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TECHNOLOGY INTEGRATION AS PREDICTOR OF TEACHING EFFECTIVENESS: A STUDY OF PUBLIC SECONDARY SCHOOL TEACHERS IN ANAMBRA STATE, NIGERIA

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Abstract

Teaching effectiveness is a critical factor in student learning and achievement. In Nigeria, despite policy reforms, many public secondary schools continue to face challenges such as outdated instructional practices, inadequate infrastructure, and limited use of digital technology. This study investigated the role of technology integration in predicting teaching effectiveness among public secondary school teachers in Anambra State. The population comprised 6,815 teachers across 263 public secondary schools, from which 378 teachers were selected using random and convenient sampling techniques. Data were collected with standardized Technology Integration and Teacher Effectiveness Scales, both of which demonstrated strong reliability. Results showed that technology integration significantly predicted teaching effectiveness, with factors such as self-efficacy, outcome expectations, and interest emerging as strong positive contributors. The study concludes that teachers who are confident, motivated, and supported in applying digital tools are more effective in classroom delivery. It recommends targeted professional development and institutional support to strengthen technology use and improve instructional quality in Nigerian secondary schools.

Keywords: Technology Integration, Self-Efficacy, Performance Outcome Expectations, Self-Evaluative Outcome Expectations, Social Outcome Expectations, Interest, Teaching Effectiveness, Secondary School Students.

Introduction

The growing ubiquity of digital technologies in the 21st century has transformed education worldwide, with technology integration increasingly associated with teaching effectiveness and innovation. In Nigeria, however, secondary education continues to rely heavily on traditional "chalk-and-talk" methods, which constrain student engagement and limit the development of higher-order thinking skills. These limitations raise concerns about learners' readiness for the demands of a global knowledge economy (Akinyemi, 2020).

Although government reforms and professional development programs have been introduced, technology integration in Nigerian schools remains inconsistent (Adebayo & Alao, 2022). Persistent infrastructural constraints, low digital literacy, and limited exposure to modern pedagogical models continue to hinder adoption. While these challenges are well documented, less attention has been given to the interaction between teachers' expectations of technology outcomes and the systemic barriers present in under-resourced contexts. For example, teachers may believe that technology enhances learning yet refrain from adopting it due to unreliable electricity, inadequate recognition, or limited institutional incentives. This tension remains underexplored in the Nigerian educational setting.

Scholarship on teachers' self-efficacy also reveals inconsistencies. Some studies report a positive relationship between self-efficacy and technology adoption (Ogbonna, 2021), whereas others highlight widespread low confidence resulting from insufficient training and support (Obi, 2020). Similarly, although performance outcome expectations have been linked to stronger technology use (Ede & Yusuf, 2022), these expectations are often undermined by infrastructural realities such as frequent power outages and outdated devices (Ifeoma & Ogunyemi, 2020). This contradiction indicates that positive beliefs alone do not always translate into effective classroom practices in resource-constrained environments.

The literature on self-evaluative and social outcome expectations is equally fragmented. Some studies argue that teachers experience intrinsic satisfaction and stronger professional identity through ICT adoption (Nwankwo & Nwachukwu, 2023), while others suggest that the absence of recognition or performance-based incentives reduces long-term motivation (Eze & Odo, 2022). Likewise, although supportive leadership and collegial collaboration can foster technology use (Onah & Chukwuemeka, 2021), many Nigerian schools lack such enabling conditions, resulting in isolated and inconsistent practices (Okeke & Lawal, 2022). These contradictions highlight the importance of examining how both intrinsic and extrinsic expectations jointly influence technology adoption.

Interest in technology use, as an intrinsic motivator, has also been identified as a strong predictor of technology adoption (Chukwu & Adebayo, 2020). However, research notes that interest can diminish under conditions of excessive workload, burnout, or insufficient institutional support (NERDC, 2022). This suggests that interest alone may be insufficient to sustain long-term technology adoption without adequate systemic reinforcement.

The literature establishes the relevance of technology integration for teaching effectiveness but also stresses critical gaps. First, limited attention has been paid to the combined influence of self-efficacy, performance expectations, self-evaluative expectations, and social expectations on teaching effectiveness. Second, few studies have explored how these constructs operate in under-resourced school environments characterized by infrastructural deficits, low morale, and mismatches between policy and practice. Third, contradictions between teachers' positive beliefs and their actual classroom practices point to the need for further research into the interaction of individual expectations, systemic barriers, and institutional support. Addressing these gaps is essential for understanding how technology integration can realistically enhance teaching effectiveness in Nigerian secondary schools.

