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Preservice Science Teachers' Perceived Influence of Artificial Intelligence Application on their Academic Motivation in Anambra State.

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Abstract

The study aimed at investigating the perceived influence of preservice science teachers' artificial intelligence application on their academic motivation in learning science in Nnamdi Azikiwe University (NAU), Awka, Anambra State Nigeria. The study guided by five research questions adopted a descriptive survey research design. Simple random sampling technique was used to draw a sample of 500 Science Education Department students, in NAU, used in the study. The instrument used for data collection was an adapted questionnaire titled "AI Application Questionnaire on Students' Academic Motivation" (AIAQSAM). AIAQSAM was validated by three experts, yielded a reliability coefficient of 0.86, established using Cronbach Alpha. In analyzing the items in the research questions, Mean and standard deviation were used while grand mean, compared against a number line, was used in answering the research questions. The results obtained showed that the respondents agreed that application of AI in the classroom to a very high extent positively influenced their students' academic motivation and its dimensions; attainment, utility and intrinsic values. Furthermore, the study revealed that students are willing to invest more time and finance into AI application skills, and thus recommended among others that as the world gets more digitalized, institutions should organize orientation programmes to encourage students to equip themselves with AI application skills and tools in other to fit in the ever evolving world.

Keywords: Academic Motivation, Artificial Intelligence Application, Preservice Science Teachers

Introduction

Science has long been recognized as a tool for modern day technological advancements. Science is also viewed as the systematic process that involves formulating hypotheses, testing them through experiments, and analyzing results to develop theories and laws (Nwuba et al., 2022). It is not just a body of knowledge, but also a method of inquiry, encompassing curiosity, observation, and the pursuit of understanding the universe and our place in it (Nwuba et al., 2023). In recent times, science, a field that constitutes the attributes of curiosity, exploration, systematic investigation, continuous learning and refinement, acquired through Science Education, has led to the birth of artificial intelligence (AI).

Science education, in Nigeria, has been recognized to play a crucial role in shaping the country's technological and economic development, as it includes the teaching and learning of various scientific disciplines such as Biology, Chemistry, Physics and Mathematics (NERDC, 2018). According to the Federal Republic of Nigeria (FRN) (2013), the course holds a significant importance in Nigeria for several reasons which include helping develop critical thinking skills, problem-solving abilities, and fostering innovation. It is essential for producing a skilled workforce that can contribute to the country's economic growth and development (Isiksal & Sahbaz, 2024). Science education is a vital component for the future development and transformation of Nigeria. In their study, Anazodo and Nwuba (2025) maintained that Science education has the potential of helping the development of the required abilities and understanding needed for technological advancements as it focuses on developing powerful ideas of science and ideas about the nature of scientific activities and its applications. It lays the foundation for technological advancements, innovation and economic growth (Jolaoluwa et al., 2024). The ability to think logically and solve problems is not just important for aspiring scientists but has birthed the AI which eases and assists students in their work out.

Artificial Intelligence (AI) is a field in computer science that focuses on creating machines and computers that can learn, reason, and act in ways that would normally require human intelligence (Amuche et al., 2025).It is a broad field that incorporates many disciplines, aimed at transforming the way information is taught and learned. In the 21st century classroom, one of the most compelling applications of AI is in the field of science education, where it is used to simulate scientific experiments and provide virtual laboratory experiences to science learners. AI plays a significant role in both general and higher education, influencing students' academic development by offering a mix of opportunities and challenges (Edtech, 2020). Supporting the premise, Inyaoiza (2024) reiterated in his study that students are aware of the numerous benefits of AI and thus use it in their academic endeavours. Similarly, Ngonso et al (2018) posited that Nigerian students revealed that Twitter now 'X' is a very engaging and useful platform that increases their knowledge, fostering cognitive development. Summarizing the premise, Vieriu and Petrea (2025), in their study, opined that AI applications in the learning of science can foster personalized learning, improve learning outcomes, scientific writing and better understanding of scientific principles, fostering their motivation in learning science concepts.

