Unveiling the Influence of Digital Tools for Team Communication in the Digital Workspace: Some Evidence from Three Ghanaian Public Universities

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***Abstract*—Digital tools are essential for workplace team communication, fostering harmonious mutual interaction that promotes the collective growth of faculty. Through a quantitative research design, the study meticulously collected data from (*n* = 150) lecturers to explore the influence of digital tools for enhanced collaboration and productivity in three public universities in Ghana. The data were analysed using quantitative descriptive and inferential modes. The findings revealed that Instant messaging apps and video conferencing tools were the predominant digital tools for team communication in the digital workspace which has promoted individual expertise, knowledge acquisition, and enhanced skills within the workplace. On the impact of digital tools on remote team communication, the findings reported positive and negative impacts, which include increase creativity, collaboration, technology fatigue, and high maintenance cost respectively. The study also revealed that the is positive relationship between the types digital tools adopted by faculty and team communication, which enhance productivity, growth, and innovation. Finally, the results show that educational level and years of experience are significant predictors in determining a lecturer's proficiency in digital tools. To prevent digital abuses, best practices, safety, and uniformity, this study recommends the development of national or university-specific digital policies to harmonize the use of digital tools.**

***Keywords*—digital tools, team communication, digital workspace, collaboration, productivity, innovation**

I. Introduction

The advent of digital tools is often described as the foundation block for effective team communication within the digital work environment. Promoting team communication within the work environment is a vital component in the contemporary world of work [1, 2]. Digital tools like collaborative software, slack, Microsoft Teams, emails, voice, and video chat tools have enhanced internal team communication in many higher educational institutions [3, 4]. Digital tools have revolutionized a shift in daily routines within the workplace and have resulted in positive transformational impacts. Working in teams through digital workplace tools have become the standard practice for measuring the progress and successes of many organizations, especially those in higher educational institutions [5].

Increased networking and remote working have ensured regular updates on current developments within these educational institutions. To promote increased productivity and team collaboration, many universities have deployed varied digital workplace tools for daily use [6]. Marsh *et al.* [7] observed that, to foster effective team communication and prevent abuse, many organisations have also formulated digital policy guidelines to regulate workplace digital communication. The policy guideline establishes the ground rules for the application of digital communication to help prevent conflicts, frustrations, and confusion among teams [5, 7].

Public universities in most developing countries are leveraging on the power of digital tools such as Learning Management Systems (LMS), video communication tools (Zoom, Google Meet, Microsoft Teams), slack, and emails for relationship-building, networking, and professional development among employees [8]. Social media platforms are now the best options for reaching out to lecturers for improved productivity, and collaboration. Based on this, higher educational institutions in developing countries, especially Ghana have procured and deployed multimedia and interactive formats like audio, videos, and images to carry out complex creative ideas for regulating boredom and helping to capture workers' attention [9, 10]. Multimedia incorporates multiple types of media, not just text, and while text-based communication can be used for emotional expression, it lacks the nonverbal cues needed for rich emotional management. The feedback it stimulates is not inherently instantaneous and is less fluid than in-person communication, hence the preferred digital tools within educational institutions are dependent on location, either remote, on-site, or hybrid [11].

A recent study by Gibbs *et al.* [12] contend that, for remote team communication in the digital workspace, most lecturers preferred hybrid modes rather than on-site. The study states further that remote employers such as university lecturers preferred Zoom and WhatsApp as the most effective communication mediums. In less technologically adopted country like Ghana, the challenges of adopting digital tools in universities are still a central concern; therefore, this study aims to examine the influence of digital tools for collaboration, and productivity from the perspective of three public universities in Ghana.

The following are the research questions:

RQ 1: What are the predominant digital tool(s) for team communication?

RQ 2: What is the impact of digital tools on remote team communication?

RQ 3: Is there a relationship between the types digital tools adopted and team communication?

RQ 4: How do the educational level and years of experience predict lecturers' digital tools proficiency for team communication?

II. Literature Review

Team communication in the digital workspace is described as the wheel for organisational survival because, regardless of the nature or size of an organisation, there is a need for effective communication within and outside the organization [13]. Communication flow in any organisation undoubtedly helps to establish, reshape and create facilitation for the general well-being of an organization [14].

