Relationship between smart interactive board usage and academic motivation of secondary school students in South East Nigeria

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Abstract
Technological incorporation into the learning environment is now essential in promoting the level of engagement and learning achievement among students. However, the level of integration and the effects of the use of smart interactive boards on the academic motivation of the students has not been well established in most secondary schools. The research examined how the use of smart interactive boards is correlated with academic motivation of students attending both public and private secondary schools in south-east Nigeria in Anambra State. Quantitative descriptive survey design was used, and ninety students were chosen using stratified and simple random sampling. A validated and reliable questionnaire was used to collect data and analyzed through descriptive statistics, independent-samples t-tests, and Pearson correlation. The results showed that those in private-schools reported higher users of smart interactive boards, compared to those in the public-schools with higher interaction and preference to board-based lessons. No difference between the academic motivation of the students in a public school and a private school was significant, but the relationship between the smart board use and academic motivation of the students was positive. The researchers have found that the effective use of smart interactive boards can be instrumental in improving student engagement, confidence, and participation and that technology integration and teacher support should be a priority in secondary education.

1. Introduction

Secondary schools around the world are making investments in interactive teaching technologies with the view that they will help solve long-standing issues of student disengagement and low academic incentive. Academic motivation, the desire of students to participate, engage, maintain effort in learning, is well known as an important predictor of educational achievement. With secondary operations being dominated by conventional lecture-based learning, the motivation tends to decrease, which leads to negative participation and learning outcomes (Montenegro & Schmidt, 2025; Ngozi & Eke, 2023). The introduction of Smart Interactive Boards (SIBs) has been described as one of these solutions; with the introduction of digital display, interactive touch, and multimedia tools that enable lessons to be more interactive, participatory, and responsive to different learning styles. As positive correlations between interactive whiteboards and engagement are repeatedly reported in previous studies, these studies are often old or emphasize the achievement outcomes more than motivation itself. As an example, interactive whiteboards were linked to a higher level of student attention and engagement in the early 2000s, but the results did not clearly differentiate between engagement and academic motivation as two constructs (Andleeb, 2022). Such confusion shows there is a vacuum in recent motivationally oriented studies, especially in the realm of secondary schools.

Recent literature has sought to fill this gap indirectly. A quasi-experimental study conducted in 2024 to determine the outcomes of interactive whiteboards on the achievement, interest, and motivation rates of students in early schooling concluded that motivational and interest rates among students were significantly higher with interactive multimedia resources than with traditional ones (Wei et al., 2024). In spite of the fact that this study involved primary learners, its results suggest that the interactive and multimodal characteristics of SIBs like drag-and-drop options, visuals, and multimedia integration can arouse the interest and intrinsic motivation by appealing to various learner profiles and sensorial preferences (Wei et al., 2024; Eke, 2023). Through implication, the same mechanisms might happen in second schools where the motivational issues of adolescent learners are further escalated by increasing cognitive exertions and social pressures.

Nevertheless, empirical studies that specifically investigated the use of Smart Interactive Board and its effects on academic motivation in high schools are unsurprisingly few in recent years. The available research concentrates either on academic performance (e.g., impact on science or biology performance) or concentrates on teacher attitudes and intentions toward the use of technology instead of student motivation. As an example, Tubo & Mohammed (2024) indicated that instructional strategies based on interactive and smartboard use

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positively affected the academic achievement of senior secondary students in cell biology, and proposed possible benefits of engagement, but did not directly assess motivation constructs (e.g., intrinsic/extrinsic motivation). Likewise, according to Alqawasmi et al (2024), interactive boards had a positive impact on student achievement and attitudes with the attitude items associated with involvement and motivational engagement, but did not separate motivation as a core outcome in the study.

Motivation plays a dual role in Smart Interactive Board (SIB) integration, shaping both teachers' willingness to adopt the technology and students' psychological readiness to engage with it. This aligns with broader adoption of renewable perspectives emphasizing human factors as key drivers of effective educational innovation (Umeocho et al., 2025). Students in insecure or poorly wellbeing learning conditions may have deteriorated motivational reactions to teaching technologies (Enwere, 2026; Enwere & Chijioke, 2024). A study examining interactive whiteboard usage by K-12 teachers at the Frontiers discovered that hedonic motivation (enjoyment) was a significant predictor of behavioural intention to use interactive boards, which suggests that motivation is the key to not only student engagement but also educator adoption and teaching decisions (Zhou et al., 2022). This highlights the importance of a study that is sensitive to both teacher and student motivated processes within the classroom secondary school setting.

