



# Enhancing ICT Integration in National Teacher Education: Perspectives, Challenges, and Solutions to Uganda's Development Studies Curriculum

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**Abstract**— The integration of Information and Communication Technology (ICT) into national teacher education is a pressing concern demanding comprehensive analysis. This study employs a mixed-methods approach to explore the perspectives of teacher educators and pre-service teachers at National Teachers' College Kaliro, regarding the challenges and potential solutions for integrating ICT into the teaching and learning of development studies within Uganda's national teacher education system. The study includes 122 randomly selected preservice teachers and the purposive selection of four administrators, which includes a senior teacher educator specializing in development studies. Rigorous data analysis reveals a significant disconnect between the potential benefits of ICT in education and its current utilization. A substantial majority of preservice teachers express dissatisfaction with the limited utilization and integration of ICT by their educators. Further analysis underscores key challenges hindering the effective integration of ICT, including a lack of appropriate training, insufficient management support, and teacher educators' confidence-related issues. Notably, there is a consensus among preservice teachers for increased encouragement to own ICT devices, while teacher educators emphasize the importance of gaining access to free ICT resources for facilitating seamless integration into development studies instruction. In light of these findings, the study proposes a targeted approach to in-service training, focusing on strategic planning and ICT integration. It also emphasizes the critical role of e-learning content creation, benefiting both educational managers and teacher educators. These recommendations aim to bridge the existing gaps, empower educators, and provide students with enhanced access to the manifold benefits of ICT within the context of Uganda's development studies curriculum.

**Index Terms**— development studies curriculum, ICT integration, solutions, Uganda.

## 1. Introduction

In the information age, the role of Information and Communication Technology (ICT) as a catalyst for innovation and knowledge production cannot be overstated (Taiwo, Tende, & Usman, 2022). A deliberate investment in teacher education is essential to harness the potential of ICT and achieve sustainable development. ICT not only supports work performance but also facilitates learning in the workplace, enabling interaction and collaboration (Korpelainen, 2011; Singh, Singh & Matthees, 2022).

Numerous studies have emphasized the transformative power of ICT in education (Anderson, 2010; Munyengabe et al., 2017; Paucek et al., 2014; Schmidt, & Tang, 2020). Paucek et al. (2014) aptly describe ICT as a force that improves learning outcomes and expands access to high-quality education, leading to unprecedented changes in the field of education worldwide.

Europe has witnessed confidence among teachers in using ICT and a positive impact on students' learning (Schoolnet, 2013). However, the picture is starkly different in Sub-Saharan Africa, including Uganda, where the integration of ICT in education lags behind (Nhamo, Nhemachena, & Nhamo, 2020). The challenges in ICT integration are multifaceted, including limited access to ICT tools, inadequate technical support, and a lack of management commitment (Lawrence & Tar, 2018; Mumtaz, 2000; Nyagorme, Arkorful, & Aheto, 2022; Pape & Prosser, 2018; Pelgrum, 2001).

Uganda recognized the importance of ICT in education and introduced the Active Teaching and Learning (ATL) approach in National Teachers' Colleges (NTCs), including National Teachers' College Kaliro (Ministry of Education and Sports, 2016). ATL includes an ICT integration component in the curricula delivered to prospective teachers in NTCs.

Regrettably, the integration of ICT in national teacher education in Uganda remains low (Nyakito, Allida, & Amimo, 2021), despite the global imperative to prepare teachers who can effectively use technology in classrooms (Chai, Koh, & Tsai, 2013; Tondeur et al, 2019). Integrating ICT in teacher education is not only essential for prospective teachers but also promotes the use of ICT in secondary schools (Mndzebele, 2013).

This study responds to the need to produce pre-service teachers capable of enhancing the competitiveness of the schools they will serve. Specifically, it explores the perspectives of teacher educators and pre-service teachers at National Teachers' College Kaliro (NTC Kaliro) regarding challenges and solutions to integrating ICT in development studies teaching and learning within Uganda's national teacher education system. The study objectives are to: a) assess the current status of ICT integration in development studies teaching and learning; b) examine the challenges hindering the

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integration of ICT in development studies teaching and learning, and c) propose contextual solutions to address the challenges of ICT integration in development studies teaching and learning.