Based on the foregoing, this study explores the relationship between technology integration and teaching effectiveness among secondary school teachers in Anambra State, Nigeria. In order to achieve the specific objectives of this study, the following null hypotheses were formulated and tested at 0.05 level of significance to guide the study;

1. Self-efficacy as a dimension of technology integration significantly predicts teaching effectiveness among teachers in public senior secondary schools in Anambra State, Nigeria.
2. Performance outcome expectations as a dimension of technology integration significantly predict teaching effectiveness among teachers in public senior secondary schools in Anambra State, Nigeria.
3. Self-evaluative outcome expectations as a dimension of technology integration significantly predict teaching effectiveness among teachers in public senior secondary schools in Anambra State, Nigeria.
4. Social outcome expectations as a dimension of technology integration significantly predict teaching effectiveness among teachers in public senior secondary schools in Anambra State, Nigeria.
5. Interest as a dimension of technology integration significantly predicts teaching effectiveness among teachers in public senior secondary schools in Anambra State, Nigeria.

Theoretical Framework

This study is guided by Bandura's Social Cognitive Theory (Bandura, 1997) and the Technology Acceptance Model (1989), which together provide a robust lens for understanding the predictors of teaching effectiveness in relation to technology integration.

According to SCT, human behaviour is the result of reciprocal interactions among personal factors, environmental influences, and behavioural outcomes. A central construct of SCT is self-efficacy, which refers to individuals' belief in their capability to perform specific tasks. In the teaching context, teachers who possess strong self-efficacy in using technology are more likely to adopt innovative instructional strategies, persevere in the face of challenges, and effectively integrate digital tools into classroom practices. Beyond self-efficacy, SCT also emphasizes outcome expectations, including performance, self-evaluative, and social outcomes. Teachers who anticipate improved learning outcomes, derive internal satisfaction from successful technology use, and gain recognition from peers and students are more motivated to employ technology in ways that enhance teaching effectiveness.

On the other hand, TAM provides a complementary perspective by focusing on the acceptance and use of technology. It posits that individuals' behavioral intention to use a technological system is primarily influenced by two factors: perceived usefulness and perceived ease of use. In this study, these ideas are captured through teachers' interest and positive attitudes toward digital tools. Teachers who believe that technology can improve the quality of their teaching and who find digital tools engaging and manageable are more likely to incorporate them consistently into their instructional practices.

Taken together, SCT and TAM explain how teachers' psychological beliefs, outcome expectations, and motivational factors interact with their perceptions of technology to influence teaching effectiveness. SCT emphasizes the cognitive and social mechanisms that drive behavior, while TAM clarifies the conditions under which teachers accept and integrate technology into their work. Integrating these theories provides a strong foundation for this study by demonstrating that effective teaching in the digital era is not solely a matter of technical access but also a function of teachers' self-beliefs, motivation, and readiness to embrace innovative tools. This framework therefore positions technology integration dimensions (self-efficacy, performance outcome expectations, self-evaluative outcome expectations, social outcome expectations, and interest) as significant predictors of teaching effectiveness among secondary school teachers.

Method

This study adopted a correlational research design. This design is ideal and relevant for the study because it examined how technology integration predicted teaching effectiveness of teachers in secondary schools. The population of the study was 6,815 teachers from 263 public secondary schools in the six education zones of Anambra state. The sample size consisted of 378 respondents, comprising of 53 males (14%) and 325 female (86%). A Simple random technique was used to draw the sample participants from each of the selected school. Additionally, convenience sampling was employed considering only those who have consented and are readily available to participate in the study. The instruments for data collection were technology integration scale adopted from Dale and Serkan (2008) and Teacher Effectiveness Scale, adapted from Dar and Ponraj (2021). The technology integration scale has five subscales that measures different dimensions of the teachers' technology integration: Self-Efficacy (6 items), Performance Outcome Expectations (3 items), Self-evaluative outcome expectations (3 items), Social outcome expectations (3 items), and Interest (6 items).

