Contextual factors' Correlates on Teachers' ICT Beliefs and their ICT use in urban slum public basic schools in Ghana

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Abstract

This study examined the implementation of Information and Communications Technology for Education (ICT4E) in public basic schools situated in urban slums in Ghana. The research focused on contextual factors, teachers' ICT beliefs, and the extent of ICT usage in these educational settings. The primary objective is to investigate the relationships between contextual factors, teachers' beliefs about ICT, and their actual use of ICT in the classroom. Data were collected from 179 randomly selected teachers through a structured questionnaire using a cross-sectional survey design. The collected data were then analyzed using IBM SPSS v.26 and Pearson's correlation coefficient to examine the associations between the variables. The results reveal a weak but statistically significant relationship between contextual factors and teachers' ICT usage, suggesting that the environmental context plays a role in ICT adoption, albeit with limited influence. The study also finds a weak and statistically insignificant relationship between contextual factors and teachers' ICT beliefs, indicating that external conditions may not heavily impact teachers' attitudes toward ICT. Furthermore, the study identifies a very weak but statistically significant relationship between teachers' ICT beliefs and their ICT usage, implying that teachers' beliefs do have a minimal role in how they integrate technology into their teaching. The findings underscore the significance of considering contextual factors when implementing ICT in schools, particularly in resource-constrained environments such as urban slums. The study advocates for comprehensive and targeted interventions that address both the contextual challenges and the need to foster positive ICT beliefs among teachers. These interventions are crucial for establishing equitable and high-quality technology-enhanced learning environments that can yield long-term educational benefits.

1. Introduction

Information and Communications Technology for Education (ICT4E) is recognized as a powerful tool for enhancing educational outcomes in disadvantaged settings. ICT integration in education aims to improve learner engagement, make learning enjoyable, bridge the educational divide, improve access to quality education, and prepare students for the global knowledge economy. However, implementing ICT4E initiatives in urban slum schools presents unique challenges due to the obvious challenges in these environments. Urban slum areas in Ghana are characterized by overcrowding, inadequate infrastructure, and limited access to basic services, including education. Schools in these areas struggle with resource scarcity, underqualified teachers, and high student-to-teacher ratios, resulting in poor educational outcomes (Njihia et al., 2021). Despite these challenges, ICT4E offers alternative learning platforms, improved teacher training, and access to educational resources.

Existing literature highlights the potential benefits of ICT4E in disadvantaged settings (Azmi, 2017; Henderson, 2020; Livingstone, 2012). ICT4E could enhance learning outcomes through interactive and engaging content, digital literacy development, and differentiated instruction. However, infrastructural limitations such as unreliable electricity, poor internet connectivity, and high technology costs hinder ICT4E effectiveness (Asongu & Boateng, 2018). Limited government support and inadequate teacher training also raise sustainability concerns (Rueda & Cerero, 2019). It is unclear whether these contextual

factors impact ICT4E in these urban slum schools particularly on teachers' ICT use and teachers' ICT beliefs.

This study explores the role of contextual factors and teachers' ICT beliefs in ICT4E implementation in urban slum schools in Ghana with the aim to understand the influence of these factors on ICT4E in disadvantaged settings with limited educational technology resources. The study also considers the broader implications of ICT4E for educational equity and inclusion, aligning with the Sustainable Development Goals (SDGs) related to quality education and reducing inequalities. This research provides insights for policymakers, educators, and stakeholders in the education sector. It aims to optimize ICT4E strategies for effective and sustainable implementation in challenging environments. Ultimately, it seeks to bridge the educational divide, promote social and economic inclusion, and reduce inequalities in urban slum areas in Ghana.

This study is guided by the following research questions:

- To what extent do contextual factors in urban slum public schools influence teachers' ICT use in classrooms?
- What is the relationship between contextual factors and teachers' ICT beliefs in urban slum public schools in Ghana?
- How well do teachers' ICT beliefs adequately predict their ICT use in urban slum public schools in Ghana?

The framework in Fig. 1 illustrates the interactions of these variables to achieve effective ICT4E implementation in resource constrained environments.

