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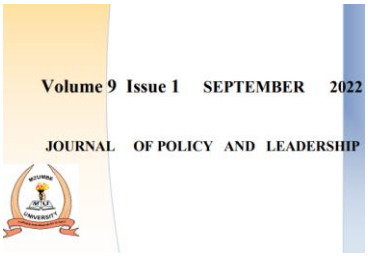

Instructors' Experience with Using ICT in Facilitating Student teachers Learning in selected Teachers colleges in Morogoro, Tanzania

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ABSTRACT

The integration of information and communication technology (ICT) into present teachers' colleges is predicated on instructors' experience and skills, as it facilitates the design of appropriate educational environments. However, instructors' experience and teaching skills with ICT in organizing and managing the ICT-based teaching and learning process are insufficient. This study investigates instructors' teaching skills and experiences in the use of ICT in facilitating student-teacher learning in Tanzanian teachers' colleges. The study was conducted in two teachers' colleges in Morogoro using 40 respondents. The study employed a mixed methods research design to collect data through questionnaires, interview guides and documentary review. Simple random sampling was used to select 36 instructors, and purposive sampling was used to select college principals and ICT specialists. Quantitative data are presented in tables showing frequency, percentage, mean and standard deviation, while data from the interview are presented in quotation marks, for explicit interpretation. Qualitative data were thematically analysed, while quantitative data were descriptively analysed. The findings reveal that instructors possessed several ICT teaching skills and experiences used in facilitating student-teacher learning. These comprise the use of internet-based digital content, resources, word processing and PowerPoint presentation skills. Furthermore, web-based video conferencing was found as scarcely used among instructors due to their lack of skills. It is recommended that the government and other education stakeholders should aim to provide in–house training to cement essential current ICT skills for instructors, to better facilitate student-teacher learning and better prepare them for future teaching careers.

Keywords: *Teachers colleges, teacher education, teacher training, ICT, student teachers, ICT in education, professional development, Tanzania*

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1. INTRODUCTION

The use of information communication technology (ICT) in both the developed and developing worlds is considered an essential tool in overcoming challenges associated with poor curriculum execution and underprivileged quality of education offered to student teachers in teacher's colleges (URT, 2016; Joel & Mungwabi, 2016; Republic of Ghana, 2015; Noyi, 2013). In recent years, the importance of ICT in education has been globally recognized at various levels of education as a pedagogical and instrumental tool to support teaching and learning (Warioba *et al*., 2022). That is, when ICT is used as an instrument in teaching and learning activities, it promotes active learning and a deep understanding of both macro and micro-content, learning that might otherwise prove difficult. A study by Gudmundsdottir and Vasbø (2017) reveals that the instructional use of ICT is fundamentally concerned with more learning that is active. As such, with the support of the pedagogical use of ICT, active learning is widely promoted (Mkilindi, 2016). Research studies reveal that the use of computers and other information technology delivery models, such as e-learning, mobile learning, e-portfolio and blended learning, assist in meeting both instructor and student-teacher learning objectives. Köksal and Köseoğlu (2019) reveal that ICT acts as a source of motivation for students in increasing efficiency and effectiveness in learning.

The use of ICT globally has brought significant changes that affect the provision of education and curriculum completion, particularly in teachers' colleges (European Schoolnet, 2020; Joel & Mungwabi, 2016; Almerich et al., 2016). It should be noted that ICT adoption in educational settings has promoted the provision of quality learning tools and learner-centred curriculum completion. As a result, instructors use several ICT facilities, services and infrastructures to deliver state-of-the-art curriculum content and design demand-driven instructional activities to be used either synchronously or asynchronously. For instance, concerning the developed world, the European Schoolnet's report of 2017 states there is a high level of ICT use in educational activities (European Schoolnet, 2018). Recent reports reveal that "Digital learning became a fundamental necessity in providing much-needed continuity and support for teachers, learners and families, in ways that would have been unimaginable, if not impossible, only a few years ago" (European Schoolnet, 2021, p.20). Other findings report that teacher education in Finland has developed strategic programme guidelines that ensure pre-service teachers are developed with equipped ICT competencies to enable them to shoulder their prospective careers adequately.

A report on ICT in education in Turkey shows significant development of ICT use in teachers' colleges. However, teachers lack more advanced competencies in the use of specific pedagogical content knowledge (Akdur, 2017). A lack of specified pedagogical content knowledge and technological know-how among in-service and pre-service teachers hinders the provision of quality education and hence hampers teacher professional development. Teacher professional development in the area of ICT for teaching and learning should be intertwined with teacher education programmes (Albion & Tondeur, 2018; Sahito & Vaisanen, 2017). A comparable analysis among European countries reveals that Germany sees a statistically significant relationship between instructors and students' use of ICT in computer and information literacy, unlike Australia, Norway and the Czech Republic (Gerick et al., 2017). The described European contexts reveal that the use of ICT at all education levels is well established in terms of infrastructure and physical facilities; however, challenges arise based on the differences in the comparison criteria. For example, e-content has not been well-developed in Turkey (Akdur, 2017; Forkosh-Baruch, 2018).