## 2. Study Area

Table 1

Socio-demographic characteristics of pre-service teachers

Demographic variables		Frequency	Percent (%)
Sex	Male	41	33.6
	Female	81	66.4
Age	18-23	95	77.9
	24-29	25	20.5
	30+	2	1.6
Religion	Anglican	40	32.7
	Catholic	39	32.0
	Muslim	15	12.3
	Others	28	23.0
Subject area	Arts	39	32.0
	Science	52	42.6
	Vocational	31	25.4
Sponsorship	Private	46	37.7
	Government	76	62.3
Studied ICT in the previous level	Yes	86	70.5
	No	36	29.5
Owned smartphone	Yes	78	63.9
	No	44	36.1

Located in Eastern Uganda, NTC Kaliro is the focal point of this study. As part of the National Teachers' Colleges system, it actively participates in Uganda's Active Teaching and Learning (ATL) initiative (Mpeirwe, 2019). ATL incorporates an ICT integration component within the teacher education curricula, particularly emphasizing the development studies curriculum. Within this institution, the integration of Information and Communication Technology (ICT) into teacher education is of paramount importance. Uganda, like many countries in the information age, recognizes the pivotal role of ICT in driving innovation, knowledge production, and sustainable development (Ricaurte, 2016). ICT plays a crucial role in education, enhancing teaching and learning processes (Chainda, 2011; Munyengabe *et al.*, 2017; Paucek *et al.*, 2014; Salehi & Salehi, 2012). It is regarded as a transformative force that improves learning outcomes and expands access to high-quality educational resources, reshaping the global educational landscape (Paucek *et al.*, 2014). Despite the global imperative of preparing teachers capable of effectively using technology in classrooms (Chai, Koh, & Tsai, 2013), ICT integration in national teacher education in Uganda, including at NTC Kaliro, remains an area with room for improvement (Nyakito, Allida, & Amimo, 2021). This stands in contrast to developed regions like Europe, where confidence in ICT use among teachers has led to positive impacts on students' learning (Schoolnet, 2013). NTC Kaliro serves as a critical study area to explore the challenges and solutions associated with ICT integration in development studies teaching and learning. This research aims to provide insights into the current state of ICT integration

within the institution, with a focus on enhancing its effectiveness within the context of Uganda's development studies curriculum.

Out of the 122 diploma-in-education pre-service teachers studied (Table 1), the majority were females (66.4%). The age range was 18 to 37 years with a mean ( $\pm$  standard deviation) age of  $22.4 \pm 2.1$  years. More than half of the respondents (62.3%) were on government sponsorship whereas most of them (70.5%) had received formal training on ICT in secondary school. Nearly half of them (42.6%) were pursuing science-related subjects and more than half of them (63.9%) reported that they owned a smartphone.

## 3. Methodology

### A. Research Design

This study employed a mixed-methods design, recognizing that it provides a more profound understanding of research problems compared to either approach alone (An, 2018). The quantitative component generated numerical data from a substantial sample, ensuring higher specificity (Mack *et al.*, 2005). In contrast, the qualitative component gathered rich, detailed insights from a select few cases (Cohen *et al.*, 2007; Mack *et al.*, 2005). NTC Kaliro was chosen as a case due to its proximity and limited funding available to the researchers. While case studies may evoke skepticism, they are widely employed because they offer unique insights that other approaches may not achieve (Rowley, 2002).

### B. Sampling Approaches and Sample Size

The study involved 205 participants, randomly selected from a pool of 433 diploma-in-education pre-service teachers using an online survey system sample size calculator. The participants, in their second and final year of study, were chosen because their responses were expected to be influenced by their experiences within the college and during school practice. In contrast, their first-year counterparts, lacking such experiences, were excluded. Additionally, four key informants were purposefully selected, consisting of one teacher educator who also served as an administrator, and three experienced administrators familiar with the institution.

### C. Data Collection Methods

Quantitative data were collected through a survey questionnaire administered to pre-service teachers. The questionnaire comprised four sections: socio-demographic characteristics, the current status of ICT integration and ICT tools used, challenges in integrating ICT in teaching and learning, and suggestions for improvement. The Likert scale, ranging from strongly agree (5) to strongly disagree (1), was employed to assess challenges, with a mean score of 3 used as the cutoff for acceptance. Qualitative data were gathered through in-depth telephone interviews with a teacher educator of development studies and administrators. The interview guide was semi-structured to facilitate a deeper understanding of the problem (Cohen *et al.*, 2007; González-Varona, López-Paredes, Poza, & Acebes, 2021; Mack *et al.*, 2005).