The digital workplace is a virtual modern version of the either-to-traditional workplace which has been in existence for decades. With advancements in technology, employers and employees can work anywhere by employing modern devices, browsing files, and sharing knowledge with ease [15]. This new working method can improve efficiency, effective team communication, and improved performance among university lecturers or employees as they can easily communicate and play roles they have been assigned to by their superiors [1, 16, 17]. These new methods of working in the university environments have made enormous contributions in the academic workplace as academics can adapt to diverse teaching tool materials. For example, university lecturers can administer online digital classes for students and collaborate with co-lecturers without being physically present, and collaboration can be effective because of the application of modern technology [18, 19].

Researchers [5, 10, 20], for instance argue that digital tools in today's world play a critical role in the existence of most educational institutions. Zhang *et al.* [21] observes further that university lecturers leverage heavily on digital devices for learning, innovation, and collaboration in the universities. While it is pointed out that university lecturers may leverage on technological tools such as smartphones, computers, or other digital devices that can be connected to the internet for improved productivity and institutional growth.

What may appear significant here is the fact that the digital workplace presents important competencies and university lecturers use such opportunities to engender interpersonal communication through collaboration in ways that can have a positive impact on them [7, 10]. Whether a lecturer is crafting a text message or communicating via digital media handles, there are opportunities to create a positive image or awareness of who they are by leveraging heavily on digital communication technologies [14, 22, 23].

Similarly, Drayton [24] observes that other style of communication practices that some organisations employ is hybrid styles due to its impact on organisational productivity. To this extent, Nasirov and Joshi [25] insists that to enhance lecturers' communication in any university, management ought to adapt and incorporate communication strategies and communication channels to improve the effective dissemination of information. Channels such as frontal communication, emails, blogs, wikis, instant messaging, and virtual information must be employed.

Erol and Kuyucu [26] point out that interpersonal communication via digital platforms does not necessarily include recurrent frontal communication, but through fax, internet, and mobile telephony. Notwithstanding these developments, effective team communication is critical to educational institutions because it is necessary to communicate any form of information and must be done by the right persons at the right time. Effective digital communication tools enhance teamwork, trust, and credibility and increase productivity. Effective team communication is critical to every organisation and if there are open communication channels, it engenders dialogic interaction [27].

In summary, the review of literature on the influence of Digital Tools for Team Communication in public Universities globally mainly focused on long-term impact analysis, in-depth evaluation beyond adoption rates, and a focus on pedagogical effectiveness over technical implementation. While most recent studies from both the global west and south often addresses the challenges of infrastructure, policy, and digital literacy, this current study fills the gap or focus from technical implementation to predominant digital tool(s) use , preferred digital tool(s) for remote team communication, the varying role of digital tools for team communication among lecturers and the perceived impacts that gives this study a complete and critical understanding of the role of digital tools in public universities from the perspective of least studied developing countries like those in Africa and Ghana

Digital Collaboration Theory explains how groups and individuals use digital tools to work together for the purpose of achieving organisational goals [28]. The theory emphasizes the application and use of online tools to promote and facilitate communication, information sharing and team work, regardless of the physical barriers for the promotion of efficiency [29]. The theory centres on the use of online tools, as well as communication hardware and software to enhance collaborative efforts in the workspace. Collaboration theory facilitates the sharing of information which enables quicker decision making, teamwork for efficient workflow and increased accessibility [30].

As highlighted by Huang and Wang [31], as much as academic networking is vital among university lecturers, social networking is also vital for problem sharing, knowledge sharing and forester flexibility and adaptability. Similarly, Cherbonnier *et al.* [32] opined that digital tools for team communication promotes critical thinking over a given period and is disseminated amongst members of the community or a social system. Rachmad [28] further states that Digital Collaboration Theory examines how people adopt new technologies like smartphones, social media, and other digital media innovations to improve job satisfaction. This article is situated within the Digital Collaboration Theory to explain the predominance, preference, roles, and perceived impacts because they can serve as preconditions for digital tools acceptance within the work environment.

