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Effect of Artificial Intelligence-Personalised Learning Strategy on Creative Thinking Skills of Integrated Science Undergraduate Students in Makurdi, Benue State, Nigeria

JOMEN, Emmanuel Oryiman¹

jomenemmanuel1@gmail.com

+2349077262773

AYUA, Geoffrey Aondolumun¹

ayuageofrey@gmail.com

+2348069337213

TERHEMBA, Wisdom Kwaghfan¹

kwatexwisdom@gmail.com

+2347063631099

FAKAA, Stanley Gbaden¹

fakaastanley@gmail.com

+2347030648402

¹Science Education Department, Benue State University (now Rev. Fr. Moses Orshio Adasu University) Makurdi, Benue State, Nigeria

Abstract

Creative thinking is a vital skill but seemingly lacking among undergraduates. The study investigated AI-personalised learning strategy's (AI-PLS) effect on creative thinking of integrated science undergraduates in Makurdi: Gender's moderating role. Two research questions and two hypotheses guided the study. The study adopted a pre-test post-test non-randomized control group quasi experimental research design. The study's population was 307 Integrated Science undergraduates. A purposive sample of 100 Integrated Science undergraduates was drawn. Creative Thinking Problem Solving Test with a reliability coefficient of 0.79 was used for data collection, the instrument was validated by three experts in science education. Data were analysed using mean and standard deviation to answer the research questions and ANCOVA to test the null hypotheses at 0.05 level of significance. Findings showed that; there is a significant difference in the development of Creative Thinking of undergraduates taught using AI-PLS and those taught using the Lecture Method, [$F(1, 97) = 83.805$; $p = 0.000 < 0.05$] and there is no significant difference in the development of Creative Thinking of male and female undergraduates taught Integrated Science using AI-PLS [$F(1, 31) = 1.065$; $p = 0.310 > 0.05$]. Based on the findings, it was recommended that students should be trained, enlightened and equipped with knowledge and devices such as computers for easy integration of AI-PLS in the process of teaching and learning to enhance creative thinking in Integrated Science undergraduates.

Keywords: AI-Personalised Learning Strategy, Creative Thinking, Gender, and Integrated Science

Introduction

Rapid technological development, especially in the area of Artificial Intelligence (AI), has had a revolutionary impact on many facets of human activity, including education. Nursalim et al. (2022) confirms that AI has emerged as a powerful tool capable of processing vast amount of data, identifying patterns, and making predictions with remarkable accuracy in recent years. Artificial intelligence has revolutionised academic learning by providing cutting-edge tools and techniques for imparting knowledge, abilities, and attitudes to students. Fwangnum et al. (2021) further lament that advancements in science and technology have transformed the educational system worldwide for growth, development and stability of developed nations. Students actively seek out the knowledge and skills they need in the learner-centred classroom of the twenty-first century. It is therefore necessary to support students' ability to develop unique solutions to urgent issues of the ever-evolving glob (Ayua et al., 2022; Ayua et al., 2023; Ayua et al., 2024). As the world develops, stakeholders in education are constantly looking forward for novel ways of knowledge transfer from teachers to students (Iweka & Abbott, 2016). AI offers revolutionary advancements in a variety of fields, including manufacturing, health, education, and services (Akgun & Greenhow, 2022; Russell & Norvig, 2016). AI has many uses, which include personalising learning processes, tracking student progress, and offering efficient feedback systems, clearly demonstrating its potential in education. Learning could be complicated and challenging for kids since the traditional educational system usually takes a one-size-fits-all approach, giving them the same material and training regardless of their unique needs. Students' creative thinking



