ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/25sep058

Extent Usability of Whatsapp Platform in Enhancing Student Teachers' Interaction with Learning Materials in Public Teachers' Colleges in Northern Zone, Tanzania

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Publication Date: 2025/09/10

Abstract: This seminar paper two aims to investigate the usability of WhatsApp platforms on enhancing student teacher interaction with learning materials in public teachers' college in Northern Zone, Tanzania. The study employed a convergent research design under a mixed-methods research approach, guided by the Social Theory. The target population included 1,041 student teachers, 302 tutors, and 7 principals, totaling 1,350 participants. The sample included six teachers' colleges from the Northern Zone, with 312 student teachers, 91 tutors, and 6 principals, making a total of 409 respondents. Quantitative data were collected through questionnaires, while qualitative data were collected through interview guides. Validity of data collection instruments was ensured by Mwenge Catholic University (MWECAU) research experts in Educational Planning and administration. Pilot study was conducted in 1 teachers' college within the Northern Zone to refine the instruments. The Reliability of the Likert-scale questionnaires was assessed using Cronbach's Alpha, yielding coefficients of 0.872 for student teachers and 0.914 for tutors, indicating high internal consistency. The trustworthiness of the qualitative data was ensured through triangulation techniques to confirm the findings' credibility. Data analysis was performed with the aid of Statistical Package for Social Sciences (SPSS) version 27. Descriptive data were analyzed using means, frequencies, and percentages, while qualitative data were analyzed using thematic analysis following the seven stages outlined by Creswell and Creswell. Ethical considerations included obtaining a research permit, informed consent, and ensuring anonymity and confidentiality during the study. Findings indicate that the usability of the WhatsApp platform significantly enhances student–teacher interaction with learning materials in Public Teachers Colleges in the Northern Zone of Tanzania. However, its full potential hindered by challenges such as intermittent internet connectivity and digital distractions. The study concludes that the study concludes that WhatsApp's user-friendly functionalities make it a highly usable platform for fostering frequent and meaningful student–teacher interactions in Public Teachers' Colleges across the Northern Zone of Tanzania. The platform enhances interaction to a high extent, particularly for sharing resources and providing feedback. However, unreliable internet connectivity and the potential for digital distractions reduce its overall effectiveness as a consistent pedagogical tool. The study recommended that, college management should formally set up WhatsApp groups for each course or class, ensuring that both tutors and student teachers actively participate. Additionally, colleges should organize hands-on training workshops on using WhatsApp effectively covering how to share learning materials, create discussions, and use WhatsApp features to support collaborative learning.

Keywords: *Usability, WhatsApp Platforms, Enhancing, Student Teacher, Interaction, Learning Materials, Teachers' College*.

How to Cite: Emmanuel O. Swai; Dr. Peter Siamoo; Dr. Bahiya Abdi (2025) Extent Usability of Whatsapp Platform in Enhancing Student Teachers' Interaction with Learning Materials in Public Teachers' Colleges in Northern Zone, Tanzania. *International Journal of Innovative Science and Research Technology*, 10(9), 197-208. https://doi.org/10.38124/ijisrt/25sep058

I. INTRODUCTION

The use of digital communication platforms in teacher education has become an essential strategy for enhancing access to learning materials and fostering effective student–teacher interaction in teachers' colleges. Maximizing the benefits of such platforms requires a comprehensive approach that emphasizes tutors' digital competence, the availability of ICT infrastructure, relevant instructional content, and supportive institutional policies (Lan, et al. 2024). This initiative aligns with Sustainable Development Goal (SDG) 4, Target 4.a, which advocates for inclusive,

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/25sep058

safe, and technology-enabled learning environment that accommodate the needs of all learners (UNESCO, 2015). WhatsApp has an important role on distributing learning materials, providing real-time feedback, facilitating group discussions, and supporting out-of-class academic follow-up (Suárez-Lantarón et al, 2022). Evidence indicates that more than 58% of student teachers experience irregular and uncoordinated interactions with their tutors via mobile platforms, which hampers timely access to academic support and essential resources (Tong, 2025). Despite the potential benefit of using WhatsApp to bridge the gaps, its educational application remains insufficiently explored within teacher training institutions.

Globally, the integration of WhatsApp into teacher education has achieved notable success in developed countries, where the platform is increasingly used to enhance student–teacher interaction with learning materials (Lee et al. 2023). In nations such as the United Kingdom, Australia, and Singapore, educational institutions have successfully adopted WhatsApp for academic communication, enabling real-time feedback, collaborative learning, and easy access to course materials (Romero-Saritama et al. 2025). These achievements are supported by strong ICT policies, high digital literacy among educators, and widespread access to reliable internet infrastructure. However, in many parts of the world particularly in low- and middle-income countries effective utilization of WhatsApp remains a challenge. Siregar et al. (2024) point out that limited digital skills among tutors, inadequate training in educational technology, and weak institutional support hinder the platform's potential to enhance student–teacher interaction. These challenges underline the importance of investing in infrastructure, capacity building, and policy frameworks to bridge the digital divide and maximize WhatsApp's effectiveness in transforming teacher education worldwide.

In African countries, efforts to enhance student–teacher interaction with learning materials in public teachers' colleges have been increasing, with governments and development partners promoting the integration of digital tools. A study by Awotunde et al., (2024) revealed that pre-service teachers had positive views using social media platforms for learning as they help them to integrate with learning materials, themselves and their instructors. Despite these efforts, low interaction with learning materials remains a significant challenge across many African teacher training institutions. In Uganda, the Ministry of Education in 2023 reveal that over 65% of student teachers report irregular access to academic materials and limited communication with tutors outside classroom hours, largely due to inadequate digital infrastructure and low digital competency among educators (Nuhu & Onojah, 2021). Besides, public teachers' colleges suffer from shortages of relevant learning materials and limited training on using digital platforms like WhatsApp, which restricts opportunities for timely feedback and collaborative learning. These challenges highlight a critical gap in ensuring that student teachers receive continuous academic support and meaningful interaction with learning resources for their professional development.