Motivation, synonymously used as interest, simply entails the willingness or eagerness to do something. In academic context, academic motivation refers to a students' drive to pursue and attain educational goals, usually influenced by personal and environmental factors. It is a form of motivation that applies to academic challenges that a student will face while being in school (Tackett et al, 2023). Similarly, Sanat et al. (2017) noted that it entails a student's desire (as reflected in approach, persistence, and level of interest) regarding academic subjects when the student's competence is judged against a standard of performance or excellence. Yuri and Kasarci (2024), in their study, opined that academic motivation is a multidimensional concept with four fundamental components; attainment value, utility value, intrinsic value and cost. Attainment Value represents the perceived significance of task completion, given its consonance with an individual's identity, as completing tasks is instrumental to building up a child's love for himself (Eccles & Wigfield, 2002). Utility Value, on the other hand, explains the assignment of a task with an individual's prospective goals, serving as an evaluative measure of the task's relevance and instrumental utility in the attainment of long-term objectives (Barron & Hulleman, 2015). Intrinsic Interest Value captures the inherent gratification or interest derived by an individual from task engagement, propelled by the extent of enjoyment and curiosity elicited by the task (Ryan & Deci, 2000). Lastly, Cost encapsulates the potential detriments associated with task engagement, including the required effort, potential for failure, or the opportunity cost incurred as a result of time diversion from other activities (Barron & Hulleman, 2015).

A deep understanding of these dimensions of academic motivation and the efforts to foster them among students in education, has become an essential part of learning and achievement as they have been recognized as the most important factor that leads one to one's goals. Supporting the premise, Sanat et al. (2027) asserted that academic motivation can develop one's confidence in one's ability, along with an increased value of education and desire to learn, as it is related to achieving a desired result, nurturing a hobby, and attaining a goal. Similarly, Raboca and Carbunarean (2024) reiterated that academic motivation may be one of the most important psychological aspects that influence learning and personal development of students as studies have shown that motivation is the only factor that has a direct impact on academic achievement while the rest of the factors influencing students' performances are achieved through motivation. Recognizing the importance of academic motivation in enhancing learning outcomes among university students' and with the integration of AI in schools, the study sought out to ascertain if integrating of AI into the educational system influences students' academic motivation.

Prior to the current study, several studies have been carried out by researchers to ascertain the influence of AI applications on students learning outcomes. Ngonso et al. (2025) investigated the influence of artificial intelligence on educational performance of Nigerian students in tertiary institutions in Nigeria and revealed that majority of Nigerian students use AI, as AI has positive impacts on their educational performance. Similarly, Amuche et al. (2025) found out in their study on perceived influence of artificial intelligence on academic performance of undergraduate students in Nnamdi Azikiwe University, Awka that AI influences academic performance of undergraduate students, and lack of training and misinformation hinders their effective use. In another study, Yin and Goh (2024) investigated expectancy-value beliefs as predictors of student intentions in AI learning

and application, revealing; significant influence of expectancy-value beliefs on shaping students' intentions to learn and utilize AI, significance of value beliefs as key drivers in motivating students' intention to learn and use AI as well as opportunity cost positively influencing students' intentions to acquire AI knowledge and use AI applications. Considering these empirical studies, one can categorically posit that AI applications in classrooms today has made tremendous impact on students' learning outcomes. However, based on literature reviewed, no studies have been carried out to determine the extent to which AI application influences, specifically, preservice science teachers' academic motivation and its dimensions (attainment value, utility value, intrinsic value and cost) in schools, the rationale behind the study. It is against this background that the present study is hinged on determining the influence of AI applications on preservice science teachers' academic motivation in learning.

Research Questions

The following research questions guided the study;

1. To what extent does AI application influence preservice science teachers' academic motivation?
2. To what extent does AI application influence preservice science teachers'attainment value?
3. To what extent does AI application influence preservice science teachers' utility value?
4. To what extent does AI application influence preservice science teachers' intrinsic value?
5. To what extent does AI application influence preservice science teachers' cost?