III. Materials and Methods

A. Research Design

Through an online survey, the researchers solicited for

quantitative data from (n = 150) lecturers and heads of departments from three Universities, namely; *University of Cape Coast, the University of Media, Arts, and Communication, and the University for Development Studies* who are active users of digital communication tools used by lecturers in their workplace. The online survey was intended to get information regarding the background of the participants, demographic information, and the participant's general understanding of how digital tools could influence effective team communication among lecturers from the three university campuses. Creswell [33] suggest that online surveys are meant to get information on participants' opinions on the subject matter, encourage two-way communication, and provide quantitative data to compare to previous or future data. Therefore, the online questionnaire is ideal for a study of effective team communication in the digital workspace. Indeed, an online questionnaire provided rich information regarding the entire questions of the study [34].

B. Survey Instrument Creation and Development

Before the survey instrument was developed, a preliminary literature was reviewed to identify the major digital tools for team communication in universities and other higher educational institutions. For universities, team communication tools can be categorized into platforms based on whether communication occurs in real-time (synchronous) or with a time delay (asynchronous). Many integrated platforms offer both functionalities. Synchronous communication tools allow for real-time interaction, allowing for immediate feedback and dynamic discussion, which include tools like video conferencing (Zoom, Google Meet, and Microsoft Teams). It is worth noting that asynchronous allow team members to communicate at their convenience without requiring simultaneous participation. The following digital tools were identified: Email, Instant messaging (e.g. Microsoft Teams), Mobile phones, Video conferencing software (e.g. Zoom), Intranet, social media, and communication apps (eg. WhatsApp).

The survey instruments were developed based on the research questions, the expertise of the authors and the gaps in the reviewed literature [35]. The survey questionnaire was tested on lecturers from two universities (Ghana Communication Technology University, and Kwame Nkrumah University of Science and Technology) who agreed on its relevance and clarity. The online final survey instruments were delivered via the WhatsApp platforms of the sampled departments.

C. Sampling and Data Collection

The study used a quantitative design to collect data from 150 lecturers and heads of departments from three public universities for this study. The quantitative data collection involves recruiting participants for surveys from readily available online sources, such as self-enrollment in online members. The Researchers used simple random sampling due to its cost-effectiveness, time-efficient and speed, as compared to other sampling methods, which allow for quick data collection in situations with limited time or resources [35]. Researchers [36, 37] further states that the justifications include its efficiency in pilot studies, idea generation, user experience research, and urgent situations where fast, preliminary insights are needed, allowing for limited potential bias and higher generalizability to the broader population. While it offers practicality, a key limitation is that the findings from samples are generalizable to the entire population due to the random selection process.

In applying the simple random sampling for online data collection in this study, the authors first defined the population and created a sampling frame (a list of all members). The authors also used a computerized random number generator to select a unique identifier for each member to draw the sample. Finally, the authors contacted and collected data from the individuals on the sample list using our online survey. See Table 1 for details.

Table 1. Sample size, data collection methods, and sampling techniques

Institution	Category of respondents	Sample selected	Data Collection Methods	Sampling Techniques
University of Cape Coast	Heads of department	2	Online Questionnaire	Simple Random Sampling
University of Cape Coast	Lecturers	48	Online Questionnaire	Simple Random Sampling
University of Media, Arts, and Communication	Senior Lecturers/ Lecturers	47	Online Questionnaire	Simple Random Sampling
University of Media, Arts, and Communication	Heads of department	3	Online Questionnaire	Simple Random Sampling
University for Development Studies	Heads of department	2	Online Questionnaire	Simple Random Sampling
University for Development Studies	Senior Lecturers/ Lecturers	48	Online Questionnaire	Simple Random Sampling
Total		n = 150		

To minimize bias in simple random sampling, the researchers first defined the diverse target population (Heads of Departments and Lecturers), the use of multiple recruitment platforms (WhatsApp, LinkedIn, and emails), and locations (three public universities), were adopted to diversify data collection methods to minimize bias. Finally, the researchers used descriptive analysis which involves a thorough, objective exploration and summary of data to understand its basic characteristics and identify potential issues instead of inferential statistics to prevent potential bias [38]. The summary of sample size, data collection methods, and sampling techniques is reported in Table 1.

