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EFFECT OF GENERATIVE ARTIFICIAL INTELLIGENCE ON COMPUTER SCIENCE EDUCATION PRE-SERVICE TEACHERS' INTEREST IN LESSON PLANNING IN UNIVERSITIES IN NORTH-EAST NIGERIA

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Abstract

The study investigated the effect of Generative Artificial Intelligence (GAI) on Computer Science Education pre-service teachers' interest in lesson planning in universities in North-East Nigeria. Two research objectives, two research questions and two hypotheses guided the study. Quasi-experimental research design, specifically the pretest-posttest non-equivalent control group design, was adopted for the study. The population of the study comprised 65 year three Computer Science Education pre-service teachers in the sampled universities in the North-East. A sample of 63 participants was used for the study, comprising 41 pre-service teachers in the experimental group and 22 in the control group. The instrument used for data collection was the Pre-Service Teachers' Interest in Lesson Planning Inventory (STILPI). The instrument was subjected to validation by experts in relevant fields, while its reliability was determined using Cronbach's Alpha which gave a reliability coefficient of 0.88.. The experimental group was exposed to GAI-supported lesson planning, while the control group was taught using the conventional lesson-planning approach. The STILPI was administered as a pretest before the intervention and re-administered as a posttest after the intervention. Data collected were analysed using mean and standard deviation to answer the research questions, while Analysis of Covariance (ANCOVA) was used to test the hypotheses at 0.05 level of significance. Findings revealed that the experimental group exposed to GAI-supported lesson planning recorded a higher posttest interest mean score of 80.47 compared with 66.05 for the control group, with a posttest mean difference of 14.42 in favour of the experimental group. The ANCOVA result further revealed a statistically significant effect of GAI on pre-service teachers' interest in lesson planning. However, the study found no significant interaction effect between treatment and gender on pre-service teachers' interest in lesson planning. The study recommended among others, that universities should integrate GAI-supported lesson planning activities into teacher preparation programmes and as well provide equitable access to digital devices, reliable internet connectivity, and other necessary technological facilities so as to enhance pre-service teachers' interest and competence in lesson planning.

Key words: Generative Artificial Intelligence, AI-Based Educational Tools, Gender, Interest, Lesson Planning, Teaching Strategies.

Introduction

The rapid advancement of emerging technologies is transforming education and creating new possibilities for improving teacher preparation and instructional practices. Among these technologies, Generative Artificial Intelligence (GAI) has emerged as a promising innovation capable of generating human-like content, including texts, explanations, lesson templates, instructional activities, and assessment tasks, in response to user prompts. In teacher education, GAI provides intelligent support for lesson planning by assisting pre-service teachers in generating instructional objectives, suggesting appropriate teaching strategies, organising lesson content, designing learning activities, and developing assessment tasks. These capabilities are particularly relevant to Computer Science Education, where lesson planning requires the careful sequencing of abstract and interconnected concepts, integration of digital tools, and design of engaging practical learning

experiences. When appropriately used, GAI may therefore, make lesson planning more interactive, creative, and manageable, potentially stimulating pre-service teachers' interest in the planning process (Ayanwale & Olatunji, 2023; Ogunyemi & Adebayo, 2024; Sengar, Hasan, Kumar & Carroll, 2025).

Computer Science Education pre-service teachers are prospective teachers being prepared with the subject-matter knowledge, pedagogical skills, and professional competencies required to teach Computer Science effectively in schools. Their preparation involves developing the ability to translate curriculum content into purposeful instructional experiences through activities such as lesson planning, microteaching, and teaching practice. Lesson planning is particularly important in Computer Science Education because the subject involves abstract, logical, and hierarchical concepts that require careful sequencing from simple to complex, appropriate scaffolding, and the integration of practical activities such as coding exercises, simulations, problem-solving tasks, and digital learning resources (Alkhateeb, Codding, Mouza & Pollock, 2020; Israel & Lash, 2020; Sankaranarayanan, 2022). However, the process of developing effective lesson plans may be perceived by some pre-service teachers as cognitively demanding, time-consuming, and routine, which can diminish their enthusiasm and willingness to engage deeply in lesson-planning activities. Studies indicate that many pre-service teachers demonstrate low interest in lesson planning, reflected in minimal engagement, reliance on existing lesson-plan templates, and limited willingness to explore innovative instructional approaches (Alkhateeb, Codding, Mouza & Pollock, 2020). This therefore, highlights the need for instructional approaches that can make lesson planning a more engaging and meaningful learning experience for Computer Science Education pre-service teachers.