In East Africa, the use of ICT in education, notably teacher education, is given adequate consideration. The literature reveals that significant progress is being made in the endeavour to incorporate ICT in teacher education to facilitate quality, competitive and market-oriented education in the East African Community member states: the Republics of Burundi, Kenya, Rwanda, South Sudan, the United Republic of Tanzania and the Republic of Uganda (Amuko et al., 2015; Hennessy & Onguko, 2009; Mtebe, 2020). Some authors suggest that different stages have been reached in launching and integrating ICT in education in the East African States. For example, recent research suggests that the Republic of Rwanda integrates ICT not only in education but also in all sectors, as a stimulus to socio-economic development, as stipulated by the Sustainable Development Goals (SDGs) 2030 and the Rwanda Vision 2020 (the Republic of Rwanda, 2017a; 2020b). Research studies on factors affecting the integration of ICT in teaching and learning among primary school teachers in Kenya unveil that the integration of ICT provides learners with opportunities to explore ideas using ICT tools and to relate their personal experiences to the world’s ideas, enhancing their conceptualisation of these ideas (Tedla, 2016; Mutisya, 2020). Most of the designed ICT policies in East African countries emphasize the use of ICT to facilitate teaching and learning (The Republic of Uganda, 2012) to enable students to explore opportunities and ideas using ICT tools, devices and available services, and to raise educational standards (Amuko et al., 2015).

Some authors suggest that the application of ICT for teaching and learning in teachers' colleges in Tanzania was enhanced by the initiation of the ICT Policy for Basic Education and the National ICT Policy of 2003 (URT, 2007a; 2003), and later, the National ICT policy (2016). Most teachers' colleges facilitate ICT as a subject and consider it a pedagogical tool that promotes teaching and learning in other subject areas (URT, 2007a). Teachers' colleges in Tanzania are mandated to ensure that student teachers are prepared for serving in pre-primary, primary and secondary schools (URT, 2003). In the context of this study, teachers' colleges are institutions of education at the third level, that is, the tertiary level of education. The National Council registers these teachers 'colleges for Technical Education.

In 2007, Tanzania introduced the ICT academic syllabus for the Diploma in Secondary Education. It was intended to impart pre-service secondary school teachers with effective ICT skills and knowledge to be academically competent and ICT literate as they support and facilitate student learning (UTR, 2007a). Studies conducted in Tanzania reveal that the most fundamental elements for ensuring ICT use in education, specifically in teachers' colleges, are the availability of the internet, computers, a state-of-the-art hub, and a reliable power supply (Almasi et al., 2017). However, Ghasia et al. (2018) and Mtebe (2020) reveal that instructors lack appropriate technological pedagogical content knowledge on facilitating specific subject content and call for professional development through in-house training, workshops and related seminars. Yet, despite the efforts, there is still minimal experience with the use of ICT in teaching and instruction activities (Kafyulilo et al., 2016). The current study sought to address this gap. Against this backdrop, the findings imply the need for additional studies to better understand instructors' experiences and teaching skills in the use of ICT in facilitating student-teacher learning in selected teachers' colleges in Morogoro, Tanzania. Likewise, another promising line of research is to answer the following research questions: (a) What are the instructors' teaching skills in the use of ICT to facilitate student-teacher learning in selected teachers' colleges? (b) What are the instructors' experiences with the use of ICT to facilitate student-teacher learning in selected teachers' colleges? (c) What ICT training and professional development are needed for the instructors to facilitate -student-teacher learning in selected teachers' colleges?

2. THEORETICAL FRAMEWORK

In teacher education, most frameworks evolve based on the institution's expectation to prepare new teachers to integrate technology into their educational practice (Albion & Tondeur, 2018;

Lee et al., 2017) and working life thereafter (Mafang'ha, 2016). Therefore, it is expected that instructors in teachers' colleges be acquainted with ICT in facilitating student-teacher learning. The current study adopted the concerns-based adoption model (CBAM) because changing teaching methods, concerns and learning styles by incorporating technology is a way of enhancing the 21st-century lives of student-teachers (Almerich et al., 2016). The CBAM represents a developmental process for adopting innovations in teachers' colleges, focusing on individuals' increased use and experiences such as the use of ICT (Garrison, 2021) to enhance student teachers learning. As such, the increased use of ICT in teachers' colleges is enhanced by instructors' strategies and actions to adopt change.

The CBAM model was developed in the 1970s by the Research and Development Center for Teacher Education in Austin, Texas (McREL.org, 2021; Hall & Hord, 2020; Hosman & Cvetanoska, 2013). The original version of the CBAM model is based on the work of Frances Fuller (Khoboli & O'Toole, 2012; Hosman & Cvetanoska, 2013) on the concerns experienced by teachers regarding the development of their teaching skills and abilities to enhance student learning. According to the literature, CBAM is founded on twelve assumptions (principles) of change (Hall & Hord, 2020, p. 11-24; Garrison, 2021):

> *"(1) change is learning; it's as simple and complex; (2) change is a process, not an event; (3) implementing change is a whole system effort; (4) organizations adopt change while individuals implement change; (5) The school is the primary organizational unit for change; (6) school-based leadership is essential to long-term change success; (7) facilitating change is a team effort; (8) interventions are key to the success of the change process; (9) appropriate interventions can reduce resistance to change; (10) all-round communication is needed at all the time; (11) mandates can work; and (12) sustaining change requires additional time, interventions and leadership."*

The CBAM model has been widely adopted and validated in the educational setting for 50 years to understand teachers' concerns, skills, behaviours, demands and experiences regarding the use of educational innovations (Hall & Hord, 2020). In recent years, the CBAM model has been applied more widely to investigate the implementation of computers in classrooms (McREL.org, 2021), precisely to address issues such as the effectiveness of directed technology interventions.
The CBAM comprises three specific aspects: stages of concern, levels of use and innovation configurations (Fuller, 1969 as in Hall & Hord, 2020). The stages of the concern process are designed for supporting and understanding the range of excitement, reactions and emotions that teachers experience regarding a specific change (e.g., a new curriculum, model or approach, ICT

integration, and teaching methods) (Hosman & Cvetanoska, 2013). It should be noted that both in-service and pre-service teachers are often confronted with new curricula and other modifications to the execution of school programmes and daily routines. The levels of the use process refer to understanding how teachers are implementing (or using) a curriculum, method, approach, programme or routine (Khoboli& O'Toole, 2012).