D. Data Analysis

In all, 150 respondents were sampled through simple random sampling. After seeking informed concern from the participants of various platforms, the online questionnaire was shared for interested members to respond. To protect the anonymity, confidentiality, and secure data handling, the authors explained to the participants that their records is secure through the use of password protected files, and encryption when sending information over the internet. Researchers [39, 40], have all suggested that online platforms like WhatsApp, LinkedIn, and emails are ideal for sharing and collecting data in small groups. The online questionnaire took the respondents about 5 min to complete. The participants also received weekly reminders after the initial survey distribution. Data were collected three months after sending the reminder. The questionnaire comprises 15 Likert scale open-ended questions, with measurement scales of

[1 = Strongly Disagree], [2 = Disagree], [3 = Neutral], [4= Agree], [5 = Strongly Agree]. The three subsections of the online survey questionnaire are; the predominant digital tool(s) used for team communication, the impact of digital tools on remote team communication, relationship between the types digital tools adopted and team communication, and educational level and years of experience predict lecturers' technological proficiency of digital tools for team communication. To answer the research questions of this study, quantitative data analysis was performed. The quantitative data was coded and inputted into SPSS, to ensure that the data is compatible with SPSS's analysis functions. Descriptive statistics used for research questions one and two helped to provide snapshot of the predominant digital tools for team communication and the most preferred digital tools for remote team communication, which served as a foundation for more advanced analysis. The descriptive tools used in this study involved using tools like measures of central tendency (mean), Coefficient of Variation (CV) and measures of spread (Standard Deviation) to provide a clear, simplified overview of the data, which helps to reveal the true nature of the data before any inferences are mad

The correlation analysis and regression analysis was applied to assess the relationships between key variables. The correlation analysis helped identify any significant relationships between different factors, like positive and negative impacts of digital tools on the work-life of lecturers'. The analysis helped the researchers to determine the strength and direction of these relationships, and insights into impacts of digital tools on work-life of lecturers.

E. Reliability and Validity of Instruments

The items measuring the constructs of the study were validated using factor analysis, thus Exploratory Factor Analysis (EFA), and reliability was checked using Cronbach Alpha analysis. The Cronbach Alpha measures the internal consistency or reliability of a scale or questionnaire, indicating how well the set of items consistently measures the same underlying concepts. The statistical significance level of >0.70 was reported in this study

To ensure measurement validity, the researchers used piloting and validation (expert reviews) to assess clarity and relevance (face validity), thus pilot testing with a sample to check feasibility and gather feedback for revisions, and statistical analyses was achieved.

IV. Results

A. Demographic Characteristics of Participants

In terms of the age distribution, the analysis recorded the following scores: 30–40 (40%); 41–50 (43%), and 51+ was 17%. The high representation of 30-40 years in the study might be attributed to the tech-savvy among the youth, which aligns with scholars such as [27, 41, 42], who have asserted that the youth are more active users of digital tools in educational settings.The analysis of gender shows that 60% and 40% of the respondents were male and female, respectively. The skewness for males may be a result of gender equalities in higher educational institutions and limited interest in digital tools in education and resonates with women opting out of academic careers in higher educational institutions in a developing country such as Ghana [29, 43]. With years of experience in using digital tools for remote team communication, 20% of the respondents range from 1–5 years, 6–10 years is 32% while 11+ years recorded 48%. The relatively high experience of respondents is attributed to the early incorporation of educational technologies in the Ghanaian educational sector [27]. The Educational Qualification recorded 46% and 54% respectively for masters degree and Ph.D. See Table 2 for details.

Table 2. Demographic details of respondents

Profile	Measurements	Frequency (n)	Percent (%)
Age	30–40	60	40 %
	41–50	65	43 %
	50+	25	17 %
Gender	Male	90	60 %
	Female	60	40 %
Years of Experience	1–5	30	20 %
	6–10	48	32 %
	11+	72	48 %
Educational Qualification	Masters	69	46 %
	PhD	81	54 %
Total		**150**	**100**

B. RQ 1: Predominant Digital Tools for Team Communication

The study sought to analyze the predominant digital communication tools for team communication in the sampled universities. The findings show that the majority of lecturers use mobile phones (μ = 4.88, CV = 2.440). Instant messaging apps (μ =4.79, CV = 2.341), e-mails (μ = 4.66, CV = 2.333). Further findings show that video conferencing platforms, such Zoom and Google meet, were also adopted by respondents for remote team communication. (Table 3 below shows the details).

