

## Revolutionizing the Educational Landscape through AI-enhanced Personalized Learning: A Mini Survey

<sup>1</sup>Adeleye Olubunmi Ajoke, <sup>2</sup>Adeola Adedayo Ezekiel, <sup>3</sup>Olasunkanmi Isaac Ayodeji

<sup>1</sup> Department of Physics, Adeyemi Federal University of Education, Ondo

<sup>2</sup> Department of Physics, Adeyemi Federal University of Education, Ondo

<sup>3</sup> Department of Physics, Adeyemi Federal University of Education, Ondo

[adeleye.shemmz18@gmail.com](mailto:adeleye.shemmz18@gmail.com), [rexolorunfemi@gmail.com](mailto:rexolorunfemi@gmail.com), [lasunkanmi1998@gmail.com](mailto:lasunkanmi1998@gmail.com)

**ABSTRACT** The manuscript explores the awareness, perception, and readiness of physics students at Adeyemi Federal University of Education, Ondo, toward AI-powered personalized learning tools. Using a descriptive cross-sectional survey with 100 randomly selected students, the study found that while students show basic awareness of AI applications in education, their practical experience and deep understanding remain limited. However, perceptions are largely positive, particularly regarding AI's potential to support comprehension, critical thinking, and visualization of complex physics concepts. The study underscores the importance of structured training, inclusive access, and ethical evaluation of AI tools. It concludes with targeted recommendations for educators and policymakers to foster AI adoption and promote equitable, engaging, and effective learning experiences.

**KEYWORDS:** Revolutionizing, Educational landscape, Personalized Learning [PL], Adaptive Learning System [ALS] and Artificial Intelligence [AI]

### I. INTRODUCTION

Artificial Intelligence (AI) is increasingly revolutionizing various sectors, including healthcare, finance, and manufacturing. The education sector is no exception, as AI-driven technologies are transforming traditional teaching and learning methodologies by introducing new possibilities for personalization, efficiency, and accessibility [1]. However, while the theoretical advantages of AI in education are widely recognized, the level of awareness and perception among students regarding AI-powered personalized learning tools remains underexplored. Personalized learning has long been identified as a key strategy for improving student engagement, academic performance, and overall learning outcomes [2]. Traditional educational methods, which rely on standardized curricula and uniform instructional strategies, often struggle to address the diverse learning needs of students. Some students may require additional support to grasp complex concepts, while others may benefit from accelerated learning pathways [3]. Despite these potential benefits, successful integration of AI in education requires a clear understanding of students' awareness, perceptions, and willingness to adopt these technologies. Without this foundational knowledge, efforts to implement AI-driven personalized learning may face resistance or fail to achieve their intended impact. This study is motivated by the growing need to assess how students perceive AI-powered personalized learning tools and whether they are adequately aware of their capabilities and limitations [4].

As AI continues to shape the future of education, understanding student perspectives is crucial for designing effective AI-based interventions and ensuring their seamless adoption. The novelty of this study lies in its focused investigation of how AI-enhanced personalized learning can be leveraged to improve students' comprehension of complex physics concepts. By assessing students' familiarity with and attitudes toward AI-powered learning, this study provides valuable insights for educators, policymakers, and industry stakeholders seeking to optimize AI integration in education. The primary objective of this study is to explore the role of AI in revolutionizing personalized learning and its implications for student learning experiences. To achieve these objectives, the study is guided by the following research questions:

- (a). What is the level of students' awareness of AI-powered personalized learning?
- (b). What are students' perceptions of AI in enhancing personalized learning, particularly in solving complex physics concepts?

By addressing these questions, this study contributes to a deeper understanding of the role of AI in education also, provides a foundation for future research on AI-driven learning interventions. The findings will inform the development of strategies to enhance AI adoption in educational settings, ensuring that students can fully benefit from its potential in creating more engaging, personalized, and effective learning experiences.

## II. RELATED WORKS

The primary purpose of this literature review is to explore the role of AI in revolutionizing personalized learning and its implications for student learning experiences, also seek to provide an in-depth understanding of the benefit of Artificial Intelligence [AI], Adaptive Learning System [ALS] and Artificial Intelligence in Physics. By integrating the existing research and academic findings, its aims to highlight key benefits and roles of AI in revolutionizing personalized learning and its implications for student learning experiences.

