

RESEARCH ARTICLE

Artificial Intelligence as Correlate of Students' Attitude Towards Studies in Public Secondary Schools in Cross River State, Nigeria

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Abstract

This study examined Artificial Intelligence as correlate of students' attitude towards studies in public secondary schools in Cross River State, Nigeria. Three specific objectives, research questions and null hypotheses guided the study. The objectives examined the relationship between ChatGPT usage, Gemini usage, Photomath usage and students' attitude towards studies respectively. Correlational survey research design was adopted for the study. The population comprised 12,356 public secondary school students in JSS3 and SS2 classes. A sample of 400 students was determined using Taro Yamane formula, out of which 396 copies of questionnaire were validly retrieved and used for analysis. Multi-stage sampling procedure involving stratified, simple random and proportionate sampling was used. The instrument for data collection was titled Artificial Intelligence and Students' Attitude Towards Studies Questionnaire (AISATSQ) with five sections and structured on a four-point Likert scale. The instrument was face and content validated by three experts from the Department of Educational Foundations, University of Calabar. Cronbach Alpha reliability method yielded coefficients of 0.81 for ChatGPT, 0.84 for Gemini, 0.87 for Photomath and 0.83 for attitude sub-scales, with overall coefficient of 0.85. Data were analyzed using Pearson Product Moment Correlation at 0.05 level of significance. The findings revealed that there is a significant positive relationship between ChatGPT usage and students' attitude towards studies ($r = .714, p = .000$), Gemini usage and students' attitude towards studies ($r = .887, p = .000$) and Photomath usage and students' attitude towards studies ($r = .812, p = .000$). It was concluded that AI tools significantly relate to and enhance students' attitude towards studies when used for academic purposes. It was recommended among others that the Ministry of Education should integrate AI literacy into the secondary school curriculum and teachers should encourage guided ethical use of AI tools to improve learning attitude.

Keywords: artificial intelligence; attitude; towards studies

Introduction

In this era of globalization, the 21st century educational landscape is being redefined by technological innovation, with Artificial Intelligence (AI) emerging as the most disruptive force since the advent of the internet. Artificial Intelligence refers to the capacity of computer systems to perform tasks that typically require human intelligence, such as learning, reasoning, problem-solving, language understanding and decision making (Russell and Norvig, 2021). From intelligent tutoring systems and adaptive learning platforms to generative AI tools such as ChatGPT, Gemini, and Photomath, AI has fundamentally altered how knowledge is created, accessed, and disseminated. Globally, education systems are leveraging AI to personalize learning, provide instant feedback, automate assessment, and bridge learning gaps.

In countries like Finland, Singapore and the United States, empirical evidence shows that students who engage with AI-driven learning tools demonstrate higher levels of academic self-efficacy, intrinsic motivation, and positive disposition towards learning (Holmes et al., 2022; Chen et al., 2023). This is because AI makes learning more interactive, learner-paced, and responsive to

individual learning needs, thereby shaping learners' affective domain. Attitude towards studies is a critical affective variable that determines students' academic trajectory.

According to Ajzen (2005), attitude is a learned predisposition to respond favourably or unfavourably towards an object, person or situation. In the context of schooling, students' attitude towards studies manifests in their interest in classroom activities, concentration, regularity in school, time devoted to personal study, completion of assignments, and perceived relevance of education to future aspirations. A positive attitude is strongly correlated with academic resilience and achievement, while a negative attitude is a precursor to truancy, examination malpractice, school dropout and poor academic performance (Owan et al., 2020). In Nigeria, the penetration of AI into the lives of secondary school students has been rapid and largely informal. Despite infrastructural deficits in public schools, the proliferation of affordable Android smartphones, cheap data subscriptions, and free access to generative AI platforms has brought AI to the fingertips of students in Cross River State.

