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ASSESSMENT OF INFORMATION AND COMMUNICATION TECHNOLOGY SUPPORT FOR INTERDISCIPLINARY RESEARCH ECOSYSTEM IN NIGERIAN UNIVERSITIES – A SURVEY

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ABSTRACT

Scientific research and technological innovations are key drivers of development and socioeconomic influence. Diverse advanced information and communication technology (ICT) innovations are revolutionizing processes to solving complex problems including those of research in interdisciplinary scope. This study evaluated scholars' knowledge of ICT tools/interdisciplinary research (IDR), capacity index for using ICT in IDR, impacts of ICT in IDR ecosystem & institutional ICT infrastructural provision in promoting the culture of interdisciplinary research ecosystem across Nigerian universities. This was a cross-sectional study design using structured questionnaire of 5-point lickert scale for data collection. It drew participants from Alex-Ekwueme Federal University Ndufu Alike and Ebonyi State University Abakaliki with sample size of 185 scholars purposively selected during academic board & associations' meetings. Data was analyzed based on percentage and mean rating (MNR) using SPSS software. On knowledge of ICT tools/interdisciplinary research (MNR: 3.51–3.95); scholars involvement in IDR (MNR: 3.21–3.34); capacity for ICT support tools (MNR: 3.07–3.95); institutional ICT support tools (MNR: 2.43–2.92); roles/impact of ICT on IDR ecosystem (MNR: 3.55–4.48). The study found that scholars' knowledge of ICT tools/IDR was fair, whereas capacity for utilizing ICTs was poor & gross inadequacy of ICT support tools in the universities. This significant gap in capacity for ICTs/IDR and gross inadequacy of ICT support tools are critical factors contributing to declining interest/involvement of scholars in IDR. We recommends articulated comprehensive ICT capacity enhancement training intervention for scholars & university authorities prioritizing actions geared towards rapid scaling up of ICT infrastructures.

KEYWORDS: interdisciplinary research, ICT tools, ecosystem, evidence-informed, latency, innovation

INTRODUCTION

Over the years, advancements in research undoubtedly generally enjoys immense complement and support of computers and computing techniques. Scientific research and technological innovations are key drivers of development and socioeconomic influence. Unfortunately, Africa and even more specifically Nigeria remains underperforming in knowledge production and utilization compared to other countries of the world (EPA, 2024). This could be attributed to unavailability or under-utilization of innovative information & communication technology (ICT) support tools. Exploring computing innovations brings some form of radicalization generally to the research community and interdisciplinary research (IDR) ecosystem in particular. This accelerates the mobilization of reliable evidence and its utilization to inform policies and practices even beyond university education sub-sector (Chigozie et al., 2015).

ICTs provides cutting edge technique useful for seamless search/access of information, brokering global network for interacting/exchanging of expert ideas and promoting IDR collaboration among scholars (Moeenian et al., 2022; Sowa et al., 2024). Emerging trends in edge computing allows for content collection, information processing and delivery close to source optimizing real-time technological interactions and reduces latency issues (Ghavifekr & Rosdy, 2015; Gartner, 2019).

In a society marked by poly-crisis, misinformation and rapidly degenerating socioeconomic norms, capacity to provision reliable data is critical for decision-makers and development practitioners (Neely 2015; EPA, 2024). Many organization are investing in innovative tools to meet this demand and other initiatives geared towards stirring an evidence ecosystem around research. This represent a frontline bridge consciously created by exercising capacity in ICT innovation to strengthen broader IDR ecosystem forecast.

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For knowledge producing industries such as the universities, robustly functional ICT platforms for IDR ecosystem would tacitly stir massive hype in the global visibility index of both the scholar and institutions. It ostensibly creates avenues that supports global research knowledge management in terms of harvest/extraction of knowledge and translation for evidence-based process (Billie, 2014; Bellgard et al., 2017). In the context of socioeconomic and political transformation, building a community of knowledge engineers requires innovative multitasking approach capable of substituting sequential steps with simultaneous ones, leading to high economic and social systems impact (Chetleyet al., 2006; Laudon & Laudon, 2010).