Table 2  
Case interview participants

Administrators	Teaching experience (years)	Department	Highest Level of Education	Interview duration (minutes)
TA1	25	Professional Studies	Bachelor's degree	21min 47sec
TA2	27	Science	Master's degree	56min 20sec
TA3	31	Science	Master's degree	44min 02sec
TE2	25	Professional studies	Bachelor's degree	59min 59sec

D. Validity and Reliability

Ensuring the validity and reliability of instruments is paramount (Mislevy et al., 2003). To guarantee validity, expert judgment was sought from three published authors in ICT in education. For reliability, the questionnaire underwent a pilot test with 44 participants, representing 10.16% of the study population. The pilot study results, analyzed using SPSS version 20, yielded an average Cronbach alpha of .738, indicating academic acceptability (Cronbach, 1951). A Cronbach alpha above 0.5 signifies instrument reliability (Amin, 2005), thus meeting established standards (Nunnally, 1978).

E. Data Analysis

Interviews were recorded using a Huawei Nova 3i smartphone and transcribed verbatim. The transcripts were shared with interviewees (Table 2) for corrections and subsequently analyzed thematically (Braun et al., 2019; Clarke & Braun, 2017; Neuendorf, 2019). Quantitatively, data from 122 questionnaires (representing 60% of the total received) were analyzed, with 80 excluded due to incompleteness. While Amin (2005) proposed a 70% response rate as fair representation, Fincham (2008) suggested approximately 60% as suitable for journal publication. Results from both analyses were compared and contrasted for corroboration and validation (An, 2018).

4. Results and Discussion

A. Status of ICT Use and Integration

This study unveils a rather disheartening status of ICT integration within the context of teacher education. Despite the recognized benefits of ICT, lecturer participation in the integration of ICT tools into teaching and learning remains minimal. In the words of TE2, "It is low," reflecting the sentiment of many educators.

Even though nearly all pre-service teachers (98.0%) agree on the benefits of ICT, only 46% of development studies lecturers rarely use ICT in their teaching practices (Fig. 1).

TA3 vividly pointed out that lecturers "continue going to class without providing any relevant audiovisuals," highlighting the lackluster implementation of ICT in pedagogy. These findings challenge conventional theories of technology adoption, as they reveal a mismatch between the perceived usefulness and actual implementation of ICT. TE2, for instance, acknowledges the benefits of ICT, stating that it "makes learning more realistic since it involves more senses." However, they still refrain from using it, emphasizing the issue of perceived ease of use and practicality in their words: "We have had...[pieces of] training...[which have] not been very practical; [thus rendering us]...unable to...implement [ICT

integration]" TE2 added.

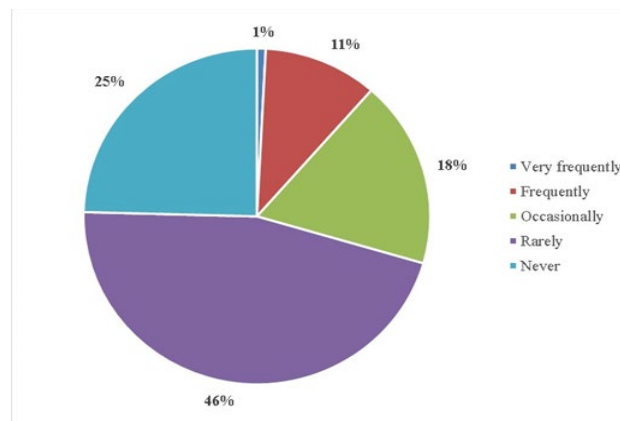


Fig. 1. Frequency of development studies teacher educators using ICT in class

Interestingly, this study sheds light on a unique aspect, contradicting Bingimlas (2009), who suggested that teachers who understand the usefulness of technologies confidently use them. The findings show that some educators, like TE2, comprehend the advantages of ICT but do not utilize it effectively. This demonstrates that the perceived usefulness construct does not entirely explain the reluctance to adopt ICT, while the perceived ease of use construct applies due to the practical difficulties faced by educators (Davis, 1989).

B. Challenges to ICT Integration

The study unearths several critical challenges impeding the successful integration of ICT into teacher education. Accessibility to ICT tools emerges as a major hurdle, as highlighted by TE2, who revealed that ICT tools are often "locked up in certain offices". Moreover, the shortage of interactive whiteboards, laptops, and computers with internet connectivity further exacerbates this problem (Table 3). Insufficient resources, including the inadequacy of desktop computers, prevent the effective implementation of pedagogical methods like the flipped classroom. As TA3 puts it, "Desktops are not very flexible", indicating their limitations in supporting modern teaching methods (UNESCO, 2015).