In Tanzania, notable progress has been made in promoting digital tools within teacher education through initiatives such as the Teacher Education Master Plan (TEMP), Teachers Educators Support Programme (TESP), Drafted national ICT Policy of 2023, and the Education and Training Policy of 2014 (revised in 2023). The efforts are further supported by the National Digital Education Strategy 2024/25 -2029/30 and the recently introduced National Guidelines on AI in Education and Training (2025), all aiming to strengthen the use of digital platforms for improving teaching and learning. Also, Digital Economy Strategic Framework (2024–2034) supports digital tools to enhance communication and learning across sectors, including education. Despite, the frameworks, a 2023 report by the Tanzania Institute of Education (TIE) revealed persistent gaps: only 38% of public teachers' colleges have reliable internet access, fewer than 30% of tutors use digital platforms for academic support, and over 62% of student teachers report rarely receiving learning materials outside class. The figures reflect limited digital infrastructure, insufficient tutor training, and lack of institutional policy enforcement. As a result, the usability of WhatsApp in fostering meaningful academic interaction remains underutilized, raising concerns about the effectiveness of current colleges' strategies in transforming digital learning within teacher education.

In the Northern Zone of Tanzania covering Kilimanjaro, Arusha, Tanga and Manyara public teachers' colleges are entrusted with shaping the country's future educators. Yet behind classroom walls, a quiet but persistent challenge remains whereby student–teacher interaction with learning materials is minimal. According to the Ministry of Education, Science and Technology (MoEST, 2023), fewer than 47% of colleges in this zone have systems in place for academic follow-up beyond scheduled lectures. A tracer study by the Tanzania Institute of Education (TIE, 2023) revealed that 63% of student teachers in the Northern Zone reported minimal academic engagement beyond formal sessions often due to irregular tutor consultations, lack of structured platforms for academic discussion, and insufficient access to supplementary instructional materials. Despite the national push for digital integration, a regional audit by Mutajwaa & Reuben (2023) found that only 28% of tutors in the zone actively use WhatsApp for academic purposes.

Even more critically, 58% of tutors admitted lacking either confidence or training to facilitate digital learning environments. The problem is uniquely pronounced in the Northern Zone since the persistent infrastructural inequities in digital connectivity across Tanga, Kilimanjaro, Arusha and Manyara compared to zones with donor-supported e-learning hubs such as the Coastal and Lake Zones (NECTA, 2023) and the absence of region-specific interventions or pilot programs to support mobile learning platforms despite growing student enrollment. These are not just statistics they reflect silenced academic dialogues, unasked questions, and

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/25sep058

lost opportunities for professional growth. In some colleges, student teachers huddle over outdated reference books or rely on photocopied notes handed down between cohorts a far cry from the dynamic, interactive learning needed to prepare competent classroom practitioners (Msuya 2022). Disconnection between teacher educations ideals and the life experiences of student teachers in the Northern Zone raises an urgent concern. It is from this space of unmet need that this study investigated the usability of WhatsApp as a tool to enhance student–teacher interaction with learning materials in public teachers' colleges across the Northern Zone of Tanzania.

➢ *Statement of the Problem*

Low levels of student–teacher interaction with learning materials remain a pressing concern in public teachers' colleges in Tanzania, particularly in the Northern Zone. Tutors, student teachers, parents, and education officers have increasingly raised complaints about limited access to instructional content, delayed feedback, and lack of structured academic follow-up. Data indicates that around 54% primarily use printed and photocopied notes rather than digital or interactive resources, compared to less than 30% in donor-supported zones such as the Coastal and Lake regions. According to MoEST (2023), only 28% of tutors across Tanga, Kilimanjaro, Arusha, and Manyara public teacher colleges actively use digital platforms such as WhatsApp to support learning beyond classroom sessions. With 65% of colleges lack dedicated digital learning labs or "Digital Access Corners. Similarly, a regional tracer report by TIE (2023) revealed that 63% of student teachers reported minimal interaction with tutors outside lectures due to infrastructural constraints, low digital facilitation capacity, and absence of institutional mechanisms to support continuous engagement. This created an under-improvement of teachers' preparation quality, especially as Tanzania moves toward learner-centered approach. While studies by Swai, (2023) and Sanga and Chitiyo (2022) highlight systemic barriers to digital learning in higher and tertial learning, none have specifically addressed WhatsApp usability in teacher colleges of the Northern Zone on enhancing students-teachers interaction with learning materials. This study responded to that gap by investigating usability of WhatsApp platform as a practical and accessible tool for enhancing student–teacher interaction with learning materials in public teachers' college in northern zone, Tanzania.

➢ *Research Question*

To what extent does usability of WhatsApp platform enhance student-teacher interaction with learning materials in Public Teachers Colleges in Northern Zone, Tanzania?

➢ *Research Hypothesis*

- H_0: There is no significant prediction of WhatsApp platform usability on the level of student–teacher interaction with learning materials in Public Teachers' Colleges in the Northern Zone of Tanzania.

➢ *Significance of the Study*

The findings of this study will significance to college principals, tutors, student teachers, education policymakers, curriculum developers, and future researchers. For college principals, the study will provide insights into how digital communication platforms like WhatsApp can be effectively integrated into academic routines to enhance student engagement and information sharing. Tutors will benefit by identifying how they can leverage the WhatsApp platform to improve access to learning materials, provide timely feedback, and promote collaborative academic discussions. Student teachers gain from improved communication and learning support, contributing to deeper understanding and academic success through increased access to resources and academic interactions. For education policymakers and curriculum developers, the study offer empirical evidence to inform policy decisions and digital integration strategies that support blended learning in teacher education colleges. It will guide the development of institutional digital policies and capacity-building programs aimed at enhancing tutors' digital competencies. The study will also contribute to the advancement of the Connectivism Learning Theory, by demonstrating how digital platforms facilitate knowledge sharing and community-based learning in a decentralized manner. Lastly, this research will enrich academic knowledge and discourse in the area of educational technology and teacher training, by focusing on the underexplored use of WhatsApp in Tanzanian public teachers' colleges as a tool for academic interaction and resource access.

