

ICT Resources Usage and Competence Levels: The Challenges of Academic Staff in Botswana Colleges of Education

Torimiro, D.O.¹, Lebala, O.¹, Alao, O.T.^{2*}, Tselaesele, N. M.¹, Mabusa, K.¹, Tladi-Sekgwama, F.¹,
Rammolai-Segokgo, M.¹

Department of Agricultural Education, Extension and Rural Development, Botswana University of
Agriculture and Natural Resources, Gaborone¹
Department of Agricultural Extension and Rural Development, Osun State University, Ejigbo-Campus,
Nigeria²

Corresponding Author: 2*



ABSTRACT— This study examined the use of information and communication technology (ICT) resources and the competence levels of academic staff in Botswana's colleges of education. It explored the demographic and job-related characteristics of the academic staff, determined their level of competence in using ICT resources, and identified the challenges in ICT usage. Data were collected from all the 265 academic staff across the four colleges of education in the country using a pre-tested questionnaire. The data collected were analyzed using descriptive statistics (frequencies, percentages, means, and standard deviations) and inferential statistics (Pearson correlation analysis) with the Statistical Package for Social Sciences (SPSS). Results showed that 57% of the staff are female, and 94% identify as Batswana. Nearly half (46.8%) hold Lecturer I positions, and 52.1% rarely travel for professional purposes. Desktop computers and Microsoft Word were extensively used by 93.6% of respondents (3.9 High), while 46% reported frequent use of Microsoft Teams (2.9 Low). Over 80% agreed they could effectively use the internet for information sharing and retrieval. A significant positive relationship was found between ICT usage and competence ($r = 0.665$; $p < 0.01$). Key challenges included poor Wi-Fi access, outdated equipment, and insufficient technical skills. The study recommends investing in ICT training and infrastructure improvements to enhance staff competence and promote positive attitudes toward ICT usage.

KEYWORDS: Botswana, ICT resources, Challenges, Academic staff.

1. INTRODUCTION

Information and Communication Technologies (ICTs) have become essential tools in modern education, transforming teaching and learning processes across the globe. In higher education, the integration of ICTs has been widely recognized as a critical factor for enhancing instructional delivery, improving administrative efficiency, and fostering collaboration among academic staff. Colleges of education have a unique role in this transformation, as they are responsible for training future educators who will be expected to leverage technology in their teaching practices. Furthermore, ICTs have transformed higher education, impacting how knowledge is delivered, accessed, and managed. According to [10], its integration into teaching and learning processes provides numerous benefits, such as increased flexibility, enhanced interaction, and the ability to access vast digital resources. In the colleges of education, ICTs play a crucial role in preparing future educators to integrate technology into their teaching, thereby fostering 21st-century skills in students [25]. Consequently, institutions that effectively integrate ICT tools into their curriculum often see improvements in

the quality of education and learner outcomes [2]. However, successful ICT implementation in education requires more than just the availability of resources. For instance, competence in using these technologies, support structures, and addressing infrastructural challenges are crucial elements [12], without which, even the most advanced technologies may remain underutilised.

In addition, competence in using ICT tools is a key factor influencing the extent of their use among educators. According to [14] Technological Pedagogical Content Knowledge (TPACK) model, effective technology integration requires not only content knowledge and pedagogical skills but also technological proficiency. In this context, academic staff must be able to blend these dimensions to integrate ICT effectively in their teaching.

In Botswana, studies on ICT competence among academic staff are still limited. Globally, however, research indicates that varying levels of ICT proficiency exist among educators, which can impact the quality and extent of ICT use in educational settings. For instance, while lack of ICT skills and low confidence levels have been identified as significant barriers to effective technology integration [18], [3] found that limited technical knowledge of educators often hinders ICT adoption in classrooms, most especially in developing countries. For Botswana's colleges of education, the competence of academic staff in using ICTs is critical, as it not only impacts their teaching but also their ability to mentor and train future educators to become proficient in these technologies. Therefore, developing targeted training programmes that enhance ICT competence is essential for improving overall ICT integration.