As per recent findings, there is still an unbridgeable gap in the empirical investigation of the impact of Smart Interactive Board use on academic motivation among students in secondary schools. The deficiencies of policy implementation that may be associated with limited outcome-focused assessment, current educational technology research tends to use achievement as a surrogate and overlook the measurement of motivation as a construct (Odimegwu & Odumodu., 2020; Odimegwu & Anyakora., 2023). Infrastructure studies, communication studies, and learning environments show that technological development is not sufficient to achieve the desirable behavioral results without specific empirical evaluation (Farinmade et al., 2025; Munonye et al., 2022). Moreover, as stated in recent literature on contextualised communication and learning effectiveness, it is important to consider the fact that human-centred responses to changing technologies need to be studied (Oramah et al., 2025; Anyakora et al., 2024). With the fast development of interactive classroom technologies, the urgent necessity appears in the recent, motivation-oriented research which will bring the application of technology into the psychological involvement of learners, especially in the secondary school level (Alicwadey & Lagawid, 2025).

The rationale behind the research on the correlation between Smart Interactive Board use and academic motivation of students in secondary schools is due to the gaps that lingered in current studies. However, despite the correlation between interactive whiteboards and improved engagement and academic achievement (Wei et al., 2024; Alqawasmi et al., 2024), few studies actually quantify motivation as a single outcome in the secondary educational setting. Most of the available studies are on younger learners, academic performance, or teacher adoption but fail to specify the precise mechanisms of student motivation (Zhou et al., 2022). It is therefore uncertain how, why and how much interactive board practices contribute to intrinsic and extrinsic motivation among adolescents and thus needs specific investigation. This gap should be addressed so that it will make a significant contribution to the literature and provide educators and policymakers with evidence-based interventions to promote motivation with the help of technology.

This study was guided by three research questions, namely (1) the level of smart interactive board usage in public and private secondary schools in South-East Nigeria; (2) the level of academic motivation of students in public and private secondary schools in South-East Nigeria; and (3) the relationship between smart interactive board usage and students' academic motivation in public and private secondary schools in South-East Nigeria.

Furthermore, the study was tested using three null hypotheses, which state that (1) there is no significant difference in the level of smart interactive board usage between public and private secondary schools in South-East Nigeria; (2) there is no significant difference in the level of academic motivation of students between public and private secondary schools in South-East Nigeria; and (3) there is no significant relationship between smart interactive board usage and students' academic motivation in public and private secondary schools in South-East Nigeria.

2. Method

This research was a descriptive survey research study that investigated the correlation between the use of smart interactive boards and the academic motivation of students in secondary schools in the public and the private schools. It was considered an appropriate design because it allowed the researcher to gather numerical data of a representative group of students at one point in time and to outline current circumstances, compare groups, and test inter-variable relationships using the statistical methods. This was done in the State of Anambra, Nigeria. Anambra State is a heterogeneous distribution of both public and private secondary schools in south-east Nigeria in urban, semi-urban, and rural milieus, and is found in the South-East geopolitical region

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of the country. This diversity provided a favorable setting in investigating differences in smart interactive board usage and differences in academic motivation of students in learning institutions with different typologies.

The study population included all the students in both the private and the public secondary schools in Anambra State. It was considered that such students were good subjects (they are directly engaged in classroom teaching and they are exposed to various pedagogical practices, such as the introduction of smart interactive boards). The investigation used a sample size of ninety (90) secondary school students. A stratified sampling was used, a stratification based on the type of school was used to ensure that there were enough representative samples of both the public and the private schools. Simple random sampling was used within each stratum, and it resulted in the availability of thirty-two (32) students in public secondary schools and fifty-eight (58) students in private secondary schools.

The information was gathered through a questionnaire with a structured format named Smart Interactive Board Usage and Students Academic Motivation Questionnaire. The questionnaire included questions that covered demographics, use of smart interactive boards, and academic motivation by students. All items were rated on a five-point Likert scale that ranged between Strongly Disagree and Strongly Agree. The instrument has been validated by face and content validation by educational technology and measurement and evaluation experts. Their comments and suggestions were included to make it clear, relevant, and provide the study variables with a full coverage. Reliability test was conducted by pilot study that was provided to students who were not in the main sample and the result data was evaluated through alpha of Cronbach. The reliability coefficient of 0.70 obtained confirmed the sufficiency of the instrument used.

