TRANSFORMING BUILDING/WOODWORK EDUCATION THROUGH INNOVATIVE AI-DRIVEN TEACHING STRATEGIES: ENHANCING STUDENT ENGAGEMENT, PSYCHO-SOCIAL WELL-BEING, AND SKILL DEVELOPMENT

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Abstract

The integration of Artificial Intelligence (AI) into education is reshaping how teaching and learning occur, particularly within Technical and Vocational Education and Training (TVET) programs. This study explored how lecturers and students perceive the use of AI-enhanced teaching strategies in Building and Woodwork Technology Education across three tertiary institutions in Lagos State, Nigeria: The University of Lagos, Lagos State University of Education, and the Federal College of Education (Technical), Akoka. Using a descriptive survey design, the study engaged 20 lecturers and 84 students, selected through purposive and stratified random sampling, respectively. Data were gathered using a validated and reliable questionnaire (AI-Enhanced Instruction and Learning Outcomes in Building and Woodwork Technology Education – AIILOBWTE), with a Cronbach's Alpha of 0.85, indicating strong internal consistency. The instrument measured participants' views on AI's effect in four key areas: instructional quality, student engagement, psycho-social well-being, and access equity. Data analysis involved descriptive statistics (mean and standard deviation) and inferential testing (independent samples t-test) at a 0.05 significance level, with a decision benchmark of 3.50 for agreement on questionnaire items. Results revealed no statistically significant difference in how lecturers and students viewed AI's effect on instructional delivery ($t = 0.057$, $p = 0.955$) and psycho-social well-being ($t = 0.338$, $p = 0.736$). Despite this, both groups expressed strongly positive perceptions of AI tools, particularly in areas like personalized learning, anxiety reduction, increased motivation, and enhanced technical skill development. Overall, the findings suggest that AI is being increasingly embraced within hands-on, practice-based disciplines and shows promising potential to complement traditional experiential learning through adaptive guidance, real-time feedback, and more equitable access to educational resources. The study recommends investments in digital infrastructure, targeted training for educators, and the formulation of inclusive, ethical AI policies to support effective and fair implementation across TVET programs.

Keywords: Artificial Intelligence, Vocational Education, Building and Woodwork Technology, Student Engagement, Psycho-social Well-being.

Introduction

Artificial Intelligence (AI) is no longer just a futuristic concept; it's increasingly becoming part of our everyday lives, including how we teach and learn. At its core, AI involves computer systems performing tasks that typically require human intelligence, such as learning, reasoning, and problem-solving. In education, this technology opens up exciting possibilities, particularly by enabling teaching approaches that adapt to individual learning styles and needs. In hands-on disciplines like building and woodworking, AI can be a powerful ally. It helps personalize lessons, strengthen theoretical understanding, and enhance the development of practical skills (Yadav & Shrawankar, 2025). Tools such as intelligent tutoring systems, learning analytics, and real-time content adjustments are becoming more common, particularly in vocational settings where practical experience is essential. For instance, virtual carpentry simulations can guide students through tasks, offer instant feedback, and suggest improvements—all of which make learning more interactive and effective (Ghosh & Ravichandran, 2024).

Beyond individual instruction, AI is helping to reshape how we teach. Methods such as flipped classrooms, blended learning, and competency-based education are becoming increasingly common in vocational training. These approaches allow students to absorb content at their own pace and then apply what they have learned in guided, hands-on workshop sessions. AI also makes learning more engaging through tools like virtual reality, voice-enabled support, and adaptive content that responds to each student's progress (Singh, 2024). Importantly, these innovations do not replace teachers—they support them. AI assists educators in identifying where students struggle, tailoring their lessons, and providing timely feedback that meets diverse learning needs.

Woodwork and building education are at the heart of Technical and Vocational Education and Training (TVET), equipping students with skills in carpentry, construction, and related trades. These programs blend theory with real-world practice, teaching students not just how to use tools but also how to think critically and solve problems on the job (Xinming, 2023). While traditional skills like blueprint reading, joinery, and cabinetmaking remain essential, modern woodwork training now includes sustainability, digital tools, and collaborative planning—skills that help students stay adaptable in a fast-changing job market (UNESCO, 2021).