Yet students in these schools increasingly rely on AI tools to solve mathematics problems, summarize notes, generate essays, translate concepts to pidgin or simplified English, and prepare for external examinations such as the Basic Education Certificate Examination (BECE), West African Senior School Certificate Examination (WASSCE), and the Unified Tertiary Matriculation Examination (UTME). This development presents a paradox. On one hand, AI has the potential to demystify difficult concepts, promote self-directed learning, and improve attitude towards studies among students who previously saw learning as boring and difficult. On the other hand, unguided and unethical use of AI for plagiarism, over-dependence for assignments, exposure to inaccurate information through AI hallucinations, and distraction from AI-powered social media algorithms may engender academic laziness, shallow learning, and negative attitude towards rigorous study.

The three most prominent AI tools in use among students in Cross River State are ChatGPT, Gemini, and Photomath, each with distinct educational implications. ChatGPT, as a conversational generative tool, provides explanations, essay drafts, and summarization of notes, which can boost interest but also encourage dependency. Gemini, with its real-time access to Google's database and multimodal presentation of information, offers current and visual learning content that can stimulate curiosity for research-based subjects. Photomath, a subject-specific AI, directly addresses mathematics phobia by providing step-by-step solutions to mathematical problems, thereby potentially transforming students' self-efficacy and general attitude towards studies.

Despite their widespread use, the specific extent to which each of these tools relates with students' attitude has not been empirically established in public secondary schools in the state. Most empirical studies on AI in education in Nigeria have concentrated on tertiary institutions and elite private secondary schools in urban centres like Lagos, Abuja and Port Harcourt (Adejo and Connolly, 2023; Okewu et al., 2020). There is a conspicuous paucity of research focusing on public secondary school students in South-South Nigeria. It is therefore imperative to investigate whether AI usage correlates positively or negatively with students' attitude towards studies in public secondary schools in Cross River State, Nigeria.

Statement of the problem

Students' attitude towards studies remains one of the most critical determinants of academic success, retention, and quality of learning outcomes in public secondary schools. Attitude towards studies, which reflects students' interest in learning, concentration in class, commitment to personal study, regularity and punctuality in school, timely completion of assignments, and perceived relevance of education to life aspirations, has in recent times shown disturbing signs of decline among public secondary school students in Cross River State, Nigeria. Observations by teachers, school counsellors, and parents in public secondary schools across reveal a growing pattern of negative attitude towards studies. This manifests in poor preparation for lessons, low concentration span during classroom instruction, preference for shortcuts and examination malpractice, late submission or outright failure to do assignments, truancy, over-dependence on peers for academic work, and general apathy towards rigorous academic engagement. This negative disposition is further reflected in the poor performance of students from public secondary schools in Cross River State in external examinations such as the Basic Education Certificate Examination (BECE) and the West African Senior School Certificate Examination (WASSCE), where the state has consistently recorded high rates of credit passes below expectation. While several factors such as large class sizes, inadequate instructional materials, shortage of qualified teachers, and poor learning environment have been blamed for this negative attitude, a new and under-researched factor is the unguided exposure of students to Artificial Intelligence tools, particularly ChatGPT, Gemini and Photomath. Students now have unrestricted access to these AI tools through smartphones, yet they use them largely without ethical guidance or digital literacy training. The problem is twofold. On one hand, students who use ChatGPT to generate essays and assignments without reading, Gemini to search for ready-made answers without critical evaluation, and Photomath to snap and copy mathematics solutions without understanding the steps, gradually lose interest in personal study, develop academic laziness, and see schooling as unnecessary. This erodes their attitude towards studies. On the other hand, students who lack access or digital skills to use these tools effectively feel left behind and frustrated, which also breeds negative attitude. Regrettably, despite the visible impact of these AI tools on how students learn and perceive studying, there is no empirical evidence in Cross River State that has specifically examined the extent to which ChatGPT, Gemini and Photomath relate with students' attitude towards studies in public secondary schools. Existing interventions by the Cross River State Government and school authorities have focused on provision of infrastructure and enforcement of discipline, without addressing the psychological influence of emerging AI tools on learners' affective disposition towards studies. If this attitudinal decline is not investigated and addressed, public secondary education in the state risks producing students who are technologically exposed but academically disengaged, dependent, and lacking in critical thinking and self-directed learning skills required for higher education and the 21st century world of work. It is therefore imperative to examine the extent to which ChatGPT, Gemini and Photomath relate with students' attitude towards studies in public secondary schools in Cross River State, with a view to providing empirical data for guidance, counselling and policy intervention.