Globally, the university community is adjudged the research hub hosting renowned intellectuals and legendry scholars given to novel research undertakings. These scholars can leverage complex networks or interconnected computing technologies to facilitate collaboration for high-impact research engagements across disciplines to solve complex societal development problems. The resultant effects of which is expected to trigger and influence modest educational system development and economic diversification geared towards realizing the SDGs. Similarly, inter-disciplinary research IDR has further advanced the scope of research framework especially in the university environment being the terrain for swift breeding of new knowledge. To pin down on one straight-touch definition for the concept of interdisciplinary research (IDR) has been difficult as several informed scholars have shared their views. IDR was referred to as a systematic way of infusing and synchronizing a variety of dynamics (ideas, facts, protocols, methodologies, etc) to bridge the traditional divide across disciplines in research uptakes (Hilde & Kampen, 2018; Menken & Keestra, 2016). In this study, the concept of IDR is viewed as a means of integrating information, ideas and methods across disciplines to generate reliable evidence useful for improving the course of development across wide range of sectors of an economy. It avails evidence-based outputs critical to policymaking across relevant sectors of governance. IDR tends to catalyze processes of economic development in the society through an ICT driven synergy for infusion of expert ideas aimed at solving complex problems (Roztocki et al., 2019). In IDR, there is the convergence of diverse scientific methods in weaving ideas and systematically creating new knowledge for advancing learning and building solution systems.

In recent years, IDR has been a major area of emphasis in the academia with a trend promising new insights and innovations rooted in cross-disciplinary collaboration (Menken & Keestra, 2016; Post et al., 2019).

Attention has further been directed towards skills and capacities of the academics (that is the scholars) in undertaking IDR, as it forms the tool used to take in, develop, integrate and question knowledge (Uneke et al., 2011; Post et al., 2019). Given the fact that one of the mandate of academic education focuses on research, it is imperative to discuss and examine skill related issues around capacity for structured and unstructured searching for, critically reading, synthesizing and analyzing textual information to formulate logical argument ((Fischer et al., 2011; Nyambane & Nzuki, 2019). This underscores the need for strong advocacy for universities to prioritize integration of ICT infrastructural investments to stir a boast in capacity enhancement for scholars (Uneke et al., 2015; Nyambane & Nzuki, 2019. Possessing a robustly built ICT capacity does not only influence teaching and learning processes, but also pivotal to improving efficiency and effectively drive research performance in particular on IDR scope (Nyambane & Nzuki, 2019, Adewoye & Salau, 2021). In view of high-level skillful and expertly investment required in IDR, the impact of the outcome of implementing a well-structured and strategically designed IDR is projected as far reaching. IDR has gained global traction, and engaging in it potentially leads to high-level discoveries anticipated to impact both developed and developing countries. In mitigating the popular perception of complexity of interdisciplinary research, it is considered ideal to start the conceptual design with addressing the ‘why’ and ‘what’ of the project to ascertain the common goals pivotal to IDR collaboration (Fischer et al., 2011). Being that IDR team members mostly trained on different research methods, discussion around technical design may become challenging, but also potentially more creative than in the case of mono-disciplinary team (Fischer et al., 2011; Hilde & Kampen, 2018). This is a strategic way of strengthening a collective resolve to build an IDR ecosystem across institutions, especially where there are resilient ICT infrastructural framework encouraging researchers’ participation. Establishing a network of IDR experts, enables collaborations characterized with shared objectives and mutual trust which canvasses a jointly potent technical design for problem solving (Moeenian et al., 2022). This would certainly avail an enduring pathway for research evidence-informed policy systems to thrive.

The purpose of this study was to evaluate the effectuality of ICT support tools in facilitating and promoting the culture of interdisciplinary research (IDR) ecosystem across Nigerian universities. The specific objectives were to ascertain as follows: (i) scholars’ knowledge of ICT tools/interdisciplinary research (IDR), (ii) capacity index for using ICT in IDR, (iii) impacts of ICT in IDR and strength of institutional ICT infrastructural provisions for IDR ecosystem.

METHODOLOGY

Study design

This was a descriptive cross-sectional study design, which followed a method introduced by Johnson and Lavis (2009) to develop a structured questionnaire of 5-point likert scale as data collection instrument. The questionnaire was organized into four (4) sections comprising demographic parameters, knowledge of ICT tools and involvement in interdisciplinary research, capacity to engage ICT tools in interdisciplinary research and roles/impacts of ICTs in interdisciplinary research dynamics.

Study area and participants

The study was conducted at sub-national level and participants were drawn from two universities within Ebonyi State south-eastern Nigeria. These universities are: Alex Ekwueme Federal University Ndufu Alike Ikwo (AE-FUNAI) and Ebonyi State University (EBSU) Abakaliki Nigeria. The target participants were all career university scholars which included professors, associate professors/readers, senior lecturers, lecturers I and II, and assistant lecturers. The different cadre of university scholars were accessed while they were attending their respective academic board and staff union meetings, where we verbally sort their consent to administer the questionnaire and those that were willing completed it accordingly. The study was conducted using a total of one hundred and eighty five (185) respondents' selected through random/purposive sampling technique.

