

**Teacher and Technology Factors as Determinants of Academic Interest Deficit Among Senior Secondary School Students in Ikom Education Zone, Cross River State.**

DOI: <https://doi.org/10.60787/tjesds.vol1no3.35>  
(<https://doi.org/10.60787/tjesds.vol1no3.35>)

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**Abstract**

This study aims to investigate the influence of Teacher, and Technology Factors as Determinants of Academic Interest Deficit Among Senior Secondary School Students in

Ikom Education Zone, Cross River State. To achieve this purpose, two null hypotheses guided the study. A correlation survey research design was adopted. The population of the study comprised all the 2,735 Senior Secondary School Two (SSS2) students in the zone. The sample of the study was 213 respondents which was determined using Taro Yamane sampling method. The research instrument was a researcher-developed questionnaire titled, Senior Secondary Students Academic Interest Questionnaires (SSSAIQ) which was face validated by experts in Test and Measurements unit of the university of Calabar, Calabar. Cronbach's Alpha was used to test the reliability coefficient and 0.88 and 0.94 were obtained. From the findings, there exists a strong impact of teacher influence on students' academic interest. Also, that digital resources like educational apps, positively impacted students' interest, and excessive social media which involves the use of technology negatively affected academic motivation. Based on the findings it was recommended among others that the ministry of education should provide regular training for in-service teachers on the effective integration of educational technologies in classrooms to maximize student engagement and motivation, while preventing potential distractions.

**Keywords:** Teacher, Technology Factors, Academic Interest, Senior Secondary.

## Introduction

Teacher's factors significantly impact students' academic engagement, motivation and interest. Traditional teacher-centered methods of teaching that emphasize rote memorization can create disinterest (Adeyemo, 2021). Conversely, research suggest that students-centered approaches that promote active learning, critical thinking and collaboration can foster academic interest (Alcinsoiuyo et al., 2019). Similarly, research by Egbokhare et al. (2020) found that incorporating project-based learning strategies lead to a rise in students' motivation and academic interest (Uche et al 2018)

Academic interest is a crucial factor influencing students' academic engagement, achievement, and future success. It refers to a student's intrinsic motivation to learn, their enjoyment of the learning process and their desire to excel in academic pursuit (Akinsoluyo et al, 2019). However, research suggest a decline in academic interest among senior secondary school students in various region, including Nigeria and Ikom educational zone in particular (Shittu, 2015; Afolay, 2018; Adeneye, 2023).

The Information and Communications Technology (ICT) which encompasses digital tools like cell phones, computers, and the internet, significantly influences a student's lack of academic interest by presenting a dual challenge: its potential for distraction and misuse and its poor integration into learning (Ayodele 2020). Excessive engagement with ICT for instant gratification activities such as gaming and social media erodes focus and time for academics,

causing schooling to seem dull compared to the digital world; conversely, a failure by schools to effectively integrate ICT into the curriculum leads to boredom, while the digital divide can cause frustration and a feeling of being left behind, ultimately contributing to a deficit in academic motivation (Esambe & Ajaji 2018). This can significantly impact students' academic engagement; while limited access to technology can hinder their ability to research, access educational resources, and participate in online learning activities (Owolabi et al. 2023). The effective integration of technology into teaching and learning increased student's engagement and academic interest. However, responsible use of technology is advised as excessive exposure to screens could cause distraction and lead to decreased attention span, reduced focus, and a decline in academic work (Smith & Johnson, 2023). Social media platforms and online games can be highly distracting, diverting students' attention away from their studies and reducing their motivation to engage in academic tasks. The quality and relevance of online educational resources can influence students' academic interest. If students cannot find reliable and engaging content, they may become disengaged and frustrated (Asledu and Agyapong 2021).