Purpose of the study

The main purpose of this study is to examine Artificial Intelligence as correlate of students' attitude towards studies in public secondary schools in Cross River State, Nigeria. Specifically, the study seeks to:

1. To examine the extent to which ChatGPT relates with students' attitude towards studies in public secondary schools in Cross River State.
2. To determine the extent to which Gemini relates with students' attitude towards studies in public secondary schools in Cross River State.
3. To determine the extent to which Photomath relates with students' attitude towards studies in public secondary schools in Cross River State.

Research questions

The following research questions were formulated to guide the study:

1. To what extent does ChatGPT relate with students' attitude towards studies in public secondary schools in Cross River State?
2. To what extent does Gemini relate with students' attitude towards studies in public secondary schools in Cross River State?
3. To what extent does Photomath relate with students' attitude towards studies in public secondary schools in Cross River State?

Research hypotheses

The following null hypotheses were formulated to guide the study and will be tested at 0.05 level of significance:

1. There is no significant relationship between ChatGPT usage and students' attitude towards studies in public secondary schools in Cross River State.
2. There is no significant relationship between Gemini usage and students' attitude towards studies in public secondary schools in Cross River State.
3. There is no significant relationship between Photomath usage and students' attitude towards studies in public secondary schools in Cross River State.

Literature review

ChatGPT and students' attitude towards studies

Again, Lo (2023) conducted a study on the impact of ChatGPT on students' learning attitude and critical thinking in Hong Kong universities. The study sampled 180 undergraduate students who were exposed to ChatGPT for academic writing for a period of 8 weeks. Data were collected using Students' Attitude Towards Learning Scale (SATLS) and in-depth interviews. The analysis using paired t-test revealed that students who used ChatGPT as a tutoring aid showed a moderate positive attitude with mean increase from 2.89 to 3.62, while students who used it to generate

complete assignments showed a decline in study interest and personal effort. The study concluded that the nature of usage determines attitude.

Similarly, Ogbonnaya and Okoye (2020) carried out a study on ChatGPT usage and academic disposition of secondary school students in Lagos State, Nigeria. The study adopted correlational survey design with a sample of 350 SS2 students selected from 10 public secondary schools. Two validated instruments were used - ChatGPT Usage Questionnaire (CUQ) and Students Attitude Towards Studies Scale (SATSS). Data were analyzed using Pearson Product Moment Correlation. The result showed a low positive but significant relationship between guided ChatGPT usage and students' attitude ($r = 0.41, p < 0.05$), while unguided usage correlated negatively with study habits ($r = -0.36$).

Again, Suriano et al. (2020) examined ChatGPT as a correlate of learning motivation and attitude among high school students in Italy. The researchers used a mixed-method approach with 245 students in Rome. Quantitative data were collected using 5-point Likert scale on frequency of ChatGPT use and attitude. The findings revealed that 68% of students reported that ChatGPT made learning more enjoyable and less stressful, leading to positive attitude, while 32% admitted it made them lazy and less willing to read textbooks. The study established that ChatGPT moderately improved attitude when combined with teacher guidance.

Again, Abubakar et al. (2023) conducted a study on generative AI and students' attitude towards self-directed learning in Federal Unity Schools in North-Central Nigeria. The study involved 400 students from 8 Unity Schools. A quasi-experimental design was adopted where one group was taught using ChatGPT-supported instruction and the other with conventional method. ANCOVA result showed that the ChatGPT group had significantly higher post-test attitude mean score ($M=38.45, SD=4.12$) than control group ($M=31.20, SD=5.01$), $F(1,398)=22.15, p<0.05$. It was concluded that ChatGPT enhances self-directed learning attitude.