Figure 1 represents the interaction among Teachers' ICT beliefs, Contextual Factors, Teachers' ICT use and ICT4E. Teachers' ICT beliefs represent their attitudes, perceptions, and values about using ICT in education. This study suggests that these beliefs influence teachers' use of ICT, which is in turn influenced by contextual factors. Teachers' ICT use refers to how teachers integrate ICT tools like computers, tablets, projectors, online resources, and educational software into their teaching. It includes the frequency, variety, and purpose of ICT integration, such as using technology in lesson plans, interactive teaching methods, and engaging students through ICT tools. These factors could be influenced by teachers' ICT beliefs and contextual factors, which ultimately affect the effectiveness of ICT4E implementation in schools.

Contextual factors consist of environmental and situational factors, such as school infrastructure, availability of ICT resources, socio-economic conditions, school leadership, and community involvement in urban slum schools. These factors could either facilitate or hinder effective ICT4E implementation by influencing teachers' ICT beliefs and use. Favourable contextual factors would positively impact ICT use resulting in effective ICT4E implementation in schools. ICT4E implementation is the central outcome of

the model, connected to teachers' ICT use and beliefs. It represents the result of the interaction between these three factors. Effective ICT4E implementation depends on how well these elements align and reinforce each other in the context of urban slum schools, indicating that the way teachers use ICT directly impacts the success of ICT4E initiatives.

2. Review of Related Literature

The integration of Information and Communication Technology for Education (ICT4E) in disadvantaged settings has gained attention in educational research. ICT4E is often seen as a way to improve educational outcomes in underserved communities. However, the success of ICT initiatives in these settings depends on infrastructure, socioeconomic conditions, and teachers' beliefs and attitudes towards technology.

The implementation of ICT in education is influenced by the contextual factors within the environment it is used. In urban slum schools, where resources are scarce, barriers could hinder effective ICT integration. Infrastructure is critical, and many schools in disadvantaged areas have limited access to electricity, internet connectivity, and necessary ICT hardware (Nkrumah et al., 2023; Wang et al., 2019). These challenges make it difficult for teachers and students to use ICT effectively, limiting the benefits of technology. Socioeconomic conditions also play a role as low-income students often lack access to ICT resources at home, exacerbating the digital divide (Aesaert et al., 2015). Schools in disadvantaged areas may struggle to attract and retain qualified teachers, who are crucial for effective ICT integration. The lack of professional development opportunities further compounds the problem as teachers may lack the necessary skills and confidence to incorporate ICT into their teaching (Stone, 2020).

Policy and support mechanisms also impact the use of ICT in urban slum schools. While national policies in Ghana emphasize the importance of ICT in education, implementation is often uneven, especially in disadvantaged areas (Natia & Al-Hassan, 2015). The availability of government or NGO support can determine whether schools in these settings can overcome barriers to ICT use. However, sustained and targeted interventions are needed to achieve meaningful integration of technology in the classroom. Teachers’ beliefs about ICT play a crucial role in determining how technology is used in the classroom. Teachers' attitudes towards ICT are influenced by their perceptions of its effectiveness, ease of use, and relevance to the curriculum (Ertmer & Ottenbreit-Leftwich, 2010; Fives & Buehl, 2017). Positive beliefs about the potential of ICT to enhance teaching and learning are associated with higher levels of technology integration. Conversely, if teachers perceive ICT as an additional burden or irrelevant to their teaching objectives, they are less likely to adopt it in their practices.

Ghana has made significant progress in promoting ICT in education through national policies and initiatives. The country's Education Strategic Plan (ESP) and the ICT in Education Policy emphasize integrating technology in schools to improve educational outcomes and digital literacy (ICT in Education Policy, 2015). However, implementing ICT4E in disadvantaged settings, such as urban slum schools, has been challenging and uneven.

Research shows that while some urban schools in more affluent areas have successfully integrated ICT into their curricula, schools in urban slums have struggled due to limited resources and infrastructure (Byker, 2014). Additionally, the lack of targeted interventions for slum schools has worsened existing inequalities in access to quality education (Mackinnon, 2017). The lack of support for teachers in these settings, especially in terms of training and professional development, further complicates the effective use of ICT in the classroom.