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may not improve as a result of the traditional approach being utilised in Integrated Science instruction. However, as classrooms gradually transition from traditional structures to digital learning environments, schools may experience changes. A significant renovation of the educational system's structure is necessary to take advantage of this potential. Since the start of 21st century, the globe has witnessed extraordinary growth in scientific and knowledge fields, spurred by forces including knowledge revolution and rapid technological advancements Ayua et al. (2023) Interactive learning, higher-order thinking abilities, and student engagement are characteristics of a classroom in the twenty-first century. scientific teachers' failure to use more effective teaching strategies has resulted in abstraction, which makes pupils less engaged and more likely to memorise routes. Factors responsible for low creative thinking skills of learners in Integrated Science, such as learners' inability to interact directly with learning materials, wrong perception of science by learners could be as the result the strategies employed by teachers during classroom instructions, however, AI-Personalised Learning strategy can be an alternative.

AI-Personalized Learning Strategy is an Integrated Science teaching method that can focus on each student's learning process and employs AI platforms or tools to address their needs, interests, and concerns using computers and machines. According to Bernacki et al. (2021), AI-Personalized learning is widely recognised as an educational model where the teaching strategy and learning tempo are tailored to each student's needs. This variation increases students' motivation to engage more fully in the learning process and progress at their own pace. According to Hennekeuser et al. (2024), AI makes personalised learning possible by tailoring instructional materials to each student's particular requirements. Individual learners' strengths and weaknesses must be taken into account when teaching and learning, however in order to effectively improve learning, students' creative and critical thinking strengths and weaknesses receive little to no attention. However, using advanced algorithms and machine learning approaches, AI platforms can assess students' creative and critical thinking strengths allowing teachers to provide tailored curriculum content and targeted interventions (Abdallah et al., 2020; Rampersad, 2020). Research has demonstrated that students' individualised learning settings had higher levels of self-efficacy and a more optimistic outlook on their studies (Johnson & Smith, 2019). AI-driven systems that analyse enormous volumes of data to find learning gaps and adjust interventions accordingly can make these experiences possible. For example, it has been demonstrated that AI-powered platforms, such as adaptive learning systems, improve student performance and engagement by offering tailored learning routes and useful feedback.

Facione (2020) emphasised that in order to improve students' capacity to assess material and form their own opinions, teachers frequently use questioning strategies, group projects, and assignments. But AI's quick information processing and perceptive answers put conventional learning techniques to the test, casting doubt on the differences between machine-based and human learning in the classroom. The creation of adaptive learning systems, which modify instructional strategies and learning materials based on the unique characteristics of each learner, is increasingly utilising AI technologies. By offering tailored comments and suggestions, these platforms enhance learning outcomes and student engagement (Sayed et al., 2023; Kochmar et al., 2022). AI-Customized Usak (2024) and Yilmaz (2024) emphasised that the future of AI-Personalized Learning is moving toward offering increasingly advanced personalisation capabilities through adaptive learning systems, virtual tutors, and immersive learning environments. Learning strategy experiences are gaining more and more attention as they are advanced using techniques like big language models, especially ChatGPT, copilot or Gemini. Educational institutions should embrace scientific and technical advancements because they can improve the outcomes of their operations. The AI-driven educational revolution in the digital age represents a fundamental change in the transmission and acquisition of knowledge. By utilising AI technologies, educators may develop dynamic learning environments that empower students, encourage creativity, and open the door to a more inclusive and fair educational system that necessitates a departure from the conventional lecture method. The oldest method of instruction is the lecture method. This method entails introducing the subject or idea through an explanation or expository session, followed by the presentation of work examples (Tukur et al, 2016). By lecture method, learning is passive, students can be unable to build their own knowledge and abilities. Obro 2022 confirms that students have not benefited much from the lecture style because it is passive and does not provide opportunities for pupils to actively participate in their education. Opportunities for original thought and problem-solving, which are crucial abilities in Integrated Science, may be restricted by the lecture method. Students may find it difficult to apply theoretical knowledge to real-world issues without active



