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Critical Factors That Shape the Pedagogical Integration of ICT in Technology-Rich Senior High Schools

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Abstract

The common belief is that providing technological tools and equipment leads to the pedagogical integration of ICT in schools. This study tested this idea by examining key factors and contextual barriers that influence how ICT is integrated pedagogically in technology-rich Senior High Schools in Ghana. Using a cross-sectional survey design, data were collected from 103 teachers in both public and private SHSs with modern ICT infrastructure. The study investigated important factors such as learning styles and needs, teacher motivation and incentives, teachers' perceived ease of use of technology, and ICT infrastructure. A multiple regression analysis revealed that teacher motivation/incentives and ICT infrastructure are significant predictors of the level of pedagogical ICT integration. These factors together explain 59.1% of the variation in ICT integration, while perceived ease of use and learning styles/needs were not significant predictors. Despite the availability of ICT resources, teachers highlighted contextual challenges, including a lack of technical skills, misalignment of technology with curriculum goals, difficulties in shifting to interactive learning methods, and promoting digital citizenship. These findings demonstrate that resources alone are insufficient; addressing pedagogical and systemic barriers is essential for meaningful ICT integration in SHSs. The implementation of sustainable technology integration in schools requires establishing policies which promote ICT-enhanced teaching methods, professional development and teacher motivation.

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Introduction

The educational community maintains an ongoing interest in how Information and communication technologies (ICT) should be integrated into the teaching and learning process. The educational process requires modern technology alignment since ICT integration produces visible benefits for student learning and engagement (Arkorful et al.,2021). The integration of ICT in Senior High Schools (SHSs) creates possibilities to enhance students' technological and computer literacy skills, particularly through digital collaboration and internet-based research and information evaluation (Aremu et al., 2020). However, the implementation of ICT integration in teaching and learning encounters institutional and systemic obstacles which reduce its effectiveness despite its potential benefits for student learning, engagement and academic performance (Fernández-Gutiérrez et al., 2020). Most research about ICT integration in SHSs has investigated gender and region together with subject and infrastructure (e.g. Dei, 2021; Arkorful et al., 2021) but excluded essential elements such as learning styles/needs, teacher motivation/incentives and teachers' perceived ease of use of available infrastructure. This study investigates the factors driving ICT integration within private and public SHSs that possess modern technology resources to understand the current status of ICT integration in SHSs with technological infrastructure. The research explores essential variables to develop evidence-based approaches for improving ICT integration in instructional practices. The success of ICT pedagogical integration depends on supporting teachers in developing their technology skills and confidence rather than merely installing modern ICT infrastructure (Dede et al., 2019). Teachers need both administrative and technical support alongside ICT infrastructure provision to effectively integrate these technologies into their classroom instruction (Pernia-Espinoza et al., 2020). Teachers' technological competence and their ability to choose appropriate software for instruction directly affect student learning outcomes (Churchill et al., 2016). The effectiveness of technology integration depends on both teacher ICT training, stable electricity and internet services, along with continuous professional development programs (Bingimlas, 2021; Amemasor et al., 2025). These problems require combined action from policymakers together with school leaders and teachers (Kirkman, 2020; Rosenberg & Koehler, 2015)

Statement of the Problem

The push to improve ICT infrastructure and digital tool access in Ghanaian SHSs has been significant. Initiatives like the Ministry of Education's connectivity project, which brought internet access to schools, the i-Box campus systems that offer digital content, and the OpenSTEM African virtual laboratories, among others (Ministry of Education, 2025), have really boosted access to modern ICT resources in schools. However, in many well-resourced SHSs, these advancements have not necessarily led to meaningful changes in teaching methods. The effective use of ICT in education remains random and often falls short of making a real impact. Teachers frequently rely on technology for basic tasks, such as looking up information and creating slides, instead of using it to foster student-centered activities, promote interactivity, engage students, and assess their learning (Asare & Okyere, 2020).