Some common challenges impede ICT adoption in educational institutions, particularly in developing countries. These challenges can be categorised into infrastructural, personal, and institutional factors. Infrastructural challenges often revolve around the availability and accessibility of ICT resources. Access to reliable electricity, stable internet connectivity, and sufficient computer facilities are often cited as barriers to ICT integration in many African countries [4], [3]. In Botswana, these issues persist, with many colleges of education facing difficulties in maintaining consistent access to ICT resources, especially in rural areas. Furthermore, personal challenges include the attitudes and beliefs of academic staff regarding the use of ICT. Research has shown that educators' negative perceptions of ICT can hinder its effective use in teaching. Factors such as fear of change, lack of motivation, and perceived complexity of ICT tools can limit engagement [6]. In addition, educators who lack confidence in their ICT abilities are less likely to use these technologies [22] couple with institutional challenges, which might include inadequate training and professional development opportunities. According to [9], continuous professional development in fostering ICT usage among academic staff is very imperative. Moreover, institutional support, including the provision of regular workshops, mentoring programmes, and ICT support teams, is vital for enhancing educators' confidence and competence in using ICTs.

Botswana has recognized the importance of ICT in education, with policies such as Vision 2036 and the Revised National Policy on Education emphasizing technology as a means of improving educational outcomes and fostering economic growth [7]. Despite these policy efforts, research indicates that the implementation of ICT in Botswana's educational institutions has been slow, with many schools and colleges lacking in the infrastructure and resources necessary for effective ICT integration [21].

Research on ICT usage in Botswana's higher education sector is limited, but [17] studies suggest that academic staff in Botswana face challenges like those in other developing countries, including limited access to resources and a lack of adequate training. These challenges are exacerbated in rural areas, where infrastructure may be less developed, leading to further disparities in ICT usage among academic staff.

One of the most effective ways to address the challenges of ICT integration is through targeted professional development. [15] have shown that professional development programmes that are ongoing, context-specific, and focused on practical applications can significantly enhance educators' ICT competence. Such programmes should not only focus on technical skills but also help educators integrate ICT into their teaching practices in meaningful ways [8].

In Botswana, there is a growing need for continuous professional development (CPD) initiatives that address the specific challenges faced by academic staff in colleges of education. This includes the need for flexible workshops, mentoring programs, and support structures that provide real-time assistance with ICT-related issues. Additionally, CPD initiatives should aim to shift attitudes toward ICT, promoting positive engagement and the recognition of ICT as a tool for enhancing, rather than replacing, traditional teaching methods.

In Botswana, the adoption and use of ICTs in educational institutions have gained momentum in recent years. However, the extent to which academic staff in colleges of education use ICT and their competence levels remain areas that require further investigation. Specifically, the study described the demographic and job characteristics of the academic staff, determined their level of ICT competence, and identified the challenges they face in using ICT resources with the aim of drawing implications for their professional development. In addition, empirical analysis was carried out to establish the relationship between the level of usage of ICTs and level of competence among the academic staff.

2. Methodology

The study was carried out in all the four (4) colleges of education in Botswana. These are: Tlokweng College of Education, Tonota College of Education, Molepolole College of Education and Serowe College of Education. Each of the colleges has a population of academic staff members as follows: 49, 82, 61 and 73, respectively, totaling 265 [20]. The entire population constituted the respondents for the study. A pre-tested and validated questionnaire was administered to elicit information from the respondents. The instrument was designed to measure the demographic and some job characteristics of the respondents, which included age, gender, educational level, marital status, average monthly income, years of work experience and teaching position. It also assessed the usage and competence levels of ICTs by the respondents. While the ICT usage level was rated never used (1), rarely used (2), occasionally used (3) and frequently used (4), the competence level was determined by listing some competence constructs against a Likert scale ranging from strongly disagreed (1), disagree (2), agree (3) and strongly agree (4). The respondents were provided with the participant information and consent forms together with the questionnaires. All of them consented and were given time to complete and return the questionnaires.

The data collected were through the questionnaires were transcribed into the Statistical Package for Social Sciences (SPSS) database which was pre-coded with the questions and responses from the questionnaire. The data were cleaned to remove erroneously entered data and were analysed. Both descriptive and inferential statistical tools were used to analyse the data. Descriptive techniques such as frequency counts, percentages, means and standard deviation, and inferential statistics such as Pearson correlation was used to analyse the data.