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engagement and practice, which would lower their overall science performance (Akpan & Umoren, 2018). During lectures, students may not be able to swiftly resolve misconceptions and misunderstandings due to the lack of rapid feedback and engagement. However, almost all instructors at institutions across the nation now employ the lecture method. In Integrated Science lecture method entails the teacher explaining Integrated Science concepts, demonstrating examples, while students listen, take notes and occasionally ask questions which in turn block the cultivation of creative thinking of students. The capacity to use one's imagination to create original and worthwhile ideas or works is known as creativity. According to Rollo (2017), one of the key skills a person can employ to deal with the world's rapid change is creativity. Thinking and producing are the two processes involved in creativity. The growth of each generation's creative capacity has recently emerged as a significant educational concern. According to Tonne et al. (2020), creative thinking is the process of attempting to perceive, discovering the laws of things, intentionally discovering new things, identifying the reason and preventing it, getting rid of the inappropriate, and developing the excellent. The capacity to approach circumstances and issues from novel angles, producing original concepts and solutions, is the essence of creative thinking. According to Ayua et al. (2023), creative thinking is a cognitive process that produces useful ideas for problem-solving under specific goals and circumstances. One of the most important abilities in Integrated Science is creativity, which is useful in many disciplines, including science.

The capacity to recognise new connections and explore uncharted territory that leads to the creation, manufacturing, or production of novel objects, concepts, methods, or solutions to issues is known as creativity. Without creativity, innovation cannot exist. Value creation is the primary indicator of both creativity and innovation. According to George (2017), creativity is a manageable ability. Learning a discipline, developing a method of thinking, and gaining a foundation of information are the first steps toward creativity. By experimenting, investigating, challenging presumptions, applying imagination, and synthesising data, a person can develop their creative skills. Learning to be creative is similar to learning a sport. It needs practice and a nurturing atmosphere to thrive. However, developing scientific information and carrying out scientific procedures and processes require creativity. The use of artificial intelligence in education, which may be gender-friendly, could totally change the way students learn in order to foster creative thinking. A person's self-representation as male or female is referred to as their gender. According to Ayua et al. (2022), it is the quality of being male or female, man or woman, boy or girl. Gender in this study refers to either male or female undergraduates who offer Integrated Science. This also means to Danjuma and Bileya (2022) that gender is perceived as a socially assigned characteristic that sets women apart from men. Gender, of course, could include the traits of being male or female, man or woman, boy or girl (Ayua & Agbedye, 2020). There is an imbalance against women in science in Africa since science is perceived as mostly a male topic of study. Girls are disproportionately under-represented in science, technology, and maths, according to Filgona (2016). Science is seen by women as a subject best left to men. When critical thinking is taken into account, Abakpa (2016) discovered that there is no discernible difference in science achievement between male and female students in cognitive structures. This suggests that gender differences have an impact on Integrated Science instruction, learning, and students' creative thinking. In an effort to teach science as a cohesive whole and give pupils a comprehensive understanding of scientific and technology material, integrated science was launched. This is due to the fact that the curriculum contains all of the many science components: Biology, Chemistry, Physics and Earth Science that are taught to students in a cohesive and comprehensive way. Integrated Science is crucial for students and the country as a whole, according to the National Policy of Education (Federal Republic of Nigeria, 2013). One of the science courses called Integrated Science aims to provide students with scientific and technological knowledge and abilities that will help them make wise decisions, create survival plans, and learn how to make a significant contribution to modern society. According to Ayodele (2016), Integrated scientific is also referred to as Basic Science, it is the foundation for a deeper comprehension of higher scientific, technology, and engineering courses. The study was anchored on Bruner's (1966) Theory of Discovery Learning which posits that learners learn best when they construct their own knowledge. Bruner stressed that learning is most effective when students are encouraged to discover principles, relationships, and concepts by themselves, rather than passively receiving information from teachers. To Bruner, education should be structured in ways that could encourage curiosity, inquiry, and problem-solving, as these processes lead to deeper understanding, long-term retention, and the development of higher-order skills such as creative thinking. Central to Bruner's theory is the idea that learning is an active, exploratory process. Bruner rejected instructional approaches that depends heavily on rote memorisation and direct