Teacher training programs need to match classroom requirements for successful technology integration in order to provide students with the required practical learning experiences (Gyamfi et al., 2025). Research shows that

the Ghanaian government's ICT for Accelerated Development (ICT4AD) policy failed to deliver promised classroom outcomes even though schools possess ICT infrastructure. The research conducted by Mintah et al. (2023) revealed that computers remained unused in instruction by 95.8% of teachers, while 83% of available computers lacked instructional software. The findings about ICT classroom success factors need further investigation to determine their actual influence on educational outcomes. Technology-rich schools face ongoing obstacles because they lack adequate technical assistance and teachers need ongoing professional development, and their institutions maintain traditional approaches to education and rigid curricula (Silva et al., 2023). The successful implementation of ICT integration in schools requires immediate solutions to these critical issues. This research aims to identify the elements and obstacles which determine successful ICT pedagogical integration in Ghanaian SHSs. The study will provide evidence-based recommendations for policy decisions and teacher support systems to improve technology-based education in Ghana.

Purpose of the Study

The purpose of the study is to investigate the factors influencing the pedagogical integration of ICT in technology-rich SHSs, aiming to inform policymakers and educational leaders about the necessary contextual conditions for ICT adoption in teaching and learning. Specifically, the study seeks to assess the predictive effect of ICT infrastructure, student learning styles and needs, teachers' perceived ease of use of existing technologies, teacher motivation, and institutional support on the level of ICT use in instructional practice. Additionally, the study aims to contribute to the existing body of knowledge by providing insights into the current state of ICT integration in Ghanaian technology-rich schools, thereby supporting evidence-based decision-making for enhancing technology-driven education.

Research Questions

1. To what extent do factors such as ICT infrastructure (ICTIF), Learning Styles and Learning Needs (LSLN), Teachers' Perceived Ease of Use (TPEU), and Incentives and Motivation for Teachers (IMT) and institutional support predict the level of ICT integration in teaching within technology-rich SHSs?
2. What contextual barriers hinder the effective integration of ICT in teaching despite the availability of ICT resources in SHSs?

Literature Review

Status of ICT Integration in Ghanaian SHSs

There has been mixed progress in the implementation of ICT policy regarding the integration of ICT in Ghanaian SHSs. Although there has been significant improvement in access to technology, challenges persist in integrating ICT in teaching and learning (Mensah & Adu, 2020). Over 70% of public secondary schools are equipped with ICT laboratories with computers and other digital equipment. Initiatives like the Ghana Online Learning Platform have also expanded access to digital educational resources (Arkorful et al., 2021). However, outdated software misaligned with the national curriculum, as well as limited professional development opportunities for teachers,

continue to hinder effective ICT integration (Mensah & Adu, 2020).

The lack of continuous professional development programs has reduced the overall impact of ICT on educational outcomes. The necessary knowledge and skills for technology integration in instructional practice are absent from practicing teachers (Asare & Okyere, 2020). The improvement in internet connectivity has not eliminated the ongoing resource distribution inequalities between rural and urban schools. More investments in modern ICT infrastructure, enhanced teacher professional development programs and the development of high-quality digital content tailored to the Ghana curriculum are needed to fully harness the potential of ICT in SHS education.

Factors That Influence Teachers' Integration of ICT in Their Instruction

The implementation of ICT in educational practices depends on multiple contextual elements. The current research identifies essential variables which determine the integration of ICT in classroom teaching methods. Stockdill and Moreshouse (1992) established that four fundamental elements, including user characteristics and content considerations, together with organizational capacity and technological factors, form the foundation of effective ICT integration. The educational technology adoption process heavily depends on the presence of factors which exist at the teacher, school and system levels according to Balanskat et al. (2007). This means that, successful deployment of technology relies on elements at both the individual and institutional levels.

Teachers' attitude toward technology integration along with institutional backing and continuous professional development, determines the adoption of ICT in education (Lim and Chai, 2018). Ghavifekr and Rosdy (2015) found in their Malaysian study that proper ICT infrastructure, together with continuous teacher training, results in successful ICT integration. The research by Gil-Flores et al. (2017) in Spain proves that classroom ICT implementation effectiveness depends on teacher factors, including self-efficacy perceptions, ICT training, educational software access and collaborative practices.