Data analysis

Data collected were systematically extracted from the questionnaire and subjected to statistical analysis using SPSS software. The demographic characteristics were analyzed in percentage ratings. The core study questions was analyzed through the use of the method developed at McMaster University Canada by Johnson and Levis (2009). The analysis was based on mean rating (MNR), using figure represented in likert scale rating 1–5 points, where 1 point = grossly inadequate, 2 points = inadequate, 3 points = fairly adequate, 4 points = adequate and 5 points = very adequate. This equally applies to cases where agreement questions were used, that is from strongly disagree up to strongly agree option.

In this analysis, values ranging from 1.0–3.4 points are considered low, whereas values ranging from 3.5–5.0 points are considered high. The results of the assessed variables are outlined in tabular form in the subsequent section.

Presentation of Results

A total of 184 university scholars across the two universities participated in the study. The profile of the participants are presented in Table 1, and included the following: the male gender (65.2%); female gender (26.1%); participants from EBSU (64.1%); participants from AE-FUNAI (35.4%); and the participants rank: Professor/Associate Professor/Reader (16.8%); Senior Lecturers (30.4%); Lecturer I (18.5%); Lecturer II (17.9%) and Assistant Lecturer (14.2%).

Table 1: Demographic Parameters of the Lecturers

Parameter	Frequency	Percentage
Gender:		
Male	120	65.2
Female	48	26.1
Unspecified	16	8.7
TOTAL	184	100
Age		
25-34	21	11.4
35-44	65	35.3
45-54	66	35.9
> 55	25	13.6
Unspecified	7	3.8
Total	184	100
Institution		
EBSU	118	64.1
AE-FUNAI	65	35.4
Unspecified	1	.5
Total	184	100
Rank		
Associate Prof/Reader/Professor	32	16.8
Senior Lecturer	56	30.4
Lecturer 1	34	18.5
Lecturer 2	33	17.9
Assistant Lecturer	26	14.2
Total	184	100

Table 2: Assessment of the scholars' knowledge of both Information Communication Technology (ICT) support tools/Interdisciplinary Research (IDR).

Questions	GI	IA	FA	AD	VA	Total	Mean
Basic Knowledge of information & communication technology (ICT) tools	3	17	58	74	27	179	3.58
Basic knowledge of computer to develop data collection instrument for interdisciplinary research (IDR)	4	16	69	72	23	184	3.51
Knowledge of electronic databases to get research information	4	15	73	65	26	183	3.59
Level of knowledge/understanding of the art of interdisciplinary research	2	6	43	80	52	183	3.95
Level of involvement in interdisciplinary research	2	15	100	44	21	183	3.34
Frequency of undertaking interdisciplinary research	4	37	79	44	20	184	3.21

Key: GI=grossly inadequate, IA=inadequate, FA=fairly adequate, AD=adequate, VA=very adequate.

Table 2, presents the result of participant's knowledge of Information & Communication Technology ICT support tools/Interdisciplinary Research IDR in mean rating (MNR) values. The mean rating for knowledge stood between 3.51–3.95, scholars' level of involvement stood between 3.21–3.34. Even though there appear to be a slightly fair knowledge of both ICT tools and interdisciplinary research, this does not represent enough strong knowledge index to enable scholars muster courage into the task of IDR. On the other hand, the result showed very poor MNR in respect of scholars' involvement and frequency of undertaking IDR. The implication of this is that there is a gross weakness of the IDR ecosystem in the universities due to lack of adequate knowledge of the concept and its dynamics among the scholars who are the foremost drivers of IDR.

Table 3: Assessment of the scholars' capacity to engage with ICT support tools for interdisciplinary research activities.

Questions	GI	IA	FA	AD	VA	Total	Mean
Researchers' general capacity to engage ICT tools in undertaking IDR	5	26	78	52	14	175	3.25
Capacity to exploring ICT support channels to interact/exchange expert ideas relevant to advance interdisciplinary research (IDR)	3	22	78	63	18	184	3.41
Capacity to engage ICT support tools in brokering research collaboration/partnership	6	24	77	55	18	180	3.30
Capacity to engage ICT tools to access information relevant for IDR	3	16	71	65	27	182	3.53
Capacity to identify/obtain relevant research information via electronic databases	2	9	55	85	29	180	3.07
Capacity to extract/synthesize information from the Internet for high priority research	3	5	35	95	46	184	3.95
Capacity to assess quality/authenticity of information resources	3	13	46	92	26	180	3.69

Key: GI=grossly inadequate, IA=inadequate, FA=fairly adequate, AD=adequate, VA=very adequate.