In urban slum schools, teacher beliefs about ICT are often shaped by their experiences with technology and the challenges they face in the classroom. Teachers in these settings may be skeptical about using ICT due to infrastructural limitations. Additionally, the lack of ongoing professional development and support can reinforce negative beliefs about ICT, leading to resistance or minimal use of technology in teaching. On the other hand, teachers who perceive ICT as a valuable tool for addressing the unique challenges of teaching in disadvantaged settings are more likely to innovate and integrate technology into their pedagogical practices.

Research has also shown that teachers' self-efficacy with ICT significantly influences their willingness to use technology in the classroom. Teachers who feel confident in their ability to use ICT are more likely to experiment with new tools and integrate them into their teaching (Stone, 2020). In contrast, those who lack confidence in their technological skills may avoid using ICT altogether, particularly in challenging environments like urban slum schools. This highlights the importance of providing teachers with adequate training and support to build their ICT competencies and confidence.

In Ghana, the integration of ICT in education has been a policy priority for several years, with various initiatives aimed at enhancing access to technology in schools. However, the implementation of these initiatives in urban slum schools has faced significant challenges due to contextual factors. Despite these challenges, there are instances where ICT has been successfully integrated into teaching in some disadvantaged schools, often due to the proactive efforts of teachers and school leaders who believe in the potential of technology to transform education. Studies on ICT4E in Ghana have highlighted the crucial role of teacher beliefs in the success or failure of ICT initiatives in disadvantaged settings. For example, Prasojo et al. (2019) found that teachers with positive attitudes towards ICT and perceived it as a useful tool for teaching were more likely to overcome barriers to ICT use. These findings underscore the need for targeted interventions that address material constraints of ICT integration and focus on changing teacher perceptions and building their capacity to use technology effectively. While infrastructural and socioeconomic challenges are significant barriers, teachers' attitudes towards ICT play a critical role in determining technology use. Addressing these challenges and fostering positive ICT beliefs among teachers is essential for success in disadvantaged settings.

3. ICT for Education (ICT4E) – the Global Perspective

ICT4E, or Information and Communication Technology for Education, involves using digital tools and resources in educational settings to enhance teaching, learning, and administration. ICT4E is believed to

improve education quality, increase access to learning, and promote innovative teaching methods. Developed countries in Europe, North America, and parts of Asia have successfully integrated ICT into their education systems with government support and investment in infrastructure, teacher training, and curriculum development. They have made advancements in digital literacy, personalized learning, and online platforms for education.

However, low- and middle-income countries face challenges in implementing ICT4E due to limited infrastructure, funding, and trained personnel. Efforts have been made to bridge the digital divide and improve education through programs like the One Laptop per Child (OLPC) initiative, which provides cost-effective laptops to children in developing nations. These programs demonstrate a global commitment to integrating ICT in education for educational equity. One of the main advantages of ICT4E is its ability to promote educational equity by providing marginalized populations with access to quality education. ICT can overcome barriers like geographic limitations, socioeconomic disparities, and disabilities, making education more inclusive and diverse.

4. Population and Educational Challenges Urban Slums

Urban slums are densely populated areas in cities with inadequate housing, poor infrastructure, and limited access to essential services. They emerge due to rapid urbanization, poverty, and socio-economic inequalities. The population in urban slums is diverse, including migrants from rural areas, low-income families, and marginalized communities. According to a report by the United Nations Human Settlements Programme (UN-Habitat), nearly one billion people worldwide live in slums, representing about 30% of the urban population in developing regions (UN-Habitat, 2016). In Ghana, the slum population is 30.4% (5.5m) of the urban population, facing challenges such as poverty and illiteracy (The World Bank, 2021). These areas have high population density, limited access to clean water, sanitation, and healthcare, leading to adverse living conditions.

Education in urban slums faces various challenges that hinder academic progress. These challenges include infrastructure deficiencies, socio-economic barriers, quality of education, and access to technology (Bird et al., 2017). Addressing these challenges requires comprehensive interventions that meet the socio-economic and infrastructural needs of these communities. Access to quality education for children in slums is vital for breaking the cycle of poverty and promoting sustainable urban development.

5. Methodology

This study used a cross-sectional survey design to explore how contextual factors and teachers' ICT beliefs influence the use of ICT in teaching in urban slum schools in Ghana. The design allowed for the collection and analysis of quantitative data from teachers at a time to investigate the phenomenon. The study was conducted in 20 randomly selected Junior High Schools out of 26 schools located in 11 identified slum settings in two major cities in Ghana. These settings were chosen based on the list of

urban slums provided by Adam et al. (2023) and Takyi et al. (2021). The focus of the study was on teachers in these schools, as they play a crucial role in implementing and integrating ICT in teaching.