Interest is an important affective variable in teacher education because it influences learners' motivation, engagement, persistence, and willingness to participate actively in learning activities. In the context of lesson planning, pre-service teachers who develop a strong interest in the activity are more likely to engage with instructional design tasks, explore alternative teaching strategies, experiment with innovative ideas, and invest sustained effort in developing meaningful lessons. Interest is particularly relevant to Computer Science Education because the discipline is dynamic and technology-driven, requiring prospective teachers to remain curious, creative, and willing to engage with new digital tools and instructional approaches. The integration of GAI may provide an opportunity to strengthen such interest by reducing some of the cognitive burden associated with lesson planning, stimulating idea generation, supporting creativity, and enabling pre-service teachers to explore multiple possibilities for organising instructional content and activities.

The influence of GAI on interest in lesson planning may also vary according to individual and contextual characteristics such as gender. Gender is considered an important variable in educational technology research because male and female learners may experience differences in access to technology, opportunities for digital skills development, confidence in using digital tools, and attitudes towards emerging instructional technologies (Kymäläinen, Elo & Södervik, 2024). In North-East Nigeria, gender-related differences in access to digital resources, training opportunities, and sociocultural expectations may shape how male and female Computer Science Education pre-service teachers engage with GAI-supported lesson planning. Consequently, examining gender alongside treatment is necessary to determine whether exposure to GAI influences interest in lesson planning similarly or not between male and female pre-service teachers.

Despite the growing potential of GAI in supporting teacher preparation and instructional design, empirical evidence concerning its effect on pre-service teachers' interest in lesson planning remains limited, particularly among Computer Science Education students in universities in North-East Nigeria. Existing challenges in teacher preparation, coupled with the demanding nature of Computer Science Education lesson planning, and the continued reliance on conventional approaches, create a need to explore innovative interventions that can stimulate pre-service teachers' interest and engagement in lesson-planning activities. Although GAI may simplify complex

planning tasks, stimulate creativity, and expose pre-service teachers to innovative instructional possibilities, its effectiveness in generating interest cannot be assumed without empirical evidence. Furthermore, this is necessary so as to establish whether the effect of GAI on interest is influenced by the interaction between treatment and gender. Therefore, the study sets out to investigate the effect of Generative Artificial Intelligence on Computer Science Education pre-service teachers' interest in lesson planning in universities in North-East Nigeria.

Research Questions

1. What are the pretest and posttest interest mean scores of Computer Science Education pre-service teachers in lesson planning in the experimental and control groups?
2. What is the interaction effect of treatment and gender on Computer Science Education pre-service teachers' interest in lesson planning?

Hypotheses

1. There is no significant difference in the pretest and posttest interest mean scores of Computer Science Education pre-service teachers in lesson planning in the experimental and control groups
2. There is no significant interaction effect of treatment and gender on Computer Science Education pre-service teachers' interest in lesson planning.

Literature Review

Lesson planning is an important component of teacher preparation and instructional practice because it provides a structured framework through which teachers organise and coordinate the different elements required for effective teaching and learning. In the context of Computer Science Education, lesson planning involves the systematic organisation of instructional objectives, subject matter, teaching strategies, learning activities, instructional resources, and assessment procedures to facilitate meaningful learning experiences. Computer Science Education pre-service teachers are expected to develop the capacity to translate complex and abstract concepts into structured learning experiences that are appropriate for learners' needs and levels of understanding. This is particularly important as Computer Science involves concepts and skills that often require logical sequencing, practical activities, problem-solving, computational thinking, and the integration of digital technologies into the teaching/learning process. Therefore, effective lesson planning enables pre-service teachers to organise instructional content and activities in ways that make Computer Science concepts more accessible and engaging to learners. However, the process of lesson planning may be demanding for pre-service teachers because it requires them to make several pedagogical decisions concerning what to teach, how to teach it, the resources to employ, and how to assess learners' understanding.