Acquiring a new skill can be overwhelming. The innovation configurations process allows for the mapping of the spectrum of behaviours and expectations within a change initiative (Haines, 2018; McREL.org., 2021). Among other things, the CBAM has been used to support teacher professional development. The CBAM, as a theory of promoting change, is, therefore, appropriate to analyse the process of teachers' adaptation to and adoption of technology vis-à-vis their teaching and learning skills, experiences and demands for professional development. Furthermore, the CBAM is adopted in this study since it specifically focuses on teachers and students who are at the core of the change process (Donovan et al., 2007; Khoboli& O'Toole, 2012; Hosman & Cvetanoska, 2013). As a result, it also provides a useful framework not only for designing teacher training and development programmes but also for studying experiences and skills in the use of ICT.

Although CBAM has been used in a wide variety of educational settings, it was developed and researched primarily within pre-primary, primary and secondary education settings. Its applicability to teachers colleges and higher learning institutions may be limited by two core assumptions. First, CBAM is based on the assumption that the innovation will be adopted. Second, its emphasis on implementing new programs (such as curriculum adoptions and educational kits) with fidelity, may not adequately address the complexity of change in teachers' colleges (Garrison, 2021). Although each of these factors may not apply, however, during COVID-19, because of the switch to ICT use, blended learning and online instruction are not things instructors decide about but rather implement. In addition, the use of ICT, blended learning, e-learning adoption and online instruction requires countless levels of commitment to ICT use.

In this study, the CBAM explains how instructors adopt and facilitate change that helps student teachers understand, adopt, lead, learn and monitor the complex process of change in education using ICT as a complex innovation that requires multifaceted design and training to implement.

Furthermore, the model must take into account the specific concerns of instructors who are being directed and required to make the necessary changes to use innovative technologies.

3. LITERATURE REVIEW

3.1 Instructors' teaching skills in the use of ICT to facilitate student-teacher learning

Teacher education is expected to develop this type of literacy in both to-service and pre-service teachers, as well as enable them to develop new skills alongside their learners. Instructors (i.e., tutors and educators) in teacher education institutions are expected to renew their teaching and learning methods, approaches and strategies towards a constructivist learning approach while using appropriate new ICT learning environments (Mbise & Lekule, 2020; Forkosh-Baruch, 2018). The constructivist learning approach is based on a student-centred teaching and learning approach that supports the use of ICT to facilitate student-teacher learning (Machumu & Zhu, 2017). Prestride (2012) outlines several ICT packages and elements required for teachers and college instructors namely, data processing, word processing, the use of the internet, the use of spreadsheets and the use of presentation software such as PowerPoint, e-mail and video chat/conferencing. These are some of the basic teaching skills for instructors, and they will now be deliberated on in detail.

First, internet skills are vital for downloading educational resources and sharing information. Studies (Ghasia et al., 2018) indicate that there is a common usage of internet-based skills among teachers and university students. Studies conducted in Tanzania uphold that the smooth use of ICT in teaching and learning is hindered by various factors, including failure of the internet, poor connectivity and limited coverage (Agyei, 2020). Therefore, the present study needed to identify the degree of internet know-how as a basic skill in enhancing instructors' browsing educational resources such as e-books and open access to digital content. Second, the use of PowerPoint has transformed instructors' teaching from traditional to learner-centred. As with the integration of any learning technology, how PowerPoint is employed will determine its pedagogical effectiveness in 21st-century teaching and learning (Huston, 2011; Brill, 2016). PowerPoint can be used to enhance instruction, promote student-teacher interaction and provide online course material, and supports multimedia such as video, audio, images and animation (Northern Illinois University Center for Innovative Teaching and Learning, 2020).

Studies reveal that teachers have a strong acceptance of the use of PowerPoint in their classrooms and that PowerPoint presentation is now common among instructors in teachers' colleges (Ghavifekr, 2016; Kennah, 2016). Some authors suggest that the associated skills are simple to learn but require the availability of computers, projectors, LCDs and sources of energy (Jones, 2003). Alkash and Al-Dersi (2017) add that the use of PowerPoint is considered a modern teaching strategy. Moreover, it is reported that proficiency in PowerPoint presentation skills reduces "teacher talk", serves time and promotes adequate concentration for students (Han et al., 2017). In light of the report by the Northern Illinois University Center for Innovative Teaching and Learning (2020), it is conceivable that PowerPoint presentation saves time and energy: once the presentation has been created, it is simple to update or modify for other courses. Thus, the present study aimed to examine how instructors in teachers' colleges are skilful in teaching and learning with the support of PowerPoint since with its current use, experience shows that there is often information overload, a usage that complicates the wider potential for diverse professional and pedagogically-sound presentations (Uzun & Kilis, 2019; Jones, 2003).
In today's digital era, video conferencing is one of the best technology options that facilitate teaching and learning via a distance mode.