Hands-on learning remains the cornerstone of woodwork education. Students learn by doing, cutting, measuring, and assembling, under the guidance of experienced instructors. This experiential model builds not only technical proficiency but also soft skills such as decision-making, teamwork, and creative problem-solving, echoing John Dewey’s “learning by doing” philosophy (1938). While new tools like CNC machines, laser cutters, and AI-assisted simulations offer precision and flexibility, the physical aspect of working with materials remains irreplaceable. Project-based learning continues to simulate real job scenarios, encouraging students to take ownership of their work and think like professionals (Eswaran, 2024).

AI also plays an increasingly vital role in keeping students engaged, important in subjects like woodwork that require both mental focus and physical effort. Student engagement encompasses more than just attending class, it's about being mentally, emotionally, and behaviourally invested. AI tools facilitate this by providing interactive simulations, real-time feedback, and even gamified elements like points, leaderboards, and badges. These features make learning feel more dynamic and help foster motivation, persistence, and confidence (Hanson, Okonkwo, & Orakwe, 2024).

Engagement is closely tied to students' emotional and social well-being. Woodwork education can be physically demanding and team-oriented, so it's important for students to feel emotionally supported and connected. AI systems that can detect signs of stress or disengagement help teachers respond in more compassionate ways (Shi, 2025). Some tools even recommend support or send alerts to instructors when students appear to be struggling. Digital platforms also enable students to collaborate beyond the classroom, sharing ideas, working on group projects, and building a sense of community that's especially valuable for learners who might feel marginalized in traditional settings (Xu, 2024). Mental health is a growing concern in vocational education. The pressure to perform in practical tasks and prepare for real-world careers can be intense. AI offers new ways to support student well-being by analysing data like attendance, grades, and engagement to flag early signs of burnout or withdrawal (Wazir et al., 2025). Confidence-building is also essential. Many students thrive when tasks are broken down into manageable steps and they receive steady, constructive feedback. AI can provide that structure, offering non-judgmental help, repeated practice, and fair assessments based on objective performance, like cut accuracy or finish quality (Rizvi, 2024). In this way, AI can create a more psychologically safe environment where all students feel respected and supported.

Skill development in building and woodwork has evolved alongside changes in technology. Students today need to master both traditional tasks, such as sawing, sanding, and framing, as well as modern digital skills, including design software and the use of automated machinery. AI makes this more accessible through virtual simulations, adaptive tutorials, and tools that provide real-time feedback. Motion tracking, performance analytics, and wearable sensors help instructors monitor students' progress in ways that extend beyond what the eye can see (Cao et al., 2022). By offering customized instruction, AI can support a wider range of learners and promote more equitable outcomes. That supposed, integrating AI into traditional, hands-on disciplines doesn't come without challenges. Many institutions still lack the infrastructure, tools, or trained staff needed to implement these technologies effectively. Instructors may be wary of change, especially those rooted in the traditions of craftsmanship and face-to-face mentorship (Napier & Wada, 2024). Resistance often stems from uncertainty, lack of training, or concern over being replaced by machines. Overcoming this requires thoughtful implementation, training, pilot programs, and collaborative planning that includes both teachers and students.

Another concern is equity. While AI can enhance learning, not all students have equal access. Those in rural or under-resourced colleges may lack internet access, devices, or exposure to AI-enhanced tools, widening existing educational gaps rather than narrowing them. Similarly, students with disabilities may find AI platforms difficult to use unless they are designed with inclusivity in mind (Ramaiah et al., 2025). On a deeper level, there are concerns about the emotional and ethical impact of AI in education. If used without care, AI risks making learning feel impersonal. Students might feel isolated or disconnected if too much instruction is automated. There are also legitimate concerns about privacy, data security, and bias in AI systems (Lata, 2024). As the nature of vocational assessment changes, new methods will be needed to fairly evaluate the kinds of skills, like craftsmanship and creativity, that AI may not fully grasp (Grasseni, 2025). In addition, AI holds real promise for transforming how we teach and learn in technical and vocational education. But for it to truly work, we must pay attention not just to technology, but to people. This includes how students engage, how they feel, and how they are supported. The current study aims to explore these human-centred aspects of AI in woodwork education, looking at its impact on learning, engagement, well-being, and equity in real classroom settings.