Studies have increasingly examined gender differences in pre-service teachers' interest in using Generative Artificial Intelligence (GAI) for educational purposes, including lesson planning (Ayanwale & Olatunji, 2023; Guan, Zhang & Gu, 2025). Although some researches on educational technologies often reported differences between male and female users in technology acceptance, confidence, and self-efficacy ((Kymäläinen, Elo, & Södervik, 2024), other studies suggest that such differences are gradually becoming less pronounced as digital literacy improves and AI-powered applications become more accessible and user-friendly (Kasneci et al., 2023; Moorhouse, Yeo & Wan, 2023; Zhai et al., 2024). Sing and Yung (2021) observed that the growing accessibility of AI technologies has contributed to broader participation among different groups of learners. Similarly, Chan and Hu (2023) found that both male and female students generally demonstrate positive attitudes towards Generative AI when they perceive the technology as useful for academic and professional activities. These findings suggest that gender may influence initial levels of confidence

or exposure to AI, but it may not necessarily determine pre-service teachers' interest in adopting GAI for lesson planning, particularly when equal access and learning opportunities are provided.

Literature further indicates that pre-service teachers' interest in GAI-assisted lesson planning is associated more strongly with perceived usefulness, ease of use, technological self-efficacy, and previous experience than with gender alone. Celik, Kontkanen, Laru and Dalyanci (2025) reported that AI-supported learning environments can stimulate curiosity, engagement, and motivation among learners, thereby encouraging greater interest in the use of AI-based tools. In the context of teacher education, male and female pre-service teachers who perceive GAI as useful for generating instructional objectives, organizing lesson content, suggesting teaching strategies, and developing assessment activities are more likely to demonstrate interest in its application. However, differences in prior exposure to technology and confidence in using digital tools may create variations in initial interest between gender groups. Moorhouse, Yeo and Wan (2023) emphasized that structured exposure and opportunities to interact with Generative AI applications can improve users' confidence and competence. This implies that appropriate training, mentorship, and repeated practical experiences may reduce gender-related differences in interest in GAI-assisted lesson planning.

Methodology

Quasi-experimental research design was adopted for the study, specifically the pretest-posttest non-equivalent control group design. The design was considered appropriate because the study involved the use of an experimental group exposed to a Generative Artificial Intelligence (GAI)-supported lesson planning strategy and a control group exposed to the conventional lesson planning approach. The sample for the study involved year three Computer Science Education pre-service teachers, comprised of 63 participants with 41 in the experimental group and 22 in the control group, drawn from the selected universities in the North-East Zone of Nigeria. For the experimental group 25 participants were male while 16 were female participants. For the control group, 16 were male while 6 were female participants. The instrument for data collection was the Pre-Service Teachers' Interest in Lesson Planning Inventory (STILPI). It was developed by the researcher following an extensive review of relevant literature. The STILPI was subjected to validation by experts in relevant fields so as to establish its suitability for measuring pre-service teachers' interest in lesson planning. The instrument's reliability was determined through pilot testing with Computer Science Education pre-service teachers from non-participating universities. The reliability of the instrument, using Cronbach's Alpha, stood at 0.88. The experimental group was exposed to a GAI-supported lesson planning strategy, while the control group received conventional lesson planning instruction. Data collected were analysed using mean and standard deviation to answer the research questions. Analysis of Covariance (ANCOVA) was used to test the hypotheses at 0.05 level of significance.

Results

Research question one: What are the pretest and posttest interest mean scores of Computer Science Education pre-service teachers in lesson planning in the experimental and control groups?

The data presented in Table 1 were used to answer research question one.

Table 1: Mean and Standard Deviation of Computer Science Education Pre-service Teachers' Interest Mean Scores in Lesson Planning in the Experimental and Control Group

Group	N	Pretest Mean	SD	Posttest Mean	SD	Mean Gain	Mean Gain difference

Experimental	41	48.29	6.04	80.47	9.35	23.20	14.42
Control	22	48.67	5.44	66.05	6.51	17..38	

Table 1 presents the result of pretest and posttest of Computer Science Education pre-service teachers' interest mean scores in lesson planning in the experimental and control groups. The table reveals that experimental group yielded a pretest score ($\bar{\mathbf{x}}$=48.29, SD=6.04) and control group had a pretest scores ($\bar{\mathbf{x}}$=48.67, SD=5.44). The table also reveals that experimental group yielded a posttest score ($\bar{\mathbf{x}}$=80.47, SD=9.35) while the control group had ($\bar{\mathbf{x}}$=66.05, SD=6.51). The posttest mean gain difference was 14.42 in favour of the experimental group. This indicates that the use of generative artificial intelligence aroused pre-service teachers' interest in lesson planning.