The decline in interest in academic tends to result in poor academic performances in both internal and external examinations, thereby hindering their future prospects. This also accounts for many acts of examination malpractice and desperation moves in order to pass internal and external examinations. Many efforts by stakeholders like the government, school management, teacher, parents and concerned bodies have failed to yield sustainable and replicable solutions to the issue. While the reason for this situation could likely be multifaceted, a clear understanding of the contributing factors is currently lacking. Since the search for lasting solution is still on, the need to empirically address the gap by exploring the various factors that are responsible for the situation cannot be over emphasized. Thus, the researcher sort to answer the question, to what extent does

Teacher, and Technology Factors affect Academic Interest Deficit Among Senior Secondary School Students in Ikom Education Zone, Cross River State.

### **Purpose of the study**

The study aimed at investigating Teacher and Technology Factors as Determinants of Academic Interest Deficit Among Senior Secondary School Students in Ikom Education Zone, Cross River State. The study specifically sought to:

1. Ascertain the contribution of teacher factors to students' academic interest.
2. Find out the contribution of technology factors to students' academic interest.

### **Hypotheses**

Based on the purpose of the study, the following hypotheses were formulated

1. Teacher factors do not significantly contribute to students' academic interest.

2. Technological factors do not significantly contribute to students' academic interest.

### **Theoretical framework**

The study adopted ecological system theory by Bandura A (1997).

#### **Ecological System Theory by Bandura A (1997)**

Ecological system theory was proposed by Bandura (1997) to explain that human development is shaped by interaction between individual and the various environments they exist (peers, family, school, community and the likes). This theory helps to explain that a positive and supportive school environment can foster academic interest, while negative interaction can diminish same.

Therefore, interaction between teacher factors and technology factors make for an environment that could interact with students' academic interest. Thus, the students' teachers and access to technology within the ecological framework are considered crucial for scientific exploration in this study.

### **Literature Review**

#### **Teacher factor and student academic interest**

Teacher related factors are known to be crucial in determining the educational interest of the students. Teachers' qualifications, teaching style, teacher-student relationship, teachers' expectations, and use of technology have been found to play a crucial role in shaping students' academic interest. When teachers have high expectations for their students, it can have a positive impact on student motivation, effort, and overall academic performance. Teachers' expectations have been found to significantly influence students' academic achievement and interest. High expectations can lead to increased student interest and effort (Ofoegbu, 2016).

(Offiong, et al 2024) examined the teachers' expectation and student self-perception in secondary schools, the research was carried out in two randomly selected schools from Educational District V, where intact classes were purposely assigned into experimental and control groups. A quasi-experimental research design was employed, and the data were collected using Teachers Expectation Inventory (TEI) and Students Self- Perception Questionnaire (SSPQ) and the data were analyzed using Regression Analysis on SPSS software. It was observed that teachers' expectations significantly predicted students' self-perception and achievement.

Teaching method are deliberate strategies adopted by the teacher during an instructional procedure to captivate the attention of the learners and foster their curiosity. Teachers who

use interactive and engaging teaching methods tend to capture students' attention, thereby leading to an increase in academic interest and performance. A study by Adeyemi (2019) examined the teaching styles and student engagement in secondary school, with a population of 4278, using a sample size of 250 students and 15 teachers. The Teaching Style Inventory (TSI) and Students Engagement Questionnaire (SEQ) were used to collect data from randomly selected schools. Factors Analysis on SPSS software was used for data analyses. The findings indicated that students-centered teaching approaches were associated with higher level of student's engagement and interest.

Teachers' qualifications play a crucial role in shaping students' academic outcomes and experiences. Research has consistently shown that teachers' qualifications are a significant predictor of students' academic achievement and interest, teacher effectiveness, and school success. Factors such as subject matter knowledge, pedagogical knowledge, experience, and school leadership also significantly influence teachers' effectiveness. Studies have shown that teachers with high qualifications have a direct impact on students' academic achievement and interest (Akpotu, 2015). This is more so because teachers with higher qualifications are more likely to have a deeper understanding of their subject matter, which can lead to more effective teaching methods and increased student engagement.