The use of ICT for teaching and learning is determined by personal characteristics, including the educational background of teachers, gender and years of teaching experience (Schiller, 2003; Campbell, 2020). According to Jones (2020) technology integration depends more on teacher preparedness and personality characteristics than physical school technology availability. Teachers who maintain positive technology attitudes along with strong implementation intentions and basic computer competency tend to integrate ICT into their educational practices (Liaw & Huang, 2015; Teo, 2018; Drent & Meelissen, 2018; Tatnall, 2020). The way a teacher feels about technology implementation directly affects their ability to effectively use ICT. A teacher's assessment of technology usefulness for teaching purposes determines their willingness to adopt it (Wilson, 2020; Hew & Brush, 2017).

The classroom adoption of ICT also depends on teachers' self-efficacy, together with their competence and their individual learning preferences and requirements (van Braak et al., 2010; Peralta & Costa, 2007). Teachers need to learn multiple application tools to achieve effective teaching. Teachers who lack technical proficiency face doubts about their ability to choose suitable technologies for classroom integration (Peralta & Costa, 2007). The

amount of work demands placed on teaching professionals affects their readiness to accept new technology. The combination of excessive course management, skill development, and administrative work prevents teachers from using technology in their educational activities according to Iftikhar (2016) and Plomp et al. (2020). The successful implementation of technology integration depends heavily on institutional factors, which include teacher access to technology and structured teacher development programs and leadership support (Anderson & Dexter, 2011; Plair, 2018).

Research findings continue to demonstrate that ICT integration in education depends on both personal characteristics and contextual conditions. Teye and Duah's (2022) study in Ghana reveals that ICT adoption depends on four essential factors, which include attitude, perceived usefulness, access to ICT tools and training and technical support. The research established that motivation, together with incentives, proved to be the most influential factors among all studied variables. The level of ICT integration in primary and secondary education depends mainly on teachers' pedagogical beliefs, according to Almerich et al. (2024). The research shows that national ICT in education policies do not match the actual classroom practices as documented by Abedi (2024). The educational sector maintains traditional teaching methods even though policies promote technology-based student-centered learning. The educational sector needs immediate professional development to match teacher beliefs with policy recommendations.

The systematic review performed by Martin et al. (2025) revealed new insights about how contextual elements affect ICT integration. Martin et al. (2025) identified four categories of factors which affect ICT integration: school-related, student-related, teacher-related and technology-related factors. The school-related factors consist of support, culture, background and curriculum while student-related factors consist of demographic details, affective, cognitive and behavioral aspects. Teacher-related factors consist of teacher conditions, beliefs and their backgrounds, while technology-related factors consist of ease of access and usability. Student cognitive engagement proved to be the main factor that supports ICT integration, yet teacher technostress acted as a barrier to successful implementation. The study shows that ICT integration success depends on more than infrastructure. Teachers' perception of technology as easy to use, their learning style and needs, their motivation levels, institutional support and policy objectives that match educational content and classroom teaching methods are imperative.

Methodology

A cross-sectional survey design, targeting teachers from technology-rich public and private schools, was used in the study. The target population was 230 teachers in both public and private schools. The public schools were Accra Academy (100) and St. Mary's SHS (70), while the private schools were Apostle Sarfo SHS (35) and Ideal College (25) (see Table 1). Using Yamane's (1967) formula with a 95% confidence interval, a sample size of 150 academic staff was determined as representative of the study population. However, out of 150 questionnaires distributed to the sample size, only 103 were retrieved successfully and used for the data analysis, representing a 68.67 % response rate.

Table 1. Sample Size Categories

Schools	Classification	Total population	Sample Size
Accra Academy SHS	Public	100	50
St. Marries SHS	Public	70	50
Apostle Sarfo SHS	Private	35	25
Ideal College	Private	25	25
Total		**230**	**150**

Sampling Method

A convenience sampling method was used to select teachers from the chosen SHSs due to cost and time efficiency. Convenience sampling involves selecting participants based on their easy accessibility rather than random selection, making it suitable for exploratory research or studies with limited resources and tight timelines (Salkind, 2010). While not as rigorous as random sampling, it is often the most practical choice when other methods are not feasible due to resource or access constraints (Creswell & Creswell, 2017).