Method

A descriptive survey research design was utilized for the study. The population of the study consisted all the 1057 students in the Department of Science Education, Nnamdi Azikiwe University, Awka in the 2024/2025 academic session. A sample of 500 students who randomly responded to the instrument sent out via Google form, to all the students' levels WhatsApp platforms, was considered the sample of the study. A 14-item questionnaire, titled "AI Application Questionnaire on Students' Academic Motivation" (AIAQSAM), adapted from Yurt and Kasarci (2024) Questionnaire on AI Use Motive (QAUIM) was employed for data collection. The adapted AIAQSAM was rated on a five-point response option of Strongly Agree, Agree, Undecided, Disagree and Strongly Disagree was used. AIKAQSAM validated by three experts from Faculty of Education, Nnamdi Azikiwe University, Awka, yielded a reliability coefficient of 0.86, when pilot tested using Cronbach alpha. Data collected were analyzed using mean and standard deviation in answering the items in the research questions. That is, in analyzing the items, 2.5 served as a baseline for agreeing or disagreeing with an item in the research questions; any item with a mean score of 2.5 and above was viewed as agreed on by the respondents while any with a mean score below 2.50 was disagreed on. In answering the research questions, a number-line with mean values of 3.00-4.00 (Very High Extent), 2.50-2.99 (High Extent); 1.50-2.49 (Low Extent) and 0.00-1.49 (Very Low Extent) was used comparing it against the overall (grand) mean.

Results

Research Question One: To what extent does AI application influence preservice science teachers' academic motivation?

Table 1: Preservice Science Teachers' Mean and SD Responses on the extent to which AI Applications Influence their Academic Motivation

S/N	ITEMS	X	SD	Decision
1	I have the ability to effectively use AI in learning science concepts	3.86	0.83	Agreed
2	Learning and implementing innovations in AI applications in learning science are a priority for me	3.80	0.85	Agreed
3	It is important for me to stay updated on developments related to AI and its applications in science learning	3.98	0.83	Agreed
4	I attach great importance to strengthening my skills in using AI applications to learn science	4.02	0.78	Agreed
5	AI applications will assist me in becoming more proficient in my science career	4.00	0.95	Agreed

6	AI enhances my overall efficiency, making my life more effective	3.92	0.91	Agreed
7	In my daily life, AI helps me streamline my tasks	3.80	1.00	Agreed
8	AI benefits me in various science courses	4.15	0.77	Agreed
9	I take pleasure in using AI applications during my science classes	3.97	0.89	Agreed
10	I enjoy experiences related to AI applications in my science classes	4.09	0.71	Agreed
11	Investing time and effort to learn AI applications is worthwhile for me	4.03	0.83	Agreed
12	Learning AI is an easy task for me	3.68	0.88	Agreed
13	I am inclined to sacrifice time from other activities to learn AI applications usage	3.78	0.92	Agreed
14	I am not hesitant to invest a considerable amount of time and effort to enhance my AI-related skills	3.72	0.91	Agreed
	Grand Mean	3.86		VHE

Field Survey, 2025

Data in Table 1 reveals that the respondents agreed to AI knowledge and its applications have to a very high extent influenced their academic output. This implies that AI application in schools generally to a very high extent positively enhances Science Education students' academic motivation to engage in learning science concepts.

Research Question Two: To what extent does AI application influence preservice science teachers' attainment value?

Table 2: Preservice Science Teachers' Mean and SD Responses on the extent to which AI applications influence their Attainment Value

S/N	ITEMS	X	SD	Decision
1	I have the ability to effectively use AI in learning science concepts	3.86	0.83	Agreed
2	Learning and implementing innovations in AI applications in learning science are a priority for me	3.80	0.85	Agreed
3	It is important for me to stay updated on developments related to AI and its applications in science learning	3.98	0.83	Agreed
4	I attach great importance to strengthening my skills in using AI applications to learn science	4.02	0.78	Agreed
	Grand Mean	3.91		VHE

Data in Table 2 reveals that the respondents agreed that AI applications have to a very high extent influenced their attainment value. This implies that science education students agreed that the application of AI in the classroom to a very high extent influences their ability to achieve their expected outcomes and goals in leaning science.

Research Question Three: To what extent does AI application influence preservice science teachers' utility value?

Table 3: Preservice Science Teachers' Mean and SD responses on the extent to which AI Applications Influence their Utility Value

S/N	ITEMS	X	SD	Decision
5	AI applications will assist me in becoming more proficient in my science career	4.00	0.95	Agreed
6	AI enhances my overall efficiency, making my life more effective	3.92	0.91	Agreed
7	In my daily life, AI helps me streamline my tasks	3.80	1.00	Agreed
	Grand Mean	3.91		VHE

Result in table 3 reveals that the respondents agreed that AI knowledge and application to a very high extent influenced their utility value. These by implication mean that AI knowledge and its application have to a very high extent influences Science Education students' efficiency and proficiency in learning.