Statement of the Problem

For many years, building and woodwork education has relied on traditional, instructor-led, and hands-on teaching methods. These approaches have been effective in passing down practical skills, but they often fall short when it comes to personalizing learning, adapting to individual needs, or incorporating modern technology. As a result, many students, especially those in large or under-resourced technical and vocational classrooms, struggle with disengagement, inconsistent learning progress, and limited emotional or social support. While there has been a global push to modernize Technical and Vocational Education and Training (TVET), the adoption of technology in these areas has been slow compared to general education. This has left a noticeable gap, particularly in disciplines like building and woodwork, where innovation could greatly enhance both teaching and learning experiences. The rise of Artificial Intelligence (AI) in education is beginning to change the landscape. Tools like adaptive learning platforms, virtual simulations, and intelligent feedback systems offer new possibilities to personalize instruction, increase engagement, and support student well-being. For fields like woodwork, where skill mastery and learner confidence are crucial, AI has the potential to be a valuable complement to hands-on instruction. Yet, despite this potential, AI is still underused in practical, skill-based subjects. Most research so far has focused on how AI supports cognitive development in more theoretical subjects. Far less is known about how it impacts students' emotional, social, and motivational experiences in vocational education – particularly in secondary schools or technical institutions in developing countries.

Moreover, questions of access and equity remain largely unanswered. Many students, especially those from low-income or rural backgrounds, may not have reliable access to the technologies required to benefit from AI-enhanced learning. If these issues are not addressed, there's a risk that AI could widen existing educational gaps rather than closing them. This study aims to explore these overlooked areas by examining how AI-driven teaching strategies affect student engagement, emotional and social well-being, and practical skill development in building and woodwork education. It will also look at the challenges and barriers to adopting AI in diverse educational settings, with the goal of supporting more inclusive, effective, and future-ready vocational training.

Purposes of the Study

The general purpose of the study is to examine the transformation of building/woodwork education through innovative AI-driven teaching strategies: enhancing student engagement, psycho-social well-being, and skill development. Specifically, the study was designed to:

1. examine the effect of AI-driven teaching strategies on student engagement and psycho-social well-being in building and woodwork education programme.
2. investigate how issues of equity and access affect the implementation and effectiveness of AI-enhanced learning tools in vocational woodwork programme.

Research Questions:

1. How do AI-driven teaching strategies affect student engagement and psycho-social well-being in building/woodwork education programme?

2. To what extent do equity and access challenges affect the implementation and effectiveness of AI-enhanced learning tools in building/woodwork education?

Hypotheses

H_{01}: There is no significant differences between AI-driven teaching strategies and student engagement or psycho-social well-being in building and woodwork education program.

H_{02}: Equity and access challenges do not significantly affect the implementation and effectiveness of AI-enhanced learning tools in building /woodwork programs.

Methodology

To explore the impact of AI-enhanced teaching strategies on student learning outcomes in building and woodwork technology education, this study employed a descriptive survey design**.** The research focused on gathering insights from both educators and learners across selected tertiary institutions in Lagos State. A total of 104 participants were involved in the study, comprising 20 lecturers and 84 students from three institutions: University of Lagos**,** Lagos State University of Education (Oto/Ijanikin), and Federal College of Education (Technical), Akoka. Lecturers were chosen through purposive sampling**,** based on their expertise and involvement in relevant teaching areas, while students were selected using stratified random sampling to ensure fair representation across departments and levels.

Data were collected through a structured questionnaire titled "AI-Enhanced Instruction and Learning Outcomes in Building and Woodwork Technology Education (AIILOBWTE)". The questionnaire included items designed to assess key areas such as the integration of AI tools in teaching, levels of student engagement, psycho-social impacts of AI use, and challenges related to access and infrastructure. Participants responded using a 5-point Likert scale, with a benchmark score of 3.50 or higher indicating agreement with a statement.