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transmission of knowledge. Instead, he outlined that learners should be presented with carefully designed problems, examples, instructions and situations that prompt them to search for patterns, formulate hypotheses, and draw conclusions. Through this process of discovery, learners engage in meaningful cognitive activity, which strengthens creative thinking. This emphasis on active engagement aligns strongly with contemporary AI-Personalised Learning environments, which are designed to place learners at the centre of the instructional process.

Empirically, research on Artificial intelligence and critical thinking presents mixed findings. Bahari (2026) carried out a study on the influence of artificial intelligence-based learning applications and student engagement on students' creative thinking skills in the Al-Qur'an Hadith subject at Madrasah Aliyah Negeri 2 Pekanbaru, both partially and simultaneously and revealed that the use of AI-based learning applications had a significant effect on students' creative thinking skills, similarly, Judijanto et al. (2025) Carried out a study on the role of Artificial Intelligence in personalised learning: Enhancing Creative Thinking in Online Classrooms and indicate that AI-based personalization significantly improves students' creative thinking, particularly in generating novel ideas, problem-solving flexibility, and originality of responses. Regarding empirical studies, Sijaj et al (2025) investigated impact of employing mobile learning in developing creative thinking skills among sixth-grade students in private schools in Bethlehem and found no statistically significant differences in the mean scores of the impact of employing mobile learning in developing creative thinking skills among sixth-grade students in private schools in Bethlehem, based on gender. Ayua et al. (2023) further examines effect of Creative-Teaching (CT) on Creative-Thinking-Elaboration (CTE) among different-ability upper-basic science students in Gboko and found that no significant difference existed in the students' CTE based on gender. Morso, Ikyernun et al. (2022) examined effect of teacher-learner improvised material on creative thinking among varied-ability upper-basic Science students in Makurdi and found that no significant difference existed in the students' creative thinking level based on gender. All of these studies are related to creative thinking and gender, however, the studies reviewed are different based on the teaching method, sample sizes and the design of the learning environment. The development of creative thinking is central to science education because it equips learners with the ability to generate new ideas, and solve problems effectively. However, research has shown that many science students exhibit low levels of creative thinking (Avwiri, 2016). The continued use of the traditional lecture method, which limits learners' participation and interaction, may contribute to this problem. Although AI-personalised learning strategy have been shown in other contexts to foster learners' engagement and cognitive development, little is known about their impact on undergraduates' creative thinking within the Nigerian context, especially in universities in Makurdi. There is also limited understanding of how gender influence the effectiveness of such strategy. Based on this background this study bid to investigate AI-Personalised learning strategy's effect on creative thinking of integrated science undergraduates in Makurdi: gender's moderating role.

Purpose of the Study

The purpose of the study is to investigate the effect of AI-personalised learning strategy on creative thinking skills of Integrated Science undergraduates in universities in Makurdi: Gender's moderating role with the following objectives

1. To find out the effect of AI-Personalised Learning Strategy on creative thinking skills of Integrated Science undergraduates in universities in Makurdi.
2. To ascertain the effect of AI-Personalised Learning Strategy on creative thinking skills of Integrated Science undergraduates in universities in Makurdi based on gender.

Research Questions

The following research questions guided the study

1. What is the difference between the mean creative thinking skills of undergraduates taught Integrated science using AI-Personalised Learning Strategy and those taught using lecture method
2. What is the difference between the mean creative thinking skills of undergraduates taught Integrated Science using AI-Personalised Learning Strategy based on gender

Research Hypotheses

The following hypotheses were used to guide the study.