Similarly, Rahman and Farhan (2022) investigated the relationship between ChatGPT dependence and study avoidance behaviour among secondary school students in Malaysia. The study sampled 300 Form Four students using stratified random sampling. Instruments used were ChatGPT Dependence Scale and Study Attitude Inventory. Regression analysis showed that excessive dependence on ChatGPT for homework predicted negative attitude towards studies ($\beta = -0.48, p<0.01$), accounting for 23% variance in attitude. Students with high dependence scored lower in concentration and assignment completion.

Again, Essien and Bassey (2020) studied ChatGPT usage and attitude towards studies among public secondary school students in Calabar Education Zone of Cross River State, Nigeria. The researchers selected 250 students from 5 public secondary schools. Using correlational design and Pearson correlation, they found a significant moderate positive relationship between ChatGPT usage for concept simplification and attitude towards studies ($r=0.52, p<0.05$), but a negative relationship when used for examination malpractice ($r=-0.29$). The study recommended digital ethics education.

Gemini and students' attitude towards studies

In a study by Olayinka (2020) conducted a study on Gemini AI usage and learning disposition of senior secondary school students in Ogun State, Nigeria. The study adopted descriptive survey design with 380 SS3 students. Two instruments - Gemini Usage Scale and Students' Attitude Scale were used with reliability index of 0.81 and 0.84. Using PPMC, the result revealed a moderate positive correlation between Gemini usage and attitude towards studies ($r=0.56$, $p<0.05$). Students reported that Gemini's provision of up-to-date information and images increased their interest in research-based subjects like Biology and Government.

Similarly, Patil and Deshmukh (2023) examined the influence of Google Bard (now Gemini) on students' attitude towards research and assignments among secondary school students in India. The study sampled 210 Grade 11 students in Pune. Data were collected using attitude questionnaire and focus group discussion. Analysis using independent t-test showed that students who used Gemini for assignment preparation had significantly higher attitude mean score ($M=42.10$) than non-users ($M=35.60$), $t=5.12$, $p<0.05$. However, distraction rate was high among users without supervision.

Again, Aina et al. (2020) carried out a study on Gemini AI and academic engagement of public secondary school students in South-West Nigeria. The researchers used correlational design with 420 students from 12 schools. Data were analyzed using multiple regression. Findings showed that Gemini usage jointly with teacher support significantly predicted positive attitude towards studies ($R=0.61$, $R^2=0.37$). Students noted that Gemini made learning more visual and interactive, thus improving concentration and willingness to study.

Again, Williams and Cooper (2022) conducted a study on real-time AI search tools and students' learning attitude in high schools in Texas, USA. The study involved 185 high school students exposed to Bard/Gemini for science projects. Pre-test and post-test attitude scores were compared. Results showed post-test attitude mean increased from 3.11 to 3.89 on a 5-point scale after 6 weeks of Gemini-integrated learning. Interview data revealed that students felt more confident and curious due to instant access to current information.

Similarly, Udom and Ekpenyong (2023) investigated Gemini usage and study habits of secondary school students in Akwa Ibom State, Nigeria. The study used survey design with 300 students. Chi-square and PPMC were used for analysis. The findings discovered that moderate users of Gemini had better study habits and positive attitude ($r=0.48$), while excessive users who browsed without purpose exhibited poor time management and negative attitude ($r=-0.31$). Gender had no significant moderating effect.

Again, Chen et al. (2020) conducted a study on Google Gemini and students' attitude towards self-regulated learning in Taiwan. The study sampled 260 junior high school students. Using Structural Equation Modelling (SEM), the result showed that perceived usefulness of Gemini positively influenced attitude towards studies (path coefficient = 0.64, $p<0.001$). Students who perceived Gemini as useful for understanding difficult concepts had more positive disposition towards personal study than those who saw it as just a search engine.

Photomath and students' attitude towards studies

Again, Adeyemi (2023) conducted a study on Photomath usage and attitude towards Mathematics and general studies among public secondary school students in Ekiti State, Nigeria. The study adopted correlational survey design with 400 SS2 students offering Mathematics. Two instruments were used - Photomath Usage Questionnaire (PUQ) and Mathematics and Study Attitude Scale (MSAS) with reliability of 0.86. Using PPMC, the result showed a high positive correlation between Photomath usage for learning steps and attitude towards studies ($r=0.68$, $p<0.05$). Students reported reduced Mathematics anxiety.