To ensure the credibility and accuracy of the instrument, three subject matter experts from the University of Lagos and Lagos State University of Education reviewed it for content validity. Also, a pilot study was carried out at Tai Solarin University of Education in Ijebu-Ode, Ogun State, which is outside the main study area. The results yielded a Cronbach's Alpha reliability coefficient of 0.85, demonstrating strong internal consistency. For data analysis, mean and standard deviation were used to summarize and describe the responses, while an independent samples t-test was conducted to determine any statistically significant differences between groups. All analyses were performed at a 0.05 level of significance.

Results

Table 1: AI-Driven Teaching Strategies, Student Engagement, and Psycho-Social Well-being in Building/Woodwork Education Programmes

S/N	Item statement	BLD/WW Lecturers		BLD/WW Students		Remark
		$\bar{X}$	S.D	$\bar{X}$	S.D	
1	Use of AI-based tools has made learning building/woodwork more interactive	4.12	0.64	4.09	0.72	Agree
2	Learning through AI simulations increases attention during lessons.	3.97	0.75	4.02	0.68	Agree
3	Classroom participation improves when AI platforms are used.	4.26	0.71	4.30	0.64	Agree
4	Interest in building/woodwork tasks increases when guided by AI technologies	4.31	0.68	4.27	0.57	Agree
5	AI-assisted learning encourages independent problem-solving	4.28	0.81	4.21	0.73	Agree
6	Confidence in completing building/woodwork tasks improves with AI-guided practice.	4.15	0.68	4.18	0.66	Agree
7	Feelings of stress decrease when AI tools provide step-by-step instructions.	4.20	0.73	4.16	0.81	Agree
8	Collaborative skills are enhanced through group tasks involving AI technology.	4.19	0.59	4.24	0.68	Agree
9	Emotional support is perceived through continuous feedback from AI platforms	4.10	0.65	4.08	0.72	Agree
10	A stronger sense of belonging is experienced when learning is supported by both AI and teacher guidance	4.28	0.78	4.22	0.77	Agree
	Grand Total	**4.19**	**0.70**	**4.18**	**0.70**	

KEY: BLD/ WW =Building and Woodwork (Lecturers and Students)

Findings from Table 1 reveal a strong, shared perception among both lecturers and students that AI-driven teaching strategies have a positive impact on Building and Woodwork Technology education. The average ratings were remarkably similar, 4.19 for lecturers and 4.18 for students, both with a standard deviation of 0.70**,** indicating a high level of agreement across the two groups. Participants highlighted several key areas where AI integration has been especially effective. Remarkably, classroom participation saw a noticeable boost, with mean scores of 4.26 from lecturers and 4.30 from students. Similarly, tasks guided by AI sparked greater interest, reflected in high ratings (4.31 for lecturers and 4.27 for students). AI's role in enhancing independent problem-solving was also widely acknowledged (lecturers: 4.28, students: 4.21), pointing to its potential in strengthening students' cognitive and practical skills. Beyond academic benefits, respondents recognized meaningful improvements in students' psycho-social well-being. The structured, step-by-step nature of AI support was seen to help reduce stress (lecturers: 4.20, students: 4.16), while continuous feedback provided by AI tools offered a form of emotional reassurance (lecturers: 4.10, students: 4.08). Moreover, AI appeared to promote a more collaborative and inclusive learning environment. Both groups noted better teamwork and collaboration through AI-facilitated group tasks (lecturers: 4.19, students: 4.24). Perhaps most importantly, students reported feeling a stronger sense of belonging in classrooms where AI tools were used alongside teacher guidance (lecturers: 4.28, students: 4.22).

Overall, the data suggest that AI-enhanced instruction is not only improving student engagement and skill acquisition but is also playing a supportive role in fostering emotional well-being and social inclusion within technical education programs.