A multi-stage sampling technique was used for this study. In the first stage, 11 slum settings were purposively selected based on availability of schools in the urban slum community. In the second stage, 20 Junior High Schools were randomly selected from these slum settings. Finally, 179 out of 312 teachers from the selected schools were randomly chosen to participate in the study using (Yamane, 1967) minimum sample estimation formula. This sample size was considered adequate to gain a comprehensive understanding of the study.

Data were collected using a self-designed closed-ended questionnaire specifically created for this study. The questionnaire collected information on teachers' demographic characteristics, ICT beliefs, contextual factors influencing ICT use, and the extent of ICT integration in their teaching practices. Before the main data collection, the questionnaire was pre-tested in a similar setting to ensure its clarity, relevance, and comprehensiveness. Feedback from the pre-test was used to refine the questionnaire, paying particular attention to the content and wording of the items. The questionnaire's validity was also ensured through a content review by experts in educational research and ICT. To assess the reliability of the questionnaire, Cronbach's alpha coefficient was computed using the pre-test data. The alpha coefficient was used to evaluate the internal consistency of the items, ensuring that the questionnaire reliably measured the constructs of interest. A Cronbach's alpha value of 0.7 or higher was considered acceptable for this study (Vaske et al., 2017).

Data collection involved administering the final version of the questionnaire to the 179 randomly selected teachers in the 20 Junior High Schools. The responses were coded and entered into IBM's SPSS version 26 for analysis. Descriptive statistics, including frequencies, means, and standard deviations, were generated to summarize the data. Pearson's correlation coefficient was used to assess the relationships between the study variables. Specifically, the analysis focused on three key relationships: the relationship between contextual factors and teachers' ICT use, the relationship between contextual factors and teachers' ICT beliefs, and the relationship between teachers' ICT beliefs and their ICT use. Pearson's correlation coefficient was chosen for its ability to measure the strength and direction of linear relationships between continuous variables (Pallant, 2020).

Ethical approval for the study was obtained from my institutional review board. Informed consent was secured from all participating teachers, and they were assured of the confidentiality of their responses. Participation in the study was voluntary, and teachers were free to withdraw at any time without any consequences. The methodological approach adopted in this study was designed to provide robust and reliable insights into the influence of contextual factors and teachers' ICT beliefs on ICT use in urban slum settings in Ghana.

6. Data Presentation, Interpretation and Discussion

The study involved 200 teachers, specifically Junior High School teachers selected from eleven (11) urban slum communities in two cities in Ghana. However, 21 questionnaires could not be retrieved. The analysis and discussions of the data were based on the 179 respondents whose questionnaires were retrieved. The data on the background characteristics of the teachers revealed that they possessed various levels of professional teacher qualifications, ranging from Diploma in Basic Education to Master of Education. The data showed that many of the teachers (59.8%) had qualifications in Bachelor of Education, while 34% had other teacher professional qualifications.

This confirmed existing data that most teachers in Junior High Schools have teacher professional qualifications. It was also evident that 76% of the respondents were males, which is consistent with national data. The background data revealed that more than half of the teachers (56.4%) were below thirty-six (36) years indicating that they were youthful. Majority of the teachers have teaching experiences below seven years which made them early career teachers.

7. Results and Discussion

The results and discussion of the analysis are presented in the ensuing sections according to the research questions.

7.1. Teachers' Contextual Factors on ICT Use in Urban Slum Public Basic Schools

Table 1 presents teachers' responses on their perceptions of contextual factors that could influence their ICT use in urban slum public schools. These were 12 items on the questionnaire and the responses were interpreted using means, mean ranges and standard deviation to determine the direction of the responses. The mean ranges used for the interpretation were based on a five-point Likert type scale as: SD = Strongly Disagree (1. 00–1. 79); D = Disagree (1.80–2.59); N = Neutral (2.60–3.39); A = Agree (3.40–4.19); and SA = Strongly Agree (4.20–5.00) as proposed by Sözen and Güven (2019).