### A. Concept of Personalized Learning

Every student is a unique individual with their own strengths, challenges, and aspirations. Personalized learning recognizes this diversity and seeks to tailor instruction to meet the distinct needs, interests, and abilities of each learner, fostering a more meaningful and effective educational experience. [5]. This approach acknowledges that every learner is distinct, with their own strengths, weaknesses, and learning styles, by tailoring education to each student's unique needs and interests, personalized learning unlocks their full potential, leading to remarkable benefits. Students experience a surge in motivation, a deeper connection to the material, and ultimately, greater academic success and personal growth, enhanced social-emotional learning, better preparation for the future, and increased accessibility and equity.

Personalized learning enables learners to master skills and concepts at their own pace, leading to improved academic outcomes. By providing learners with agency over their educational journey, personalized learning fosters a sense of ownership and motivation. In personalized learning environments, we nurture the whole child. By prioritizing social-emotional skills like self-awareness, self-regulation, and empathy, will help students develop a deeper understanding of themselves and others, fostering compassion, resilience, and meaningful relationships. When education is tailored to each student's unique needs, they thrive. By focusing on individualized instruction, we can unlock every learner's potential, fostering a deeper love of learning and helping them grow into compassionate, curious, and capable individuals [6].

### B. Concept of Adaptive Learning System [ALS]

Adaptive learning refers to an educational approach that tailors the learning experience to individual students' needs, abilities, and learning styles. It involves using data and analytics to adjust the difficulty, content, and pace of learning materials in real-time, providing a personalized learning experience that optimizes student outcomes. Adaptive learning systems [ALS] have emerged as a transformative force in education, leveraging artificial intelligence [AI] and machine learning [ML] to deliver personalized instruction tailored to individual learner needs. Recent studies highlight the efficacy of ALS in improving engagement, knowledge retention, and academic performance. AI-powered adaptive learning systems can provide customized learning pathways, offering students personalized guidance and support. These systems can adjust to the distinct learning requirements and preferences of each student, providing an optimal level of challenge and support [7]. Research indicates that personalized learning experiences significantly enhance student motivation, engagement, and academic achievement. By providing each student with tailored support and guidance, we can help them unlock their unique strengths and abilities, empowering them to reach their full potential and achieve a sense of personal fulfilment and academic success. These systems can analyze student performance data and create customized learning paths, improving student engagement, motivation, and academic performance [8]. As AI technology advances, personalized learning experiences will become increasingly crucial in education, ensuring all students have equal opportunities to succeed. Timely and thoughtful feedback can be a powerful catalyst for growth. By providing students

with clear insights into their strengths and areas for improvement, we can help them develop a deeper understanding of themselves and guide them toward achieving their goals [9]. This instant feedback allows students to focus on areas that require improvement. Moreover, AI can facilitate educators' ability to track student progress effectively, identifying trends and patterns in student performance. Personalized learning through AI can accommodate diverse learning styles and needs, catering to each student's unique preferences and pace [10]. AI-powered adaptive learning systems can provide customized learning experiences, addressing the challenge of limited educational resources [6]. By analyzing student performance data, creating customized learning paths, providing immediate feedback, and accommodating diverse learning styles, AI can enhance student engagement, motivation, and academic performance.

### C. Artificial Intelligence [AI] in Physics

Artificial Intelligence [AI] has revolutionized various scientific disciplines, including physics, by enhancing computational efficiency, data analysis, and predictive modeling. Recent advancements in Machine Learning [ML] and Deep Learning [DL] have enabled physicists to tackle complex problems in quantum mechanics, astrophysics, condensed matter physics, and high-energy physics. This review synthesizes the latest research on AI applications in physics, highlighting key contributions, challenges, and future directions. Some of the applications of Artificial Intelligence [AI] in Physics include:

- (a). **AI in Quantum Physics:** AI has significantly impacted quantum computing and quantum mechanics. [11] introduced Neural-Network Quantum States [NQS] to solve many-body quantum problems efficiently. More recently, [12] demonstrated that hybrid quantum-classical algorithms enhanced by AI can optimize quantum circuit designs, improving error correction in Noisy Intermediate-Scale Quantum [NISQ] devices. Another breakthrough is the use of Reinforcement Learning [RL] in quantum control. [13] applied deep [RL] to optimize pulse sequences in superconducting qubits, achieving higher fidelity in quantum gates.
- (b). **AI in Condensed Matter Physics:** Machine learning has accelerated materials discovery and phase classification. [14] developed an unsupervised [ML] approach to identify novel topological materials from electronic structure data. Additionally, [15] Integrated Graph Neural Networks [GNNs] to predict material properties, enabling rapid screening of candidate materials for energy applications.
- (c). **AI in High-Energy Physics:** Particle physics experiments, such as those at CERN's Large Hadron Collider [LHC], generate vast datasets requiring AI-driven analysis. [16] reviewed how deep learning improves jet tagging and anomaly detection in collider experiments. Furthermore, [17] demonstrated that transformer-based models enhance event reconstruction in high-energy physics, outperforming traditional methods.