Table 2: Equity and Access Challenges in AI Implementation and Effectiveness in Building/Woodwork Technology Education

S/N	Item statement	BLD/WW Lecturers		BLD/WW Students		Remark
		$\underline{X}$	S.D	$\underline{X}$	S.D	
11	Access to AI learning tools is consistent across all students.	3.98	0.67	3.65	0.59	Agree
12	Limited internet access affects the ability to use AI platforms effectively	4.32	0.73	4.27	0.67	Agree
13	Device availability influences participation in AI-supported lessons.	4.14	0.62	4.16	0.74	Agree
14	Technical support is readily available when using AI tools in class	3.78	0.66	3.72	0.58	Agree
15	Students from low-income backgrounds face more barriers to using AI resources	4.23	0.71	4.19	0.76	Agree
16	Equal opportunity is provided to all students to engage with AI-based learning.	3.48	0.68	3.38	0.63	Disagree
17	School infrastructure adequately supports the integration of AI tools.	3.65	0.71	3.59	0.69	Agree
18	Language or interface complexity of AI tools poses learning challenges.	3.89	0.59	3.95	0.64	Agree
19	AI content is accessible to students with different learning needs or disabilities	3.47	0.65	3.39	0.59	Disagree
20	Differences in digital literacy levels among students limit the effectiveness of AI-enhanced learning	4.12	0.75	4.21	0.73	Agree
	Grand Total	**3.91**	**0.68**	**3.85**	**0.66**	

KEY: BLD/WW=Building and Woodwork (Lecturers and Students)

The findings from Table 2 highlight several important equity and access challenges that currently hinder the effective implementation of AI tools in Building and Woodwork (BLD/WW) education programmes. Overall, both lecturers (mean = 3.91, SD = 0.68) and students (mean = 3.85, SD = 0.66) acknowledged these challenges, reflecting broad agreement on the key issues, even though some disparities in perception were evident. One of the most pressing concerns is limited internet access, which both groups identified as a major barrier to using AI effectively (lecturers: 4.32, students: 4.27). Similarly, a lack of available digital devices, such as laptops or tablets, was seen as another critical obstacle (lecturers: 4.14, students: 4.16). These limitations are particularly felt by students from low-income backgrounds, who face additional hurdles in accessing AI-enhanced learning resources (lecturers: 4.23, students: 4.19).

Both students and lecturers also pointed out that differences in digital literacy, the ability to confidently use digital tools, affect how successfully learners can engage with AI-based instruction (lecturers: 4.12, students: 4.21). While these observations underline broader systemic challenges, the data also uncovers deeper issues related to inclusivity. For example, when asked whether all students have equal opportunities to benefit from AI tools, both groups expressed some level of disagreement (lecturers: 3.48, students: 3.38). Likewise, they felt that AI content is not sufficiently accessible for students with learning disabilities or special needs (lecturers: 3.47, students: 3.39). These lower ratings indicate a gap in the design and delivery of AI-based education, where equity still needs to be prioritized. In terms of infrastructure and support, responses were moderate. Technical support (lecturers: 3.78, students: 3.72) and general infrastructure like classroom setup and electricity (lecturers: 3.65, students: 3.59) were seen as somewhat adequate, though clearly not optimal. Another moderate concern was the complexity of AI interfaces and language, which some students find difficult to navigate (lecturers: 3.89, students: 3.95).

Taken together, these results paint a clear picture: while the integration of AI in technical education is showing promise, there are still significant access and equity challenges that must be addressed. For AI to truly support all learners, institutions will need to invest in better infrastructure, improve digital literacy, and ensure that AI tools are inclusive and accessible to students of all backgrounds and abilities.

Table 3: Independent Samples t-test Comparing Mean Responses of Building/Woodwork Lecturers and Students

Group	N	Mean	SD	df	t-value	p-value (Sig. 2-tailed)	Decision
Building/Woodwork Lecturers	20	4.186	0.702				
Building/Woodwork Students	84	4.177	0.698	102	0.057	0.955	Not Significant

To examine whether lecturers and students differed in their views on the use of AI-enhanced teaching strategies in Building and Woodwork Technology education, an independent samples t-test was conducted. The analysis compared the mean responses of 20 lecturers and 84 students. As shown in Table 3, the results revealed very similar mean scores from both groups: lecturers had a mean of 4.19 (SD = 0.70), while students reported a mean of 4.18 (SD = 0.70). The t-test yielded a t-value of 0.057 with 102 degrees of freedom, and a p-value of 0.955, which is well above the 0.05 threshold for statistical significance.