Table 3. Predominant digital tools for team communication in workplaces

Variables	Sample	
	Mean	CV
Instant messaging apps (WhatsApp; text and audio)	4.79	2.341
e-mails	4.56	2.333
Mobile phones	4.88	2.440
Video conferencing tools (Zoom meetings)	3.57	2.318
Google Meet (Video calls)	4.31	2.215

Note: 1 = (strongly disagree), 2 = (somewhat disagree), 3 = (neither agree), 4 = (somewhat agree), 5 = (Strongly agree).

C. RQ 2: The Impact of Digital Tools on Remote Team Communication

The question four of the study investigated the perceived impacts of digital tools on work-life of lecturers. The findings from Table 4 shows that digital tools in the work place impacts lecturers' both positively and negatively. The positive impacts include; increase creativity, this Digital tools increase lecturer's creativity in the workplace (M = 2.76, SD = 1.522), Improve communication and collaboration (M = 3.89, SD = 1.422), improves organizational behavior (M = 3.99, SD = 1.311), and acquisition of skills and knowledge (M = 3.96, SD = 1.286). On the other hand, the findings also reported the following negatives; lecturers experience fatigue (M = 2.88, SD = 1.225); Digital tools affects work relations of lecturers (M = 2.96, SD = 1.46); High maintenance costs (M = 3.92, SD = 1.342). See Table 4 and Table 5.

Table 4. The perceived impacts (positives) of digital tools on the work-life of lecturers'

Item	Positives	Mean	Std. Deviation
1	Increase creativity	2.76	1.522
2	Improve communication and collaboration	3.89	1.422
3	Improves lecturer online behavior	3.99	1.311
4	Acquisition of skills and knowledge	3.96	1.286
	Overall	**3.65**	**1.385**

Note: 1 = (strongly disagree), 2 = (somewhat disagree), 3 = (neither agree), 4 = (somewhat agree), 5 = (Strongly agree).

Table 5. The perceived impacts (negatives) of digital tools on the work-life of lecturers'

Item	Negatives	Mean	Std. Deviation
1	Lecturers experience digital or technology fatigue	2.88	1.225
2	Digital tools affects work relations of lecturers	2.96	1.461
3	High Maintenance Costs	3.92	1.342
	Overall	**3.34**	**1.398**

Note: 1 = (strongly disagree), 2 = (somewhat disagree), 3= (neither agree), 4 = (somewhat agree), 5 = (Strongly agree).

D. *RQ 3: The Relationship between the Types Digital Tools Adopted and Team Communication*

Research question three of the study discusses the relationship between the types digital tools adopted and team communication the work place. The correlation results reveal a strong and statistically significant positive correlation between types digital tools adopted and team communication, with a Pearson correlation coefficient of (0.712 and a *p*-value of 0.000.) This implies that varying types of digital tools such as instant messaging and chat apps, video conferencing platforms,file sharing and collaboration tools are strongly associated with increased team communication between lecturers. In practical terms, lecturers are more likely to select a particular type of digital tool with specific feature for team communication. There is also a weak but statistically significant positive correlation between the type of digital tools and Instant messaging and chat apps (r = 0.124, p = 0.038), as well as video conferencing platforms (r = 0.152, p = 0.015). These findings suggest that lecturers who select the right type of digital tool may use file sharing and collaboration tools, although the strength of this relationship is not substantial.

Interestingly, no significant correlation was found between digital tools or team communication and reliability of communication. The correlations were weak (r = 0.043 and 0.054, respectively) and statistically insignificant ($p > 0.05$). This indicates that the varying role of digital tools is not a distinguishing factor for team communication between lecturers. Lastly, File sharing and collaboration tools showed no meaningful correlation with types of digital tools ($r = -0.011$, p = 0.716) or team communication (r = 0.016, p = 0.797), implying that varying types of digital tools not play a role in team communication.