The questionnaire was administered face to face and was administered by the principal researcher with the help of trained research aides. Clear guidelines were given to the respondents and questionnaires that were completed were collected instantly to achieve a high response rate. The data collected were coded and analyzed using the Statistical Package of the Social Sciences (SPSS). The research questions were answered using descriptive statistics, frequencies, percentages, means, and standard deviations, and the null hypotheses were tested using inferential statistics, namely, independent samples t-tests and Pearson Product 95% Product - Moment Correlations.

3. Results and Discussion

As illustrated in Figure 1, the respondents were drawn from both public and private secondary schools, with a higher proportion coming from private schools.

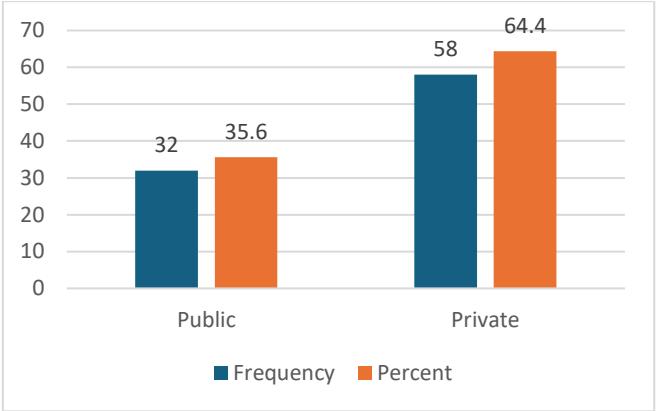

Figure 1. Distribution of Respondents by School Type

The Figure 1 shows that out of the 90 respondents used for the study, 32 students (35.6%) were drawn from public secondary schools, while 58 students (64.4%) were selected from private secondary schools. This indicates that a greater proportion of the respondents attended private secondary schools. Next, Figure 2 distribution of respondents by school location.

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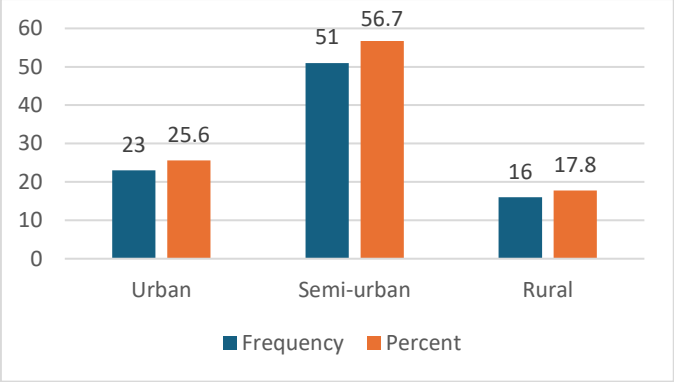

Figure 2. Distribution of Respondents by School Location

Figure 2 shows the distribution of the 90 respondents based on school location. The results indicate that the majority of respondents were from semi-urban areas, accounting for 51 students (56.7%), followed by urban areas with 23 students (25.6%), while rural areas contributed the smallest proportion with 16 students (17.8%). Next, Table 1 group statistics of smart interactive board usage by school type.

Table 1. Group Statistics of Smart Interactive Board Usage by School Type

	School Type	N	Mean	Std. Deviation	Std. Error Mean
Smart interactive boards are used regularly during my lessons.	Public	32	3.34	.483	.085
	Private	58	3.69	.467	.061
My teachers use the smart board to explain difficult topics.	Public	32	3.16	.847	.150
	Private	58	3.31	.467	.061
Lessons taught with the smart board are more interesting than traditional lessons.	Public	32	2.88	1.408	.249
	Private	58	3.91	.283	.037
I am encouraged to interact with the smart board during class.	Public	32	3.91	.296	.052
	Private	58	3.53	.503	.066
The smart board helps me understand subjects better.	Public	32	3.72	.888	.157
	Private	58	3.53	.503	.066
Visuals, videos, and animations on the smart board improve my learning.	Public	32	3.91	.296	.052
	Private	58	3.53	.503	.066
Smart board lessons make classroom activities more engaging.	Public	32	2.88	1.408	.249
	Private	58	3.91	.283	.037
I prefer lessons taught with smart interactive boards.	Public	32	3.91	.296	.052
	Private	58	3.53	.503	.066

Table 1 presents the mean responses of public and private secondary school students on smart interactive board usage. Private school students generally reported higher usage in most areas, such as finding lessons more interesting (M = 3.91) and classroom activities more engaging (M = 3.91), compared to public school students (M = 2.88 for both). However, public school students reported higher means for interaction with the smart board (M = 3.91) and preference for lessons taught with it (M = 3.91). Overall, both groups show moderate to high usage of smart boards, with slight variations across specific indicators. Next, group statistics of academic motivation of students by school type can be seen in Table 2.