According to Innocent (2016), there has been a great change in the use of video conferencing in teaching and learning. However, research demonstrates that video conferencing skills are not commonly taught in teachers' colleges due to high cost, limited internet bandwidth and low internet speed (Tseng et al., 2019). Video conferencing skills are not common among instructors, even though they can greatly enhance lively teaching and learning among people in different places simultaneously. For example, Google Hangouts, Google Meet, Skype and Zoom are popular cloud-based video conferencing services used to virtually meet with others –by video, audio or both, while conducting live chats – and sessions can be recorded for reuse. It is reported in the literature that if instructors need to collaborate with members of a learning team, host interactive virtual events or offer student teachers a way of communicating with instructors or peers, a video conferencing system is an ideal practice (Pappas, 2015; Uzun & Kilis, 2019). It should be considered an academic platform to assist teaching and learning; as such, instructors should be skilled and knowledgeable regarding its use. Thus, the present study also intended to examine instructors' teaching skills in the use of video conferencing in teachers' colleges.

3.2 Instructors' experiences with the use of ICT in facilitating student-teacher learning

Studies establish that the level of ICT use in teaching and learning is on the rise (Pollacia & McCallister, 2019). Furthermore, Birgin, et al. (2020) reveal that the commonly used and well-known forms of ICT include word processing, the internet and e-mail. It has been reported that instructors' attitudes and behaviours vary depending on experience and their level of knowledge of ICT use (Birgin et al., 2020). That is, long-time in-service instructors with appropriate knowledge and skills are more likely to have experience with the use of ICT than the pre-service and upcoming instructors. In their study, Dooley et al. (2016) reveal that upcoming and experienced ICT-related training programmes develop instructors' competencies in computer use, influence instructors' usage of computers, assist teachers in shifting to teaching tasks involving technology and make new technology tools vital for teaching and learning.

Atabek (2020) indicates that although instructors desire to apply technology and have adequate technical skills, they lack knowledge on how to use technology in teaching and learning. That is, instructors' use of ICT is hampered by the lack of skills to successfully implement ICT-supported teaching and learning. Scholars urge instructors to use ICT in their courses when teaching as it enables the transferring of skills and knowledge among teacher trainees to supplement their teaching activities (Tosuntaş et al., 2019).

3.3 Instructors' ICT training and professional development needed to facilitate student-teachers learning

Instructors' training and professional development are a gateway for successful teaching and learning in teacher education. Findings by Dlamini and Mbatha (2018) indicate the need for in-service professional development activities in the use of ICT for teaching and learning, in teaching as well as in classroom management. While most studies indicate high levels of instructors' satisfaction with the use of ICT (Sahito & Vaisanen, 2017), the evidence for the value of ICT teacher professional development centres around three characteristics of ICT use for facilitating student-teacher learning: reduced costs, flexibility and the capacity to create collaborative student-teacher learning communities (Thakral, 2015). It was reported in the literature (see Thakral, 2015; Dlamini & Mbatha, 2018), that instructors' ICT professional development needs are not addressed in a meaningful and systematic way despite the demand for instructors to develop ICT skills and competencies. In their study, Dooley et al.(2016) reveal that ICT-related training programmes develop instructors' competencies in computer use, build long life experiences, influence instructors' attitudes toward computers and assist in adjusting tasks of

technology and toward the understanding of how new technology tools are important in teaching and learning. As Atabek (2020) observes, although instructors desire to apply technology and have adequate technical skills, they lack knowledge on how to use technology in teaching and learning. Other scholars (see Almerich et al., 2016; Tosuntaş et al., 2019) noted that instructors need to use ICT in their programmes when teaching in teachers' colleges as it enables them to supplement their teaching. In other words, there should be increased encouragement and motivation to instructors by teacher education departments to increase the usage of ICT in teaching and learning. The question of interest regarding pre-service and in-service training toward ICT is spiralling instructors' professional development (Mutisya, 2020).

Although there are various initiatives carried out by the government of Tanzania via the Ministry of Education, Science and Technology (MoEST) to provide ICT training, seminars, and workshops, the degree of ICT use in teachers' colleges remains unaddressed. Previous research can only be considered the first step toward a more profound understanding of instructors' need for ICT training and professional development to enhance the facilitation of student-teachers learning.

4. RESEARCH METHODS

The study employed a mixed methods research design to generate both qualitative and quantitative data. This design was primarily preferred because the study is directly linked to the needs of mixed methods research, which embraces a plurality of methods, where the focus is on the adequacy of particular methods for answering the research questions. The study is centred on pragmatism, as its philosophical underpinning. The current study was conducted in two selected government-built, operated and maintained teachers' colleges in Morogoro, Tanzania. The teachers' colleges were selected purposively as they were among 34 teachers' colleges that benefited from the ICT project launched by the government in collaboration with developmental partners in 2005. Thus, the colleges were anticipated to be well-established with ICT infrastructures, facilities, staff and services to facilitate teaching and learning. It was assumed that in the selected teachers' colleges, the level of ICT use in teaching and learning would be well established, so they were deemed appropriate to collect data from instructors' experiences and teaching skills.

In connection with the professional development required among instructors, skills gaps analysis via documentary review was conducted to determine the need for ICT training. A series of recent studies indicate that there are skills gaps among instructors thus needing the following, (1) a

blend of education and training to equip instructors with both basic and advanced ICT skills and knowledge required for their daily work and (2) determining the ICT content that can help instructors facilitate student teacher learning. These points motivated researchers to interview teachers and college principals to respond to the following questions, "What are the ICT training and professional development needed for instructors to facilitate student teachers' learning?" The interest in pre-service and in-service teacher training towards ICT is strengthening instructors' professional development and experience. Therefore, the current study focused on instructors' experiences and teaching skills in the use of ICT facilities in teaching and learning.