1. There is no significant difference between the mean creative thinking skills of undergraduates taught Integrated Science using AI-Personalised Learning Strategy and those taught using lecture method



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2. There is no significant difference between the mean creative thinking skills of undergraduates taught Integrated Science using AI-Personalised Learning Strategy based on gender

Research Methodology

This study adopted a pre-test post-test non-equivalent control group quasi-experimental research design. This method lies between the rigor of a true experimental method (true experimental design includes random assignment to at least one control and one experimental/interventional group) and the flexibility of observational studies (Maciejewski, 2020). A population of 307 (143 males & 164 females) Integrated Science undergraduates in two regular public universities in Makurdi, Benue State, Nigeria [Joseph Saawuan Tarka University (formerly Federal university of Agriculture) and Benue State University (now Rev. Fr Moses Orshio Adasu University)] was use for the study. A sample of 100 undergraduate in 300 level was drawn using multistage sampling procedure (purposive and random inclusively) Firstly, a purposive sampling technique was used to purposively selected two co-educational regular public universities with similar facilities and academic characteristics. Secondly, the intact classes were randomly assigned to the experimental and the control groups to avoid disruption of the universities' timetables. Creative Thinking Problem Solving Test (CTPST) was used for data collection. The CTPST has two sections. Section A elicits personal information from the respondents while section B contains the 20 multiple-choice items with options each, which tests creative thinking ability involving fluency, flexibility, originality and elaboration. The instrument was validated by three experts in Science Education and trial-tested on 15 undergraduates who were not part of the actual sample for the study so as to guide against priming. The data gathered was computed using Person Product Moment Correlation statistic which yielded a reliability value of 0.79. The research assistant on the experimental group was trained on how to use the AI-Personalised Learning Strategy, and the research assistant for the control group were trained on how to use the lecture method. A pretest was administered to both the experimental and control groups before commencement of the treatment. Both groups were taught using the same topic "earth and the Universe". The experimental group was taught using AI-Personalised Learning Strategy lesson plans. Meanwhile, the control group was taught using Lecture Method lesson plans. After the five weeks of treatment, a post-test was administered in both groups. The extraneous variables such as initial difference effect, group interference, case history and teacher difference were controlled. The data collected were analysed using mean and standard deviation to answer the research questions; while the Analysis of covariance (ANCOVA) was used to test the null hypotheses at 0.05 alpha level of significance.

Presentation of Results

The results of the study are presented in order of the research questions and hypotheses as follows:

Research Questions Four: What is the difference between the mean creative thinking skills scores of undergraduates taught Integrated Science using AI-Personalised Learning Strategy and those taught using lecture method.

Table 1: Mean and Standard Deviation of Undergraduates' Creative Thinking based on Teaching Method

Method	Sample (n)	Pre-CT Mean	St. D	Post-CT Mean	SD	Gain
AI-Personalised Learning Strategy	34	6.29	3.31	17.65	7.60	11.36
Lecture Method	66	5.97	3.23	8.18	3.05	2.21
Difference		0.32		9.47		9.15

The results in Table 1 revealed that undergraduates taught Integrated science using AI-Personalised Learning Strategy had Creative Thinking mean of 6.29 with standard deviation of 3.31 in the Pre-CT and Creative Thinking mean of 17.65 with standard deviation of 7.60 in the post-CT. Undergraduates taught Integrated science using Lecture Method had Creative Thinking mean of 5.97 with standard deviation of 3.23 in the Pre-CT and Creative Thinking mean of 8.18 with standard deviation of 3.05 in the post-CT. Table 1 further shows that undergraduates taught Integrated science using AI-PLS had mean gain scores of 11.36 while those taught using LM had a mean gain score of 2.21. Thus, there was a mean gain difference of 9.15 in favour of undergraduates taught Integrated science using AI-Personalised Learning Strategy. This shows that undergraduates taught using AI-PLS developed Creative Thinking more as compared to those taught using LM. Also, SD for LM at post-CT was lower than for AI-PLS, showing that LM scores clustered closer to their means more than for AI-PLS.