Data Collection Instrument

The primary data collection instrument was a questionnaire. The questionnaire combined validated scales from different sources. Infrastructure and Support scales were adopted from Eze et al. (2021), Ease of Use and Self-Efficacy scales were adopted from Teo (2009), Motivation and Adapt learning-style scales were adopted from Al-Awidi and Aldhafeeri (2017). To establish validity, the instrument was reviewed by experts in ICT education research, followed by a pilot test with 20 teachers who shared characteristics with the study sample. Feedback from experts and the pilot test was incorporated to refine the instrument. Additionally, the reliability of the questionnaire was assessed using Cronbach's Alpha coefficient, which fell within the acceptable range of 0.70 to 0.90 (see Table 2), as suggested by Creswell and Creswell (2017).

Table 1. Reliability

Factors	Cronbach's Alpha	Cronbach's Alpha Based on Standardized items	N of Items
1	.811	.818	10
2	.728	.743	10
3	.723	.705	10
4	.731	.725	10
5	.911	.916	10

Data Collection and Analysis

Data were collected through self-administered hard-copy questionnaires, accompanied by an introductory letter and an ethical consent form. The questionnaires were distributed over a week, and responses were received within three weeks, with a 25% delay due to bureaucratic procedures in schools. The final response rate was 68.6% (103

out of 150), which provided an adequate representation of the sample. Data analysis was done using Statistical Package for the Social Sciences (SPSS). Descriptive statistics and multiple linear regression were applied to answer the research questions.

Results

Demographics About Participants

From Table 3, Accra Academy was the most represented school in the survey, constituting 36.9% (n = 38) of the participants. This was followed by Apostle Safo School of Arts and Science, comprising 24.3% (n = 25) of the participants. Ideal College was next, making up 23.3% (n= 24) of the participants. Then, finally, St. Mary's SHS, the least represented among the four, with 15.5% (n = 16) of the participants.

Table 3. Various Schools of the Participants

	Frequency	Per cent	Cumulative Percent
Accra Academy	38	36.9	36.9
Apostle Safo School of Arts and Science	25	24.3	61.2
ideal college	24	23.3	84.5
St. Mary's SHS	16	15.5	100.0
Total	103	100.0	

The majority of the participants (70%, n= 72) were males, and 30% (n=31) were females as shown in Figure 1.

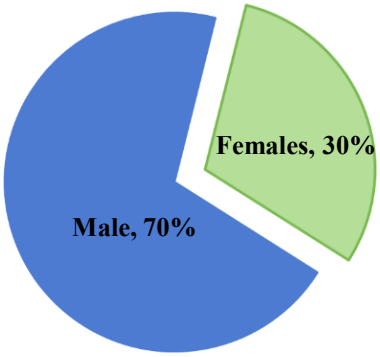


Figure 1 Gender Distribution

Data on the educational qualifications of participants were collected and are presented in Table 4. The results indicate that the majority of respondents (64.1%, n = 66) hold a Bachelor's degree, followed by 25.2% (n = 26) who possess a Diploma. A smaller proportion (3.9%, n = 4) reported having a Master's degree, while 6.8% (n = 7) were identified as untrained teachers. These findings suggest that the teaching workforce is predominantly composed of individuals with bachelors-level qualifications, indicating a foundation of formal pedagogical training. Conversely, participants with Master's degrees represent the smallest group, highlighting the limited representation of advanced academic preparation within the sample.

Table 4. Level of Education

	Frequency	Per cent	Cumulative Percent
Bachelors' degree	66	64.1	89.3
Diploma	26	25. 2	25. 2
Masters	4	3.9	93.2
Untrained teacher	7	6.8	100.0
Total	**103**	**100.0**	

As shown in Table 5, 25.2% (n = 26) of participants reported having less than two years of teaching experience, while 15.5% (n = 16) had between two and four years of experience. Additionally, 26.2% (n = 27) indicated having taught for four to seven years, and the largest proportion, 33.0% (n = 34), reported ten or more years of teaching experience. These results reflect a diverse range of teaching experience among participants, with a notable concentration of experienced educators who have been in the profession for a decade or more.