Hypothesis One: There is no significant difference in the pretest and posttest interest mean scores of Computer Science Education pre-service teachers in lesson planning in the experimental and control groups

The data the data that were used to test hypothesis one are presented in Table 2.

Table 2: Summary of ANCOVA Result of the Difference in Pretest and Posttest Interest Mean Scores of the Experimental and Control Groups.

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	3562.351[a]	2	1781.175	35.797	.000
Intercept	8946.449	1	8946.449	179.801	.000
Pretest interest experimental and Control	994.064	1	994.064	19.978	.000
Group	2460.189	1	2460.189	49.444	.000
Error	2388.355	48	49.757		
Total	289237.000	51			
Corrected Total	5950.706	50			

a R Squared = .599 (Adjusted R Squared = .582)

Table 2 presents the result of Analysis of Covariance (ANCOVA), which was conducted to determine if a significant difference existed in the lesson planning interest mean scores of pre-service teachers in the experimental and control groups. The table reveals that $F(1, 48) = 49.44$, $P < 0.05$. Since the p-value of .000 is less than 0.05 level of significance, the null hypothesis was rejected, indicating that there was a statistically significant effect of generative artificial intelligence on pre-service teachers' interest in lesson planning. The result further reveals an adjusted R squared value of .582, which means that 58.2% of the variation in the dependent variable, which is pre-service teachers' interest in lesson planning, is explained by variation in the treatment, while the remaining is due to other factors not included in the study.

Research Question Two: What is the interaction effect of treatment and gender on Computer Science Education pre-service teachers' interest in lesson planning?

The data for answering research question two are presented in Figure 1.

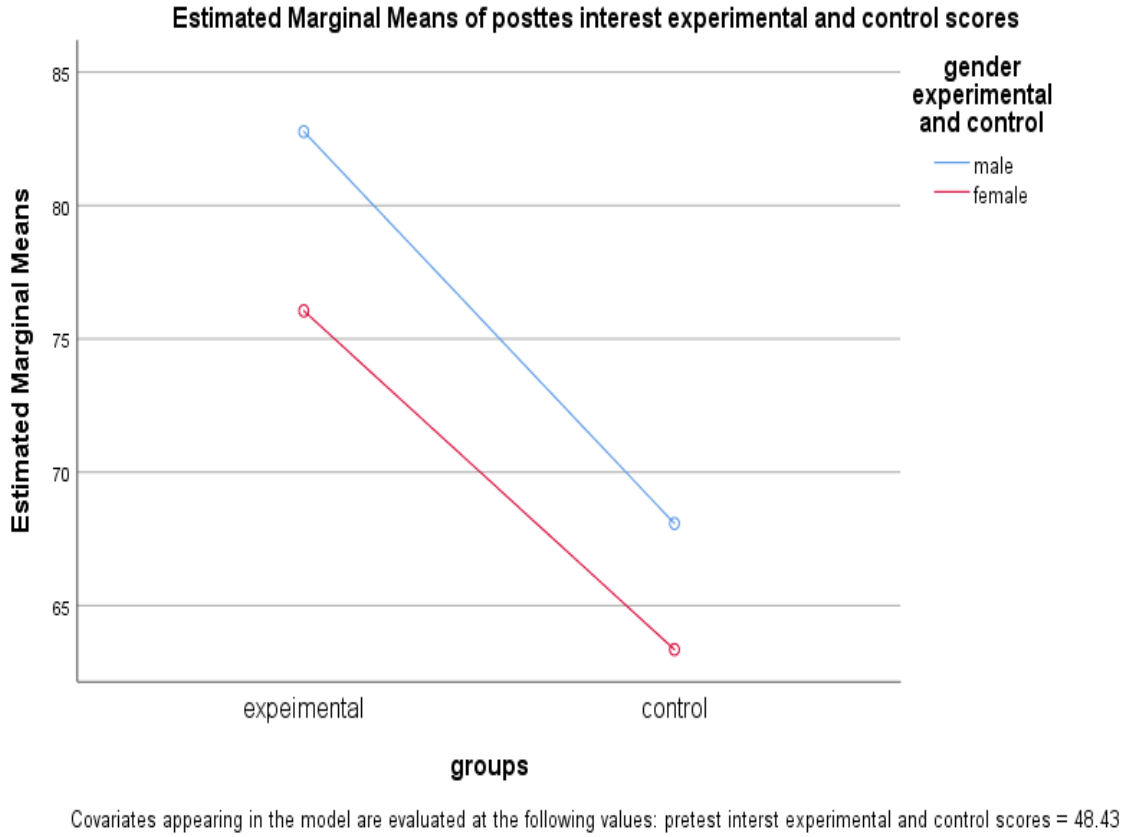


Figure 1: Mean Interaction Effect of Groups (treatments) and Gender on pre-service teachers' Interest in Lesson Planning.