### D. Theoretical Frame Work

The Technology Acceptance Model [TAM] is a foundational framework for understanding how users adopt new technologies. Introduced by Fred Davis in 1989, TAM identifies two critical factors that drive user acceptance: the technology's perceived usefulness and its perceived ease of use. Users must believe that the technology will enhance their performance or help them achieve their goals. Additionally, they must find the technology intuitive and user-friendly. These two perceptions shape the user's attitude toward the technology, influencing their intention to use it and ultimately affecting their actual usage. By grasping these factors, organizations can design technologies that meet users' needs and expectations, increasing the likelihood of successful adoption. TAM has been extensively applied across various sectors, including education, healthcare, and business, to predict and explain user acceptance. Its simplicity and versatility have made it a popular choice among researchers and practitioners. Over time, TAM has undergone extensions and modifications to account for contextual factors such as social influence, facilitation conditions, and enjoyment. While limitations exist, TAM remains a valuable tool for understanding user behavior and designing effective technologies.

The survey design is deeply rooted in the Technology Acceptance Model [TAM], a framework that elucidates the factors influencing individuals' acceptance and adoption of technological innovations. By drawing upon TAM's core constructs, such as perceived usefulness and perceived ease of use, this study

seeks to investigate students' awareness and perceptions of personalized learning, particularly in the context of complex physics concepts. The survey questions, informed by TAM's theoretical underpinnings, aim to capture students' attitudes towards educational tools, thereby providing valuable insights into the potential benefits and challenges associated with their integration into physics education. By exploring students' perspectives, this research endeavors to contribute to the development of effective interventions that cater to learners' diverse needs, ultimately enhancing their academic experiences and outcomes.

### III. METHODOLOGY

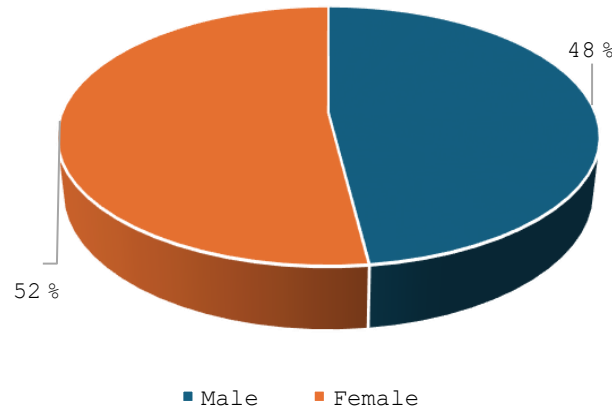
We sought to gain a deeper understanding of the experiences and perspectives of individuals by conducting a survey that captured a snapshot of their thoughts and feelings at a particular moment about the awareness and perceptions of Physics students at Adeyemi Federal University of Education, Ondo, regarding the revolution of the educational landscape through AI-enhanced personalized learning. The study's population comprised 200 randomly selected Physics students from Adeyemi Federal University of Education, Ondo. A stratified random sampling technique was used to select 100 respondents from different academic year levels. A researcher-designed questionnaire was used to collect data from the participants. The questionnaire was a thoughtful tool, consisting of 20 items, divided into two sections that resonated with participants' experiences. Section A gathered demographic information, allowing us to understand the diverse backgrounds of our participants. Section B explored participants' awareness and perceptions, providing a window into their thoughts and feelings. The 5-point Likert scale, ranging from 'Agree' to 'Disagree,' gave participants a voice, enabling them to express their opinions freely. Experts in Physics education and measurement and evaluation generously shared their expertise, validating the questionnaire's content and construct. The reliability of the instrument was confirmed, with a Cronbach's Alpha coefficient value of 0.81, indicating a strong foundation for our findings. Through descriptive statistics, including mean and standard deviation, we carefully analyzed the collected data, seeking to understand the nuances of human experience and feelings at a particular moment.

In conclusion, descriptive statistics, particularly the Mean, serve as a fundamental tool for analyzing research questions by providing a clear summary of central tendencies within the data. For this study, the Mean helps to quantify students' perceptions of personalized learning tools in physics education, enabling educators and policymakers to assess acceptance levels and identify areas for improvement. Future studies could expand on these findings with deeper statistical analysis, providing further insights for better teaching strategies.