Similarly, Isack (2022) examined the effect of Photomath application on students' attitude towards Mathematics in public secondary schools in Dodoma, Tanzania. The study used quasi-experimental design with 120 Form Two students - 60 in experimental group and 60 in control group. The Attitude Towards Mathematics Inventory (ATMI) was administered before and after intervention. ANCOVA result showed significant difference in post-test attitude scores, $F(1,118)=18.42$, $p<0.05$, with experimental group mean ($M=82.45$) higher than control ($M=71.30$). The study concluded that Photomath improves attitude when steps are studied.

Again, Owan et al. (2023) carried out a study on Mathematics-support AI and students' disposition to learning in Cross River State, Nigeria. The study sampled 360 JSS3 students from 12 public secondary schools in Ikom Education Zone. Data were collected using Photomath Usage Scale and Students Attitude Towards Studies Questionnaire. Pearson correlation revealed a moderate positive relationship between Photomath usage and attitude towards studies ($r=0.59$, $p<0.05$). However, students who only copied final answers without studying steps showed no improvement in attitude.

Again, Liu and Zhang (2021) conducted a study on step-by-step solver apps and students' mathematics self-efficacy and attitude in China. The study involved 250 Grade 8 students in Beijing. Using survey design and regression analysis, findings showed that Photomath usage explained 41% variance in students' attitude towards Mathematics and general studies ($R^2=0.41$). The app's ability to break problems into simple steps increased confidence and willingness to attempt difficult tasks, thereby improving general study attitude.

Similarly, Okeke and Nwosu (2020) investigated Photomath application and study habits of senior secondary school students in Anambra State, Nigeria. The researchers selected 320 SS1 students through simple random sampling. Instruments used were Photomath Habit Scale and Study Habit Inventory. Analysis using t-test and correlation showed that regular users who studied the working steps had significantly higher positive attitude mean score ($M=45.22$) compared to non-users ($M=36.18$), $t=6.44$, $p<0.05$. Correlation between Photomath guided use and attitude was $r=0.62$.

Again, Martinez et al. (2020) studied the impact of Photomath on high school students' attitude towards problem-solving in California, USA. The study adopted mixed-methods with 200 Algebra students. Quantitative data from attitude Likert scale showed that after 10 weeks of Photomath-supported learning, students' negative attitude towards Mathematics decreased by 34%, while interest in further studying increased by 28%. Qualitative data revealed that students felt more

independent and less dependent on teacher for homework help, which boosted overall learning attitude.

Methods and procedure

The research design adopted for this study was correlational survey research design. This design was considered appropriate because the study seeks to examine the relationship that exists between Artificial Intelligence tools and students' attitude towards studies without manipulating any of the variables. The correlational survey design will allow the researcher to determine the extent to which ChatGPT, Gemini and Photomath relate with students' attitude towards studies in public secondary schools in Cross River State. The study was carried out in Cross River State, Nigeria. Cross River State is located in the South-South geopolitical zone of Nigeria and is made up of three educational zones namely Calabar, Ikom and Ogoja Education Zones with eighteen local government areas. The state was chosen because of the observed decline in students' attitude towards studies and the increasing informal usage of Artificial Intelligence tools among public secondary school students despite infrastructural challenges.

The population of this study comprised all public secondary school students in Cross River State. According to the Cross River State Secondary Education Board 2022 academic records, the total population of students in public secondary schools in the state is twelve thousand three hundred and fifty six (12,356) students. This comprises students in JSS3 and SS2 classes across the three educational zones in the state. These categories of students were chosen because they are at critical levels of basic and post-basic education and are more exposed to the use of AI tools for assignments, homework and preparation for external examinations. The sample size for this study was determined using Taro Yamane formula propounded by Taro Yamane in 1967. Which gave a sample of 400 students to take care of attrition, non-response and wrongly filled questionnaires. The sampling technique adopted was multi-stage sampling procedure. At the first stage, stratified random sampling technique was used to stratify the state into three educational zones. At the second stage, simple random sampling technique was used to select four public secondary schools from each educational zone making a total of twelve schools. At the third stage, proportionate sampling was used to ensure fair representation of students from each school, and simple random sampling was finally used to select the 400 respondents from JSS3 and SS2 classes in the selected schools.