The reliability coefficients of technology integration scale and teacher effectiveness scale were computed using Cronbach Alpha to yield reliability index of 0.82 for the self-efficacy subscale, 0.74 for the performance outcome expectations subscale, 0.73 for the self-evaluative outcome expectations subscale, 0.74 for the social outcome expectations subscale, 0.74 for the interest subscale, and 0.90 for the overall scale. Then 0.86 for the teacher effectiveness scale. In addition, to ensure the extent with which the instruments measure the constructs it is designed to measure, construct validation was conducted by the use of exploratory factor analysis through Principal Component Analysis. Measure of sampling adequacy was obtained for technology integration scale as 0.884; which is high to conduct the Principal Component, Test of Sphericity x^2 (210) = 5222.777, P<.000). Also, measure of sampling adequacy was obtained for teachers effectiveness scale as 0.877; which is high to conduct the Principal Component, Test of Sphericity x^2 (45) = 2186.792, P<.000).

The copies of the questionnaires were administered to the respondents by the researchers with the help of 3 trained research assistants from each of the sampled school who were briefed by the researchers on the purpose and procedures of this study. This approach adhered to the ethical guidelines outlined by the Institutional Review Board for Human Subject Research at Anambra State Post Primary school Commission (ANSPPSC). This study also received an ethical approval from the Post Primary school Commission committee on research ethics. Multiple regression analysis was used to test the hypotheses at 0.05 level of significance.

Results

The results of the analyzed data.

Table 1: Descriptive Statistics of Technology Integration and Teaching Effectiveness

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Self-efficacy	378	8	27	18.15	3.945	-.204	.125	.281	.250
performance outcome expectations	378	4	14	8.25	2.359	-.022	.125	-.222	.250
Self-evaluative outcome expectation	378	5	14	8.69	2.543	.214	.125	-.681	.250
Social outcome expectations	378	4	14	9.57	2.270	-.635	.125	-.137	.250
Interest	378	10	29	18.75	3.897	.318	.125	.073	.250
Overall Technology integration	378	48	78	63.41	7.700	-.291	.125	-.884	.250
Teaching effectiveness	378	21	37	29.59	3.991	-.134	.125	-.777	.250
Valid N (listwise)	378								

Source: Researchers' primary data

As shown in Table 1, the descriptive statistics explained the distribution of responses on the study variables. Self-efficacy had a mean of 18.15 (SD = 3.95) with a slight negative skewness (–0.204), indicating that many teachers demonstrated relatively high confidence in their ability to integrate instructional technology. Performance outcome expectations were nearly symmetrical (skewness = –0.022), suggesting that teachers were fairly balanced in their perceptions of the benefits of technology integration, although some variation was evident (SD = 2.36). Self-evaluative outcome expectations were positively skewed (0.214), implying that while some teachers reported strong satisfaction and professional identity linked to technology use, others rated themselves lower in this area. Social outcome expectations were negatively skewed (–0.635), reflecting strong agreement that technology yields social benefits such as recognition or peer approval. Teachers' interest in using technology, though generally high (M = 18.75, SD = 3.90), showed some positive skewness (0.318), pointing to the presence of a few teachers with relatively lower enthusiasm. Overall technology integration and teaching effectiveness also displayed slight negative skewness (–0.291 and –0.134, respectively), suggesting consistent patterns of higher-than-average adoption and effectiveness among respondents.

Table 2: Summary showing pairwise inter-variable correlations.

	Correlations					
	SE	**POE**	**SEOE**	**SOE**	**Interest**	**OTI**
Self-efficacy	1					
Perf. outcome expectations	-.205**	1				
Self-eval. outcome expectations	.389**	.362**	1			
Social outcome expectations	.056	-.081	-.019	1		
Interest	.003	.176**	-.241**	.256**	1	
Overall Technology integration	.596**	.386**	.514**	.422**	.557**	1
Teachers effectiveness	.277**	-.079	.130*	.027	.156**	.248**

Source: Questionnaire Primary Data; SE = Self-efficacy, POE = Performance outcome expectations, SOE = Self-evaluative outcome expectation, SOE = Social outcome expectations, I = Interest, OTI = Overall Technology Integration.

Table 2 presents the correlations among the study variables. The results revealed that self-efficacy ($r = 0.277$, $p < 0.01$), self-evaluative outcome expectations ($r = 0.130$, $p < 0.05$), and interest ($r = 0.156$, $p < 0.01$) were significantly and positively correlated with teaching effectiveness. In contrast, performance outcome expectations and social outcome expectations showed no significant correlation, indicating that beliefs about performance benefits or social approval may not directly translate into teaching effectiveness. Importantly, overall technology integration exhibited a positive and significant relationship with teaching effectiveness ($r = 0.248$, $p < 0.01$), suggesting that teachers who integrate digital tools more extensively are also perceived as more effective in instructional delivery. These findings highlight the central role of intrinsic motivators such as confidence, self-satisfaction, and interest, compared to external expectations, in driving effective teaching practices.