Table 2. Group Statistics of Academic motivation of students by School Type

	School Type	N	Mean	Std. Deviation	Std. Error Mean
I feel motivated to attend classes where smart boards are used.	Public	32	3.72	.888	.157
	Private	58	3.53	.503	.066
The use of smart boards makes me more interested in my subjects.	Public	32	2.31	.965	.171
	Private	58	3.48	.504	.066
I participate more actively in lessons that use smart boards.	Public	32	3.91	.296	.052
	Private	58	3.91	.283	.037
Smart board lessons encourage me to study harder.	Public	32	3.91	.296	.052
	Private	58	3.53	.503	.066
I pay more attention in class when smart boards are used.	Public	32	2.69	1.512	.267
	Private	58	3.33	.803	.105
The use of smart boards increases my confidence in learning.	Public	32	3.91	.296	.052
	Private	58	3.71	.459	.060
I enjoy learning when modern teaching tools are used.	Public	32	3.56	.504	.089
	Private	58	3.40	.493	.065
Smart board usage makes learning more enjoyable for me.	Public	32	3.72	.888	.157
	Private	58	3.53	.503	.066

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Table 2 shows the level of academic motivation among students in public and private secondary schools in south-east Nigeria. Public school students reported higher motivation in attending classes (M = 3.72), participating actively (M = 3.91), studying harder (M = 3.91), and increased confidence in learning (M = 3.91) compared to private school students. Conversely, private school students showed higher motivation in becoming more interested in their subjects (M = 3.48) and paying attention in class (M = 3.33).

Hypothesis 1: There is no significant difference in the level of smart interactive board usage between public and private secondary schools in south-east Nigeria. Table 3 shown a independent samples t-test for smart interactive board usage by school type.

Table 3. Independent Samples t-Test for Smart Interactive Board Usage by School Type

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Smart Interactive Board Usage	Equal variances assumed	.749	.389	-2.06	88	.042	-.15975	.07723	-.3132	-.0062
	Equal variances not assumed			-1.9	54.84	.055	-.15975	.08146	-.3230	.00351

The t-test analysis in Table 3 shows a significant difference in smart interactive board usage between public and private secondary schools in south-east Nigeria. With equal variances assumed, the t-value is -2.068 and the p-value is 0.042, which is less than the 0.05 significance level. This indicates that private school students reported significantly higher usage of smart interactive boards compared to public school students. Therefore, the null hypothesis stating that there is no significant difference in smart interactive board usage between public and private schools is rejected. The result highlights variations in technology integration between school types.

Hypothesis 2: There is no significant difference in the level of academic motivation of students between public and private secondary schools in south-east Nigeria. Table 4 shown a independent samples t-test for academic motivation of students by school type.

Table 4. Independent Samples t-Test for Academic motivation of students by School Type

		Levine's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Academic motivation of students	Equal variances assumed	7.199	.009	-.91	88	.362	-.089	.09726	-.28232	.10425
	Equal variances not assumed			-.83	49.347	.407	-.089	.10653	-.30309	.12502

The t-test results in Table 4 shown no significant difference in academic motivation of students between public and private secondary schools in south-east Nigeria. With equal variances assumed, the t-value is -0.915 and the p-value is 0.362, which is greater than the 0.05 significance level. This indicates that both public and private school students exhibit similar levels of academic motivation when using smart interactive boards. Therefore, the null hypothesis stating that there is no significant difference in academic motivation of students between public and private secondary schools in south-east Nigeria is accepted, suggesting that school type does not significantly influence students' motivation levels.

Hypothesis 3: There is no significant relationship between smart interactive board usage and academic motivation of students in public and private secondary schools in south-east Nigeria. Table 5 shown a Pearson correlation between smart interactive board usage and academic motivation of students.