Table 5. Teaching Experience of Participants

	Frequency	Per cent	Valid Percent	Cumulative Percent
Below 2 years	26	25.2	25.2	25.2
2 – 4 years	16	15.5	15.5	40.8
4 - 7 years	27	26.2	26.2	67.0
10 years and above	34	33.0	33.0	100.0
Total	103	100.0	100.0	

Findings

Research question 1: To what extent do factors such as ICT infrastructure (ICTIF), Learning Styles and Learning Needs (LSLN), Teachers' Perceived Ease of Use (TPEU), and Incentives and Motivation for Teachers (IMT) and institutional support predict the level of ICT integration in teaching within technology-rich SHSs?

A multiple linear regression analysis was conducted to examine how well ICT Infrastructure (ICTIF), Learning Styles and Learning Needs (LSLN), Teachers' Perceived Ease of Use (TPEU), and Incentives and Motivation for Teachers (IMT) predict the level of ICT integration in teaching within technology-rich SHSs. The required assumptions for multiple regression were carefully tested and met before the analysis.

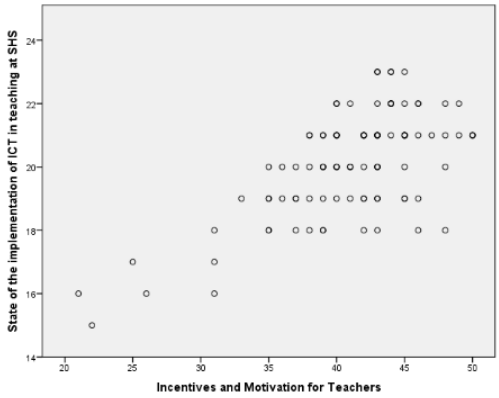
Test of The Assumption of The Multiple Linear Regression Model

Before the regression analysis, the necessary assumptions for the multiple linear regression were examined and met:

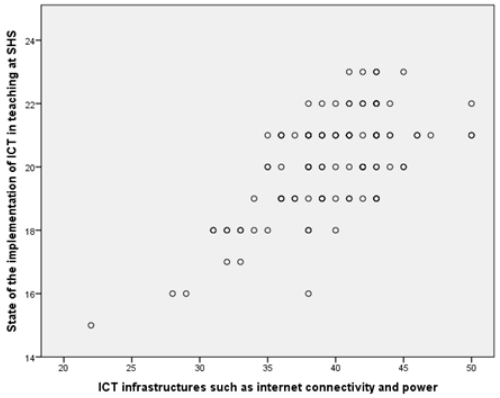
- *Measurement Level*: Both dependent and independent variables were treated as continuous variables through the transformation of Likert-scale responses into interval-level data.
- *Independence of Residuals*: The Durbin-Watson statistic was 2.189, suggesting that the residuals were

independent and free from autocorrelation (see Table 6).

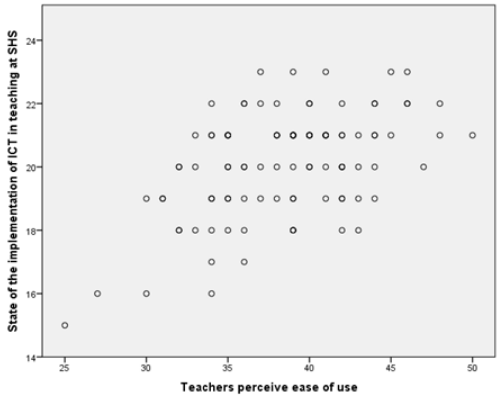
- *Linearity*: Scatterplots revealed linear relationships between each predictor and the dependent variable (see Figure 2).