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Research Questions 2: What is the difference between the mean creative thinking skills scores of undergraduates taught Integrated Science using AI-Personalised Learning Strategy based on gender

Table 2: *Mean and Standard Deviation of Creative Thinking of Male and Female Undergraduates Taught Integrated Science using AI-Personalised Learning Strategy*

Gender	Sample (n)	Pre-CT		Post- CT		Gain
		Mean	St. D	Mean	SD	
Male	12	6.50	3.63	19.50	7.96	13.00
Female	22	6.18	3.20	16.64	7.39	10.46
Difference		0.32		2.86		2.54

The results in Table 2 revealed that male undergraduates taught Integrated science using AI-Personalised Learning Strategy had Creative Thinking mean scores of 6.50 with standard deviation of 3.63 in the pre-CT and Creative Thinking mean scores of 19.50 with standard deviation of 7.96 in the post-CT. Female Undergraduates who were taught Integrated science using AI-Personalised Learning Strategy had Creative Thinking mean scores of 6.18 with standard deviation of 3.20 in the post-CT and Creative Thinking mean scores of 16.64 with standard deviation of 7.39 in the post-CT. Table 2 further shows that male undergraduates taught Integrated science using AI-PLS had mean gain scores of 13.00 while female undergraduates taught using the same AI-PLS had a mean gain score of 10.46 with a mean gain difference of 2.54 in favour of the male undergraduates taught Integrated science using AI-Personalised Learning Strategy. This explained that male undergraduates taught using AI-PLS developed Creative Thinking more as compared to their female counterpart undergraduates taught Integrated science using the AI-PLS. However, females had a lower SD of 7.39 over males, showing female scores laid closer to their mean scores.

Hypotheses One: There is no significant difference between the mean creative thinking skills scores of undergraduates taught Integrated Science using AI-Personalised Learning Strategy and those taught using lecture method.

Table 3: *ANCOVA Summary of Undergraduates' Creative Thinking Based on Teaching Method*

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	2283.234 ^a	2	1141.617	49.419	.000	.505
Intercept	2013.497	1	2013.497	87.162	.000	.473
Pre-CT	272.816	1	272.816	11.810	.001	.109
Teaching Methods	1935.942	1	1935.942	83.805	.000	.464
Error	2240.766	97	23.101			
Total	17520.000	100				
Corrected Total	4524.000	99				

The ANCOVA statistic summary in Table 3 shows that $F_{(1,97)} = 83.805$; $p = 0.000 < 0.05$. This shows that the probability level is less than the quantified alpha of 0.05. Accordingly, the null hypothesis was rejected. This implies that there is a significant difference in the development of Creative Thinking mean scores of undergraduates taught using AI-PLS and those taught using the LM in Integrated Science. This indicates that AI-PLS significantly develops undergraduates' Creative Thinking than LM in Integrated Science. The partial eta squared value of 0.464 is considered to be a large effect size, indicating that the AI-PLS has a substantial impact on undergraduates Creative Thinking. This means that approximately, 46.4% of the variance in undergraduates' Creative Thinking scores can be attributed to the difference between the two teaching methods and also, there is a strong association between the AI-PLS and undergraduates' Creative Thinking.

Hypotheses Two: There is no significant difference between the mean creative thinking skills of undergraduates taught Integrated Science using AI-Personalised Learning Strategy based on gender

Table 4: *ANCOVA Summary of Undergraduates' Creative Thinking Based on Gender*

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	63.729 ^a	2	31.864	.536	.591	.033
Intercept	2250.589	1	2250.589	37.835	.000	.550
Pre-CT	.055	1	.055	.001	.976	.000
Gender	63.361	1	63.361	1.065	.310	.033

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Error	1844.036	31	59.485
Total	12496.000	34	
Corrected Total	1907.765	33	