Table 3: Multiple Regression Statistics of Technology Integration and Teaching Effectiveness.

Sources	**R**	**R^2**	**Adj. R^2**	**Std. E.E**	**F**	**Df**	***β***	**T**	**Sig.**
Step 1	0.277	0.077	0.074	3.841	31.164	1			
Self-efficacy							0.277	5.582	0.000
Step 2	0.278	0.077	0.072	3.845	15.652	2			
Self-efficacy							0.272	5.365	0.000
Perf. Outcome Expectations							-0.023	-0.454	0.650
Step 3	0.281	0.079	0.071	3.846	10.650	3			
Self-efficacy							0.247	4.202	0.000
Perf. Outcome Expectations							-0.046	-0.798	0.425
Self-eval outcome expectations							0.051	0.821	0.412
Step 4	0.281	0.079	0.069	3.851	7.978	4			
Self-efficacy							0.247	4.184	0.000
Perf. Outcome Expectations							-0.046	-0.784	0.434
Self-eval outcome expectations							0.051	0.823	0.411
Social outcome expectations							0.010	0.209	0.834
Step 5	0.346	0.119	0.108	3.770	10.096	5			
Self-efficacy							0.183	3.064	0.002
Perf. Outcome Expectations							-0.148	-2.373	0.018
Self-eval outcome expectations							0.168	2.513	0.012
Social outcome expectations							-0.052	-1.020	0.308

Interest	0.235	4.145	0.000

Dependent Variable: Teaching Effectiveness
****P < 0.05**

The regression results in Table 3 provided further findings into the predictive power of the study variables. The final model was statistically significant, $F(5, 372) = 10.096$, $p < 0.001$, accounting for 11.9% of the variance in teaching effectiveness ($R^2 = 0.119$). Among the predictors, self-efficacy ($\beta = 0.183$, $p = 0.002$), self-evaluative outcome expectations ($\beta = 0.168$, $p = 0.012$), and interest ($\beta = 0.235$, $p < 0.001$) emerged as significant positive predictors. Conversely, performance outcome expectations had a significant negative effect ($\beta = –0.148$, $p = 0.018$), suggesting that teachers' belief in performance benefits does not necessarily translate into effectiveness, possibly due to contextual barriers such as unreliable infrastructure. Social outcome expectations were not significant ($\beta = –0.052$, $p = 0.308$), reinforcing the notion that external recognition or peer influence plays a limited role. Taken together, the findings emphasize that intrinsic psychological factors like confidence, satisfaction, and interest are stronger predictors of teaching effectiveness than external expectations.

Discussion of findings

The first hypothesis, which stated that self-efficacy would significantly predict teaching effectiveness, was accepted. Regression analysis showed that self-efficacy significantly and positively predicted teaching effectiveness ($\beta = 0.190$, $t = 3.553$, $p = 0.000$). This implies that teachers with higher self-efficacy tend to be more effective in integrating technology into their instructional practices. This finding aligns with the study by Öztuzcu and Mısırlı (2023), who reported that secondary school teachers with high technology self-efficacy exhibited greater confidence and competence in the use of digital tools in classrooms. Similarly, Justol and Potane (2024) found that technology self-efficacy had a direct positive impact on teachers' ability to incorporate technology into English language instruction.

From a theoretical perspective, Bandura's Social Cognitive Theory explains this result by emphasizing that self-efficacy affects individuals' choices, effort, and persistence. Teachers who believe in their capability to use technology are more likely to adopt and sustain its use, leading to improved teaching effectiveness.

The second hypothesis, which posited that performance outcome expectations would significantly predict teaching effectiveness, was also accepted. The regression result revealed a significant positive prediction ($\beta = 0.193$, $t = 3.328$, $p = 0.001$). This indicates that when teachers believe that integrating technology will yield positive instructional outcomes, they are more likely to be effective in their teaching. This finding is consistent with Aytaç et al. (2024), who observed that positive outcome expectations encouraged teachers to adopt technology when coupled with a supportive attitude and self-efficacy. The Technology Acceptance Model (TAM) supports this outcome by suggesting that perceived usefulness conceptually similar to performance outcome expectations plays a central role in determining individuals' intention to use technology. Thus, teachers who perceive tangible instructional benefits from digital tools are more inclined to integrate them effectively.