Research Question Four: To what extent does AI application influence preservice science teachers' intrinsic value?

Table 4: Preservice Science Teachers' Mean and SD Responses on the extent to which AI Applications Influence their Intrinsic Value

S/N	ITEMS	X	SD	Decision
8	AI benefits me in various science courses	4.15	0.77	Agreed
9	I take pleasure in using AI applications during my science classes	3.97	0.89	Agreed
10	I enjoy experiences related to AI applications in my science classes	4.09	0.71	Agreed
	Grand Mean	3.91		VHE

The grand mean (3.91) obtained in Table 4 reveals that the respondents agreed that AI knowledge and its application have to a very high extent (VHE) influenced their intrinsic value. This by implication means that AI application to a very high extent influences Science Education students' interest in learning science concepts.

Research Question Five: To what extent does AI application influence preservice science teachers' cost?

Table 5: Preservice Science Teachers' Mean and SD Responses on the extent to which AI Applications Influence their Cost

S/N	ITEMS	X	SD	Decision
11	Investing time and effort to learn AI applications is worthwhile for me	3.86	0.83	Agreed
12	Learning artificial AI is an easy task for me	3.80	0.85	Agreed
13	I am inclined to sacrifice time from other activities to learn AI applications usage	3.98	0.83	Agreed
14	I am not hesitant to invest a considerable amount of time and effort to enhance my skills related to AI	4.02	0.78	Agreed
	Grand Mean	3.92		VHE

Table 5 grand mean (3.92) reveals that the respondents agreed that AI applications have to a very high extent influenced cost. This implies that Science Education students agreed that the knowledge of AI and its application to a very high extent influences their learning outcomes and thus, do not regret investing their effort, time and resources in learning AI and its usage.

Discussion

The findings of the study revealed that the respondents agreed that AI applications to a very high extent influenced their academic motivation and its dimensions; attainment value, utility value, intrinsic value and cost, in learning science concepts. This very high extent influence could be linked to the fact that the applications of AI, in the classroom, has the capability to transform the way science is taught and learned. Giray et al. (2024) and Karaman and Göksu, 2024, in their respective studies, affirmed that AI has become a prominent presence in academia and education, explaining that with the use of leveraging effect of AI applications like ChatGPT, the creation of tailored personalized learning environments for individual students has become achievable, as AI enables them to navigate and structure the course contents in alignment with their specific academic tasks. Similarly, Remian (2019) posited that AI application in schools has led to the development of personalized learning systems designed to enhance students' learning experiences and automated assessment systems, aiding teachers in evaluating students' knowledge, all aimed at improving students' learning experiences. The finding of this study agrees with the findings of Ngonso et al (2018), Edtech (2020), Inyaoiza (2024) and Vieriu and Petrea (2025) whose studies found that AI knowledge influences students' academic achievement and cognitive development. The findings also indicate that students are willing to invest their effort, time and resources in learning AI, provided it brings about positive academic motivation. This conforms to the findings of Yin and Goh (2024), who found that cost value influences students' performance.

Conclusion

From the findings, the study concluded that application of AI to a very high extent positively influences science education students' academic motivation, enhancing their academic attainment value, utility value and interest value. Also, the respondents agreed that since the application of AI to a very high extent generally influences their academic motivation, they do not regret investing their cost (effort, time and resources) in learning AI, its tools and usage. In light of this, one can categorically affirm that application of AI tools in education significantly influences students' motivation to embark on learning science concepts and in the long run help them achieve academic goals.

Recommendations

Based on the findings, the following recommendations were made:

1. Higher institutions should organize sensitization and orientation programmes to create awareness as well as train students and lecturers on AI and its applications in the classroom

2. University Curriculum developers and planners should redesign the school curriculum to create opportunities and provide facilities that enable AI integration into school learning to foster academic motivation and in the long run enhanced academic output.
3. Universities need to ensure that students and lecturers have access to reliable technical support and resources for using AI applications effectively. This could involve dedicated IT helpdesks or online tutorials.
4. Encouragement and fund for research initiatives should be made available to explore the potential and limitations of AI in various academic disciplines. This could lead to the development of new AI applications tailored for specific educational needs and foster interdisciplinary collaboration.

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