3. Results and discussion

1 Demographic and job-related characteristics of the respondents

Data in Table 1 shows that 57.0 percent of the respondents are female, while 43.0 percent are male. This gender disparity may reflect broader trends in the education sector, where women have increasingly become

predominant. The higher percentage of females could be attributed to changing gender roles and increased educational opportunities for women [26]. The growing presence of women in academia may also signify a shift toward gender inclusivity in higher education, with more women pursuing and succeeding in academic careers. The study further reveals that 6.04 percent of the respondents are below the age of 40 years, indicating a relatively smaller proportion of younger professionals among the teachers. Some, 48.3 percent, fall within the 51-60 age group, while 35.5 percent are aged between 40 and 50 years. The mean age of 51.6 years suggests that the overall maturity and experience level of the respondents is skewed toward the upper age range, indicating a stable and seasoned workforce with considerable cumulative experience.

The demographic profile of academic staff in Botswana's colleges of education highlights a predominant representation of Motswana individuals, who constitute 94.0 percent of the sample. In contrast, non-Batswana individuals make up 6.0 percent. This nationality distribution reflects the localised nature of the academic workforce, with an overwhelming majority being native of Botswana.

A significant majority (84.9 %) of the respondents obtained a master's degree, reflecting a high level of expertise and specialisation within their respective fields. Very few (2.6 %) obtained a PhD, highlighting a smaller cohort of highly specialised and research-oriented academics. This distribution suggests a well-qualified and diverse academic workforce, with individuals at various stages of their educational and professional journeys. The position of Senior Lecturer I emerges as the most prevalent (46.8 %) designation among academic staff, indicating a significant presence of experienced educators with advanced roles and responsibilities, contributing to both teaching and potentially research or administrative duties. Following closely, Senior Lecturer II represents 22.3 percent of the academic workforce, signifying a substantial group of educators with senior-level expertise. Head of Department (HOD) positions, with a representation of 20.0 percent, underscore the leadership and administrative components within the academic structure.

A majority (52.1 %) of the respondents reported that they rarely travel outside Botswana for professional engagements. This suggests a predominant focus on local academic responsibilities, with limited international exposure. Additionally, 34.7 percent of the respondents claimed that they never travelled outside Botswana for professional reasons, which may be indicative of various factors, including institutional priorities, resource constraints, or a greater emphasis on local initiatives.

Table 1: Distribution of the respondents by their demographic and job-related characteristics (n=265)

Variable	Frequency	%	Mean±SD
Demographic Characteristics			
Gender			
Male	114	43.0	
Female	151	57.0	
Age (years)			
<40	16	6.0	51.60±6.112
40-50	94	35.5	
51-60	128	48.3	
>60	8	3.0	
No Response	19	7.1	
Nationality			
Motswana	249	94.0	
Non-Motswana	8	3.0	
No Response	8	3.0	
Level of education			

Degree	29	10.9	
Master's degree	225	84.9	
PhD	7	2.6	
No Response	4	1.6	
Job Related Characteristics			
Designation/Teaching position			
Lecturer	16	6.0	
Senior Lecturer I	124	46.8	
Senior Lecturer II	59	22.3	
HOD	53	20.0	
No Response	13	4.9	
Travel outside Botswana on professional engagements.			
Never	92	34.7	
Rarely	138	52.1	
Often	25	9.4	
Very often\	7	2.6	
No Response	3	3.8	
Subscription to the workers union			
Ordinary member	209	78.9	
Committee member	18	6.8	
Executive member	12	4.5	
No Response	26	9.8	

Source: Field survey, 2023

Finally, a substantial majority (78.9 %) of respondents are ordinary members of their workers' union. This indicates widespread participation in the union, suggesting a collective effort among the academic staff to ensure their interests and rights are represented in the workplace. Ordinary members likely contribute to the union's strength and voice through their membership, supporting initiatives related to fair labour practices and employee well-being.

2. Level of usage of ICTs by respondents in performing their academic roles

Data in Table 2 and Figure 1 show the level of ICT resources by respondents in percentages and rate of use from 1 to 4. The desktop computers and Microsoft Word are extensively used, with 93.6 percent of respondents reporting frequent usage (3.9 High) highlighting their central role in academic activities. This is followed by WhatsApp (88.3% at 3.9 High), Printers (86.0% at 3.8 High), Internet (79.6% at 3.8 High), Email (78.1% at 3.9 High) and Laptop (72. 1% at 3.7 High). However, 46.0 percent of the respondents indicated that they frequently used Microsoft Teams, a collaboration platform, which was rated 2.9 Low (See Figure 1).