The sample was drawn from a list of instructors provided by academic officers in the selected teachers' colleges. Furthermore, purposive sampling was conducted with those participants directly involved in the day-to-day ICT monitoring, including teachers college principals and ICT technicians, while 36 instructors were subject to sampling using multiple probability techniques. The sample was composed of the following: two teachers college principals, two ICT technicians and 36 instructors, totalling 40 respondents. The sample size and sampling technique are summarized and presented in Table 2.

Table 1: Instructors' Demographic Characteristics

S/N	Categories	Sub-categories	Frequency	Percentage (%)
1	Gender	Male	20	55.6
		Female	16	44.4
2	Age of respondents	15-25	0	0
		26-35	9	25
		36-45	26	72.2
		46 and above	1	2.8
3	Academic rank	Bachelor degree	7	19.4
		Master degree	29	80.6
		PhD holder	0	0
		Professor	0	0
4	Teaching experience with ICT	0-5	10	27.8
		6-10	15	41.7
		11-15	8	22.2
		16 and above	3	8.3

Source: Data (2021)

Table 2: Sample Size and Sampling Procedure

Category of respondents	Sample size selected			Sampling technique	Research questions	Types data collected
	TC^1	TC^2	Total			
Instructors	18	18	36	Simple random sampling	1&2	Quantitative data
Teachers college principals	1	1	2	Purposive sampling	3	Qualitative data
ICT technicians	1	1	2			
Total	20	20	40			

Source: Data (2021) Key: TC^1 = First Teachers College; TC^2 = Second Teachers College

The study used an observation checklist to verify the presence of ICT facilities such as computer laboratories and wireless internet connectivity in teachers' colleges to justify their participation. Furthermore, a semi-structured interview was used to collect data from key informants, including ICT specialists and college principals. The study used sequential explanatory mixed methods, whereby the analysis began with the quantitative data to inform the qualitative analysis. As such, quantitative data were subject to descriptive statistics analyses, while qualitative data were thematically analysed. The descriptive analysis was computed through the Statistical Package for Social Sciences. The quantitative data illustrated that a mean score of three was the decision point to judge the extent of instructors teaching skills in the use of ICT in facilitating student-teacher learning. The decision point was obtained by adding together the response key numbers and dividing them by the total number of response keys: (1+2+3+4+5)/5 = 15/5 = 3.

Moreover, the frequency, percentage, mean and standard deviation were presented in tables for simple interpretation. The outcome of the quantitative analysis confirmed that qualitative analysis could fill the gap. The validity and reliability of this study were ensured through the use of multiple data collection techniques and pre-testing of the instruments (piloting), as well as triangulation. Study instruments were tested in one of the teachers' colleges that had the same characteristics as the studied teachers' colleges. Triangulation techniques involved the use of more than one method of data collection. The study used a questionnaire to collect data from instructors on the use of ICT in teaching and learning and gauge their experiences. Likewise, interviews were conducted with college principals and ICT technicians. Finally, the study used an observation checklist to observe the use of ICT gadgets, computer labs and facilities. To maintain and adhere to research ethics, researchers requested research permits from several authorities, and respondents' consent to participate was requested during the presentation of the overall objective of the study.

5. FINDINGS

5.1 Instructors' ICT teaching skills in facilitating student-teacher learning

In the current study, instructors' ICT teaching skills were gauged through survey questionnaires focusing on the following ICT skills for teachers: PowerPoint presentations and web conferencing/video skills. The findings are presented in Tables 2 and 3.

Table 3: Instructors' ICT Teaching Skills in Facilitating Student Teacher Learning

SN	ICT teaching skills	Response							
		1	**2**	**3**	**4**	**5**	**N**	**SD**	**MS**
1	I create teaching aid such as visual graphics, charts and drawings	1 2.7%	-	-	7 19.4%	28 77.8%	36	.75	**4.69**
2	I apply a PowerPoint presentation	1 2.7%	-	1 2.7%	6 16.7%	28 77.8%	36	.79	**4.67**
3	I use a computer to prepare to teach professional documents (schemes of work, lesson plans, lesson notes)	1 2.7%	-	2 5.5%	10 27.8%	23 63.8%	36	.85	**4.50**
4	I use a scanner or digital camera to import graphics, photos and text for presentation	12 33.3%	2 5.5%	5 13.8%	15 41.7%	2 5.5%	36	1.43	2.81
5	I use the internet to search for educational resources that support teaching and learning in my subject	-	-	-	6 16.7%	30 83.3%	36	.38	**4.83**
6	I use web conferencing/video chat to communicate/collaborate with my students	13 36.1%	7 19.4%	9 25%	5 13.8%	2 5.5%	36	1.27	2.33
7	I provide students marks/results via email or text message	11 30.5%	8 22.2%	4 11.1%	8 22.2%	5 13.8%	36	1.48	2.67
8	I use the word processor (writer), database (base) and spreadsheets	3 8.3%	2 5.5%	1 2.7%	8 22.2%	22 61.1%	36	1.27	**4.22**
	Mean Score								**3.84**

Source: Data (2021)

The mean score of responses above 3 in this study shows that instructors strongly agreed with the item statements presented to them. The results in Table 2 establish that instructors' ICT teaching skills in the use of the internet to search for educational resources and download material that supports teaching and learning had a high mean score of 4.83. This finding was supported by 83.3 per cent of the respondents, who rated the item "strongly agree." Creating teaching aids such as visual graphics, charts, drawings and PowerPoint presentations returned high mean scores of 4.69 and 4.67; these items were strongly agreed on by 77.8 per cent of respondents.