The teacher-student relationship plays a vital role in shaping students' academic interest and experience, this relationship can have a significant impact on students' interest, engagement and overall performance. When a teacher shows genuine interest and care, students are more likely to developed interest to learn and meet their academic expectations (Wentzel, 2020). Positive relationships help students feel connected to their teachers and peers, promoting a sense of belonging and reducing anxieties. The quality of the relationship between teachers and students is a critical factor that affects student academic interest. A positive and supportive teacher-student relationship built on trust, respect, and effective communication can enhance students' interest to learn and participate actively in class activities. Conversely, a strained or negative relationship may dampen students' enthusiasm for academics. In terms of the teacher-student relationship, studies have highlighted the importance of positive teacher-student interactions in fostering a conducive learning environment.

### **Technology related factor and students' academic interest**

In the contemporary educational world, technology plays a pivotal role in fostering students' academic interest. The integration of technology in teaching and learning processes has been linked to increased student engagement, improved academic performance, and enhanced learning experiences. The access to information is a fundamental practice that has gained significant attention in the contemporary world. The ability to obtain and process information

is crucial for individual empowerment, social development, and economic growth. Several technology-related factors such as, access to technology (computers, tablet, internet, etc.), use of educational technology (online learning platform, digital tools), digital literacy skills (ability to find, evaluate and use information online) and use of technology for communication and collaboration with peers and teachers.

Access to technology has become a crucial factor in determining the quality of education in today's digital age. It is essential for providing students with the skills they need to succeed in the digital age. However, there are still significant disparities in access to technology, particularly for marginalized groups. Krueger (2018) found that students from low-income families had less access to technology than their peers from more affluent families. Interactive learning environments created by technology have been shown to boost students' academic interest. Interactive whiteboards, educational software, and multimedia resources provide students with opportunities to explore concepts in a more engaging and interactive way (Kebritchi et al., 2020).

Personalized learning facilitated by technology is another factor that can enhance students' academic interest. With the help of adaptive learning platforms and educational apps, teachers can tailor instruction to meet individual students' needs and learning styles (Dziuban & Moskalpavilionis, 2015). This personalized approach can help students stay engaged in the learning process and feel more interested to learn. The use of educational technologies and online learning platforms has transformed the teaching and learning experience in the digital age.

Technology tools such as Google Docs, wikis, and discussion forums allow students to work together on projects from anywhere in the world (Buckingham Shum & Williams, 2016). With the vast amount of information available online, students have unprecedented access to resources that can help them deepen their understanding of complex concepts (Chen et al., 2014). Moreover, digital libraries and e-books offer convenience and flexibility for students who may not have easy access to physical textbooks or libraries. Picciano (2020) examined the effect of educational technology on student engagement and learning outcomes of students in higher education. Sample size of 500 students from 10 universities, and an online survey was used for data collection, with descriptive statistics and regression for data analysis. The result showed that the use of educational technology was found to improve student engagement and learning outcomes.

Digital literacy skills refer to the ability to effectively and critically navigate, evaluate, and create information in digital environments. They are essential for navigating the digital world

and accessing information, services, and opportunities (Wagner, 2018). Digital literacy skills include technical skills, information literacy skills, and critical thinking skills. Digital literacy skills are critical for academic success, workforce development, and lifelong learning. They can bridge the digital divide and promote social inclusion. A study conducted by Wagner (2018) focused on investigating the relationship between digital literacy skills and academic interest. It covered students in grade K-12 with a sample size of 2000 students from 40 schools. The research employed Standardized test score and survey questionnaire for data collection. Data were analyzed using descriptive statistics and regression analysis. The findings of the study shows that students with strong digital literacy skills tend to perform better academically

### **Methodology**

A correlation survey research design was adopted. The population of the study comprised all the 2,735 Senior Secondary School Two (SSS2) students in the zone. A multi-stage sampling technique was applied, firstly, simple random, secondly; accidental sampling techniques. Thirdly, Out of 66 public secondary schools in Ikom, ten (10) were randomly selected through a lottery method. In each of the sampled schools the senior secondary school two (SS2) class teacher was instructed to give twenty-one (21) students who were members of the class from any unit. To determine the sample of the study, the researcher made use of Taro Yamane.