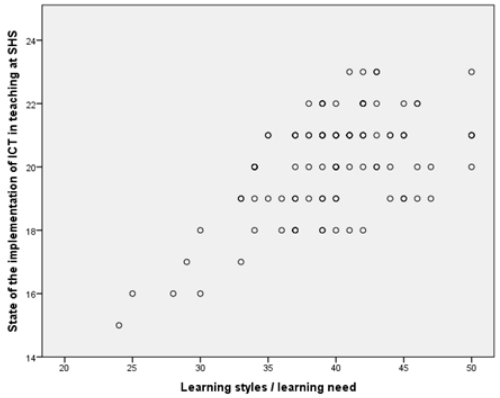
IMT*ICT integration in teaching



ICTIF*level of ICT integration in teaching



TPEU*level of ICT integration in teaching



LSLN*level of ICT integration in teaching

Figure 2. Scatterplot of Independent Variables and Dependent Variable

- *Homoscedasticity*: The scatterplot of standardized residuals versus predicted values indicated constant variance and no evidence of heteroscedasticity (see Figure 3).
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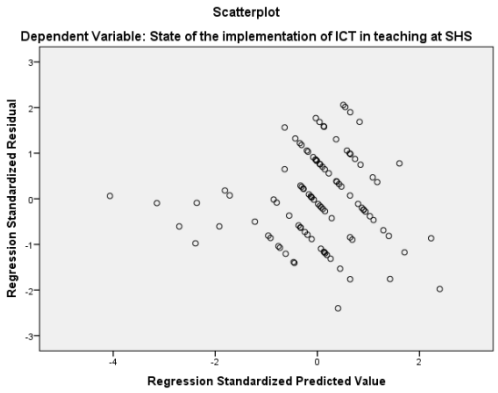

Figure 3. Scatterplot of Standardized Residuals Versus Standardized Predicted Values

- *Multicollinearity*: The tolerance values and Variance Inflation Factor (VIF) scores indicated no serious multicollinearity among predictors. The results showed that the tolerance values ranged from 0.358 to 0.599, which are above the critical threshold of 0.10, and the VIF scores ranged from 1.671 to 2.792, all well below the cut-off of 10 (see Table 8). These findings suggest that multicollinearity was not a concern in the model and that each predictor contributed uniquely to explaining the variation in ICT integration in teaching at the SHS level.
- *Influential Outliers*: Cook's Distance values were all below 1, indicating no influential data points were unduly affecting the model.
- *Normality of Residuals*: Histogram (see Figure 4) and Normal Q-Q plots of standardized residuals showed that the residuals were approximately normally distributed.

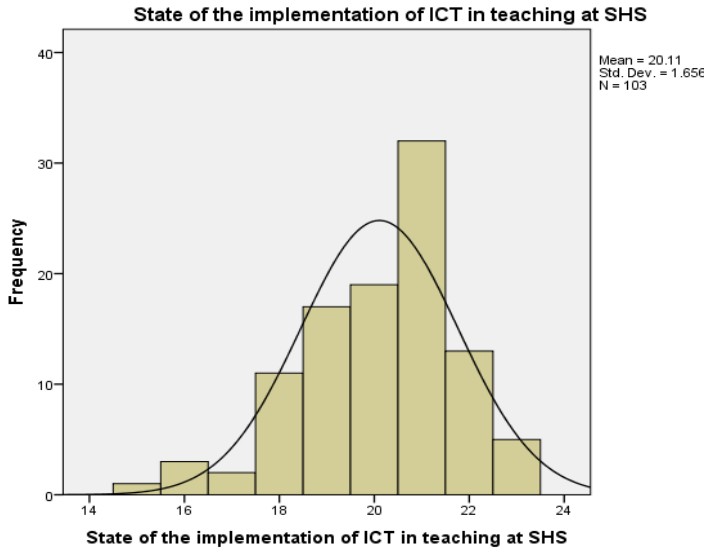

Figure 4. Histogram with the Normal Curve for the Dependent Variable

These checks confirmed that all key assumptions for regression were satisfactorily met, thereby validating the reliability of the model used for assessing ICT integration.

The Regression Model

The regression model was found to be statistically significant, $F(6, 96) = 23.103$, $p < .001$ (see Table 7), suggesting that the combination of the predictors significantly explains variance in ICT integration level in technology-rich SHSs. The model accounted for approximately 59.1% ($R^2 = .591$) of the variance, indicating a substantial level of explanatory power by the predictors combined (see Table 6). Among the independent variables, ICT Infrastructure (ICTIF) and Incentives/Motivation for Teachers (IMT) emerged as significant predictors. ICTIF had the strongest standardized effect ($\beta = 0.387$, $p < .001$), while IMT also contributed significantly ($\beta = 0.303$, $p = .003$) as shown in Table 8. These results highlight the critical roles of adequate infrastructure and motivational incentives in promoting ICT integration in teaching. These findings underscore the need for investments not only in infrastructure but also in teacher support systems to ensure the successful integration of ICT in instructional

practices.