➢ *Theoretical Review*

This study was guided by Connectivism Theory, proposed by Siemens and Downes (2005), which underscores the central role of digital technologies and social networks in the learning process. The theory views learning as a process of forming connections across a digital network, with learners such as student teachers functioning as interactive nodes. In this framework, platforms like WhatsApp facilitate student–teacher interaction by enabling the real-time sharing of academic materials, initiating discussions, and supporting collaborative tasks both within and beyond the physical classroom. This ongoing engagement reflects learning as a lifelong, dynamic, and socially constructed activity, enhanced by digital usability.

Connectivism Theory provides a strong foundation for examining the extent to which the usability of WhatsApp enhances student–teacher interaction with learning materials in public teachers' colleges. The theory highlights how digital platforms support continuous, flexible, and collaborative learning. WhatsApp enables easy access to shared notes, academic reminders, discussion threads, and instructional audio-visuals. By conceptualizing student teachers and tutors as interconnected participants, the theory promotes increased engagement, rapid information flow, and peer support, thereby enriching the learning process. This aligns with the study's aim to evaluate how the functional use of WhatsApp transforms traditional teaching into an interactive, network-based experience. Despite its relevance, Connectivism Theory presents some limitations

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/25sep058

in addressing the usability of WhatsApp in teacher education. The theory over rely on digital infrastructure, which may not be equally accessible to all students due to technological, financial, or geographic constraints.

Connectivism Theory is highly relevant to this study as it offers a framework to explore how the usability of WhatsApp enhances student–teacher interaction with learning materials in public teachers' colleges. The theory emphasizes learning through network creation and digital connectivity, which aligns with the way WhatsApp facilitates academic discussions, material sharing, feedback provision, and collaborative learning. For instance, student teachers can use WhatsApp to participate in class groups, receive academic support from tutors, and access educational resources in real time. Through such engagement, the platform fosters interactive, inclusive, and learner-centered environments. Thus, Connectivism Theory helps explain how the effectiveness and usability of WhatsApp contribute to modern teaching and learning practices in teacher education.

II. EMPIRICAL REVIEW

The empirical literature is thematically organized in alignment with the study's research questions and spans global, continental (Africa), regional (East Africa), national (Tanzania), and local contexts. This review offers a comprehensive understanding of the research problem by highlighting relevant findings, methodologies, and approaches to data collection and analysis used in previous studies.

- *The Extent to which WhatsApp Platform Enhances Student-Teacher Interaction with Learning Materials in Public Teachers Colleges*

In this digital world, WhatsApp platform is a vital tool for fostering student-teacher interaction with learning materials among student teachers in Public Teachers Colleges. The following empirical studies demonstrate the multifaceted ways in which WhatsApp platform facilitates knowledge sharing through digital interaction learning processes of various educational stakeholders.

Lee et al., (2023) conducted a study on WhatsApp Use in a Higher Education Learning Environment a Perspective of Students of Sunway City, Malaysian. The focus was to investigate the impact of using WhatsApp in higher education learning. The study deployed a convergent design under mixed-methods approach. Data were collected through online survey and interviews. The findings of this study present insights that WhatsApp platform tool ensure collaborative learning, as well as for interaction between students and lecturers, and among students. The study highlighted WhatsApp in facilitating interaction learning; it focused on university graduates with a little focus to the college student-teachers. Consequently, the current study used convergent research design to investigate WhatsApp usability in enhancing student-teacher interaction with learning materials in public teacher colleges in Northern Tanzania.

Baishya and Maheshwari (2020) carried a study on exploring the academic uses of WhatsApp groups among students in India. The study observed chats in four WhatsApp groups for one year, two with teachers and two without. Interview was carried out. Results indicated that teachers' presence encouraged academic discussion on the WhatsApp group. While the study provides valuable insights into how teachers motivate learning, the study focused on students and excluded school administration, which could offer an administrative perspective on social media use. The current study included student teachers, tutors, and principals to better understand WhatsApp's usability for student-teacher interaction with learning materials in public teacher colleges in Northern Tanzania.

Mohammed et al., (2024) conducted a study on the comparative performance of undergraduate students in micro-teaching using Telegram and WhatsApp in collaborative learning environments at Gombe State University and Federal University Kashere in Nigeria. Using purposive sampling, students were divided into two experimental groups: one using Telegram and the other using WhatsApp. Findings indicated that WhatsApp enhanced student performance, particularly in larger classroom settings, due to its collaborative nature. The study offers valuable insights into WhatsApp's effectiveness for university students, primarily emphasizing its impact on academic performance, with a partial attention to student interaction with academic learning materials. Consequently, the current study adopts a convergent research design to examine the usability of the WhatsApp platform, specifically focusing on student–teacher interaction with learning materials in Public Teachers Colleges in Northern Tanzania.

Linda Thaba-Nkadimene, (2020) studied the impact of WhatsApp on collaborative pedagogy and social networking during teaching practice at a rural South African university. The study focused on pre-service teachers and their supervisors, using a qualitative approach that included semi-structured interviews with four pre-service teachers and four supervisors. Findings revealed that WhatsApp is an effective interactive learning platform for sharing pedagogical information. However, the study primarily relied on qualitative data, with its findings mainly generalizable to the sharing of pedagogical information, paying a little attention to other interactive learning materials such as both digital and non-digital resources, as well as information from seminars and workshops. Therefore, there was a need to investigate the usability of WhatsApp in facilitating broader student–teacher interaction with various learning materials in Public Teachers Colleges in Northern Tanzania.