However, it is essential to note that merely providing access to ICT tools does not guarantee their integration into teaching and learning. While TE2 acknowledges that ICT tools are occasionally accessible, they report "not" having used ICT in class teaching in front of or with pre-service teachers. This underscores the complexity of the accessibility issue and its intricate relationship with actual ICT integration.

Furthermore, this study echoes previous research by revealing that lecturers often lack sufficient technical support during lesson delivery. This deficiency in technical assistance during ICT implementation aligns with previous findings

Table 3  
Organizational challenges - survey

Item	Mean (M) ± Std. Deviation
Insufficient number of computers	3.04 ± 1.51
Insufficient number of Internet-connected computers	3.16 ± 1.48
Insufficient Internet bandwidth or speed	3.76 ± 1.28
Insufficient number of interactive whiteboards	3.38 ± 1.33
Insufficient number of laptops	3.58 ± 1.34
Lack of adequate content/material for learning	2.78 ± 1.37
College computers are out of date / need repair	2.66 ± 1.24
Insufficient technical support for lecturers	3.16 ± 1.37
Using ICT in teaching-learning is not a goal in our college	2.30 ± 1.32

Table 4  
Individual challenges – survey

Item	Mean (M) ± Std. Deviation
ICT is too difficult to be used in development studies classes	1.99 ± 1.00
Lack of interest of lecturers	2.70 ± 1.26
Lack of adequate skills of lecturers	2.69 ± 1.30
College timetable does not allow for the use of ICT in development studies	2.81 ± 1.53
Pressure to prepare for exams and tests	2.73 ± 1.35
No or unclear benefit to use ICT for teaching and learning	1.97 ± 1.09

(Bingimlas, 2009; Cassim & Obono, 2011; Pape & Prosser, 2018; & Salehi & Salehi, 2012). The absence of such support can be demoralizing for educators, discouraging them from engaging with ICT (Goktas, Yildirim, & Yildirim, 2009).

Another substantial challenge highlighted in the study is the lack of institutional management support for ICT integration. TA3 succinctly points out that "Good plans can be thwarted by managers if they do not understand and support them". This emphasizes the pivotal role played by leaders and managers in facilitating or hindering institutional initiatives, including ICT integration. The lack of commitment from leaders can undermine the efforts of lecturers and obstruct meaningful progress (Errida & Lotfi, 2021).

Fear of embarrassment among lecturers in classrooms where some pre-service teachers exhibit greater ICT proficiency is another significant obstacle. TE2 confesses that "fear is powerful...this is especially true when learners show off that they know much better than you". This fear aligns with previous research indicating that teachers' confidence significantly influences ICT adoption (Schoolnet, 2013). Pre-service teachers in the survey also dismiss a lack of lecturer interest as a factor affecting ICT integration (Table 4). This suggests that while lecturers may have an interest in ICT, their reservations are rooted in the fear of being overshadowed by technologically adept students (Wastiau, et al., 2013).

The study further reveals that a significant portion of lecturers remain ill-prepared for ICT integration, despite having received ICT-related training. The limited duration and practicality of these training programs leave teacher educators ill-equipped to effectively integrate ICT into their teaching methods. This finding aligns with the research by Goktas, Yildirim & Yildirim (2009) and Moga & Obuba (2017), emphasizing the crucial role of teacher competence and technological proficiency in ICT integration. It also underscores the necessity for comprehensive and practical training for educators (van Aalderen-Smeets & van der Molen, 2015).

Additionally, some educators express resignation due to approaching retirement, suggesting that attitude plays a role in

ICT integration. TA2 notes: "We have a section of our staff who are approaching retirement. They don't feel they can make a big difference now". This attitude is consistent with the assertion that teacher competence is a factor in resistance to change (Bingimlas, 2009; Fu, 2013). Nevertheless, the researchers agree that resistance is indicative of deeper issues, as competent and aware educators should integrate ICT if resources and incentives are in place (Bingimlas, 2009).

The study also reveals that the demand for educators to use ICT labs limits their ability to explore and experiment with ICT tools. TA2 highlights the constraints of "go[ing] to the computer lab to use ICT...[which] doesn't give ... [a lecturer] enough time to explore on his own". This pressure is consistent with findings by Pape & Prosser (2018) regarding time constraints on planning for instruction. Due to the urgency to cover content within limited time frames, ICT integration may be deprioritized (Vrasidas et al., 2010).