Table 6. Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.769[a]	.591	.565	1.092	2.189

Table 7. ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	165.328	6	27.555	23.103	.000[b]
	Residual	114.497	96	1.193		
	Total	279.825	102			

a. Dependent Variable: Status of ICT integration in SHS

b. Predictors: (Constant), Learning styles/learning need (LSLN), ICT infrastructures such as internet connectivity and power (ICTIF), Teachers perceive ease of use (TPEU), Incentives and Motivation for Teachers (IMT)

Conversely, Teachers' Perceived Ease of Use (TPEU) and Learning Styles and Needs (LSLN) did not significantly contribute to the prediction of ICT integration status, with p-values of p=.605 and p=.264, respectively. While their coefficients were positive, the lack of statistical significance suggests that these variables did not have a strong influence on ICT integration levels. This suggests that while ease of use and alignment with student learning styles may be relevant in some contexts, they were not the primary drivers of ICT integration in technology-rich SHSs.

Table 8. Regression Model

	Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
Model	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
(Constant)	8.520	1.111		7.666	.000		
IMT	.092	.034	.303	2.703	.003	.358	2.792
ICTIF	.139	.031	.387	4.461	.000	.599	1.671
TPEU	.017	.033	.049	.519	.605	.506	1.975
LSLN	.041	.037	.125	1.123	.264	.362	2.759

a. Dependent Variable: status of ICT integration in SHS

The regression model is as follows:

Levels of ICT Integration in Technology-Rich SHSs =0.092(IMT) + 0.139 (ICTIF)+8.520

This indicates that an increase in either incentive/motivation of teachers (IMT) or ICT infrastructure (ICTIF) corresponds to a measurable increase in ICT integration, holding other factors constant. Overall, the findings emphasize that investment in robust ICT infrastructure and provision of incentives and motivational support for teachers are crucial for fostering effective ICT integration in SHS teaching practices.

Research Question 2: What Contextual Barriers Hinder The Effective Integration of ICT in Teaching Despite the Availability of ICT Resources in SHSs?

This section explores the contextual challenges that hinder effective ICT integration in teaching, even in environments where ICT resources are available in SHSs. The findings, presented in Table 9, reflect teachers' responses to key barriers identified in the literature, with participants indicating their level of agreement with each item. Notably, none of the respondents disagreed with the listed challenges, suggesting widespread acknowledgement of these issues.

Table 9. Challenges in the Implementation Process of ICT Integration in Teaching at SHS

Challenges	Responses				
	SD	D	N	A	SA
1. Lack of skills and confidence to troubleshoot technical issues	0 (0)*	0 (0)	14 (13.6)	27 (26.2)	62 (60.2)
2. Shift in Teaching Approaches to Interactive learning	0 (0)	0 (0)	10 (9.7)	31 (30.1)	62 (60.2)
3. Nurturing digital citizenship and responsible use of technology	0 (0)	0 (0)	12 (11.7)	27 (26.2)	64 (62.1)
4. Alignment with curriculum and learning objectives	0 (0)	0 (0)	13 (12.6)	33 (32)	57 (55.4)

* Percentage in parenthesis

A significant proportion of teachers (60.2%, n = 62) strongly agreed that a lack of skills and confidence to troubleshoot technical issues is a major barrier to ICT integration. This was further supported by 26.2% (n = 27) who agreed with the statement, while only 13.6% (n = 14) remained neutral. Another widely recognized challenge was the shift in teaching approaches from traditional methods to more student-centered and interactive learning. Again, 60.2% (n = 62) of respondents strongly agreed that this shift presents difficulties, with 30.1% (n = 31) agreeing and just 9.7% (n = 10) reporting neutrality. In terms of nurturing digital citizenship and encouraging responsible use of technology, 62.1% (n = 64) of participants strongly agreed that this is a significant implementation challenge. An additional 26.2% (n = 27) also agreed, while 11.7% (n = 12) were neutral on the matter. Finally, 55.4% (n = 57) of the respondents strongly agreed that aligning ICT use with curriculum goals and learning objectives is a challenge. This view was shared by 32% (n = 33) who agreed, whereas 12.6% (n = 13) neither agreed nor disagreed. Overall, the data indicate a strong consensus among teachers that technical skills, pedagogical shifts, digital citizenship, and curriculum alignment are contextual barriers. These barriers significantly impact their ability to integrate ICT effectively, despite the availability of digital resources.