Similarly, the results establish that instructors had skills in word processing because there was the use of a computer to prepare professional documents (schemes of work, lesson plans and

lesson notes), and the use of the word processor (writer), database (base) and spreadsheets returned high mean scores of 4.50 and 4.22, represented by 63.3 and 61.1 per cent of respondents, respectively. These findings support the notion that instructors had basic ICT skills, as rated variables were above 3 on the mean score (mean score from respondents = 3.84). However, other variables rated below 3 as the mean score reveal that instructors had limited ICT teaching skills in these areas. As presented in Table 2, these variables comprised using a scanner or digital camera to import graphics, photos and text for presentation (mean score from respondents = 2.81), providing students marks/results via email or text message (mean score from respondents = 2.67) and using web conferencing/video chat to communicate or collaborate with students (mean score from respondents = 2.33). These results imply that certain skills are barely employed by the instructors, regardless of their potential in teacher education.

Table 4: Instructors' ICT Experience with Facilitating Student Teacher Learning

S/n	Instructors' experience/ opportunities	Response							
		1	**2**	**3**	**4**	**5**	**N**	**S.D**	**MS**
1	Do you have your personal computer?	1 2.7%	- 	- 	7 19.4%	28 77.8%	36	.75	4.69
2	I feel confident using the computer	1 2.7%	-	1 2.7%	6 16.6%	28 77.8%	36	.79	4.67
3	I enjoy using ICT in teaching	1 2.7%	-	2 5.5%	10 27.7%	23 63.8%	36	.85	4.50
4	I do provide assignments to my students using ICT	2 5.5%	2 5.5%	5 13.8%	15 41.7%	12 33.3%	36	1.11	3.92
5	I use the internet to search for educational resources that support teaching and learning	1 2.7%	-	1 2.7%	11 30.5%	23 63.8%	36	.89	4.36
6	I have access to a networked computer at my office	4 11.1%	5 13.8%	6 16.6%	7 19.4%	14 38.8%	36	1.42	3.61
7	I use web conferencing/video chat to communicate/collaborate with my students	13 36.1%	7 19.4%	8 22.2%	5 13.8%	3 8.3%	36	1.34	2.39
8	I provide students grades/marks via email or text message	11 30.5%	8 22.2%	4 11.1%	8 22.2%	5 13.8%	36	1.48	2.67
9	Have you ever taken a training course in ICT?	3 8.3%	2 5.5%	1 2.7%	8 22.2%	21 58.3%	36	1.28	4.20
10	Do you usually read about ICT?	0 -	1 2.7%	4 11.1%	21 58.3%	10 27.7%	36	.71	4.11
	Total Mean								**3.91**

Source: Data (2021) Key: 5 = Strongly Agree; 4 = Agree; 3 = Not Sure; 2 = Disagree; 1 = Strongly Disagree; N =total number of respondents; SD = standard deviation; MS =mean score

Key: Table 4 represents the technology experience of participants: 1–<2 is no to little experience; 2–<3 is little to fair experience; 3–<4 is fair to substantial experience, and 4–5 is substantial to extensive experience.

5.2 Instructors' ICT experience with facilitating student teachers' learning

The observations indicate that the use of ICT in facilitating student teachers learning in the selected teachers' colleges was substantial due to the availability of ICT devices.

The findings (see table 4 above) establish that most instructors own personal computers, so they can use them and comprehend and impart meaningful experiences to student teachers, thereby facilitating their learning. It is recognized that instructors are confident in and enjoy using computers in their pedagogical processes because the data returns high mean scores of 4.67 and 4.50, supported by 77.8 and 63.8 per cent of the respondents, respectively, who "strongly agreed." Plausibly, these findings reveal that instructors used computers in their endeavours. It is further revealed that most instructors had the opportunity of using the internet for searching educational resources and had attended ICT training courses, owing to the high mean scores of 4.36 and 4.20. The data potentially disclose training issues related to ICT. Furthermore, the study demonstrates that instructors had the opportunity of reading about ICT, implying that they are literate and experienced in the use of ICT to facilitate student-teacher learning. Finally, the findings reveal that instructors had access to a networked computer at their office while providing assignments through ICT. These findings imply that there is a diversity in instructors' experiences regarding ICT use in teaching and learning. Instructors had different experiences in terms of knowledge, competence and attitudes in deploying ICT in teaching and learning.

5.3 Instructors' ICT training and professional development for facilitating learning

In the current study, Research Question 3 was intended to collect qualitative data through interviews to obtain key information regarding training and professional development related to ICT. To determine the context of training and professional development based on ICT use, two college principals and two ICT technicians with custody of ICT issues, from two teachers' colleges were interviewed. In the current study, researchers aimed to ascertain if there was any training and professional, development offered at the respective colleges. College principals were interviewed first, followed by ICT technicians. P1 and P2 used below, represent interviewed college principals, respectively. One of the college principals had this to say,

> *Currently, there are various initiatives carried out by MoEST in providing training on ICT as a pedagogical tool. Every individual ought to attend the pieces training. This has given room for individual instructors to upgrade their skills in computer studies (Response from P1, March 2021).*

Another college principal had this to say when asked about the extent of training and professional development offered to instructors about ICT use to enhance -student-teacher learning at his college,

> *Since my appointment at this teachers' college, both government and non-government organisations have offered several pieces of training and professional development related to ICT for teaching and learning. Concisely, though the training has been offered, only a few instructors attended the training due to the availability of slots. However, the instructors need as much in-house training as possible (Response from P2, March 2021).*

It was also revealed that ICT technicians provided in-house training and professional development on the use of ICT to (T1) instructors. A technician from the *first teachers' college* had this to say,

> *Apart from the training rendered by the government on ICT use as a pedagogical tool, other initiatives include the indoor training that is rendered in our department to the instructors on the basics of computers, including installation, troubleshooting, updating and recovery programme. We have a schedule at least twice per week (Response from T1, March 2021).*