This outcome indicates that there is no significant difference between how lecturers and students perceive the instructional value of AI in woodwork education. The near-identical mean scores suggest a shared and consistent recognition of AI’s benefits, highlighting broad support and growing familiarity with AI-enhanced learning methods among both educators and learners. These findings point to a positive trend: whether through formal institutional support or individual exploration, both lecturers and students appear to be engaging with AI technologies in meaningful ways. The fact that their perceptions align so closely underscores AI's potential to bridge gaps in the teaching-learning dynamic, even in fields traditionally reliant on manual, hands-on instruction. Importantly, the strong average ratings, both well above the 3.50 decision threshold, reinforce the notion that AI is not only being accepted but also valued as a transformative tool in technical and vocational education. This shared perspective suggests that AI can serve as a common ground for innovation, enhancing learning outcomes while supporting more personalized, inclusive, and interactive teaching experiences.

Table 4: Independent Samples t-test Comparing Mean Responses of Building/Woodwork Lecturers and Students

Group	N	Mean	SD	df	t-value	p-value (Sig. 2-tailed)	Decision
Building/Woodwork Lecturers	20	3.906	0.677				
Building/Woodwork Students	84	3.851	0.662	102	0.338	0.736	Not Significant

An independent samples t-test was carried out to compare how lecturers and students in Building and Woodwork Technology perceive the psycho-social impact of AI-enhanced instruction. The findings revealed that both groups held very similar views, with lecturers reporting a mean score of 3.91 (SD = 0.68) and students scoring slightly lower at 3.85 (SD = 0.66). The statistical test produced a t-value of 0.338 and a p-value of 0.736, which is well above the 0.05 threshold for significance. This means there is no statistically significant difference between the two groups' perceptions.

In practical terms, this result suggests that both lecturers and students agree that AI-supported instruction contributes positively to psycho-social well-being. They recognize AI as a helpful tool in areas such as boosting student confidence, reducing classroom anxiety, and encouraging collaborative learning. The mean values, both comfortably above the decision benchmark of 3.50, further reinforce the idea that AI is generally viewed as beneficial for the social and emotional aspects of learning. The absence of a significant difference between groups reflects a shared experience, possibly influenced by similar classroom environments or institutional efforts to integrate AI effectively.

Ultimately, this alignment between educators and learners highlights the importance of considering psycho-social factors when deploying AI in technical education settings. It emphasizes that AI should not only support knowledge acquisition but also foster emotional support, social inclusion, and a sense of belonging—especially in disciplines that are traditionally hands-on and skill-based.

Findings

This study highlights the transformative role that AI-driven teaching strategies are beginning to play in building and woodwork technology education. Consistent with broader trends in technical and vocational education, AI tools, such as intelligent tutoring systems and virtual simulations, are proving effective in enhancing student engagement. These findings support previous research (Yadav & shrawankar, 2025; Ghosh & Ravichandran, 2024), which has shown how AI fosters more interactive, personalized, and adaptive learning experiences. Importantly, the use of AI in these hands-on fields is not replacing traditional instruction but rather complementing it, supporting both practical skill development and the cognitive and emotional dimensions of learning. Students and lecturers alike recognized that AI can make learning environments more engaging, responsive, and emotionally supportive, especially in disciplines where precision, confidence, and independent problem-solving are essential.

One of the more significant outcomes of this study was the recognition of AI's positive psycho-social impact. Both groups agreed that AI tools help reduce learning-related stress and build self-confidence by offering structured, real-time feedback. These benefits are particularly valuable in vocational education, where learners often face pressure to master detailed, hands-on tasks. This finding supports earlier studies (Shi, 2025; Xu, 2024) and reflects educational philosophies such as Dewey's (1938) "learning by doing," which emphasizes experiential, collaborative learning. AI appears to enhance this model by enabling teamwork, communication, and peer interaction in digitally supported ways (Eswaran, 2024; Vaithianathan et al., 2024).