Discussion and Conclusion

The research shows that ICT integration in technology-rich SHSs mainly depends on two key factors: ICT infrastructure (ICTIF) and teacher incentives or motivation (IMT). While proper ICT infrastructure is essential,

the actual crucial element for integrating ICT into teaching and learning is teacher motivation and incentives. Teachers are more likely to use ICT resources if school management acknowledges their ICT efforts and offers financial incentives and training opportunities. The findings align with existing studies indicating that technology adoption in classrooms relies on both ICT infrastructure and teacher motivation (Ghavifekr & Rosdy, 2015; Teye & Duah, 2022; Amemasor et al., 2025). The perceived ease of use (TPEU) and learning styles or needs (LSLN) of teachers did not influence the level of ICT integration in technology-rich schools, despite earlier research highlighting their importance (van Braak et al, 2010; Peralta & Coasta, 2007; Apeanti, 2016). This may be because access to technology becomes less problematic in schools where availability is not an issue, shifting focus from tool functionality and learning compatibility to providing adequate support for effective ICT integration in classrooms. The key factor for sustainable ICT implementation becomes institutional characteristics and leadership support (Anderson & Dexter, 2011).

Having ICT resources alone does not overcome contextual challenges that hinder the full integration of these tools. Teachers report feeling they lack sufficient skills and confidence, alongside difficulties in adopting student-centered methods, teaching digital citizenship, and aligning ICT with educational goals. Other studies reinforce these findings, showing how policies and classroom practices vary (Mensah & Adu, 2020; Asare & Okyere, 2020). School administrators must realize that merely providing infrastructure is inadequate for meaningful ICT integration, as teachers face multiple skill gaps and practice barriers. Ongoing professional development should focus on teaching methods that combine technological support with learner-centered approaches. Continuous training on technology integration for learner-centered environments can prevent teachers from sticking to traditional methods that limit ICT's transformative potential (Hew & Brush, 2017; Abedi, 2024). The difficulties teachers encounter in aligning ICT with curriculum standards reveal deep structural issues in Ghana. ICT integration becomes ineffective when outdated software and content that do not align with the national curriculum pose major barriers (Mensah & Adu, 2020). The problem is compounded by the absence of structured professional development programs that link technology to curriculum needs. The challenges teachers face when teaching digital citizenship are consistent with Martin et al. (2025), who found that teachers experience technostress due to a lack of sufficient technology responsibility skills. The study shows that SHS ICT integration success depends on ICT resources, motivated teachers, sustained professional development and curriculum alignment. The research shows that investing in ICT resources by itself is not enough because institutions must also prepare their teachers and establish strong internal support mechanisms (Lim & Chai, 2018; Plomp et al., 2020).

The research shows that specific factors determine how ICT integrates into technology-rich SHSs. Teachers' motivation and incentives are crucial in influencing their use of technology in teaching and learning within these environments. Merely having ICT infrastructure available does not ensure successful outcomes. Effective integration of ICT in teaching methods requires recognizing teachers' efforts, along with tangible rewards and professional development opportunities, to motivate them. Schools with ICT resources should focus on establishing institutional support, developing teachers' skills, and creating sustainable motivation strategies.

The provision of ICT resources in schools does not eliminate all contextual barriers that teachers face. Teachers encounter three main obstacles, which include insufficient skills and confidence issues and difficulties in adopting

student-centered teaching approaches. There seems to be a mismatch between technology use, national curriculum goals and the need to develop digital citizenship skills. The existing problems reveal the difference between educational policy targets and real classroom practices. The implementation of ICT infrastructure alone does not solve the problem. The implementation of ICT infrastructure requires simultaneous professional development and teacher motivation programs. A sustainable ICT integration in Ghanaian SHSs requires a complete strategy which combines ICT infrastructure investment with capacity development and institutional backing.

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