Shuubi and Kivara, (2023) conducted a study on Assessing WhatsApp as a collaborative learning tool in Tanzanian higher education post-COVID-19. The study applied a multi-case study involved students from three institutions across certificate, diploma, and degree programs, utilizing Google Forms for data collection, with responses illustrated through charts and graphs. Findings showed that WhatsApp fosters collaboration and connections among

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/25sep058

students from different colleges. However, the study primarily focused on university students. The current study sought to investigate how WhatsApp enhances collaborative learning specifically within Public Teachers Colleges in Northern Tanzania, utilizing a convergent mixed-method design to obtain comprehensive insights.

III. SUMMARY OF LITERATURE REVIEW AND RESEARCH GAP

The reviewed empirical studies on the use of WhatsApp to enhance student–teacher interaction with learning materials reveal notable gaps at conceptual, contextual, and methodological levels. Conceptually, studies such as Lee et al. (2023) and Baishya and Maheshwari (2020) underscore WhatsApp's role in fostering collaborative learning and academic discussions primarily among university students but pay limited attention to college-level teacher education students, highlighting a conceptual gap. Contextually, research conducted in diverse settings including Malaysia, India, Nigeria, South Africa, and Tanzania (Lee et al., 2023; Mohammed et al., 2024; Linda Thaba-Nkadimene, 2020; Shuubi & Kivara, 2023) tends to focus predominantly on university populations or excludes key educational stakeholders such as tutors and school administrators, indicating a contextual gap specific to public teachers' colleges in Northern Tanzania. Methodologically, most prior studies rely heavily on qualitative or single-method approaches and often limit participant perspectives to either students or tutors alone, revealing a gap in comprehensive mixed-method designs and multi-stakeholder engagement. This study addressed the gaps by employing a convergent mixed-methods design to investigate the extent to which WhatsApp enhances student–teacher interaction with various learning materials in public teachers' colleges in Northern Tanzania, incorporating the perspectives of student teachers, tutors, and principals to provide a holistic understanding and practical implications.

IV. RESEARCH METHODOLOGY

The study adopted a convergent research design under a mixed research approach, which involved the simultaneous collection and analysis of quantitative and qualitative data to achieve a comprehensive understanding of the research phenomenon. Data were gathered simultaneously from multiple levels using diverse data collection methods to ensure depth and richness of information. Quantitative and qualitative datasets were analyzed independently before being compared to assess the convergence or divergence of findings, as outlined by Creswell and Creswell (2018).

The target population comprised 1041 student teachers, 302 tutors, and 7 principals, totaling 1,350 participants. The sample included six teachers' colleges from the Northern Zone, with 312 student teachers, 91 tutors, and 6 principals, making a total of 409 respondents. Quantitative data were collected via structured questionnaires, while qualitative data were obtained through semi-structured interview guides. The instruments were validated by experts in education planning and administration from Mwenge Catholic University. A pilot study was conducted in 1 teachers' college within the Northern Zone to refine the instruments. Reliability of the Likert-scale questionnaires was assessed using Cronbach's Alpha, yielding coefficients of 0.872 for student teachers and 0.914 for tutors, indicating high internal consistency. Trustworthiness of the qualitative data was ensured through peer debriefing and data triangulation. Quantitative data were analyzed descriptively with the aid of SPSS version 27, while qualitative data underwent thematic analysis involving familiarization, coding, theme development, review, definition, and final reporting.

V. FINDINGS AND DISCUSSION

This study was conducted to answer the research question: To what extent does the WhatsApp platform enhance student–teacher interaction with learning materials in Public Teachers Colleges in Northern Tanzania. The study collected information from key educational stakeholders, including student teachers, tutors, and college principals. The findings are presented and discussed under the main theme derived from this question.

- *The Extent to Which WhatsApp Enhances Student–Teacher Interaction with Learning Materials in Public Teachers Colleges in Northern Tanzania*

The objective of this study was to examine the extent to which the WhatsApp platform enhances interaction between student teachers and tutors, particularly in the sharing and engagement with learning materials. A five-point Likert scale was used to measure the responses, with scale values of 1 = Very Low Extent (VLE), 2 = Low Extent (LE), 3 = Moderate Extent (ME), 4 = High Extent (HE), and 5 = Very High Extent (VHE). The unit of analysis was based on the mean scores derived from the responses, where a mean score greater than 3 indicates that WhatsApp enhances student–teacher interaction; a mean score less than 3 indicates limited enhancement; and an exact score of 3 implies neutrality (Chyung & Hutchinson, 2023). The rate of percentage described as ≤ 20=extremely minority; 21-49= minority; 50-59=moderate; 60-69= majority; 70-89= very high majority; 90-99=extremely majority; 100= overwhelming majority (Taherdoost, 2019). Response for student-teachers and tutors are summarized in Table 1.

Table 1 The Extent to which WhatsApp Platform Enhance Student-Teacher Interaction with Learning Materials in Public Teachers Colleges (N=312 and 91)

S/N	Statement	Resp	VLE		LE		ME		HE		VHE		Mean
			f	%	f	%	f	%	f	%	f	%	
1	WhatsApp enhances interaction with course outline contents.	S-Trs	14	4.5	11	3.5	48	15.4	159	51.0	80	25.6	3.90
		Ttrs	4	4.3	8	8.8	25	27.5	35	38.5	19	20.9	3.63