Figure 1 presents the profile plot/graph of the interaction effect of treatment and gender on pre-service teachers' interest in lesson planning. The interaction pattern shows that the plots for male and female do not interact though not parallel lines. This indicates that there is likelihood of an interaction effect between treatment and gender in interest for experimental group, if the plot is extrapolated.

Hypothesis 2: There is no significant interaction effect of treatment and gender on Computer Science Education pre-service teachers' interest in lesson planning.

The data testing hypothesis two are presented in Table 3.

Table 3: Summary of ANCOVA Result on Interaction Effect of Treatment and Gender on the Interest Mean Scores of Computer Science Education Pre-service Teachers.

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	3894.533[a]	4	973.633	21.782	.000
Intercept	8447.359	1	8447.359	188.981	.000
Pretest-interest	1297.946	1	1297.946	29.037	.000
Groups	2149.783	1	2149.783	48.094	.000
Gender	313.550	1	313.550	7.015	.011
Group * Gender	10.912	1	10.912	.244	.624
Error	2056.173	46	44.699		
Total	289237.000	51			

Corrected Total	5950.706	50

a R Squared = .654 (Adjusted R Squared = .624)

The lesson planning interest mean scores were subjected to two-way Analysis of Co-variance (ANCOVA) having two levels of gender (male and female students) and interest, as results show in Table 3. There was no significant interaction effect of gender on lesson planning interest of pre-service teachers' using Generative Artificial Intelligence, with $F(1, 46) = 0.24$, $P > 0.05$. Since the p-value of .624 is greater than 0.05 level of significance, the null hypothesis was retained. This indicates that the interest mean scores of male pre-service teachers' in lesson planning do not significantly differ from that of female pre-service teachers'. The result reveals that the interaction effect of gender was statistically insignificant on pre-service teachers' interest in lesson planning when taught using generative artificial intelligence.

Discussion of Results

The findings in Table 1 reveal that exposure to Generative Artificial Intelligence (GAI) had a positive effect on Computer Science Education pre-service teachers' interest in lesson planning. Before the treatment, the experimental group recorded a pretest interest mean score of 48.29 (SD = 6.04), while the control group recorded 48.67 (SD = 5.44). The relatively close pretest mean scores indicate that both groups had comparable levels of interest in lesson planning before the intervention. However, after the treatment, the experimental group recorded a substantially higher posttest mean score of 80.47 (SD = 9.35) compared with 66.05 (SD = 6.51) for the control group. The experimental group also recorded a higher mean gain of 23.20, compared with 17.38 for the control group, resulting in a posttest mean difference of 14.42 in favour of the experimental group. This finding indicated that exposure to GAI-supported lesson planning increased the interest of Computer Science Education pre-service teachers in lesson planning. The finding is consistent with the view in the literature (Bond, Broutin, Bedenlier, Zawacki-Richter, & Kerres (2020; UNESCO, 2024), that GAI can make lesson planning more engaging by simplifying complex planning tasks, generating instructional ideas, supporting creativity, organising content, and enabling pre-service teachers to explore different instructional possibilities.

The higher posttest interest mean score obtained by the experimental group further indicates that GAI-supported lesson planning may provide additional benefits beyond those associated with conventional lesson-planning approaches. The improvement in interest may be attributed to the opportunity provided by GAI tools to assist pre-service teachers in generating instructional objectives, organising lesson content, suggesting teaching strategies, and developing learning activities. These features may reduce some of the difficulties associated with lesson planning and make the activity more interactive and creative. The result therefore, indicated that GAI can serve as a supportive technological resource capable of stimulating pre-service teachers' enthusiasm and engagement in lesson planning. This finding is also consistent with Ayanwale and Olatunji (2023) and Ogunyemi and Adebayo (2024), who reported that GAI can support pre-service teachers' pedagogical preparedness and creativity. Similarly, Sengar, Hasan, Kumar, and Carroll (2025) noted the potential of GAI to expose pre-service teachers to technology-enhanced pedagogies and strengthen their digital competence.