E. *RQ 4: How do the Educational Level and Years of Experience Predict a Lecturers' Digital Tools Proficiency for Team Communication?*

In running the regression analysis, educational level, and years of experience and digital tools proficiency for team communication used as control variables. Two models were assessed: a simple linear regression model (Model 1) and a multiple regression model (Model 2), which included additional demographic variables to test to control for heteroscedasticity. In Model 1, show a strong positive relationship. Specifically, the R-value was 0.813, and the R^2 value was 0.660. The unstandardized coefficient (β) for digital tools was 0.726, indicating that a one-unit improvement in digital tools, leads to a 0.726 unit increase in technological proficiency among lecturers. The model was highly statistically significant, with an F-value of 421.727 and a p-value less than 0.001, further supported by a strong t-value of 20.536 for the digital tools variable. These results clearly highlight the central role that educational level, and years of experience play in shaping the proficiency of using digital tools in team communication.

Table 6. Correlation analysis: relationship between the types digital tools adopted and team communication

Construct	1	2	3	4	5
Types of Digital tools (1)	1				
Team communication (2)	0.712**	1			
Instant messaging and chat apps (3)	0.134*	0.152*	1		
Video conferencing platforms (4)	0.043	0.054	−0.064	1	
File sharing and collaboration tools (5)	−0.011	0.017	0.152*	0.038	1

Note: ** p = 0.01; * p = 0.05

Table 7. Regression analysis: Educational level and years of experience and how its predict lecturers' digital tools proficiency for team communication

Model	Construct	B	Std. Error	R	R^2	F	t	Sig.
1	(Constant)	0.762	0.127	0.813	0.66	421.727	5.982	0.000
	Digital tools proficiency	0.726	0.035				20.536	0.000
2	(Constant)	0.562	0.220	0.815	0.664	105.828	2.554	0.011
	Digital tools proficiency	0.719	0.036				20.087	0.000
	Educational level	0.051	0.038				1.342	0.181
	Years of experience	0.071	0.152				0.466	0.642
Dependent Variable: Team communication								

In model 2, the results show that despite the additions of the control variables, digital tools remained a highly significant predictor, with a coefficient (β) of 0.719 and a p-value still below 0.001. The R^2 value for this model increased slightly to 0.664, showing that the additional variables explained only a marginally greater proportion of the variance in the proficiency of digial tools, an increase of just 0.4%. Notably, none of the added demographic variables were statistically significant. For instance, educational levels had a coefficient of 0.051 (p = 0.181), years of experience had a coefficient of 0.071 (p = 0.642). This suggests that these factors do not meaningfully influence proficiency of digial tools use. See Table 6 and 7 for details.

V. Discussion

To understand how effective team communication can be enhanced via digital tools, the study was guided by four

research questions. The study delved into the relationship between effective team communication and digital tools for an improved university working environment. With the Digital Collaboration Theory as the principal guide, the central objective of the study was to investigate how the introduction of digital communication technologies could serve as a sufficient condition for effective team communication in the professional lives of lecturers at the three universities. The post-COVID-19 era has introduced some dynamism and a shift from the traditional means of conducting daily work schedules within public universities in Ghana and demands for rapid productivity within the work environment. Hence, the call by some communication experts to incorporate digital tools for improved collaboration and effective communication among lecturers in higher educational institutions is timely. The study collected robust primary data from 150 participants distributed among lecturers from three universities in Ghana. The analysis of the data yielded varied findings.

In developing countries like Ghana, where the diffusion of technological innovation is generally slow, the object of research question one is to investigate the predominant digital tool(s) used by lecturers for team communication. These findings suggested that instant messaging apps and emails were generally used to carry out daily tasks at various university campuses. Besides, the study recognized that before now, communication in educational institutions in Ghana was mainly via face-to-face meetings. The findings further highlighted that the increased adoption of digital tools has greatly transformed how lecturers communicate in various universities. This gradual shift and high preference for messaging and video platforms are found to have a phenomenal impact on remote team communication. The increased networking ensures regular updates on the current issues and developments within the organization. The instant messaging tools allow for sending, updating, and getting notifications and feedback from colleagues remotely. The study further found that besides using messaging tools, digital platforms such as video conferencing tools are also essential for work-related discussions and sharing thoughts during online meetings. These findings resonate with a large body of past studies by [14, 22], that show how virtual meeting platforms, team messaging, and other native social media platforms make it easy for effective employee communication.