Table 1
Contextual Factors that Influence Teachers' ICT Use

Statement	Mean	Standard Deviation	Rank
I have access to adequate ICT resources to use for teaching in my school	2.51	1.07	10th
I have access to adequate ICT resources to use for lesson preparation at home	2.99	1.18	8th
I have sufficient training on how to use ICT resources for teaching	3.12	1.05	7th
I am encouraged and supported by my colleague teachers to use ICT resources for teaching	3.78	0.89	4th
Adequate access to electricity in my community influences my ability to use technology resources for teaching	3.87	1.03	2nd
Adequate access to electricity in my school influences my ability to use technology resources for teaching	3.78	0.99	5th
I feel confident in my ability to use technology for teaching in school	3.88	0.87	1st
I feel confident in my ability to use technology for lesson preparation at home	3.87	0.97	3rd
I have reliable access to the internet for using technology for teaching at school	2.98	1.18	9th
I have reliable access to the internet for using technology for lesson preparation at home	3.41	1.15	6th
Cultural beliefs about gender or social roles limit my access to technology for teaching in school	2.45	1.12	11th
Cultural beliefs about gender or social roles limit my access to technology for lesson preparation at home	2.32	1.07	12th
Average	3.25	1.65	
Source: Field Data – Teacher's Questionnaire (September, 2023)			

The data on contextual factors influencing ICT use among teachers in urban slum schools reveals insights into the challenges and opportunities they face. As evident in Table 1, teachers reported limited access to ICT resources both in their schools and at home. The mean score of 2.51 for school access and 2.99 for home access fall within the "Disagree" and "Neutral" ranges, respectively, indicating insufficient access to these resources. The moderate standard deviations suggest variability in access among teachers, but overall, access remains a significant barrier to effective ICT integration in teaching.

In terms of training and support, the teachers expressed moderate levels of agreement regarding their training and the support they receive from colleagues. The mean score of 3.12 for sufficient training is within the "Neutral" range, indicating that while some training has been provided, it may not be fully

adequate. On the other hand, the mean score of 3.78 for colleague support falls within the "Agree" range, suggesting that teachers generally feel encouraged and supported by their peers to use ICT. The lower standard deviation for colleague support indicates that this experience is relatively consistent among the teachers, which is important for fostering a collaborative environment for ICT adoption. Teachers also reported high confidence in their ability to use ICT, both in school and at home, with mean scores of 3.88 and 3.87, respectively, both in the "Agree" range. These high confidence levels are critical for the successful implementation of technology in teaching. The low standard deviations in these responses reflect a consensus among teachers in their confidence, making it one of the strongest positive factors in ICT use.

Access to electricity also plays a significant role, with teachers reporting that both community and school access to electricity influence their ability to use technology for teaching. The mean scores of 3.87 for community access and 3.78 for school access both fall within the "Agree" range, indicating that electricity availability is generally reliable. However, the standard deviations suggest some variability, with some teachers experiencing more consistent access than others. Internet access, however, remains a challenge. The mean score of 2.98 for reliable internet access at school falls within the "Neutral" range, indicating that this is a significant barrier for teachers trying to integrate ICT into their teaching. The slightly better mean score of 3.41 for internet access at home, which falls in the "Agree" range, suggests that while teachers may have better internet access at home, it is still not entirely reliable but better than access in school.

Cultural beliefs about gender or social roles present another barrier, particularly at home. The mean scores of 2.45 for cultural limitations in school and 2.32 at home fall within the "Disagree" range, indicating that these beliefs do not indeed limit access to technology, especially in the home environment. The higher standard deviations in these responses appear to suggest diverse experiences among teachers, with some feeling more restricted by cultural beliefs than others.

The mean average of the means, calculated at 3.25, falls within the "Neutral" range on the five-point Likert type scale. This indicates that, overall, teachers neither strongly agree nor strongly disagree with the statements regarding ICT use. This neutral stance suggests that while there are some positive aspects (such as confidence in using ICT and support from colleagues), there are also significant challenges, particularly in access to ICT resources and reliable internet, as well as cultural barriers. The standard deviation of 1.65 is relatively high, indicating substantial variability in responses among teachers. This high variability suggests that while some teachers may have more favourable experiences with ICT access and usage, others face significant difficulties. This disparity could be due to differences in resources available at individual schools, varying levels of support, or differing personal circumstances, such as home internet access or cultural influences. In conclusion, the results suggest that while there is a moderate level of comfort and capability among teachers regarding ICT use, there is no strong consensus, and significant barriers remain. The high variability highlights the need for targeted interventions to address the specific challenges faced by different groups of teachers. These interventions should aim to create more uniform access to resources and support across the board.