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/25sep058

2	WhatsApp enhances interaction with lesson notes.	S-Trs	11	3.5	8	2.6	42	13.5	139	44.6	112	35.9	4.07
		Ttrs	5	5.4	4	4.4	12	13.2	40	44.0	30	33.0	3.95
3	WhatsApp enhances interaction with scheme of work and lesson plan.	S-Trs	9	2.9	15	4.8	38	12.2	140	44.9	110	35.3	4.05
		Ttrs	5	5.4	4	4.4	15	16.5	31	34.1	36	39.6	3.98
4	WhatsApp enhances interaction with recorded video lectures.	S-Trs	8	2.6	17	5.4	45	14.4	155	49.7	87	27.9	3.95
		Ttrs	6	6.5	7	7.7	15	16.5	35	38.5	28	30.8	3.79
5	WhatsApp enhances interaction with e-books.	S-Trs	11	3.5	13	4.2	43	13.8	157	50.3	88	28.2	3.96
		Ttrs	5	5.5	5	5.5	22	24.2	34	37.4	25	27.5	3.76
6	WhatsApp enhances interaction with various class timetables	S-Trs	6	1.9	18	5.8	39	12.5	151	48.4	98	31.4	4.02
		Ttrs	4	4.4	7	7.7	12	13.2	38	41.8	30	33.0	3.91
7	WhatsApp enhances interaction with links for various learning platforms.	S-Trs	15	4.8	8	2.6	47	15.1	158	50.6	84	26.9	3.92
		Ttrs	7	7.6	7	7.7	18	19.8	32	35.2	27	29.7	3.71
8	WhatsApp enhances interaction with learning pictures and diagrams	S-Trs	11	3.5	14	4.5	35	11.2	150	48.1	102	32.7	4.02
		Ttrs	5	5.4	7	7.7	17	18.7	33	36.3	29	31.9	3.81
9	WhatsApp enhances interaction with recorded audio lectures.	S-Trs	7	2.2	17	5.4	39	12.5	159	51.0	90	28.8	3.99
		Ttrs	5	5.4	9	9.9	15	16.5	34	37.4	28	30.8	3.78
10	WhatsApp enhances interaction with various class quiz and assignments.	S-Trs	13	4.2	15	4.8	30	9.6	148	47.4	106	34.0	4.02
		Ttrs	6	6.5	11	12.1	17	18.7	32	35.2	25	27.5	3.65
	Grand Mean												**3.89**

Source: Field Data, (2025)

Data in Table 1 indicates that very high majority of student teachers (76.6%) and moderate tutors (59.4%) rated WhatsApp as a platform that enhances interaction with course outline contents to a high and very high extent. Additionally, an extremely minority of student teachers (15.4%) and minority of tutors (27.5%) rated this aspect at a moderate extent. Conversely, only an extreme minority (8.0%) of student teachers and (13.1%) of tutors perceived WhatsApp as having a low contribution to enhance interaction with course outline contents. The mean scores of 3.90 for student teachers and 3.63 for tutors reflect an overall positive perception of WhatsApp as an effective platform for enhancing academic interaction. To which during a face-to-face interview, Principal 4 elaborated:

"In most cases, student teachers are very active in sharing academic subject course outline on various WhatsApp groups. They ask tutors to share in their groups or class representative and after is shared to all. However, some tutors are still passive they rarely participate unless prompted. I think this affects the balance of engagement when expecting in a digital learning environment (Principal 4, Personal communication, 30th May, 2025).

Insights gathered from student teachers, tutors, and the principal suggest that WhatsApp is a powerful tool for promoting student teacher interaction with learning materials such as course outline however, its full potential is hindered by inconsistent participation from tutors. When tutors fail to engage regularly students tend to dominate discussions, which limit the depth and structure of pedagogical guidance. This highlights a critical tension: although student-led discussions demonstrate growing digital autonomy, maximizing the educational value of WhatsApp requires balanced and sustained engagement from tutors. The findings are consistent with those reported by URT (2022) which emphasized the need for both tutor digital readiness and institutional support in the effective integration of digital learning platforms. The findings resonate with Connectivism Theory, proposed by Siemens and Downes (2005) which emphasizes learning as a process of forming networks and connections facilitated by digital technologies.

Data in Table 1 shows that a majority of student teachers (80.5%) and tutors (77.0%) rated to a high extent that WhatsApp enhances student teachers' interaction with lesson notes. An extremely minority of student teachers (6.1%) and tutors (9.8%) rated this item at a low extent, suggesting only a few respondents were less satisfied with the platform's effectiveness in this area. Additionally, an extremely minority of student teachers (13.5%) and tutors (13.2%) rated it at a moderate extent. The mean score was 4.07 for student teachers and 3.95 for tutors imply that both student teachers and tutors widely acknowledge WhatsApp as an effective tool for sharing lesson notes. The responses demonstrate strong confidence in the platform's capability to support access to instructional content in a flexible and timely manner. Nonetheless, the high mean scores confirm general approval of WhatsApp as a digital tool for sharing lesson notes to student teachers.

The researcher, during a face-to-face interview with Principal 2, had this to share;

"WhatsApp has truly simplified the way tutors and students exchange materials. It is quicker than copying notes on their exercise books, and everyone is already familiar with the app. Notes, past papers, even recorded lectures are shared instantly. However, I've noticed some tutors are reluctant to share extensive content, fearing misuse or dependency (Principal 2, Personal communication, 27th May, 2025)

Principal 6 had this to say; *"It's a good platform for sharing materials. Students get notes even if they missed class. But still have a few tutors who believe sharing too much encourages laziness. They prefer using it only for*

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/25sep058

announcements, not for learning materials (Principal 6, Personal communication, 20th June, 2025)

Information from student-teacher, tutors and Principal "2" and Principal "6" affirms the usefulness of WhatsApp in enhances student teacher interact with lesson notes. This indicates its speed, accessibility, and ease of use, particularly for sharing documents and recorded content. The views reveal that while WhatsApp is widely used and appreciated for content sharing, the effectiveness of its use is somewhat constrained by tutor attitudes and caution over student teachers' behavior. The findings align with the study did by Tondeur et al. (2021), who emphasized that effective integration of technology in education requires not only infrastructure but also positive attitudes and active engagement from educators. For that reason, while WhatsApp has a proven role in enhancing access to learning materials, consistent tutor participation and a supportive digital culture are crucial for maximizing its educational impact. The findings resonate with Connectivism Theory (2005), which posits that learning in the digital age occurs through networks, connections, and shared knowledge across digital platforms.