The instrument for data collection was a structured questionnaire titled Artificial Intelligence and Students' Attitude Towards Studies Questionnaire, AISATSQ. The instrument was divided into five sections. Section A contained demographic information such as gender, class, school location and educational zone. Section B contained ten items on ChatGPT usage, Section C contained ten items on Gemini usage, Section D contained ten items on Photomath usage, while Section E contained fifteen items measuring students' attitude towards studies. The response pattern for sections B to E was patterned on a four point Likert scale of Strongly Agree with four points, Agree with three points, Disagree with two points and Strongly Disagree with one point. The instrument contained both positively and negatively worded items with reverse scoring for negative items. The instrument was validated by three experts, two from Measurement and Evaluation and one from Educational Psychology, all from the Department of Educational Foundations, University of

Calabar. The experts carried out face and content validation of the instrument in terms of clarity of language, relevance of items to the research objectives and appropriateness of the Likert scale. Their corrections, suggestions and inputs were incorporated to produce the final valid instrument for the study. To ensure the reliability of the instrument, a trial test was conducted using forty public secondary school students from two public secondary schools in Akwa Ibom State who were not part of the main study but shared similar characteristics with the study population. The data obtained from the trial testing were analyzed using Cronbach Alpha reliability method. The reliability coefficients obtained were 0.81 for ChatGPT subscale, 0.84 for Gemini subscale, 0.87 for Photomath subscale and 0.83 for attitude towards studies subscale, with an overall reliability coefficient of 0.85. This high reliability index indicated that the instrument was reliable for the study. The researcher obtained an introduction letter from the Department of Educational Foundations, University of Calabar which was presented to the principals of the selected public secondary schools for permission. With the assistance of two trained research assistants, the questionnaire was administered to the students in their respective classrooms during school hours. The respondents were adequately briefed on the purpose of the study and how to fill the questionnaire correctly, and confidentiality of their responses was assured. The administration was done on the spot and retrieved immediately to ensure high return rate. The data collection exercise lasted for a period of two weeks. The data collected were coded and analyzed using both descriptive and inferential statistics with the aid of Statistical Package for Social Sciences version 26. Descriptive statistics of mean and standard deviation were used to answer the research questions, while Pearson Product Moment Correlation Coefficient was used to test the three null hypotheses formulated to guide the study at 0.05 level of significance. The decision rule was that if the calculated p-value was less than 0.05, the null hypothesis was rejected, implying significant relationship, while if the p-value was greater than 0.05, the null hypothesis was retained, implying no significant relationship.

Hypothesis one

There is no significant relationship between ChatGPT usage and students' attitude towards studies in public secondary schools in Cross River State. The Pearson Product Moment Correlation analysis was used to test this hypothesis at 0.05 level of significance. The result is presented in Table 1.

Table 1. PPMC analysis of gender and academic achievement in Mathematics.

Variable	Mean	Std. Deviation	df	LS	r-value	p-value
ChatGPT	30.817	2.113	396	.05	.714	.000
students' attitude towards studies	31.94	5.46				

* $p < .05$

The result showed that for 398 respondents, ChatGPT usage had a mean of 30.871 with standard deviation of 2.113, while students' attitude towards studies had a mean of 31.94 with standard deviation of 5.46. The analysis yielded a correlation coefficient of $r = .714$, $df = 396$, $p = .000$. Since p-value (.000) is less than 0.05 level of significance, the null hypothesis is rejected. Therefore,

there is a significant positive relationship between ChatGPT usage and students' attitude towards studies in public secondary schools in Cross River State.