7.2. Relationship between Contextual Factors and Teachers' ICT Use

This section presents the analysis of the assessment on the relationship between contextual factors and teachers' ICT use in urban slum public basic schools. The data was analysed using the Pearson's correlation coefficient to explore the relationship between these variables.

Table 2
Pearson's correlation for Teachers' ICT Use and their Contextual Factors

Variables		Teachers' ICT Use	Contextual Factors
Teachers' ICT Use	Pearson Correlation	1	.279**
	Sig.(2-tailed)		.000
	N	179	179
Contextual Factors	Pearson Correlation	.279**	1
	Sig.(2-tailed)	.000	
	N	179	179
Correlation is significant at the 0.01 level (2-tailed).**			
Pearson Correlation Interpretation: 0.800–1.00 (Positively Very Strong); 0.600–0.799 (Positively Strong); 0.400–0.599 (Positively Moderate); 0.200–0.399 (Positively Weak); 0.001–0.199 (Positively Very Weak); 0.000 (No correlation exist) (Wahyuni & Purwanto, 2020)			

The Pearson's correlation analysis in Table 2 which analysed the relationship between contextual factors and the use of ICT by teachers in urban slum public basic schools revealed that there is a positively weak but statistically significant relationship between these variables ($r(177) = .279$, $p = .000$). This suggests that improvements in contextual factors, such as access to ICT resources, training, and support, are associated with a slight increase in teachers' utilization of ICT in their teaching practices.

Despite the weak strength of this correlation, the relationship is statistically significant, with a p-value of .000, which is well below the .01 significance threshold. This statistical significance indicates that the observed relationship is unlikely to have occurred by chance, and we can confidently assert that there is a real connection between contextual factors and ICT use among teachers in these schools. The implications of this finding are important for understanding how contextual factors influence ICT integration in education. Although the correlation is weak, it suggests that improving these factors may lead to better ICT adoption among teachers. However, the weak correlation also suggests that other unexamined factors may be influencing teachers' use of ICT. These could include individual characteristics of the teachers, the role of school leadership, or broader socio-economic conditions that were not captured in this analysis.

7.3. Relationship between Contextual Factors and Teachers' ICT Beliefs

This section presents the analysis of the assessment on the relationship between contextual factors and teachers' ICT beliefs in urban slum public basic schools. The data was analysed using Pearson's correlation coefficient to explore the relationship between these variables. The data is presented in Table 3.

Table 3
Pearson's correlation for Teachers' ICT Beliefs and their Contextual Factors

Variables		Teachers' ICT Beliefs	Contextual Factors
Teachers' ICT Beliefs	Pearson Correlation	1	− .127
	Sig.(2-tailed)		.091
	N	179	179
Contextual Factors	Pearson Correlation	− .127	1
	Sig.(2-tailed)	.091	
	N	179	179
Pearson Correlation Interpretation: 0.800–1.00 (Positively Very Strong); 0.600–0.799 (Positively Strong); 0.400–0.599 (Positively Moderate); 0.200–0.399 (Positively Weak); 0.001–0.199 (Positively Very Weak); 0.000 (No correlation exist) (Wahyuni & Purwanto, 2020)			

The results presented in Table 3 illustrate that the Pearson's correlation coefficient is indicating a weak inverse relationship between teachers' ICT beliefs and their contextual factors ($r(177) = -.127$, $p = .091$). This suggests that as contextual factors in the teachers' environment become more challenging, teachers' positive beliefs about ICT may slightly decrease. The significance level of .091 implies that the observed correlation is not statistically significant. This suggests that the relationship between contextual factors and teachers' ICT beliefs may be attributed to random chance rather than an actual association. Therefore, based on the available data, it is not possible to confidently conclude that the contextual factors have a meaningful impact on teachers' beliefs about ICT use in urban slum public basic schools. In sum, the analysis reveals a very weak and statistically insignificant negative relationship between the contextual factors teachers face and their beliefs about ICT. It is possible that other variables, not accounted for in this study, may have a greater influence on shaping teachers' ICT beliefs, or that the contextual factors examined may not significantly impact these beliefs in the studied context. Further research could investigate additional variables or employ different methodologies to gain a better understanding of the factors influencing teachers' ICT beliefs in such environments

7.4. Relationship between Teachers' ICT Beliefs and their ICT Use

This section presents an analysis of the assessment conducted on the correlation between teachers' ICT beliefs and their ICT use in urban slum public basic schools. The data was analysed using Pearson's correlation coefficient to examine the relationship between these variables. The results of the analysis is presented in Table 4.