Data in Table 1 shows that a very high majority of student teachers (80.2%) and tutors (73.7%) rated to a high extent that WhatsApp enhances student teachers' interaction with scheme of work and lesson plans. An extremely minority of student teachers (7.7%) and tutors (9.8%) rated this to a low extent. Additionally, a minority of student teachers (12.2%) and tutors (16.5%) rated it at a moderate extent. The mean score is 4.05 for student teachers and 3.98 for tutors, implies that both student teachers and tutors recognize the value of WhatsApp in fostering student teachers' interaction with scheme of works and lesson plans. The responses reflect strong confidence in the platform's ability to enhance peer-to-peer interaction, which enrich academic experience through idea exchange and group support. However, the high mean scores of 4.05 for student teachers and 3.98 for tutors reinforce the overall approval of WhatsApp in promoting student teacher interaction with learning materials for the well-being of the student teachers.

The researcher, during a face-to-face interview with Principal 1, had this to share; *"With WhatsApp, a student from College A collaborate with another from College B on assignment related to preparation of scheme of work and lesson plan. This level of interaction never existed before. However, it depends how active the group is (Principal 1, Personal communication, 23rd May 2025)*

Principal 5 added by saying that; *"Yes, WhatsApp builds academic bridges. Tutors once shared to me that students from different colleges form subject-based groups that share scheme of work and lesson plan during Block teaching practices (BTP). Under this situation tutor's guidance is highly needed (Principal 5, Personal communication, 19th June, 2025)*

Information from both Principal "1" and Principal "5" supports the idea that WhatsApp enhances student teachers' interaction with scheme of work and lesson plan across various colleges and classes. Principal 1 highlights the platform's role in enabling academic collaboration that was previously difficult to achieve, but notes that the success of such interaction depends on group activity levels. Similarly, Principal 5 emphasizes that while subject-based groups are useful and dynamic, they sometimes suffer from a lack of guidance, which may reduce academic focus. These views suggest that although WhatsApp supports wide-reaching academic interaction, consistent group coordination and moderation are needed to sustain its effectiveness. The findings are in line with those by Bellhäuser (2025), who asserted that digital platforms, when effectively utilized, extend learning communities beyond institutional boundaries and promote collaborative learning. This aligns closely with Connectivism Theory (2005), which emphasizes that learning is a process of connecting specialized information nodes and sources. WhatsApp serves as one such node, enabling continuous interaction, inclusivity, and peer-supported academic development essential for knowledge construction in today's networked learning environments.

Data in Table 1 shows that a very high majority of student teachers (77.6%) and majority of tutors (69.3%) rated to a high extent that WhatsApp serves as a platform for enhancing student teachers with recorded video lectures. An extremely minority of student teachers (8.0%) and tutors (14.2%) rated this item at a very low extent. While, an extremely minority of student teachers (14.4%) and tutors (16.5%) rated the item at a moderate extent. The mean score was 3.95 for student teachers and 3.79 for tutors suggests that both groups generally recognize the value of WhatsApp in enhancing student teachers' interaction with recorded video lectures. The responses reflect growing reliance on digital platforms for informal, timely, and accessible academic communication. Though, the consistently high mean scores reflect strong general approval of WhatsApp as a tool for interacting with learning materials. The researcher, during a face-to-face interview with Principal 6, had this to share; *"Tutors and students use WhatsApp to share various recorded video lectures. They say it's fast, user friendly. The challenge is, not all tutors and student teacher teachers use it consistently, some claim the issue of bundle to upload and download (Principal 6, Personal communication, 20th June, 2025)*

Principal 5 had this to say; "WhatsApp allows sharing of recorded video lectures to large group of student teachers, which keeps students engaged. But sometimes tutors are reluctant to use WhatsApp, and student teachers get discouraged and use for their interest. We still need to train everyone on how to use it more professionally for academic purpose *(Principal 5, Personal communication, 19th June 2025)"*

Information from both Principal "6" and Principal "5" supports the idea that WhatsApp has become a preferred platform for enhancing student teachers' interaction with video recorded lectures. Principal 6 highlights its speed and student responsiveness, but also points out inconsistency

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/25sep058

among tutors and student teachers' due shortage of bundle for uploading and downloading academic videos. Principal 5 echoes the benefits of real-time interaction to large group but identifies a gap in tutor responsiveness, which can demotivate learners. These views suggest that while WhatsApp is an efficient medium for enhancing video lectures interaction, the impact is constrained by inconsistent usage patterns and lack of standardization in communication practices. The information resonates with the study done by Reisoglu (2021), who emphasized that digital platforms must be accompanied by clear communication policies and digital training for both students and teachers to ensure effective use. This aligns with Connectivism Theory (2005), which views learning as a networked process where knowledge is acquired through interaction with digital tools, people, and systems. WhatsApp, in this context, functions as a digital learning node that fosters continuous access to academic instructional contents.

Data in Table 1 shows that a very high majority of student teachers (79.8%) and tutors (74.8%) rated to a very high and high extent that WhatsApp assists student teachers' interaction with e-books. An extremely minority of student teachers (7.7%) and tutors (12.1%) rated this item at low extent. While, an extremely minority of student teachers (12.5%) and (13.2%) of tutors rated it at a moderate extent. The mean score was 4.02 for student teachers and 3.91 for tutors, implies that both student teachers and tutors widely acknowledge the usefulness of WhatsApp in interacting with e-books. The response reflects WhatsApp platform's effectiveness in enhancing interaction with e-books among student teachers.