Formula

$$n = \frac{N}{1+N(e^2)}$$

Where:

n = is the sample size

N = is the population size (2,135)

e = is the margin of error (0.10)

Therefore

$$n = \frac{2,135}{1+2,135(0.10^2)}$$

$$n = \frac{2,135}{1+2,135(0.10)}$$

$$n = \frac{2,135}{1+2,135}$$

$$n = \frac{2,135}{22.35}$$

$$n = 213$$

Therefore, based on the above, the sample size for this study was 213 respondents. The research instrument used for data collection was a researcher-developed questionnaire of Senior Secondary Students Academic Interest Questionnaires (SSSAIQ) which was face validated by experts in Test and Measurements unit of Educational Foundation Department of the university of Calabar, Calabar. Cronbach's Alpha was used to test the reliability coefficient and 0.88 and 0.94 were obtained. Data collected were analyzed using simple linear regression particularly, the correlation coefficient (R), coefficient of determination and regression ANOVA which was used to test all the hypotheses at 0.05 level of significance.

## Presentation of Results

**Hypothesis one:** Teacher factors do not significantly contribute to students' academic interest.

**Table 1: Simple linear regression analysis of the contribution of teacher factor to students' academic interest**

		Students' Academic Interest (SAI)	Teacher Factor (TF)	R	R <sup>2</sup>	
Pearson Correlation	Students' Academic Interest (SAI)	1.000	.693	0.693	0.481	
Sig. (1-tailed)	Teacher Factor (TF)	.693	1.000			
	SUMSAI	.	.000			
	SUMTF	.000	.			
N	SUMSAI	213	213			
	SUMTF	213	213			
ANOVA						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	956.895	1	956.895	195.323	.000
	Residual	1033.696	211	4.899		
	Total	1990.592	212			

a. Dependent Variable: Students' Academic Interest (SAI)

b. Predictors: (Constant), Teacher Factor (TF)

The result in the table above indicates that when the scores from students' responses on teacher factor were correlated with the scores from their responses on academic interest, a correlation coefficient (R) of .693 with a coefficient of determination (R<sup>2</sup>) of .481 were obtained from the analysis. The correlation coefficient of .693 shows that there exists a highly positive relationship between teacher factor and students' academic interest. The coefficient of determination (R<sup>2</sup>) of .481 means that teacher-related factors contribute to 48.1% changes



in students' academic interest. Further analysis also revealed that teacher factors significantly contribute to students' academic interest, ( $F(1, 211) = 195.323$ , Sig. = .000). This is due to the fact that the associated probability (sig.) value of .000 when compared with 0.05 level of significance for testing the hypothesis was found to be significant because .000 is less than 0.05 ( $p < .05$ ). Thus, the null hypothesis two ( $H_{02}$ ) was rejected, and the inference drawn is that teacher factors significantly contribute to students' academic interest.

**Hypothesis two:** Technology factors do not significantly contribute to students' academic interest.

**Table 2: Simple linear regression analysis of the contribution of technology factor to students' academic interest**

		Students' Academic Interest (SAI)	Technology Factor (TECHF)	R	R <sup>2</sup>
Pearson Correlation	Students' Academic Interest (SAI)	1.000	.591	0.591	0.350
	Technology Factor (TECHF)	.591	1.000		
Sig. (1-tailed)	SUMSAI	.	.000		
	SUM TECHF	.000	.		
N	SUMSAI	213	213		
	SUM TECHF	213	213		

ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	696.138	1	696.138	113.473	.000
	Residual	1294.454	211	6.135		
	Total	1990.592	212			

a. Dependent Variable: Students' Academic Interest (SAI)

b. Predictors: (Constant), Technology-Related Factor (TECHF)

The result in the above table shows that when the scores from students' responses on technology factor were correlated with the scores from their responses on academic interest, a correlation coefficient (R) of .591 with a coefficient of determination (R<sup>2</sup>) of .350 were obtained from the analysis. The correlation coefficient of .591 shows that there exists a moderately positive relationship between technology factor and students' academic interest. The coefficient of determination (R<sup>2</sup>) of .350 implies that technological factors contribute to 35.0% changes in students' academic interest. Further analysis also revealed that technological factors significantly contribute to students' academic interest, ( $F(1, 211) =$

113.473, Sig. = .000). This is because the associated probability (sig.) value of .000 when compared with 0.05 level of significance for testing the hypothesis was found to be significant because .000 is less than 0.05 ( $p < .05$ ). Hence, the null hypothesis three ( $H_{O3}$ ) was rejected, and the inference drawn is that technological factors significantly contribute to students' academic interest.