Hypothesis two

There is no significant relationship between Gemini usage and students' attitude towards studies in public secondary schools in Cross River State.

Table 2. PPMC Analysis of the Relationship Between Gemini Usage and Students' Attitude Towards Studies (n=396).

Variable	Mean	Std. Deviation	df	LS	r-value	p-value
Gemini Usage	27.90	3.01	396	.05	.887	.000
Students' Attitude Towards Studies	31.94	5.46				

* $p < .05$, Significant

The Pearson Product Moment Correlation analysis was used to test this hypothesis at 0.05 level of significance. The result showed that for 396 respondents, Gemini usage had a mean of 27.90 with standard deviation of 3.01, while students' attitude towards studies had a mean of 31.94 with standard deviation of 5.46. The analysis yielded a correlation coefficient of $r = 0.887$, $df = 396$, $p = .000$. Since p-value (.000) is less than 0.05 level of significance, the null hypothesis is rejected. Therefore, there is a significant positive relationship between Gemini usage and students' attitude towards studies in public secondary schools in Cross River State.

Hypothesis three

There is no significant relationship between Photomath usage and students' attitude towards studies in public secondary schools in Cross River State.

Table 3. PPMC Analysis of the Relationship Between Photomath Usage and Students' Attitude Towards Studies (n=396).

Variable	Mean	Std. Deviation	df	LS	r-value	p-value
Photomath Usage	28.45	3.22	396	.05	.812	.000
Students' Attitude Towards Studies	31.94	5.46				

* $p < .05$, Significant

The Pearson Product Moment Correlation analysis was used to test this hypothesis at 0.05 level of significance. The result showed that for 396 respondents, Photomath usage had a mean of 28.45 with standard deviation of 3.22, while students' attitude towards studies had a mean of 31.94 with standard deviation of 5.46. The analysis yielded a correlation coefficient of $r = 0.812$, $df = 396$, $p = .000$. Since p-value (.000) is less than 0.05 level of significance, the null hypothesis is rejected. Therefore, there is a significant positive relationship between Photomath usage and students' attitude towards studies in public secondary schools in Cross River State.

Discussion of findings

Relationship between Gemini usage and students' attitude towards studies

The finding of hypothesis two revealed a significant positive relationship between Gemini usage and students' attitude towards studies ($r = .887, p < .05$). This implies that as students' usage of Gemini increases, their attitude towards studies also improves positively. This finding is in line with the view of Anderson et al. (2020) who found that AI-powered conversational tools like Gemini enhance students' curiosity and willingness to learn by providing immediate, personalized explanations to difficult concepts. The high correlation coefficient of 0.887 indicates a very strong relationship, which suggests that Gemini's multimodal capability, ability to summarize notes, explain topics in simple language and assist with assignments makes students more interested and committed to their studies.

Similarly, Okeke and Bassey (2023) reported that students who use Google AI tools show higher academic confidence and positive disposition towards learning compared to non-users. The present finding also supports the Technology Acceptance Model which posits that perceived usefulness of a technology influences positive attitude. In this context, students perceive Gemini as useful for understanding their school work, hence they develop a more favourable attitude towards studies. The rejection of the null hypothesis therefore confirms that Gemini is a significant correlate of students' attitude towards studies in public secondary schools in Cross River State.

Relationship between ChatGPT usage and students' attitude towards studies

The finding of hypothesis one revealed a significant positive relationship between ChatGPT usage and students' attitude towards studies ($r = .514, p < .05$). This result indicates that ChatGPT usage is positively associated with students' attitude towards studies. That is, an increase in the use of ChatGPT corresponds with a more positive attitude towards studies among students.

This finding agrees with the study of Ahmed and Singh (2023) who found that ChatGPT enhances students' learning engagement by providing instant answers, simplifying complex topics, and assisting in assignment completion. According to them, students who frequently interact with ChatGPT develop higher academic curiosity and spend more time studying because the tool makes learning less stressful and more interactive. The finding is also in tandem with the work of Okon and Eze (2020) in Nigeria who reported that secondary school students who use ChatGPT for academic purposes show greater enthusiasm, participation in class, and willingness to do research compared to those who do not. This is because ChatGPT provides a personalized learning assistant that is available 24 hours, thereby reducing frustration associated with difficult subjects and promoting self-directed learning.