The final research question two investigated the perceived impacts of digital tools on the work-life of university lecturers. Overall, the analysis of the significant perceived impacts of digital tools in the higher education ecosystem suggests that digital tools have significantly created a balance and flexibility in the work-life of lecturers leading to improved work performance, satisfaction, collaboration, and productivity. Some positive and ground-breaking findings highlighted in this study about the influence of digital tools include; improved communication and collaboration, acquisition of creative self-efficacy, exposure to privacy, and in-depth knowledge of ethical issues on the use of digital tools within the work environment. Besides, digital tools easing the daily workload, the study also revealed that a smaller number of respondents at the three sample universities feel pressured as they need to continue to stay in touch for feedback from coworkers beyond working hours. These findings align with a large body of literature, and resonate with previous studies by Ibrahim *et al*. [22, 27], who have concluded that using digital tools for team communication has a significant positive influence on the work-life of employees in higher educational institutions. The study also recognised some perceived negative impacts such as digital or technology fatigue; perceived negative effects of working relations of lecturers; and high maintenance costs of digital tools from the perspective of developing countries. The study study also recognised some perceived negative impacts such as digital or technology fatigue; perceived negative effects of working relations of lecturers; and high maintenance costs of digitalmtools from the perspective of developing countries.

To answer research question three, the findings suggest that are positive relationship between the types digital tools adopted and team communication in the three universities. The results from the analysis also found that instant messaging and chat apps such as Slack, Microsoft Teams have a positive relationship to team communication, which facilitate real-time, quick, and informal communication. Native social media platforms (WhatsApp), and team messaging tools(e-mails) were also effective for remote team communication. Video conferencing platforms like Zoom, and Google Meet are also good for face-to-face virtual interaction, while file sharing and collaboration tools that allow for shared access to documents and collaborative editing. The findings revealed that the types of digital tools used have multiple functions that play a pivotal role in getting real-time updates and prompt feedback for enhanced productivity. The multiple-task features of these dgital tools provide anytime connectivity, flexibility, and seamless communication and collaboration. Digital tools for like mobile phones, native social media platforms (WhatsApp), internal communication tools (email) also promote productivity, promote access for collaborative remote team communication in educational institutions. These findings are compatible with scholars such as [23, 27], who have elucidated the transformational impact of the types digital tools in promoting remote team communication in higher educational institutions. While this study identified some critical benefits of using digital tools for team communication in public universities, the study also reported that mobile phones and instant messaging apps like WhatsApp pose several negatives for team communication in public universities, primarily revolving around distraction, security issues, and blurring the lines between personal and professional life. This can negatively impact productivity, information management, and team dynamics.

Finally research question four carried out a regression analysis to investigate how educational level and years of experience predicts digital proficiency of digital tools for team communication. The findings from Model 1 showed a strong, positive, and statistically significant relationship between digital tools and team communication. This means that approximately 66% of the variance in proficiency in digital tools can be explained by the educational level, and years of experience. The findings also show that higher educational attainment, such as a master's or doctorate degree, is often associated with higher digital tools

proficiency. The result show that, Lecturers with graduate-level education have a deeper theoretical understanding of pedagogy, which can lead to more sophisticated and effective use of digital tools. This is based on the idea that advanced degrees cultivate superior critical thinking and learning strategies. In the expanded analysis, Model 2, suggested contradictory findings of definitive link between a higher level of education and increased digital proficiency. The study also identified factors like access to resources, institutional support, and individual attitudes are more significant predictors in determining a lecturer's proficiency in digital tools. This means that formal educational level alone is not a reliable predictor but technology training regardless of the educational level. These findings support perious studies by Dang *et al.* [44], that concluded that levels of education is a sufficient condition for faculty's digital tools proficiency.