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Table 5. Pearson Correlation Between Smart Interactive Board Usage and Academic motivation of students

		Smart Interactive Board Usage	Academic motivation of students
Smart Interactive Board Usage	Pearson Correlation	1	.922**
	Sig. (2-tailed)		.000
	N	90	90
Academic motivation of students	Pearson Correlation	.922**	1
	Sig. (2-tailed)	.000	
	N	90	90

**. Correlation is significant at the 0.01 level (2-tailed).

The correlation analysis in Table 5 shows a strong positive relationship between smart interactive board usage and academic motivation of students, with a Pearson correlation coefficient of r = 0.922 and a p-value of 0.000, which is less than the 0.01 significance level. This indicates that increased use of smart interactive boards is associated with higher levels of academic motivation of students in both public and private secondary schools in south-east Nigeria. Therefore, the null hypothesis, which states that there is no significant relationship between smart interactive board usage and academic motivation of students, is rejected.

3.1. Discussion

The research showed that there were differences in the use of smart interactive boards in the secondary schools which were public or those which were private. The interaction with the smart boards was also more likely to be reported among private students in terms of interest in the lesson and the dynamism in the classroom, but among public school student's greater interaction and preference of smart board lesson. The results are supported by Rahayu and Makmur (2024), who found that smart interactive technology could promote student interaction and positive learning experiences, which means that in the situation the technology is used in a meaningful way, the learners would experience the lesson at a faster and more engaging pace, despite the setting.

But a different body of literature suggests that the effective use is not only based on the availability of technology but also on the preparedness of teachers and support of infrastructure. According to Zhou et al (2022) in the article published in the journal Frontiers in Psychology, interactive whiteboard adoption is predicted positively by teacher intentions and facilitating conditions with a significant effect on the rural environment due to the absence of high use patterns with access. This finding suggests that the existence of differences in the patterns of usage between school types could be a result of disparities in training and support frameworks.

Concerning academic motivation, the results showed that the levels of motivation between both groups were moderate to high, though the motivational indicators differed across the types of schools. In a similar investigation involving the use of smart boards, Elma et al (2024) stated that interactive technologies have the ability to positively affect student attitudes and involvement by making the learning environments more engaging and conducive to a wide range of learning styles, which is also implicated in the current study, which states that interactive tools are favorable to motivational components of learning. Unlike the various studies that report high levels of motivational differences according to access to technology, the lack of significant difference in motivation among the two types of schools in this research implies that interactive board use has the potential to reduce the levels of motivational differences when both schools have access to the technology. This would follow larger ICT studies which have shown multimedia tools can lessen disengagement and aid active learning within all circumstances which have been reported in general ICT engagement studies.

The substantial disparity in usage between the two types of schools nullifies the first hypothesis and speaks to the differences in technology integration which has been cited by researchers all over the world, noting that schools with better resources and training are more likely to integrate technology successfully. In the meantime, the lack of a motivational difference indicates that in the exposure of students to interactive tools, motivational advantage can cross contextual boundaries. The positive correlation between the use of the smart board and academic motivation is substantial and can prove the rich literature that interactive technologies contribute to engagement, interest, and attitudes of learners. The result is in line with Rahayu and Makmur (2024), who stated the positive effects on motivation when interactive boards were introduced with entertaining pedagogical strategies.

4. Conclusion

This paper examined a study on smart interactive board usage and the academic motivation of students in both public and private secondary school in the state of Anambra. The results showed that the students in private schools tended to use smart interactive boards more, especially in the aspects of interest in the lesson and engagement in the classroom, but students in the public schools were more interactive and preferred smart

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board lessons. Although these usage differences occurred, no meaningful difference in academic motivation between the students in the public and private schools was found thus showing that the use of interactive boards can enhance motivation in schools of either type. In addition, the smart interactive board use and academic motivation showed a strong positive correlation thus indicating that successful incorporation of interactive technology facilitates more student engagement, assurance, and participation in the learning process. These findings highlight the need to not only equip secondary schools with proper technology but also train the teachers to get the full benefits of smart interactive boards.

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All authors have equal contributions to the paper. All the authors have read and approved the final manuscript.

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Declaration of Conflicting Interests

The author declared no potential conflicts of interest with respect to the research, authorship, and/ or publication of this article.

Data Availability

The datasets generated during and/ or analysed during the current study are available from the corresponding author on reasonable request.

Declaration on AI Use

The authors declare that no artificial intelligence (AI) or AI-assisted tools were used in the preparation of this manuscript.

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