During a face-to-face interview, Principal 2 had the following to comment that;

"We now use WhatsApp as our primary platform for sharing various subject e-books from Tanzania institute of education (TIE). It works well as many student teachers during class time or free time read the online modules from TIE using their smart phone to answer question or assignments given. But it depends on how active the group is and whether reminders are sent on time (Principal 2, Personal communication, 27th May, 2025)"

Principal 3 added by saying that; *"It's very effective when used correctly. I had tutors saying that they experience student teachers sharing various e-books in form of PDF using WhatsApp. But there are times when some students miss updates because they muted the group or weren't attentive (Principal 5, Personal communication, 28th May, 2025)".*

The information with Principal "2" and Principal "3" suggests that WhatsApp is indeed a practical platform for sharing e-books, particularly due to its accessibility and ease of use. Principal 3 highlights its reliability in sending updates, but also notes that effectiveness depends on active management of group communications. Similarly, Principal 6 confirms its role in enabling a variety of academic functions but cautions that passive behavior from some students can limit its impact. The insights advocate that WhatsApp's success in student teachers' interaction with learning materials is closely linked to user engagement and communication discipline within the group. When used actively and responsibly, it significantly improves student teachers' interaction with learning materials. The findings are in line with those of Gao & Chen (2024), who affirmed that mobile communication tools such as WhatsApp play an instrumental role in academic coordination and logistics. Effective digital communication strengthens student teachers' interaction with learning materials and ensures that both tutors and students are informed and actively engaged in learning process.

VI. HYPOTHESIS TEST

➢ *Tests of Normality*

A normality test was conducted to examine whether the data on the usability of the WhatsApp platform for enhancing student–teacher interaction with learning materials met the assumptions of normal distribution necessary for conducting parametric statistical analyses. The results of the Kolmogorov-Smirnov and Shapiro-Wilk tests are presented in Table 2.

Table 2 Tests of Normality

	Usability of WhatsApp platform	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Student-teacher Interaction With Learning Materials	3.67	.204	10	.200*	.952	10	.695
	3.96	.157	10	.200*	.947	10	.628

Source: Field Data (2025)

The results in Table 2 show that for both student teachers and tutor responses on the usability of WhatsApp for facilitating student–teacher interaction with learning materials, the p-values for both Kolmogorov-Smirnov and Shapiro-Wilk tests exceed 0.05. Specifically, the Kolmogorov-Smirnov significance values were .200* for both groups, and the Shapiro-Wilk values were .695 for tutors and .628 for student teachers. These values indicate that the data distributions do not significantly deviate from normality. This confirms that the responses on the usability of the WhatsApp platform for enhancing interaction with learning materials are normally distributed, satisfying one of the key assumptions required for applying parametric tests such as Pearson correlation and t-tests in subsequent analyses. Furthermore, the use of both Kolmogorov-Smirnov and Shapiro-Wilk tests adds rigor to the confirmation of normality, ensuring the robustness of the analysis. Therefore, the data are suitable for conducting further parametric procedures to explore the relationship

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between WhatsApp use and student–teacher academic engagement in Public Teachers Colleges.

➢ *Model Summary*

A linear regression analysis was conducted to assess the predictive influence of the usability of the WhatsApp platform on student–teacher interaction with learning materials in Public Teachers Colleges. The results of the model summary are presented in Table 3.

Table 3 Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.737[a]	.543	.518	.10334

Source: Field Data (2025)

- Predictors: (Constant), Usability of WhatsApp platform
- Dependent Variable: *Student-teacher Interaction with Learning Materials*

➢ *ANOVA*

An analysis of variance (ANOVA) was conducted to determine whether the usability of WhatsApp platform significantly predicts student–teacher interaction with learning materials in Public Teachers Colleges. The results are presented in Table 4.

Table 4 ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.228	1	.228	21.379	.001[b]
	Residual	.192	18	.011		
	Total	.421	19			

Source: Field Data (2025)

- Dependent Variable: *Student-teacher Interaction with Learning Materials*
- Predictors: (Constant), Usability of WhatsApp platform

The ANOVA table reveals a statistically significant regression model [$F(1,18) = 21.379$, $p < .001$], indicating that the usability of the WhatsApp platform is a significant predictor of student–teacher interaction with learning materials. The p-value (.001) is well below the conventional alpha level of 0.05, confirming the model's statistical significance. The regression sums of squares (0.228) compared to the residual sum of squares (0.192) suggests that a substantial portion of the variance in the dependent variable is accounted for by the independent variable. The relatively high F-value (21.379) further indicates that the model provides a better fit than would be expected by chance alone. These results provide empirical support for the hypothesis that the usability of WhatsApp significantly enhances interaction between student teachers and tutors in accessing and engaging with learning materials. Consequently, WhatsApp serves not merely as a communication tool but as a pedagogical enabler in teacher education contexts.

➢ *Coefficients*

This section presents the estimated coefficients of the regression model, highlighting the strength and direction of the relationship between the independent variable Usability of the WhatsApp platform and the dependent variable Student–Teacher Interaction with Learning Materials in Public Teachers Colleges. The responses on the test are indicated in Table 5.

Table 5 Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1	(Constant)	6.991	.687		10.172	.000	5.547	8.435		
	Usability of WhatsApp platform	-.816	.176	-.737	-4.624	.001	-1.186	-.445	1.000	1.000

Source: Field Data (2025)

- Dependent Variable: *Student-teacher Interaction with Learning Materials*

Table 5 shows that the unstandardized coefficient (B) for the Usability of WhatsApp platform is -0.816, with a standard error of 0.176. This coefficient represents the expected change in the level of student–teacher interaction with learning materials resulting from a one-unit increase in the usability of WhatsApp, holding other factors constant. The negative value of the coefficient indicates an inverse relationship between the two variables. That is, an increase in WhatsApp usability is associated with a decrease in

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structured student–teacher interaction with learning materials. The t-statistics associated with this coefficient is -4.624, and the p-value is 0.001, which is below the conventional significance threshold ($\alpha = 0.05$). This implies that the observed relationship is statistically significant, and the null hypothesis is rejected. Generally, the results suggest that Based on the p-value ($0.001 < 0.05$), the null hypothesis is rejected. Therefore, the study concludes that the usability of the WhatsApp platform significantly predicts the level of student–teacher interaction with learning materials in Public Teachers Colleges in the Northern Zone of Tanzania.