## **Discussion of findings**

### **Teacher Factors and Students' Academic Interest**

The study found that teacher's factors contribute to 48.1% changes in students' academic interest. Further analysis also revealed that teacher factors significantly contribute to students' academic interest. This shows the important role of teachers in shaping students' motivation. Teachers can influence students' interest through their teaching style, communication, classroom management, and ability to relate academic content to real-life scenarios. Effective teachers who engage students actively, provide constructive feedback, and show genuine concern for their progress typically inspire higher levels of academic interest among students.

This is in line with Ofoegbu (2016) who noted that teacher expectation has been found to significantly influence students' academic achievement and interest which the high expectation can lead to an increased in student interest and effort. The finding also corroborates that of Williams et al. (2023) who found that students taught by enthusiastic teachers reported significantly higher levels of academic interest. Furthermore, Evans and Hill (2022) similarly reported that teacher-student rapport and interactive teaching strategies were closely linked to sustained academic interest. In contrast, a study by Santos and Mitchell (2021) showed minimal influence of teacher characteristics on students' academic interest, emphasizing instead the role of peer support. However, Davis and Carter (2023) identified that consistent mentorship and encouragement by teachers' enhanced students' academic engagement, further confirming the influence of teacher's factors on academic interest.

### **Technological Factors and Students' Academic Interest**

The findings of the study showed that technological factors contribute to 35.0% changes in students' academic interest. Further analysis also revealed that technological factors significantly contribute to students' academic interest. This suggests that technology has a notable but slightly lesser impact compared to teacher factors. This can be true because technology offers students access to interactive and engaging learning resources that can enhance interest in academic activities. However, excessive or unregulated use of technology for entertainment rather than educational purposes may detract from academic focus, leading to a complex relationship between technology use and academic interest.

This finding is consistent with the findings of some previous scholars like Brown and Ahmed (2023) who reported that technology use in classrooms, when managed well, can increase students' engagement and interest in learning. Similarly, the finding is in tandem with that of Kang and Zhang (2022) which showed that digital resources like educational apps, positively impacted students' interest. On the other hand, Parker and Hughes (2021) found that excessive social media which involves the use of technology negatively affected academic motivation. Moreover, Foster and Nguyen (2024) indicated that while technology can support learning, without adequate guidance, students may be distracted, thus reducing their academic interest.

### **Conclusion**

In conclusion, the study demonstrated that teacher and technology factors significantly influence academic interest among Senior Secondary Schools. The findings underscore the crucial importance of teacher engagement and responsible technology integration as key strategies for addressing and mitigating academic interest deficit in the student population.

### **Recommendations.**

Based on the finding, the following recommendation were projected.

1. Teachers should be provided with regular professional development opportunities to enhance their teaching skills, focusing on student engagement, active learning, classroom management, and responsible technology use.
2. Management of schools should implement mentoring programs where teachers can support students beyond academic content, fostering a supportive environment for growth and motivation.
3. Teachers should encourage the use of educational technologies among students, such as interactive learning apps and online resources, to compliment classroom learning.
4. School authorities should implement guidelines to help students balance educational and recreational technology use, minimizing distractions and promoting focus on academic content.
5. The ministry of education should provide regular training for in-service teachers on the effective integration of educational technologies in classrooms to maximize student engagement and motivation, while preventing potential distractions.

### **References**

Achimbola, O. O. and Onwuka, C. N. (2021). The Role of Learning Environment in Academic Interest of Senior Secondary School. *International Journal of Educational Research*; 12(1), 8-22.