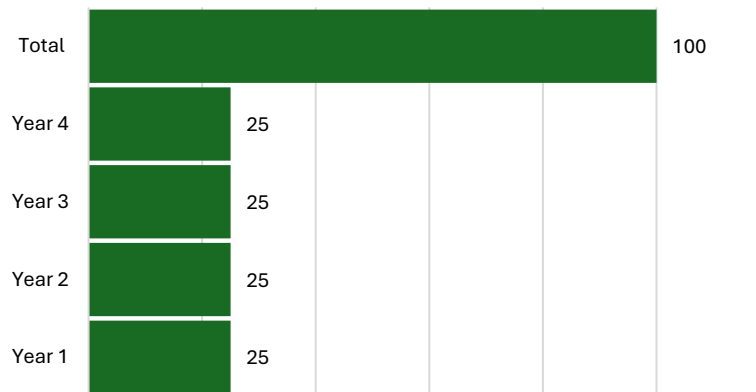
### IV. RESULTS AND DISCUSSION

#### A. Demographic Representation of the Respondents

The questionnaires contained information on the students' demographic characteristics that the researcher considered significant in the current study. The number of students in the sample was [100]. The distribution of the sample [frequency and percentage] according to the return rate of the questionnaire, gender, age and school types are presented in this section. This result confirms that the research process and the collection of data from the respondents were well monitored by the researcher and it also attests to the reliability and validity of the data collected from the respondents. The distribution of the respondents according to their gender is presented in Figure 1 below. From the distribution it can be seen that there were more female students, [52%], compared to male students, [48%]. The near-equal gender representation suggests no significant gender bias in participation but highlights an opportunity to address any subtle disparities in engagement or performance. Figure 2 also presents the distribution of respondents based on their year of study in the department of Physics. It was ensured that the selection of the respondents also followed the same trend of no bias in the distribution across the study years. This means equal percentages [25%] of the total respondents were selected from the first year, second year, third year and fourth year students.



**Fig. 1.** Gender Distribution of Survey



**Fig. 2.** Demographic Information of Survey Participants by Year of Study.

### B. Mean Analysis of Responses to Research Questions

The Decision Rule was employed to analyze the responses to the 20 research questions. The mean score of the responses for each item on the 5-points Likert scale was determined, making Agree [A] to 3 and Disagree [D] to 2. If the mean values for each item are greater than 2.50 the statement will be accepted while it will be rejected if the mean is less than 2.50.

**Research Question One:** What is students' level of awareness about AI personalized learning?

**Table 1:** Mean Analysis of Responses to Research Question 1

S/N	ITEMS	Mean
1.	Artificial Intelligence (AI) is being used in education to enhance learning experiences.	2.80
2.	AI-powered personalized learning is a widely discussed topic in educational circles.	2.60
3.	The use of AI in education has the potential to improve learning outcomes.	2.90
4.	AI-driven adaptive learning is a key feature of modern educational technology.	2.40

5.	AI-powered learning tools are designed to provide personalized feedback.	2.70
6.	The integration of AI in education can help identify knowledge gaps.	2.70
7.	AI-powered learning analytics can inform instructional design.	2.70
8.	AI-driven personalized learning can facilitate student engagement.	2.80
9.	The use of AI in education can help reduce teacher workload.	2.52
10.	The integration of AI in education can help teachers to identify knowledge gaps and improve student learning outcomes.	2.52

The result from Table I suggests that most students have heard of AI tools being used in teaching and learning, but their learning experience and comfort level with using AI tools in their assignments, self-reading, and coursework are limited. Additionally, most students have not received expertise on how to use AI tools in teaching and learning, signifying the potential need for the introduction of more technological resources to enhance the teaching and learning process.

**Research Question Two** - What is the perception of the students of AI enhanced personalized learning to solve complex physics concepts?

**Table 2:** Mean Analysis of Responses to Research Question 2

<i>S/N</i>	<i>ITEMS</i>	<i>Mean</i>
11.	AI can enhance the learning experience in physics by providing interactive simulations.	2.60
12.	AI-powered learning tools can facilitate a deeper understanding of complex physics concepts.	2.32
13.	The use of AI in physics education can improve problem-solving skills.	2.55
14.	AI-driven adaptive learning can help overcome difficulties in physics.	2.70
15.	AI-powered learning platforms can provide personalized guidance on physics assignments.	2.62
16.	The integration of AI in physics education can promote critical thinking.	2.65
17.	AI-powered learning tools can facilitate collaboration on physics projects.	2.90
18.	AI-driven learning analytics can inform physics instructional design.	2.85
19.	The use of AI in physics education can enhance visualization of complex concepts.	2.95
20.	AI-powered learning platforms can provide timely feedback on physics assignments.	2.75