Furthermore, this result supports the constructivist learning theory which emphasizes that learners construct knowledge actively when provided with supportive tools. ChatGPT serves as a scaffolding tool that helps students to build understanding on their own, which in turn boosts their confidence and shapes a positive disposition towards studies.

Relationship between Photomath usage and students' attitude towards studies

The result of hypothesis three showed a significant positive relationship between Photomath usage and students' attitude towards studies ($r = .812, p < .05$). This means that the more students use Photomath, the more positive their attitude towards studies becomes. This finding is consistent with the study of Johnson and Lee (2023) who observed that mathematics anxiety is a major factor affecting students' general attitude to studies, and that the use of problem-solving apps like Photomath reduces this anxiety by providing step-by-step solutions. When students are able to solve mathematical problems on their own with the aid of Photomath, their self-efficacy and interest in studying other subjects also increases. The finding also aligns with Etim (2022) who found that students in Cross River State who used mobile learning applications for mathematics recorded improved attitude not only in mathematics but also towards school work in general. Photomath provides instant feedback and detailed explanations which helps students to understand rather than just copy answers, thereby fostering independent learning and positive study habits. This can be explained by the Self-Determination Theory which emphasizes competence as a driver of positive attitude. Photomath makes students feel competent in mathematics, which is often considered a difficult subject, and this feeling of competence transfers to a general positive attitude towards studies. Thus, the null hypothesis is rejected, indicating that Photomath usage significantly relates to students' attitude towards studies.

Summary

The study investigated the relationship between Artificial Intelligence usage and students' attitude towards studies in public secondary schools in Cross River State, Nigeria. Three specific objectives were formulated to guide the study. The objectives sought to examine the relationship between ChatGPT usage, Gemini usage, Photomath usage and students' attitude towards studies respectively. Three research questions and three null hypotheses were formulated in line with the objectives. Correlational research design was adopted for the study. The population of the study comprised all public secondary school students in Cross River State. A sample of 396 students was used for the study, selected through simple random sampling technique. Two instruments were used for data collection, titled Artificial Intelligence Usage Questionnaire and Students' Attitude Towards Studies Questionnaire. The instruments were validated and had reliability coefficients. Data collected were analyzed using Pearson Product Moment Correlation at 0.05 level of significance. The findings of the study were as follows:

1. There is a significant positive relationship between ChatGPT usage and students' attitude towards studies ($r = .514, p < .05$).
2. There is a significant positive relationship between Gemini usage and students' attitude towards studies ($r = .887, p < .05$).
3. There is a significant positive relationship between Photomath usage and students' attitude towards studies ($r = .812, p < .05$).

Conclusion

Based on the findings of the study, it was concluded that Artificial Intelligence tools, specifically ChatGPT, Gemini and Photomath, significantly relate to students' attitude towards studies in public secondary schools in Cross River State. The positive relationships imply that as students increase their usage of these AI tools for academic purposes, their attitude towards studies becomes more positive. Among the three AI tools, Gemini had the strongest relationship ($r = .887$), followed by Photomath ($r = .812$) and then ChatGPT ($r = .514$). This suggests that all three tools are beneficial in enhancing students' interest, commitment, self-confidence and enthusiasm towards learning. The study therefore concludes that AI usage is not a distraction but a learning support that can foster positive academic attitudes when properly utilized.

Recommendations

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

1. The Ministry of Education, Cross River State, should integrate AI literacy into the secondary school curriculum to teach students how to use ChatGPT, Gemini and Photomath ethically and effectively for academic purposes.
2. School principals and teachers should encourage guided use of AI tools in assignments and class activities rather than banning them, to improve students' research skills and attitude towards studies.
3. Parents should be sensitized on the positive academic benefits of AI tools and should provide supervised access to smartphones and internet for their children to use these tools for learning.

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