Similarly, respondent T2, an ICT technician from *second teachers college,* when asked the same question, revealed the following,

> *The indoor training has helped the instructors to gain more opportunities and experience in ICT use in teaching and learning activities. The questions of minor technical support are addressed through such an institutional-based programme (Response from T2, March 2021).*

6. DISCUSSION

6.1 Instructors' teaching skills in the use of ICT in enhancing student-teacher learning

Instructors' teaching skills in the use of ICT in enhancing student learning are now discussed in tandem with the following aspects that emerged from the study findings: PowerPoint presentations and web conferencing/video skills, preparation of digital content, the use of digital devices, search for educational resources, creating assessments and word processing, and databases and spreadsheets. The results reveal that PowerPoint presentation skills had a high

mean score of 4.69. This means that PowerPoint presentation is a common teaching method that most instructors practise in facilitating teaching and learning. The finding is supported by the finding in a study by Kennah (2016), who reports teachers' strong acceptance of the use of PowerPoint in their classrooms. PowerPoint presentation is commonly used among tutors since it acts as a memory aid, stimulates student learning and accommodates many students with visual impairments. The use of PowerPoint presentations in teaching and learning is a common ICT skill employed in teacher education in Tanzania. The reasons for this include its simplicity, its early introduction to teacher education and its effectiveness for large and diverse classes as it engages multiple learning styles.

Furthermore, the findings concur with the findings in other studies (Xingeng & Jianxiang, 2012; Lari, 2014) that reveal PowerPoint as a simple programme to use and a powerful tool for presentation. The method provides the opportunity for collaboration, simply access and the sharing of information beyond the initial meeting. The findings illustrate that instructors hardly exhibit web conferencing/video skills, with a mean score of 2.33. The findings also imply that most instructors possess moderate ICT teaching skills. This discrepancy might be due to a lack of skills, devices, internet services and facilities that support video conferencing (Almasi *et al*., 2017). The reasons for limitations in web conferencing/video teaching skills can be debated; first, they might include limited internet coverage and speed and inherited ICT teaching and learning strategies for teacher education (Joel & Mungwabi, 2016). This problem limits both instructors and learners, hindering the full application of web-based conferencing. The finding that teachers demonstrate moderate skills in the use of web conferencing during the teaching and learning process (Innocent, 2016; Krutka & Carano, 2016) further supports our observation. Second, according to Tseng et al. (2019), the low level of video conferencing skills used in teaching and learning is due to high cost, limited internet bandwidth and low speed of the internet.

The current study, in particular, established that the technology was not commonly used because it is not given equal weight as given to other applications. Web-based conferencing/video chat could be the panacea for education issues due to the prevailing COVID-19 pandemic. This is because it can serve e-schooling (online schooling where students are mostly taught online or through the internet (Gherhes et al., 2021), with student teachers being taught while in their homes. Therefore, it is time for instructors to venture into greater ICT use and strengthen student-teacher learning because out-of-class learning has become easier. The findings of this

study, therefore, support the application of the CBM model, predicting a wide range of behaviours, experiences, concerns and emotions regarding ICT use in facilitating student-teacher learning depending on whether it is favourable or unfavourable to a user to perform the task. If instructors have the appropriate skills in using ICT, then the emotions related to using it become more favourable.

6.2 Instructors' experiences with the use of ICT in facilitating student-teacher learning

The findings ascertain that instructors with the appropriate ICT skills, who have their own ICT devices (computers) and who are well versed in ICT-related technology enjoy using ICT in their classroom. Instructors' competencies depend on their confidence. Instructors may gain confidence if they can access networked computers in their offices. This finding aligns with the findings of Ghavifekr (2016), who reveals that instructors' experiences and adequate pedagogical skills encourage them to use ICT in teaching and learning activities. As Birgin et al. (2020) highlight, the instructors' experiences become animated with proper training, not only for the novice but also for the in-service instructor. Therefore, to create competent, confident and experienced instructors, teacher education institutions should lay the foundation, where teachers are primarily born.

The findings of this study concur with the finding in a study by Mafang'ha (2016), who establishes that accessibility and availability of ICT facilities such as computers and internet services influence the strengthening of one's experience. This contention is strongly supported by the current study findings, with a mean score of 4.69 (as seen in Table 4). It is evident from the data that instructors owning ICT facilities such as computers are likely to enhance their experience with ICT use in teaching and learning. As Karimi (2012) observes, instructors who possess ICT devices to demonstrate competence and experience in ICT use in teaching and learning.

These results are also consistent with the observation that the deficiency of computers and related ICT devices in teachers' colleges in Tanzania frustrates instructors' efforts in integrating ICT use in the classroom (Noyi, 2013). Given that most instructors rely on institutional ICT devices, they have limited time to practice ICT skills as a means of building their competence. As illustrated by the CBAM model, the focus is on instructors' increased use of ICT in enhancing student teachers learning, however, limited ICT devices discourage instructors' usage. The presence of ICT facilities at the individual level, not just the institutional level, motivates instructors to

effectively use their time in preparing lesson plans, schemes of work and other professional documents comfortably. Therefore, instructors' experiences are determined and well-articulated when they break their habit of relying on institutional devices. Such changes will grant them adequate time and space for orienting themselves towards ICT innovation for educational activities.