The results from Table II suggests that students generally found AI tools to be helpful in enhancing personalized learning to solve complex physics concepts. Furthermore, it can be observed that the respondents understood that AI-powered learning platforms can provide personalized guidance on physics



assignments. The use of AI in physics education can also enhance visualization of complex concepts and AI-powered learning platforms can provide timely feedback on physics assignments. These results suggested that AI can significantly enhance personalized learning among physics students to solve complex physics concepts. The findings of this study in Table I provide valuable insights into students' level of awareness and perceptions regarding the use of AI in personalized learning, particularly in the context of complex physics concepts. The results indicate that while students have some familiarity with AI tools being used in education, their comfort level and experience with using these tools in their learning are limited. This suggests that there is a need to introduce more technological resources to enhance the teaching and learning process. Moreover, the lack of expertise among students on how to effectively utilize AI tools in their learning highlights the importance of providing adequate training and support.

The level of awareness and perception of students regarding the use of AI in personalized learning is a crucial aspect of this study. Consistent with previous research, the findings suggest that students have a limited awareness and understanding of AI-powered learning tools [18]. This lack of awareness may be attributed to AI-powered learning tools being relatively new and emerging in the education sector. However, as noted by [7], AI-powered adaptive learning systems have the potential to improve student outcomes, particularly for students who are struggling with complex concepts. Also, the findings from Table 2 regarding the perceptions of students on the role of AI in enhancing personalized learning to solve complex physics concepts suggest that students generally view AI tools as helpful in facilitating deeper understanding and improving problem-solving skills. The results also indicate that students appreciate the potential of AI-powered learning platforms to provide personalized guidance, timely feedback, and enhanced visualization of complex concepts. Notably, the findings suggest that AI can significantly enhance personalized learning among physics students, particularly in overcoming difficulties and promoting critical thinking. However, it is essential to acknowledge that the effective integration of AI in education requires careful consideration of the needs and concerns of both students and educators. The perception of students towards AI-powered learning tools is also an important aspect of this study. The findings suggest that students generally have a positive perception of AI-powered learning tools, with many believing that these tools can enhance their learning experience and improve their understanding of complex concepts [19]. However, as noted [20], it is essential to critically evaluate the potential benefits and limitations of AI-powered learning tools and to consider the ethical implications of their use. Furthermore, [21] highlights the need for a nuanced understanding of the complex relationships between technology, teaching, and learning. Overall, this study highlights the potential benefits of AI in personalized learning and underscores the need for further research and development in this area. By exploring the complexities of AI-powered learning and addressing the challenges and concerns associated with its implementation, we can work towards creating more effective and inclusive learning environments that support the diverse needs of students.

## V. CONCLUSION

This study's findings indicate that students have limited awareness and experience with learning tools, highlighting the need for increased technological resources and targeted training to enhance their effective utilization. However, students generally perceive learning tools as beneficial for facilitating deeper understanding and improving problem-solving skills, particularly in complex physics concepts. The results also suggest that learning platforms can provide personalized guidance, timely feedback, and enhanced visualization, which can significantly enhance student learning outcomes. While students exhibit a positive perception of learning tools, it is crucial to consider their needs and concerns to ensure effective integration. These findings underscore the potential benefits of personalized learning and emphasize the need for further research and development to create more effective and inclusive learning environments that support diverse student needs. Finally, based on the findings from this study, the following recommendations are made:

- (a). Educators should provide training and support to help students effectively utilize learning tools. This can include workshops, tutorials, and online resources that help students develop the skills they need to use these tools effectively.

- (b). Educators should critically evaluate the potential benefits and limitations of learning tools and consider the ethical implications of their use. This can include assessing the tools' effectiveness, identifying potential biases, and ensuring that they align with the curriculum and learning objectives.
- (c). Educators are to create inclusive learning environments that support the diverse needs of students. This can include using learning tools that cater to different learning styles, abilities, and languages.
- (d). Educators should continuously monitor and feedback on the effectiveness of learning tools. This can include collecting data on student performance, soliciting feedback from students and teachers, and using this information to improve the tools and their implementation.
- (e). Educators, policymakers, and industry partners should collaborate to develop and implement learning tools that are effective, equitable, and aligned with the curriculum and learning objectives. This can include partnerships to develop new tools, share best practices, and provide professional development opportunities.
- (f). Educators, policymakers and academic researchers should address the digital divide by ensuring that all students have access to computer devices, internet connectivity, and digital literacy skills. This can include initiatives to provide devices and internet access to underserved communities, as well as programs to develop digital literacy skills.

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