The result presented in Table 2 revealed a statistically significant difference between the groups, $F(1, 48) = 49.44$, $p < .05$. Since the p-value of .000 was less than the 0.05 level of significance, the null hypothesis was rejected. This finding confirms that the observed difference in posttest interest scores between the experimental and control groups was statistically significant and that exposure to GAI had a significant effect on pre-service teachers' interest in lesson planning. The adjusted R-squared value of .582 further indicates that approximately 58.2% of the variation

in pre-service teachers' interest in lesson planning was explained by the variables included in the model, with treatment making a significant contribution.

The findings presented in Table 3 reveal that there was no statistically significant interaction effect of treatment and gender on Computer Science Education pre-service teachers' interest in lesson planning. The ANCOVA result showed that the interaction effect was not significant, $F(1, 46) = 0.244$, $p = .624$. Since the p-value of .624 was greater than the 0.05 level of significance, the null hypothesis was retained. This finding indicates that the effect of GAI-supported lesson planning on pre-service teachers' interest did not significantly differ across male and female pre-service teachers. Although the profile plot in Figure 1 showed some differences in the pattern of interest scores between male and female participants, the statistical result indicates that these differences were not sufficiently large to establish a significant interaction between treatment and gender. Thus, the effectiveness of GAI in stimulating interest in lesson planning appears to be generally consistent across male and female Computer Science Education pre-service teachers.

The findings further reveal that gender had a statistically significant main effect on pre-service teachers' interest in lesson planning, $F(1, 46) = 7.015$, $p = .011$, even though the interaction between treatment and gender was not significant. This indicates that gender may be associated with differences in overall interest levels, but it did not significantly change the effect of the GAI treatment on interest. Therefore, the result should not be interpreted to mean that male and female pre-service teachers had exactly the same level of interest; rather, it indicates that the effect of GAI-supported lesson planning was not significantly dependent on gender. This finding suggests that GAI-supported lesson planning may be useful for enhancing interest among male and female Computer Science Education pre-service teachers.

On the whole, these results indicate that GAI-supported lesson planning significantly enhanced Computer Science Education pre-service teachers' interest in lesson planning compared with the conventional lesson-planning approach. The substantial mean improvement and significant ANCOVA result demonstrate the potential of GAI to make lesson planning more engaging, creative, and appealing to pre-service teachers. At the same time, the non-significant treatment-by-gender interaction indicates that the positive effect of GAI on interest did not significantly vary according to gender. Although gender had a significant main effect on interest, it did not significantly moderate the effect of treatment. Consequently, the findings suggest that GAI-supported lesson planning can be considered a potentially effective approach for increasing interest in lesson planning among Computer Science Education pre-service teachers, irrespective of whether they are male or female.

CONCLUSION AND RECOMMENDATIONS

The study examined the effect of Generative Artificial Intelligence (GAI) on Computer Science Education pre-service teachers' interest in lesson planning in universities in North-East Nigeria. Findings revealed that pre-service teachers exposed to GAI-supported lesson planning demonstrated higher posttest interest mean scores and greater improvement in interest compared with those taught using the conventional lesson-planning approach. The results indicate that the use of GAI can make lesson planning more engaging, creative, interactive, and appealing by supporting pre-service teachers in generating instructional ideas, organising lesson content, developing learning activities, and exploring alternative teaching strategies. The study further established that GAI had a significant positive effect on pre-service teachers' interest in lesson planning. Although gender had a significant main effect on interest, the interaction effect between treatment and gender was not statistically significant, indicating that the positive effect of GAI-supported lesson planning did not significantly differ between male and female pre-service teachers. The study therefore, concluded that GAI-supported lesson planning is an effective approach for enhancing Computer Science Education pre-service teachers' interest in lesson planning and can be beneficial to both male and female pre-service teachers. Based on the findings, the study

recommended among others, that lecturers and teacher educators should provide Computer Science Education pre-service teachers with adequate training and practical workshops on the effective and responsible use of Generative Artificial Intelligence (GAI) tools for lesson planning, and Computer Science Education programmes in universities in North-East Nigeria should integrate GAI-supported lesson planning activities into teacher preparation programmes to make lesson planning more engaging, creative, and interesting for pre-service teachers.

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