6.3 Instructors' ICT training and professional development

Initiatives have been taken by responsible organisations towards offering ICT professional development via long-term and short-term training among instructors. Moreover, training on the use of ICT as a pedagogical tool among instructors is likely to improve teaching methods. The findings reveal that instructors who have attended ICT training courses in their careers are confident and demonstrate positive attitudes towards ICT use. As such, it appears that professional development of ICT use among instructors in teachers' colleges and associated seminars and workshops has increased preparedness and interest in the use of ICT in teaching and learning (Mafang'ha, 2016). This is consistent with the finding in a study by Dooley et al. (2016), who report that the ICT experience of upcoming and in-service instructors does not end with the teachers' college but rather with professional development programmes.

Moreover, the findings suggest that teacher education departments should encourage and motivate instructors to use ICT in teaching and learning. The current study noted that training acts as a means of instructor professional development and motivation, as instructors are being well oriented towards teaching using technology. The results strongly imply that instructors' professional development and related training on the use of ICT should mirror the student teachers' skills. As advocated by CBAM, instructors' experiences in the use of ICT need to sustain the implementation of a variety of approaches to curriculum, instruction and assessment henceforth-enhancing student teachers learning. One interpretation of these findings is that the intensification of institution-based professional development (indoor training) should include more instructors. Taken together, the current study findings indicate that the focus of indoor training should be on training more instructors on the use of ICT.

7. IMPLICATIONS, CONCLUSIONS AND RECOMMENDATIONS FOR FURTHER RESEARCH

7.1 Implications

The findings of the current study have several probable implications based on delineated research findings. First, regarding implications for instructors, the study illustrated that instructors in teachers' colleges are aware of the rationale, integration and use of ICT in teaching and learning. The exhibited instructors' skills call for the establishment of ICT guidelines and a framework that is appropriate to the Tanzanian context. The study findings imply that limited resources and infrastructures should be maximally used, improvising the technology to meet the needs. It could be maintained that the instructors' awareness of ICT is due to intensive training provided by MoEST and donor partnerships such as Swedish International Development Cooperation Agency (Sida). Instructors should ensure that they sustain the training rendered in case developmental partners cease to support the programme. Indoor training should be encouraged on the specific subject, with a subject-specific ICT framework. To ensure changes in educational technology are communicated, there should be timely notification and briefing of instructors to avoid any knowledge gaps or grievances between the innovator and users. Second, regarding policy implications, the current study maintains that the implementation of ICT policy for basic education in teachers' colleges is positive despite the challenges encountered. Nevertheless, there is a mismatch between the policy guidelines and practices.

The experience gained from the field is evidence that priorities are given to instructors, and little attention is paid to student teachers who are prospective teachers. It should be noted that the role of teacher education is to produce competent teachers, yet institutional policy does not allow student teachers to use mobile phones, which are the most common ICT devices and are accessed by the majority. The policy should establish guidelines that offer freedom to students to use such devices under specific conditions. Indeed, to ensure that both instructors and pre-service teachers become an integral part of digital society, practical action plans for every teachers' college are imperative. The plans should consider raising standards and awareness of student teachers by utilizing the available resources to ensure that there is a match between policy guidelines and practices. The plan should ensure that indoor training policies are established for strengthening individuals' professional development.

Practical application of ICT in teaching and learning will be harnessed when there are inclusive and collaborative efforts between the teachers' colleges and service providers. Teachers' colleges ought to be innovative regarding skills, based on their specific contexts and not merely on national ICT policy that is bureaucratically implemented. In the same vein, the findings recommend that the teachers' college administrations should provide favourable conditions to ensure that pre-service teachers complete their studies and are competent in applying ICT in teaching and learning. Such observations imply lessening the prevailing gap between theory and practice among in-service instructors on the use of ICT in the pedagogical process.

8. CONCLUSIONS

The study findings conclude that the instructors had basic experience with ICT activities that can facilitate student-teacher learning: the use of digital teaching aids, the internet for communication, browsing of teaching and learning content, video chat and PowerPoint presentation. The use of PowerPoint presentations dominates ICT applications. Although the integration and use of ICT in teaching and learning aim to transform teaching from traditional to learner-cantered, the practice in the field reveals that the use of internet based-technologies was mainly for searching and downloading educational material, while the web-based and video conferencing skills, which also require the internet to enhance remote learning, were hardly practised. Furthermore, the study concludes that in-service training opportunities rendered by all teachers' colleges towards consolidating instructors' ICT teaching skills are required: ICT facilities, devices, internet services and infrastructures enhance competence, confidence and experience. The present research, therefore, contributes to a growing body of knowledge suggesting that the possession of appropriate ICT teaching skills and gadgets such as laptops, iPods and smartphones has a positive influence on instructors' experiences because it allows abundant time to practice various skills.

9. LIMITATIONS AND RECOMMENDATIONS FOR FURTHER RESEARCH

It is appropriate to recognize several potential limitations of this present study. The first limitation concerns the location of the study. The current study was conducted in two government-owned, operated and maintained teachers' colleges in Morogoro, Tanzania. The study focused on instructors' experiences with the use of ICT in facilitating student-teacher learning. Thus, the generalization is limited, and the findings may not reflect the characteristics of all teachers' colleges regarding instructors' experience with the use of ICT in Tanzania, particularly in privately operated teachers' colleges. The second limitation is that the study

employed instructors as a unit of investigation in teachers' colleges, leaving student teachers undocumented. Further studies could be conducted to capture both private and government-operated teachers' colleges, with a larger sample size as well as wider geographical coverage, to increase the reliability and scope to generalize the research findings. Despite these limitations, the present study has enhanced our understanding of instructors' experiences with teaching via the use of ICT in teachers' colleges. It is hoped that the current research will stimulate further investigation into this important area, preferably in locations with minimal resources.

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