### C. Potential Solutions to Challenges to ICT Integration

Addressing the challenges faced in ICT integration within teacher education requires multifaceted solutions.

#### 1) In-service Training

Teacher educators must undergo regular in-service training with a strong focus on ICT integration, including content creation for their subjects (Fig. 2). As TA2 emphasizes, "What is important is making integration of ICT compulsory for lecturers". This implies the need for relevant and comprehensive in-service ICT training, conducted regularly following a needs assessment (Ghavifekr & Rosdy, 2015; Johnson, Maasdorp, & McElwee, 2014).

#### 2) Management Commitment

Encouraging managers to participate in training, meetings, or benchmarking related to ICT integration can help them gain a better understanding of its potential. TA3 recommends bringing managers on board, saying: "It is important that managers...are brought on board." Their involvement can motivate them to provide administrative support, ensuring that relevant ICT tools and infrastructure are available (Ghavifekr & Rosdy, 2015).

#### 3) Strategic Technology Plan

Developing a strategic technology plan serves as a roadmap

for ICT implementation. “We need to have...an ICT implementation plan which brings everybody on board,” TA3 strongly advises. This collaborative document outlines the current state and desired technology goals of the institution. It provides clarity on resource allocation, procurement, implementation, progress assessment, and accountability (Emre, 2019; Prasojo et al, 2019).

4) *Incentives*

Providing incentives to teacher educators can motivate them to embrace ICT integration. TE2 confidently asserts that: “Usually with incentives, everybody appreciates and makes things work”. These incentives may include devices, opportunities for exposure visits, promotions, or further studies for educators who excel in ICT integration (Ndunge, Kamau, & Gikandi, 2016; Nyaga, 2014; Scott, 2011).

5) *Equipping Educators with Devices*

Equipping teacher educators with free mobile devices can facilitate ICT integration. “Equipping the lecturers with [free] ICT equipment would solve the issue of access” asserts TA2, sounding hopeful. This requires ensuring that the necessary ICT infrastructure, software programs, and materials are provided (Saxena, 2017). Encouraging pre-service teachers to own personal devices can also address issues of limited access (Vrasidas et al., 2010).

6) *Technical Support*

Providing relevant and adequate technical support to lecturers is essential because there are instances when “...equipment fails in class” TA2 points out in a concerned tone. This support should be readily available to educators to prevent them from getting discouraged by technical problems (Goktas, Yildirim, & Yildirim, 2009; Salehi & Salehi, 2012).

7) *Role Models*

Educators require role models or advocates who actively exhibit proficient ICT integration. This is supported by TE2’s call for colleagues with expertise in ICT integration to “...guide others...” Such guidance serves as a model, motivating other educators to emulate these practices (Goktas, Yildirim, & Yildirim, 2009).

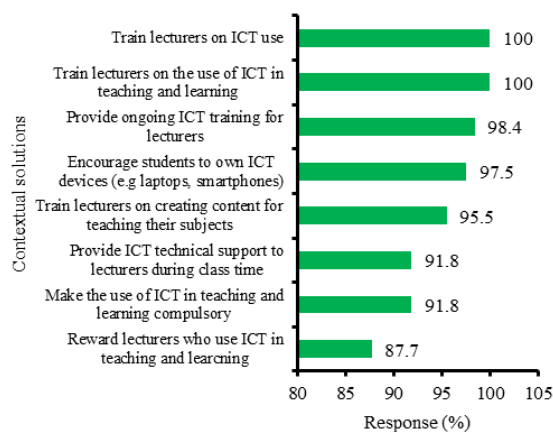


Fig. 2. Pre-service teachers’ solutions to challenges of ICT integration

5. Conclusion

In conclusion, this study highlights the pressing need for

improvements in ICT integration within national teacher education programs. The challenges faced, including limited accessibility, inadequate technical support, and a lack of management commitment, require immediate attention. Additionally, individual-level challenges, such as fear, lack of competence, and negative attitudes, must be addressed. The proposed solutions encompass in-service training, management involvement, strategic technology planning, incentives, and provision of devices, technical support, and the presence of role models. These strategies can collectively contribute to more effective ICT integration in teacher education.

Future research should expand the study to include a broader range of teacher colleges to gain a more comprehensive understanding of the challenges. Additionally, further investigation could explore the role of ICT in teacher professional development, the use of social media in teacher education, and ICT’s impact on peer and micro-teaching. This would provide valuable insights into the multifaceted aspects of ICT integration within teacher education.

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