The findings demonstrate the widespread integration of ICT resources into the academic roles of staff in Botswana's colleges of education, aligning with [19] which emphasizes the importance of teachers' ICT competence for effective integration. The frequent use of desktop computers and laptops reflects their central role in academic activities, consistent with [1] identifying ICT as a crucial component in education. Furthermore, the substantial use of printing resources, projectors, and Microsoft Office applications highlights the diverse ways in which ICT supports teaching and learning processes, in line with [16] discussing the influence of ICT resource availability and accessibility on usage. The low level of Microsoft Teams usage underscores the need to explore factors influencing the adoption and usage of specific ICT tools among academic staff. The high use of communication tools like email and WhatsApp reflects the importance of

ICT in facilitating collaboration and communication within the academic community for promoting effective ICT use in education.

Table 2: Distribution of the respondents by their level of ICTs usage (n=265)				
ICTs	Never used 1	Rarely used 2	Occasionally used 3	Frequently used 4
Desktop Computers	3 (1.1%)	1 (0.4%)	13 (4.9%)	248 (93.6%)
Laptop	13 (4.9%)	37 (14.0%)	24 (9.1%)	191 (72.1%)
Printers	3 (1.1%)	18 (6.8%)	16 (6.0%)	228 (86.0%)
Projectors	31 (11.7%)	39 (14.7%)	20 (7.5%)	175 (66.0%)
Microsoft PowerPoint	10 (3.8%)	41 (15.5%)	34 (12.8%)	180 (67.9%)
Microsoft Excel	14 (5.3%)	58 (21.9%)	34 (12.8%)	159 (60.0%)
Microsoft Word	1 (0.4%)	7 (2.6%)	9 (3.4%)	248 (93.6%)
Microsoft Teams	52 (19.6%)	42 (15.8%)	19 (7.2%)	122 (46.0%)
You Tube	16 (6.0%)	50 (18.9%)	15 (5.7%)	162 (61.1%)
Photocopiers	3 (1.1%)	26 (9.8%)	29 (10.9%)	198 (74.7%)
Interactive Whiteboards	36 (13.6%)	30 (11.3%)	15 (5.7%)	169 (63.8%)
Internet	3 (1.1%)	18 (6.8%)	31 (11.7%)	211 (79.6%)
Email	1 (0.4%)	18 (6.8%)	35 (13.2%)	207 (78.1%)
WhatsApp	2 (0.8%)	2 (0.8%)	25 (9.4%)	234 (88.3%)
Source: Field survey, 2023				