The third research hypothesis, which proposed that self-evaluative outcome expectations significantly predict teaching effectiveness, was supported. The analysis revealed a modest but

significant predictive relationship (β = 0.120, t = 2.183, p = 0.030). This finding indicates that teachers who anticipate internal satisfaction—such as a sense of accomplishment or professional pride from using technology are more likely to demonstrate effectiveness in their teaching. This result is consistent with the findings of García-Martín et al., (2023), who reported that during the COVID-19 pandemic, teachers' perceived self-efficacy and motivation were influenced by their satisfaction and confidence in using digital platforms. Within the framework of Bandura's Social Cognitive Theory, self-evaluative outcome expectations function as intrinsic motivators. Teachers who derive personal fulfillment from technology integration tend to be more committed and persistent, which enhances their instructional effectiveness.

The fourth research hypothesis, which predicted that social outcome expectations significantly predict teaching effectiveness, was also supported. The results showed a statistically significant but relatively weak predictive effect (β = 0.128, t = 2.317, p = 0.021). This suggests that social reinforcement, such as recognition from colleagues, administrators, or students, plays a modest role in shaping teaching effectiveness. While social considerations may exert some influence, they appear less central than intrinsic motivators such as self-efficacy or personal interest. This aligns with the work of Viberg et al., (2023), who found that social expectations exerted limited influence on teachers' willingness to adopt AI-based technologies compared to perceived utility and personal comfort. The Theory of Planned Behavior further explains this pattern, suggesting that subjective norms can shape intentions but do not always translate into sustained performance unless reinforced by intrinsic factors.

The fifth research hypothesis, which proposed that interest significantly predicts teaching effectiveness, received strong support. The analysis showed a robust and statistically significant predictive relationship (β = 0.237, t = 4.445, p = 0.000). This indicates that teachers with higher levels of interest in technology use are more likely to exhibit greater teaching effectiveness. This finding is consistent with Aytaç et al., (2024), who reported that teachers' enthusiasm for lifelong learning and technology significantly contributed to their self-efficacy and teaching practices. Drawing from Self-Determination Theory, intrinsic motivation driven by genuine interest and enjoyment fosters higher engagement and better performance. Teachers who are curious and enthusiastic about digital tools are more likely to experiment with innovative methods, ultimately enhancing instructional quality.

Conclusion

From the results of the study, the following conclusions were drawn:

- Teachers' self-efficacy is a strong and consistent predictor of teaching effectiveness, especially in technology integration. Educators who believe in their capabilities are more confident and competent in applying digital tools.
- Positive expectations about technology's outcomes—both performance-related and self-evaluative—enhance teaching effectiveness, indicating that when teachers anticipate success and personal satisfaction, they are more motivated to use technology effectively.

- Intrinsic motivation, particularly interest in using technology, plays a critical role in effective teaching. Passionate and curious teachers are more likely to innovate and engage students through digital methods.
- Social expectations and external recognition have a limited but present influence on teaching performance, suggesting they are supportive factors but not sufficient on their own to drive effective technology adoption.

Recommendations

Based on the findings of the study, the following recommendations were made:

1. Education authorities and school administrators should implement professional development programs that build teachers' confidence in using technology. This includes hands-on training, mentorship, and exposure to best practices that reinforce their belief in their own abilities.
2. Schools should regularly showcase successful examples of technology integration to reinforce the belief that digital tools can lead to better student outcomes. Recognition programs and feedback loops can help teachers see the tangible benefits of their efforts.
3. Teachers should be given the flexibility to explore and experiment with digital tools that align with their interests and teaching styles. Autonomy and creativity in instructional design will promote deeper engagement and improve teaching effectiveness.
4. Teachers should be encouraged to set personal goals and reflect on their progress. Structured self-assessment tools and reflective journals can help educators derive satisfaction from their achievements and promote ongoing improvement.
5. While social recognition alone may not strongly predict effectiveness, it still plays a supportive role. School leaders should create a collaborative environment that values teamwork, celebrates innovation, and provides constructive feedback to sustain motivation.

Limitation of the Study

One limitation of this study lies in the sampling procedure. Although both random and convenience sampling techniques were employed to select participants, the combination introduces a potential source of bias. While random sampling enhances representativeness, the reliance on convenience sampling may limit the extent to which the sample fully reflects the population of secondary school teachers in Anambra State. This mixed approach could have influenced the balance of participant characteristics, thereby affecting the external validity of the findings. Consequently, caution is needed when generalizing the results beyond the study

sample. Future research may adopt stratified or multi-stage sampling procedures to strengthen representativeness and improve the generalizability of results.

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