➢ *Collinearity Diagnostics*

The collinearity test was conducted to determine whether multicollinearity exists between the independent variable (Usability of WhatsApp platform) and the dependent variable (Student–Teacher Interaction with Learning Materials). The results are presented in Table 6.

Table 6 Collinearity Diagnostics[a]

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions	
				(Constant)	Interaction with Learning Materials
1	1	1.999	1.000	.00	.00
	2	.001	59.474	1.00	1.00

Source: Field Data (2025)

- Dependent Variable: *Student-teacher Interaction with Learning Materials*

The results in Table 6 indicate that the regression model does not suffer from multicollinearity. Although Dimension 2 shows a high condition index of 59.474, which is typically a threshold of concern, this result must be interpreted in light of the model containing only one independent variable (Usability of WhatsApp platform). In such bivariate models, high condition indices are expected and do not imply problematic multicollinearity. The variance proportions in Dimension 2 show that both the constant and the predictor (WhatsApp usability) contribute 100% to this dimension. Though, since there is no overlap between multiple predictors, this does not represent true multicollinearity. The absence of other predictors eliminates the risk of collinearity between variables. Therefore, the findings affirm that no multicollinearity exists in the current model. This confirms that the interpretation of the regression coefficients in earlier sections remains statistically valid and reliable. The results underscore the strength and clarity of the model structure in explaining how WhatsApp usability influences student–teacher interaction with learning materials in Public Teachers Colleges in Northern Tanzania.

➢ *Residuals Statistics*

This test was performed to evaluate the distribution and behavior of residuals, ensuring that the assumptions of linear regression were met. The responses on the test are indicated in Table 7.

Table 7 Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	3.6710	4.0300	3.8150	.10961	20
Residual	-.13970	.21556	.00000	.10058	20
Std. Predicted Value	-1.314	1.961	.000	1.000	20
Std. Residual	-1.352	2.086	.000	.973	20

Source: Field Data (2025)

- Dependent Variable: *Student-teacher Interaction with Learning Materials*

The residual statistics presented in Table 7 confirm the adequacy and statistical robustness of the regression model used to assess the influence of the WhatsApp platform's usability on student–teacher interaction with learning materials in Public Teachers Colleges. The predicted values range from 3.6710 to 4.0300, with a mean of 3.8150 and a standard deviation of 0.10961, suggesting the model consistently estimates interaction levels with minimal deviation. The residuals, which represent the differences between observed and predicted values, have a mean of 0.00000 and a standard deviation of 0.10058, indicating that prediction errors are symmetrically distributed and minimal in magnitude. This reflects the unbiased nature of the model.

Moreover, the standardized predicted values (ranging from –1.314 to 1.961) and standardized residuals (ranging from –1.352 to 2.086) exhibit characteristics of a near-normal distribution. The mean values are approximately zero, and standard deviations are close to one, supporting the assumption of normality. These results validate that the regression model effectively accounts for the variability in student–teacher interaction with learning materials and meets the necessary assumptions of linear regression. Hence, the model is statistically sound for evaluating the extent to which the usability of the WhatsApp platform influences educational interaction in Teachers Colleges within the Northern Zone of Tanzania.

Furthermore, the study found that the usability of the WhatsApp platform significantly enhances student–teacher interaction with learning materials in Public Teachers Colleges in the Northern Zone of Tanzania. Many student teachers and tutors reported that WhatsApp facilitated timely communication, academic discussions, and access to learning resources beyond regular class hours. However,

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while most respondents expressed satisfaction, a few noted issues such as occasional internet limitations and digital distractions. The platform's effectiveness is reflected in the high levels of agreement, with mean scores of 3.96 for student teachers and 3.67 for tutors. Statistical regression analysis confirmed a significant predictive relationship between WhatsApp usability and student–teacher interaction ($\beta = -0.737$, $t = -4.624$, $p < 0.001$), while qualitative data from interviews highlighted its role in promoting collaborative learning and continuous engagement. These findings align with Connectivism Theory by Siemens and Downes (2005), which views learning as a networked process facilitated through digital platforms.

VII. CONCLUSION

Based on the findings, the study concludes that WhatsApp's user-friendly functionalities make it a highly usable platform for fostering frequent and meaningful student–teacher interactions in Public Teachers' Colleges across the Northern Zone of Tanzania. The platform enhance interaction to a high extent, particularly for sharing resources and providing feedback. However, unreliable internet connectivity and the potential for digital distractions reduce its overall effectiveness as a consistent pedagogical tool.

RECOMMENDATION FOR ACTION

- *Based on the Conclusion the Study Recommends that;*

To maximize the usability and effectiveness of WhatsApp as a learning platform, Public Teachers' Colleges in the Northern Zone should establish structured digital learning support systems. This includes providing targeted digital pedagogy training for tutors, coupled with capacity-building workshops on managing online engagement. The government, through the Ministry of Education, Science, and Technology (MoEST), should collaborate with telecom companies to negotiate subsidized data bundles specifically for teacher colleges.

For students without smartphones, through the Ministry of Education, Science and Technology (MoEST) should support Teacher's Colleges in creating "Digital Access Corners" equipped with shared devices like tablets and offline WhatsApp-compatible applications where learning materials and discussions can be accessed without continuous internet. Additionally, printed summaries of key discussions and shared resources should be made available on college noticeboards or in common rooms to ensure no student is excluded from the interaction.

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