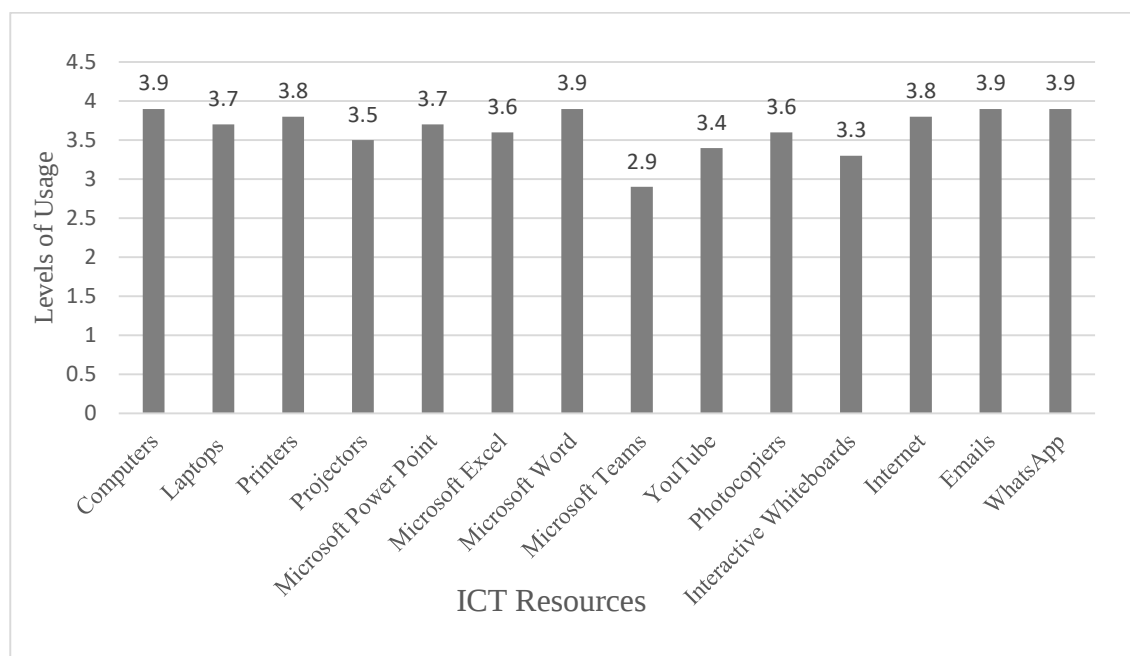


Figure 1: Bar chart showing the respondents' levels of ICT resources usage
Levels of Usage: <3.6 = Low; 3.6 = Moderate; >3.6 = High

3. Respondents' competences level of ICTs usage

Table 3 shows that many (over 80%) of the respondents strongly agreed as follows, that: they can use the internet to share and retrieve information; they can use ICT resources in searching for information/learning aids; they can use Microsoft Word; and that they can use social media platforms such WhatsApp among others.

These findings align with [19] emphasis on the influence of teachers' ICT competence on the effective use of

ICT. Many academic staff display strong agreement with the use of ICT resources to teach students (66.4%), reflecting the critical role of ICT integration in educational practices [1]. Additionally, the strong agreement with competence in self-evaluation (60.2%), independent learning (71.3%), and tracking academic activities (62.4%) underscores the versatility of ICT skills among academic staff, aligning with recommendations to promote continuous professional development in ICT [13]. The ability to use ICT for information retrieval and data processing highlights its role in facilitating efficient access to information and supporting data-driven decision-making processes within the academic community. Moreover, the readiness for online teaching signifies a proactive approach to embracing digital pedagogies, reflecting the evolving nature of teaching practices in response to technological advancements.

Table 3: Distribution of the teachers according to their level of competence (n =265)				
Statements	Strongly Disagree (1)	Disagree (2)	Agree (3)	Strongly Agree (4)
I use ICT resources to teach students	2 (0.8%)	1 (0.4%)	86 (32.5%)	176 (66.4%)
I can use ICT resources to evaluate my performance	4 (1.5%)	30 (11.4%)	71 (26.9%)	159 (60.2%)
I can use ICT resources to carry out independent learning	2 (0.8%)	6 (2.3%)	68 (25.7%)	189 (71.3%)
I can use ICT resources to track my academic activities	4 (1.5%)	18 (6.8%)	77 (29.3%)	164 (62.4%)
I can use ICT resources in searching for information/learning aids	0 (0.0%)	2 (0.8%)	37 (14.0%)	226 (85.3%)
I can use ICT resources to process data	23 (8.7%)	0 (0.0%)	76 (28.7%)	166 (62.6%)
I can use a smartphone	1 (0.4%)	6 (2.3%)	46 (17.5%)	210 (79.8%)
I can use ICT resources for my professional development	6 (2.3%)	0 (0.0%)	49 (18.5%)	210 (79.2%)
I can use social media platforms e.g. WhatsApp	0 (0.0%)	0 (0.0%)	30 (11.3%)	235 (88.7%)
I received formal training in ICT usage	26(9.8%)	40 15.1%)	51 (19.2%)	148 (55.8%)
I can use PowerPoint slides for presentation	0 (0.0%)	0 (0.0%)	54 (20.5%)	209 (79.5%)
I can use Microsoft Word	0 (0.0%)	0 (0.0%)	35 (13.2%)	230 (86.8%)
I can use Microsoft Excel	10(3.8%)	18 (6.8%)	68 (25.7%)	169 (63.8%)
I can use the internet to share and retrieve information	1 (0.4%)	0 (0.0%)	41 (15.5%)	223 (84.2%)
I can conduct Online teaching	22(8.3%)	57 21.5%)	53 (20.0%)	133 (50.2%)