However, the study also draws attention to persistent equity and access challenges. Issues such as poor internet connectivity, limited access to digital devices, and gaps in digital literacy continue to affect students—particularly those from low-income backgrounds. These barriers mirror wider concerns about the digital divide in education (Ramaiah et al., 2025), where unequal access to technology can unintentionally reinforce existing inequalities. Our findings echo growing calls for more inclusive AI design, as well as targeted investments in digital infrastructure to ensure no learner is left behind (Napier & Wada, 2024).

One notable outcome of the study was the remarkable alignment between lecturers' and students' perspectives. The absence of significant differences in their responses points to a shared optimism about the role of AI in vocational education. This suggests that both educators and learners are increasingly embracing digital transformation, likely influenced by institutional support, national policy directions, and a broader shift toward technology-enhanced learning (Singh, 2024; Martin, 2019). That believed, some resistance remains, particularly among educators who are cautious about how AI might impact traditional craftsmanship and manual teaching methods. This highlights the importance of ongoing professional development to help teachers feel confident and competent using AI tools in ways that enrich, rather than replace, their established practices (Napier & Wada, 2024).

Summarily, while the study affirms the potential of AI-enhanced instruction to boost engagement, well-being, and skills acquisition in building and woodwork education, its long-term success depends on how effectively we address the structural challenges, particularly around equity and educator readiness. Moving forward, future research should explore the sustained psycho-social effects of AI in technical education and develop scalable strategies to implement these innovations in under-resourced settings.

Conclusion

This study explored how lecturers and students perceive the use of AI-enhanced instructional strategies in building and woodwork technology education across three tertiary institutions in Lagos State. The results showed a strong alliance in views between both groups, with no significant differences in their perceptions of AI's instructional and psycho-social benefits. This shared perspective points to a growing acceptance of AI as a valuable tool in technical education, even in fields traditionally rooted in manual, hands-on learning. The high level of agreement suggests that teaching and learning in vocational settings are beginning to shift toward more technologically integrated practices. AI is seen not just as a means of delivering content, but as a way to enhance student engagement, support emotional well-being, and strengthen skill development, key outcomes in any effective learning environment.

However, realizing AI's full potential will require more than just enthusiasm. Challenges around digital access, lecturer preparedness, and the ethical use of AI must be carefully addressed to ensure that its benefits are inclusive and sustainable. Without deliberate efforts to close these gaps, the advantages of AI may remain out of reach for many students and educators. Ultimately, this study adds to the evolving conversation on AI in education by showing that it holds real promise for transforming vocational and skill-based learning. But to truly make that transformation meaningful, institutions must invest not only in technology, but also in the people and systems that bring it to life.

Recommendations

Based on the findings of this study, the following practical steps are recommended to enhance the effective use of AI in building and woodwork technology education:

1. Tertiary institutions should prioritize the adoption of AI-driven instructional tools that not only deliver content but actively support hands-on skill development and boost student engagement in vocational programs like woodwork and building technology.
2. To ensure successful integration of AI into the classroom, institutions should organize regular capacity-building workshops and continuous professional development programs. These initiatives will help equip lecturers with the necessary skills, confidence, and pedagogical strategies to use AI tools effectively.

3. Institutions must take deliberate steps to improve digital access, ensuring that all departments, especially those that are under-resourced, have reliable internet connectivity, appropriate digital devices, and access to relevant software platforms. This will help level the playing field for all learners.
4. Developers of educational AI technologies should integrate affective computing features, such as empathetic feedback and emotional recognition capabilities, to help support students' mental and emotional well-being, particularly when they face challenges or feel isolated during learning.
5. Educational stakeholders should create and enforce policies that promote the ethical use of AI in education. These policies should focus on protecting student data privacy, ensuring fair and non-discriminatory algorithms, and guaranteeing that all students, including those with special needs, have equal access to AI-enhanced learning opportunities.

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