Table 4
Pearson's correlation for Teachers' ICT Beliefs and their ICT Use

Variables		**Teachers' ICT Beliefs**	**Teachers' ICT Use**
Teachers' ICT Beliefs	Pearson Correlation	1	.168
	Sig.(2-tailed)		.024*
	N	179	179
Teachers' ICT Use	Pearson Correlation	.168	1
	Sig.(2-tailed)	.024*	
	N	179	179
Correlation is significant at the 0.05 level (2-tailed).*			
Pearson Correlation Interpretation: 0.800–1.00 (Positively Very Strong); 0.600–0.799 (Positively Strong); 0.400–0.599 (Positively Moderate); 0.200–0.399 (Positively Weak); 0.001–0.199 (Positively Very Weak); 0.000 (No correlation exist) (Wahyuni & Purwanto, 2020)			

It is evident from Table 4 that the Pearson's correlation coefficient for teachers' ICT beliefs and their ICT use in urban slum public basic schools revealed a positively very weak but significant correlation ($r(177) = .168$, $p = .024$). Given the significant correlation at $p = .024$, it can be deduced that there exists a modest association between teachers' beliefs regarding ICT and their actual utilization of ICT in teaching practices. This further suggests that the observed relationship is unlikely to have arisen by chance, thereby bolstering the credibility of the finding. However, the weak value of the correlation indicates that teachers' beliefs about ICT do not strongly predict their ICT usage within this specific context. This outcome may be attributed to various constraints that restrict ICT implementation, such as limited access to resources or infrastructure challenges present in urban slum schools, which may overshadow personal beliefs.

Consequently, this implies that while a positive relationship exists—whereby an increase in teachers' positive beliefs about ICT coincides with an increase in their ICT usage—the strength of this relationship remains minimal. This suggests that other factors, such as resource availability, training opportunities, or external support, may exert a greater influence on teachers' ICT usage than their beliefs alone. In sum, although teachers' ICT beliefs demonstrate a statistical relationship to their ICT usage, the weak

correlation indicates that beliefs alone may not significantly drive the integration of ICT in teaching. This underscores the importance of addressing additional contextual and structural factors that may better facilitate and enhance ICT integration in these educational institutions

7.5. Findings and Discussions

This present study sought to examine the relationships between teachers' ICT use, their contextual factors, and their beliefs about ICT in urban slum public basic schools. The findings reveal a complex interplay between these variables, with several significant but weak correlations that provide important insights into the factors influencing ICT integration in these challenging educational environments.

This finding on the correlation between teachers' ICT use and their contextual factors aligns with existing literature that emphasizes the role of external factors in enabling or hindering ICT integration in schools. For instance, Farjon et al. (2019) argue that access to technology and institutional support are crucial determinants of teachers' ability to incorporate ICT into their classrooms. Similarly, Pima and Sedoyeka (2016) found that barriers such as insufficient ICT infrastructure and inadequate training significantly limit teachers' ICT use. Therefore, while the relationship observed in this study is weak, it reinforces the notion that contextual improvements are essential for enhancing ICT utilization among teachers, particularly in under-resourced settings like urban slum schools.

The weak inverse relationship found between teachers' ICT beliefs and their contextual factors could be explained by the frustration and demotivation that teachers may experience when they believe in the potential of ICT but are unable to realize its benefits due to external constraints. This finding highlights a potential erosion of confidence and optimism about ICT use in the face of persistent environmental barriers. As noted by Tondeur et al. (2017), teachers' beliefs about ICT are often shaped by their experiences and the practicality of using technology in their specific contexts. When the environment does not support effective ICT use, even teachers with initially positive attitudes may become disillusioned, leading to a decline in their beliefs about the value and feasibility of integrating ICT in their teaching. It underscores the need for systemic improvements to support not only the practical aspects of ICT use but also to sustain teachers' positive attitudes toward technology.