The ANCOVA statistic summary in Table 4 shows that $F_{(1, 31)} = 1.065$; $p = 0.310 > 0.05$. This confirms that the probability is greater than the specified alpha level of 0.05. So, the null hypothesis was not rejected. This specifies that there was no significant difference in the development of Creative Thinking mean scores of male and female undergraduates taught using AI-PLS in Integrated Science. This explains that AI-PLS is effective and has no significant gender-based differences in learning outcomes for both male and female undergraduates. The partial eta squared value of 0.033 is considered to be a very small effect size, indicating essentially equivalent development of Creative Thinking mean of male and female undergraduates when taught using AI-PLS. This means that approximately 03.3% of the variance of undergraduates' Creative Thinking can be attributed to no statistically significant difference between male and female undergraduates.

Discussion of Findings

The study made two findings and they are discussed as follows:

As regards the effect of AI-Personalised Learning Strategy (AI-PLS) and Lecture Method (LM) on Creative Thinking skills, the study found a significant difference in the development of creative thinking among Integrated Science undergraduates taught using AI-PLS and those taught using the LM, $F(1, 97) = 83.805$; $p = 0.000 < 0.05$. The AI-PLS group had a higher mean gain of 11.36 compared to 2.21 for the Lecture Method group, with a large effect size. This implies that AI-PLS is more effective than the LM in developing creative thinking skills among Integrated Science undergraduates. This finding aligns with Bruner's Theory of Discovery Learning (1966), which posits that learning is most effective when students actively engage in problem-solving and knowledge construction. AI-PLS likely promoted this by adapting content to individual learners' needs, providing immediate feedback, and encouraging exploration, which are consistent with Bahari (2026) and Judijanto et al. (2025) who reported that AI-based learning significantly improves students' creative thinking. In contrast, the passive nature of the LM limits student participation and interaction, as noted by Obro (2022), and may explain the lower gains in creative thinking. The implication is that integrating AI-PLS into Integrated Science classrooms can address the challenge of low creative thinking and shift instruction from teacher-centred to learner-centred approaches. Concerning the effect of AI-PLS on Creative Thinking based on Gender, the study found no significant difference in the development of creative thinking of male and female undergraduates taught Integrated Science using AI-PLS, $F(1, 31) = 1.065$; $p = 0.310 > 0.05$, with a very small effect size of 0.033. Although males had a slightly higher mean gain of 13.00 compared to 10.46 for females, the difference was not statistically significant. This suggests that AI-PLS is gender-friendly and enhances creative thinking irrespective of gender. This finding is consistent with Sijaj et al. (2025), Ayua et al. (2023), and Ikyernun et al. (2022) who found no significant gender differences in creative thinking when state-of-the-art teaching tactics were employed. The finding contradicts the stereotype that science is a male-dominated field and supports the need for inclusive methods in science teaching. Theoretically, this indicates that personalised learning environments created by AI can minimise gender disparities by catering to individual learning needs rather than group characteristics. Practically, the implication is that lecturers can adopt AI-PLS to foster equitable development of creative thinking skills among both male and female Integrated Science undergraduates without the fear of gender prejudice.

Conclusion

Based on the findings, the study concludes that AI-PLS has significantly enhance creative thinking skills of Integrated Science undergraduates without gender disparity. Therefore, teachers and lecturers should use Artificial Intelligence Personalized Learning Strategy for teaching of science in schools and tertiary institutions.

Recommendations

Based on the findings, the following recommendations were made:

1. Digital library should be a core recommendation for accreditation of universities to enable easy integration of AI-PLS in the process of teaching and learning
2. Students should be trained, enlightened and equipped with knowledge and devices such as computers for easy integration of AI-PLS in the process of teaching and learning to enhance creative thinking in Integrated Science undergraduates.



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3. Workshop should be organised by government, STAN and NGOs to enlighten teachers and lecturers on how to use AI-PLS for effective teaching of Integrated Science for harnessing science through creative thinking.

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