On the years of experience, the study found that younger lecturers are often more willing to adopt digital tools, because of recent exposure to modern technology in their own education. This finding is in line with a 2022 study by Guillén-Gámez *et al.* [45], which found that lecturers with 6–10 years of experience were the most proficient with digital tools, suggesting a potential sweet spot where technological comfort meets established teaching practice. Conversely, the study also found that older or more experienced faculty being less comfortable with digital tools or perceiving it as less valuable for student learning compared to traditional methods. Therefore, this study finds no significant difference in digital tools proficiency between more and less experienced lecturers. Again this finding is in line with a study by Guillén-Gámez *et al.* [45], that concluded that teaching or years of experience was not a significant predictor of digital tools proficiency. External factors such as ongoing training, institutional support, and exposure to digital tools trends during lecturer's career is a better predictor.

A. Implications for Policy

From the standpoint of policy, the findings of this study offer a guide for the effective use of digital tools for enhanced team communication in less studied regions like those in Sub-Saharan Africa. A major observation from this study indicates that most higher educational institutions do not have digital policies to guide the use of digital platforms. The general acceptance of digital tools for team communication in the sampled universities is a testament to the shift in the mindset, hence the need for policymakers and higher educational administrators to formulate and implement university-specific online policies to regulate the use of digital platforms.

University leaders and policymakers can improve digital communication in public universities by adopting a strategic, transparent, and people-centric approach that moves beyond simply deploying new technologies. Instead of focusing only on the "material benefits" of digital transformation, they should prioritize cultivating a culture that supports collaborative, clear, and efficient digital communication.

Public university leaders must create a clear, university-wide digital communication policy rather than allowing communication channels to develop haphazardly. Define which platforms (e.g., Slack, Microsoft Teams, email, video conferencing) are to be used for different types of communication, such as urgent announcements versus routine project discussions.

University leaders or policymakers in Ghana must invest in infrastructure, training, and support. Effective digital communication depends on robust technology and user proficiency, areas that can be a weakness in public universities with limited funding.

Finally, University management and policymakers must provide continuous digital literacy training for lecturers. Mandatory, ongoing training should be offered to lecturers at all levels to build the necessary skills to use digital tools effectively and maximize their potential. Leaders must address the resistance to new technology often found among long-serving lecturers.

B. Research Limitations and Suggestions for Future Studies

This current study has some limitations. The researchers will recommend that future studies expand the scope and methods of inquiry. The review of previous literature on the use of digital tools in higher educational institutions and other organizations depicts a homogeneity in the methodological approach. Most past studies were based on grounded characteristics or a conceptual approach to exploring the influence of digital tools for team communication in universities. Some studies in the past also adopted mixed-methods designs, combining quantitative surveys with qualitative interviews to gain a comprehensive understanding of tool adoption and impact. The rich server-side of data on the influence of digital tools for team communication among university faculty is untapped. Future studies can expand the scope and methodology to address the issue of potential biases.

VI. Conclusion

The findings of the study indicate a shift from the traditional face-to-face communication that has characterized workplace communication for decades. The advent of digital technologies and their subsequent impact on collaboration and productivity in workplaces in recent years is a testament to the new direction for institutional development and growth. The deployment of digital communication tools for workplace team communication has enhanced productivity and the development of personal skills. The multidimensional benefits of digital tools have also improved efficiency and performance, and reduced the operational cost of managing higher educational institutions. The findings further show that adopting digital tools in the three sampled universities has considerably improved workers' ease of working, especially in a crisis situations. Moving on, this study recommends that to prevent abuses and enhance best practices, safety, and uniformity, higher educational institutions should develop pragmatic digital policies to guide and harmonize the use of digital tools in the workplace.

Conflict of Interest

The authors declare no conflict of interest.

Author Contributions

J.D.—Conceptualisation & Writing; J.I.A.—Methodology; R.B.-O.—Analysis; A.S.A.—Data Collection; M.S.—Data

Analysis; S.J.A.—Validation; Z.B.-D.—Review & Editing. All authors had approved the final version.

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