From the result presented in Table 3, shows the outcome of participants Capacity to Engage with ICT support tools in Interdisciplinary Research, having mean rating MNR values ranging between 3.07–3.95. Evidently, this results are very poor and a demonstration of severe capacity deficiency and a serious constraining factor for university scholars/lecturers in undertaking IDR activities. This is for obvious reasons of the fact that ICTs are the core drivers of virtually everything around the educational system, much more the research hub in the university.

Table 4: Assessment of impacts of ICT in interdisciplinary research dynamics and strength of institutional ICT tools provisions for IDR ecosystem

Questions	SD	DA	FA	AG	AG	SA	Total
Agree to importance of ICT tool in facilitating IDR ecosystem among scholars	4	6	20	58	95	183	4.27
ICT support for IDR enhances the reach and uptake of its outcome in policymaking	1	5	17	82	72	177	4.23
ICT support for IDR represents a critical process towards generating evidence-based result	5	4	11	58	105	183	4.38
ICT tools as veritable avenue for global IDR collaboration	2	3	8	61	109	183	4.48
ICT support for IDR potentially improves its outcomes and confidence in same	2	1	10	67	98	178	4.44
Agree that policymakers value IDR outcomes more than others from mono-discipline	7	32	38	55	45	177	3.55
ICT support for IDR enhances global visibility index of both researcher & her institution	2	1	10	63	103	179	4.47
the impacts of IDR outcomes on policymaking process far outweighs those of sole discipline	2	6	24	70	78	180	4.20
non-utilization of ICT support tools constrains IR across the global research community	4	9	16	66	86	181	4.22
Agree that institutions' inadequate ICT support incentives/infrastructures such as broadband internet service, modern ICT based laboratories, subscription to electronic databases & research grants hampers scholars' interest in IDR.	4	5	13	57	103	182	4.37
	GI	**IA**	**FA**	**AD**	**VA**	**Total**	**Mean**
Describe the adequacy of available ICT support channels for IDR in your institution	11	51	70	35	12	179	2.92
Describe your institutions' commitment to provide ICT support incentives for IDR	29	75	51	24	3	182	2.43

Key: SD=strongly disagree, DA=disagree, FA=fairly agree, AG=agree, SA=strongly agree and GI=grossly inadequate, IA=inadequate, FA=fairly adequate, AD=adequate, VA=very adequate

The results presented in Table 4, are the outcome of assessing impacts of ICT support tools in interdisciplinary research dynamics and the adequacy of institutional provisions for ICT support tools. The MNR values ranges between 3.55–4.48 for impacts/importance of ICT support tools in IDR processes, and 2.43–2.92 for institutional ICT provisions respectively. As is displayed in the above results, the very high agreement MNR values recorded in favour of the roles/impact/importance of ICTs demonstrates scholars' affirmation to its effectuality in advancing IDR. This equally contributes greatly in enhancing IDR outcomes as reliable evidence and encourages its doubtless uptake in policymaking. On the other hand, the obvious grossly inadequate institutional provision for vital ICT support tools in the understudied universities represent serious shortcoming for advancing IDR ecosystem across these universities.