The finding that there is a positively weak but statistically significant correlation between teachers' ICT beliefs and their ICT use is consistent with previous research, which has shown that while positive attitudes toward ICT are necessary for its integration, they are not sufficient on their own. Ottenbreit-Leftwich et al. (2018) emphasize that a variety of factors, including access to resources, training, and support, play critical roles in determining whether teachers can translate their beliefs into actual practice. This suggests that even when teachers believe in the benefits of ICT, other barriers may prevent them from fully integrating technology into their teaching, highlighting the multifaceted nature of ICT adoption, where beliefs, contextual factors, and practical constraints all interact to influence outcomes.

8. Implications for Practice and Recommendations

The findings of this study indicate that structural and contextual barriers have a more significant impact on ICT use than previously thought. It calls for the need to address these practical barriers to facilitate the integration of ICT in teaching. This could involve improving infrastructure, providing adequate ICT resources, and ensuring reliable electricity and internet access in schools. It is evident that comprehensive support systems are necessary to go beyond cultivating positive attitudes towards technology alone. District education directorates should design professional development programmes to enhance teachers' ICT skills and offer ongoing support, mentorship, and collaboration opportunities. It could include establishing peer networks where teachers can exchange best practices, troubleshoot issues, and receive encouragement from colleagues who have successfully incorporated ICT into their teaching.

While teachers' beliefs about ICT are important, this study suggests that they do not significantly drive ICT use. Therefore, training programmes for teachers should be more focused, targeting practical skills that directly address the specific challenges teachers face in using technology. Training should be tailored to the unique conditions of urban slum basic schools and should incorporate hands-on, scenario-based learning that empowers teachers to overcome the specific obstacles they encounter in their teaching environments.

This study further calls for policymakers to allocate educational technology resources effectively and equitably by ensuring that all teachers have the necessary tools and conditions to use ICT in their classrooms. This might require investing in infrastructure improvements in under-resourced schools and providing teachers with the technology and materials needed to implement ICT-based teaching strategies. Policies should also prioritize bridging the gap between teachers' positive beliefs and their actual ability to use ICT by addressing the external factors that hinder ICT adoption. The findings suggest that external factors, such as cultural beliefs and environmental conditions, may have a greater influence on ICT use than previously assumed. It is important educational stakeholders to consider these cultural and environmental factors when developing interventions to promote ICT integration.

Declarations

Declaration of Competing Interest

The author one and corresponding author, Issah Baako, declares that he has no conflict of interest to this work.

The author two, Eric Opoku Osei, declares that he has no conflict of interest to this work.

The author three, Winston Kwame Abroampa, declares that he has no conflict of interest to this work.

For studies with human subjects and animals

This study conformed with the Helsinki Declaration of 1975, as revised in 2008 (5) concerning Human Rights, and the policy concerning Informed Consent as shown on Springer.com was followed.

All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2008 (5). Informed consent was obtained from all respondents for being included in the study.

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Figures

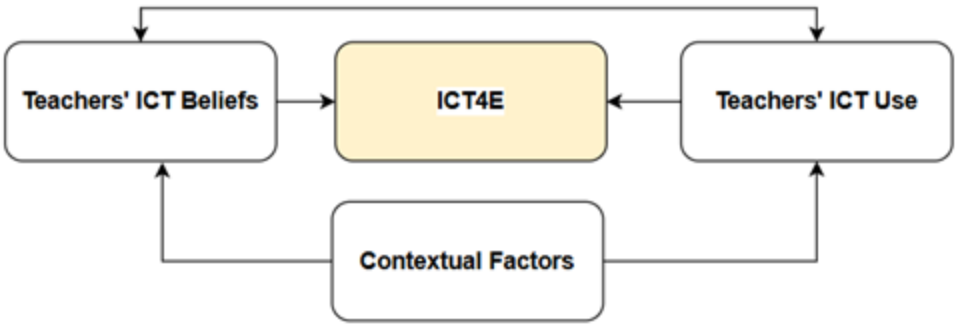

Figure 1

Conceptual Model