Educational levels

■ HEI ■ K-12 ■ All levels

Figure 9: Analysis of the educational levels that dominate articles published in IJEDICT

Regarding the type of research methodology, data analysis, and technique used in articles published in IJEDICT, our visualization analysis in Figure 10 shows that social networks, research methodology, case studies, qualitative research, literature reviews, comparative studies, and experiments dominated the connected nodes within the data obtained. Other visible information content analysis, data analysis, bibliometrics, inquiry method, and need analysis.

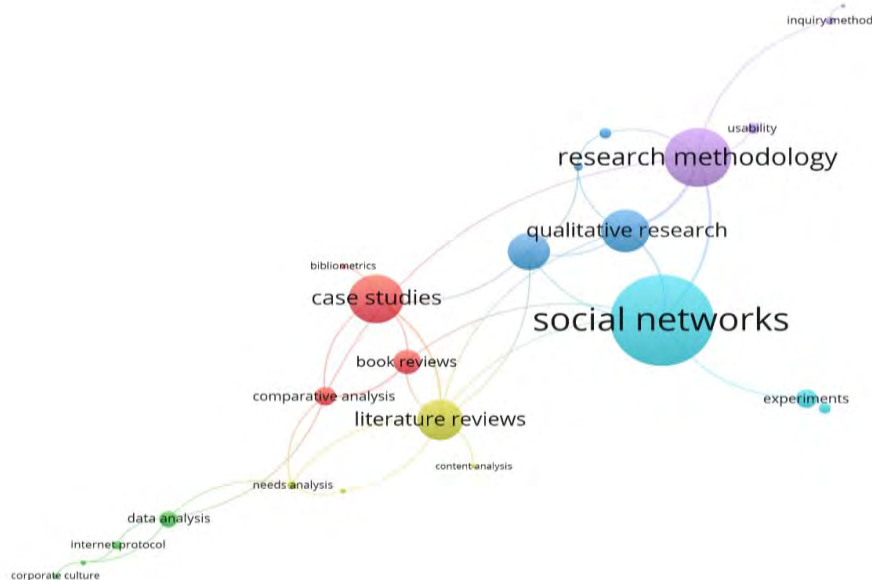


Figure 10: Visualization of methodology and data analysis techniques

Additionally, we investigated the common theories used by authors in the list of articles published in IJEDICT between 2005 to 2021. This analysis is presented in Figure 11.

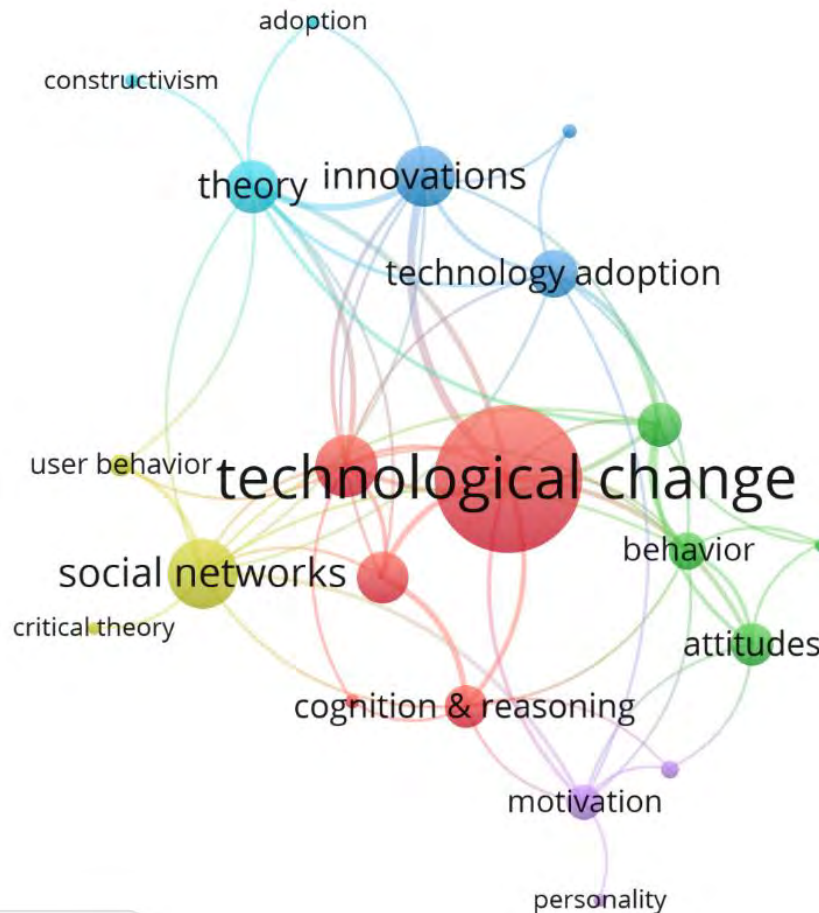


Figure 11: Visualization of theories used in articles published in IJEDICT

Our findings show that all other theories in the articles revolve around technological change. According to Misa, articles revolving around the theory of technological change “illustrate the diversity and excitement of recent work in technology studies” (Misa, 1992). Strongly connected to the technological change theory include social network, cognitive & reasoning, technology adoption, innovations, user behavior, constructivism, attitudes, motivation, personality, and adoption theories. This result suggests that most of the familiar theories connected to technology-mediated studies are utilized in studies published in IJEDICT.

Study implication

The bibliometric review offers some valuable insights for the practicing managers. One, the ICT consultants and managers can leverage the country gaps revealed in this study and carry out a background feasibility study to penetrate the countries lacking in skills, human power, and

infrastructure and initiate turnaround startups that will proffer solutions to existing challenges. Two, regarding the different ICT users identified in this review, the marketers could use this knowledge to segment the ICT markets in different developing countries and tailor-made solutions that meet the *Connectors*, *Productivity Enhancers*, *Inexperienced Experimenters*, *Lacklustre*, *Off the network* and *Indifferent* segments. Three, the insights from this study can help the policymakers in developed countries channel their abundant ICT resources into developing countries. It can help the policymaker in developing countries wake up to the reality of ICT and formulate a robust policy that will help their citizens. This review could help the IJEDICT Editorial assess the saturated research domain, the under-researched domain, and emerging research fields for necessary decision making. Presently, the evolving field of blockchain in education, cloud computing, virtual mentors, augmented and virtual reality in education, personalized learning, e-collaboration, open education data, smart learning, smart portfolio assessment, and other similar information and communications technology are less pronounced.

CONCLUSIONS

The existing bibliometric literature has discovered its relevance and importance to showcase the authors' productivity, research direction, and gaps for future study (Olaleye, 2020). Also, Zupic & Čater (2015) elevates bibliometric study as a corresponding analysis with meta-analysis and other scientific output evaluation analyses. This study reviewed the developing nations' education and development using ICT from the IJEDICT journal from 2005 to 2021. The study generates interesting stylized facts for researchers, ICT managers, institutions, and nations. The bibliometric results are in tandem with Agbo et al. (2020a), emphasizing the importance of ICT in academic settings and society. This bibliometric review contributes to the advancement of research. This review has identified research gaps in ICT education for researchers, who can fill these gaps by investing more resources to research areas that have not received sufficient attention. Besides, the journals in the field of ICT or related fields can benchmark their productivity and impact with this review. For society, this review will be an enlightenment and freedom from ignorance solution. Lastly, the government and the policymaker can use this review as a foundation for policy formulation.

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