DISCUSSION OF FINDINGS

The outcome of this study suggests that computer & information technology (ICT) support tools in its varieties are very useful instrument for facilitating and promoting IDR ecosystem, just as capacity constraints in its usage among university scholars drastically limits involvement in IDR across universities. Findings in this study massively affirmed to the overriding importance of ICT support tools and its inevitable need in facilitating interdisciplinary research ecosystem across universities. In recent study, Nyambane & Nzuki (2019) reported that government are under pressure to invest more in technology in order to improve organizational performance in learning institutions where most operations are outdated. A study by Nyambane & Nzuki (2019) and supported in Khan and Clement (2012) reported that capacity for ICT effectively influences its utilization in improving organizational performance of learning institutions which by extension incorporated their scholars. Scholars' knowledge index for ICT support tools and involvement in interdisciplinary research was relatively fair, which implies a possibility of good prospects if capacity for its utilization in IDR can be enhanced. This was not unexpected being that research is one of participants' three core duty mandate and the highest composition of study participants were of the senior cadre whose benchmark qualification is the degree of doctorate in their respective discipline. Findings in a previous study suggests that capacity for ICT use is a combination of the know-how and application of the skill in performing the task (Uneke et al. 2018; Nyambane & Nzuki 2019). This study findings partly presented good ICT capacity for basic activities like information search, but very weak result in terms of advanced services such as engaging ICT to broker research collaboration/interactive communication and exchanging of expert ideas. This implies an intolerable and unacceptable capacity deficiency, especially for supposed knowledge transfer agents at a time ICT technique is dynamically ruling the world in diverse ways. In a recent study, expert utilization and application of digital technology tools in core education activities enhances scholars' digital competence (Chigozie et al., 2015; Timotheou et al., 2023). Suffice it to say that the IDR ecosystem will continue to be stagnated if supposed frontiers lack capacity to consciously conceive and design studies that stirs creation of enabling interface for scholars/researchers across universities. A previous study affirmed that building robust ICT capacity is strategically positioning for collaborative study, where researchers from unrelated discipline cross-cut their methods for a more creative study design (Fischer et al., 2011; Hilde & Kampen, 2018). Notwithstanding the fair knowledge, this study findings indicated very poor level of involvement and frequency at which scholars delve into interdisciplinary research activity. This gap may not be unconnected with the observed constraints in capacity and probably the general perception that IDR process is overtly complex, time consuming and costly (Glob 2019).

On the impacts of ICT tools in IDR dynamics, this study findings indicated that ICTs are critical in driving IDR ecosystem. A major contributing factor to the reported capacity deficiency in utilizing ICT tools especially for advanced services that facilitates IDR was institution's inability to provide critical ICT infrastructures and incentives such as broadband internet service, well equipped modern computer laboratories, subscription to electronic databases, adequate power supply, research grants, etc. The implication of this is that university scholars/researchers will only resort to conducting researches within the reach of their means. This obviously declines their interest in IDR and places a huge limit on opportunities to fully explore their career potentials (Laudon & Laudon, 2010; Latorre-Cosculluela et al., 2024). A previous study presented a strong perception that integrating ICTs as tools with efficacy for promoting educational practices involving research process represents an indicator of positive influence towards IDR undertakings (Roztocki et al., 2019; Latorre-Cosculluela et al., 2024). This view can be justified further with the position of most scholars strongly agreeing that inability of their institutions to provide above mentioned critical ICT infrastructures/incentives was a major limitation.

Further findings shows most of the scholars expressing firm view that exploring ICT support tools in conducting interdisciplinary research is a critical strategy in generating evidence-based results which validates its relevance for policy/decision making. The study also found that policymakers places high premium on the outcome of interdisciplinary researches due to rigorous collaborative efforts that refines the underlying scientific process (Moeenian et al., 2022).

It implies that ICT tools supports for IDR contributes in birthing a creative study design for improved outcomes and enhances its uptake in policymaking (Fischer et al., 2011; Hilde & Kampen, 2018). Outcome of this study with very poor MNR for institutional ICT provisions, suggest that realizing effective interdisciplinary research ecosystem across universities still remains a herculean task. The implication of this is that the governance system of universities may have neglected this critical aspect of her operation and needs to urgently refocus.

CONCLUSION

The study found that scholars' knowledge of ICT support tools/IDR processes was fair, whereas the capacity for utilizing ICTs was very poor and there was gross inadequacy of ICT support tools in the university. This significant gap in the capacity index for ICTs/IDR and the gross inadequacy of ICT support tools in the universities are critical factors contributing to the declining interest/involvement of scholars in IDR. On account of the perceived complex processes associated with IDR, prospects of its advancement continues to get slimmer. This development requires a swift and drastic response to assuage, given that acquisition of advanced competences enabling all-round utilization of ICT tools places researchers at advantage in pace with their counterparts in developed economies. Generally, the study outcome projected reliable evidence useful for policymaking, envisaged to lead robust drive in the strengthening of Nigeria university system and to effectively dismantle her myriads of operational challenges.

RECOMMENDATIONS

Based on the findings from this study, the following recommendation has been made for consideration by relevant authorities and interest groups. In other to strengthen this foremost knowledge production industries (the universities), their governing authorities should as a matter of policy undertake to embark on the following:

i. design and commission a strategically articulated comprehensive capacity enhancement intervention roadmap for routine up-skill training and retraining of her scholars especially on the evolving scientific research trends and computing technology innovations.

ii. prioritize and expedite actions geared towards scaling up the provision of modern and state of the art ICT support infrastructures in the universities.

iii. provide moderately inviting incentives for scholars by way of grants and handsome award for outstanding research innovations.

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