Source: Field survey, 2023

4. Challenges to ICT resources usage among the respondents

Data in Table 4 present the findings on the challenges related to ICT usage in Botswana's colleges of education with rankings based on mean scores. The most prominent challenge reported by the respondents was insufficiency of workshops on ICT usage, ranking first with a mean score of 3.0, indicating a significant concern. Other major challenges include poor internet connectivity (2nd), outdated ICT equipment (3rd), poor Wi-Fi access (4th), and the lack of ICT resources in colleges (5th). Additional challenges involve the lack of training on ICT resource usage, difficulties with computer usage, insufficient computers in colleges, a lack of skills to use ICT resources, limited technical expertise, negative attitudes towards ICT adoption by academic

staff, time constraints in teaching with ICT, the perceived time-consuming nature of ICT usage, and a general lack of interest in using ICT.

Table 4.: Ranking of challenges to ICT resources usage by the respondents (n = 265)				
Challenges	N	Mean	Std. Deviation	Rank
Insufficient workshops on the use of ICT	261	3.0	0.955	1st
Poor Internet connectivity	259	2.71	0.861	2nd
Outdated ICT equipment	262	2.67	0.889	3rd
Poor Wi-Fi access	262	2.58	0.866	4th
Lack of ICT resources in my college	259	2.39	0.915	5th
Lack of training on the use of ICT resources	257	2.34	0.779	6th
Usage problems with computers	262	2.23	0.864	7th
Inadequate computers in my college	259	2.22	1.008	8th
Lack of skills to use ICT resources	259	2.21	0.756	9th
Lack of technical know-how to use ICT	261	2.16	0.779	10th
Negative attitudes towards using ICTs by academic staff	257	2.13	0.837	11th
The time needed to teach using ICT prevents me from using ICT	262	1.9	0.755	12th
The use of ICTs is time-consuming	257	1.89	0.834	13th
The use of ICT is uninteresting	262	1.72	0.886	14th
Negative attitudes towards using ICTs by students	262	1.69	1.047	15th

Source: Field Survey, 2023

Hypothesis Testing

The significant relationship between the level of ICT resource usage among academic staff and their level of competence was established using Pearson correlation analysis. The results in Table 5 reveal a significant positive relationship between ICT usage and ICT competence among the academic staff with a correlation coefficient of 0.665 ($p < 0.01$). This strong positive correlation suggests that higher levels of ICT competence are associated with greater ICT usage.

This finding aligns with [19], [23] who established that higher competence in ICT often results in more frequent and effective use of technology in teaching. This correlation is further supported by [11], [5], who argued that professional training and competence are essential for successful ICT integration. The establishment of a positive and significant relationship underscores the importance of investing in ICT competence development to enhance the practical application of ICT resources in line with [24] stance on the pivotal role of ICT proficiency in achieving educational objectives.

Table 5: Correlation analysis showing the relationship between the level of ICT resource usage among academic staff and their level of competence			
A		ICT Usage	ICT Competence
ICT Usage	Pearson Correlation	1	.665**
	Sig. (2-tailed)		.000
	N	265	265
ICT competence	Pearson Correlation	.665**	1
	Sig. (2-tailed)	.000	
	N	265	265
** . Correlation is significant at the 0.01 level (2-tailed).			

4. Conclusion and recommendation

In conclusion, the academic staff exhibit strong proficiency in using ICT resources for teaching and professional development. High levels of competence in information retrieval, data processing, and the use of social media platforms indicate a readiness to embrace digital pedagogies and enhance educational practices. However, challenges such as poor Wi-Fi access, outdated equipment, and inadequate technical skills continue to hinder optimal ICT usage. Additionally, negative attitudes toward ICT among both staff and students pose significant barriers, highlighting the need for strategies to foster a positive ICT culture and address infrastructural deficiencies. In addition, the study underscores that academic staff with higher ICT competence tend to use ICT resources more frequently and effectively in their teaching and professional tasks.

Based on these findings, it was recommended that adequate investment needs to be made in ICT training and improvement of ICT infrastructure with a view to enhancing the academic staff competence development and promoting positive attitudes toward ICT usage.

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