- Adenyeye and fatade (2023) Parental Influence and Academic interest of Senior Secondary School Students. A mediation Analysis. *Journal of Teacher Education and Research*, 11(1)1-12.
- Adeyemo, S.O (2021) The Role of Teacher- Students Relationship On Academic Interest of Senior Secondary School Students. *International Journal of Educational Research* 20(2)1-15.
- Adeyemi, B.O (2019) The Impact of Teaching Style on Academic Interest of Senior Secondary School . *International Journal of Educational Research* 17(1)1-15.
- Afolay A.O (2018) The Role of Teacher – Students Relationship on Academic Interest of senior Secondary School Students. *International Journal of Eduactional Research*.14(1) 1-15.
- Akinsolue, A.O Ogunyemi, B.O and Oyinloye, G,O (2019) The Role of Parental Influence on Academic interest of Senior Secondary School Students in Nigeria. *Journal of Educational Research Review* 8(3) 1-12.
- Aseledu, K. and Agypong, G.K (2021) The Relationship Between Teacher-students Relationship and Academic Interest of Senior Secondary School Students. *Journal of Teacher Education and Research*, 10 (1)1-10.
- Ayodele,O.O (2020) The Role of Teacher-Student Relationship on Academic Interest of Senior Secondary School Students, *Journal of Educational Research*.18(2)1-15.
- Akpotu, N.E (2015) The Relationship between Teacher Qualification and Academic Interest of Senior Secondary School. *International Journal of Educational Research* 13(1)5-22.
- Buckingham, shum.S.and William, R. (2016) The Impact of Digital Tools and Academic interest of Students. *International Journal of Educational Research*, 10(2)1-15.
- Esambe, E.E and Ajaji, O.T (2018) The Impact of Learning Environment on Academic Interest of Senior Secondary School. *Journal of Educational Psychology*,16(1)1-12.
- Chen,X. Holland, L. Brooks, W. and William, C Cooks (2014) The Relationship between Access to Technology and Academic Interest. *Journal of Educational Psychology*,12(1)1-12.
- Kebritchi, M. Lipschitz and Goren,O,(2020) The impact of Personalized Learning on Academic Interest. *Journal of Educational psychology* 20(2)1-12.
- Krueger,R.A (2018) The Relationship between Socio-economic Status and Access to Technology. *International Journal of Educational Research*, 12(1)1-1515.
- Offiong, Uba J.U, Oyamo, V. I, & Kujoh, J. U. (2024). Influence of Family and Technology-Related Factors on the academic Interest of Senior Secondary School Students in Calabar Education Zone of Cross River State, Nigeria. *Federal Polytechnic Ugep Journal of Innovation and Research (FPUJIR) Maiden Edition*, [www.fpujournal.com](http://www.fpujournal.com), 1(1), 89-97.

- Ofoegbu, F.I (2016) The Impact of Innovative Teaching Method on Academic Interest of Senior Secondary School. *International Journal of Educational Research* 10(1)1-12.
- Owolabi, T.O, Adeniyi, O and Fatade A.O (2023) The Role of Peer Group on Academic interest of senior Secondary school, *International Journal Of Educational Research* 16(2)1-15.
- Shittu, A.O (2015) Impact of Teacher- Student Relationship on Academic Interest of Senior Secondary School Students. *Journal of Educational Psychology*, 13(1) 1-12.
- Smith, L., Nguyen, T., & Zhang, M. (2023). Parental involvement and student academic interest. *Journal of Family and Education Dynamics*, 17(1), 25-39.
- Uche, A. C, Oguneeyemi, B.O. and Oyinloye, G.O (2018) The Role of Peer Group on Academic Interest of Senior Secondary School Students. *Journal of Educational Research and Review*, 7(3)1-10.
- Wagner, T. (2017) The Relationship Digital Literacy and Academic Interest. *International Journal of Educational Research*, 11(12)1-15.
- Wentzel, K.R (2020) The Impact of Teacher Support on Academic Interest of Senior Secondary School. *International Journal of Educational Research*, 20(2)1-15.