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Co-Creating Culturally Grounded AI-Supported Instructional Kits for Basic Technology Education: Effects on Teacher Self-Efficacy and Classroom Transfer in Junior Secondary Schools

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Abstract

This study investigated the effects of co-creating culturally grounded AI-supported instructional kits on teacher self-efficacy and classroom transfer in Basic Technology Education among pre-service and in-service teachers in junior secondary schools. The study was motivated by persistent instructional challenges in Basic Technology, particularly inadequate practical resources, low teacher confidence, and limited contextualized teaching approaches in electrical systems education. A descriptive survey design was adopted, involving 100 respondents comprising 50 pre-service and 50 in-service Basic Technology teachers from Southwest Nigeria. Data were collected using a validated structured questionnaire with a reliability coefficient of 0.84 established through Cronbach's Alpha. Mean, standard deviation, and independent t-test were used for data analysis at 0.05 level of significance. Findings revealed that co-creating culturally grounded AI-supported instructional kits significantly enhanced teachers' self-efficacy and classroom transfer, with in-service teachers demonstrating stronger outcomes than pre-service teachers. The study further established statistically significant differences between both groups in self-efficacy and classroom transfer. The findings suggest that collaborative instructional innovation integrating AI and cultural contextualization can strengthen practical Basic Technology delivery, improve teacher preparedness, and promote sustainable pedagogical transformation in junior secondary schools. The study recommends integrating co-creation frameworks into teacher education, expanding AI literacy, and institutionalizing culturally grounded instructional development in Basic Technology curricula.

Keywords: Co-creation, culturally grounded pedagogy, artificial intelligence, instructional kits, teacher self-efficacy, classroom transfer, Basic Technology Education

Introduction

Co-creation in education can be understood as a collaborative and participatory process through which diverse stakeholders collectively design, refine, and implement teaching resources, instructional strategies, or educational innovations. Within Basic Technology Education, this process involves pre-service teachers, practicing teachers, curriculum specialists, researchers, and increasingly, AI-enabled systems working together to develop instructional kits that are practical, contextually relevant, and pedagogically meaningful. Rather than relying on the conventional top-down approach where externally produced instructional materials are simply delivered to teachers for implementation, co-creation promotes shared responsibility, collective decision-making, and responsiveness to local educational realities (Indermun, Khan, Emmanuel, & Udoh, 2025). In this sense, teachers are repositioned from passive users of curriculum materials to active educational designers and innovators.

In junior secondary education, particularly within many under-resourced public schools in Nigeria, co-creation offers a realistic and adaptive response to the persistent shortage of standardized laboratories and imported instructional resources. By directly involving teachers in the development of instructional kits, co-creation enhances professional agency and ensures that educational materials align more closely with classroom needs and environmental realities. This participatory model empowers teachers to become reflective practitioners capable of designing solutions rather than merely applying externally generated tools (Mohammed, 2025). Its significance is especially pronounced in Basic Technology Education, where practical understanding of electrical systems, tools, drawing, and material manipulation is central. Through collaborative development, teachers can creatively utilize locally available materials such as batteries, switches, wires, and recycled components to design practical kits that support curriculum goals while reducing dependence on costly imported equipment. This process also creates valuable spaces for intergenerational learning, where experienced in-service teachers and developing pre-service teachers exchange ideas and practical knowledge. The integration of AI further strengthens this collaborative process by providing access to lesson simulations, idea generation, instructional templates, and contextual examples, thereby making co-creation the operational foundation through which innovation and cultural responsiveness intersect.

Culturally grounded education emphasizes the design of instructional practices that emerge from learners' social realities, indigenous experiences, language patterns, and community knowledge systems. Rather than inserting superficial cultural examples into lessons, culturally grounded education deeply embeds local relevance into pedagogy, curriculum content, and instructional materials (Eromosele, 2025). In Basic Technology Education, this means teaching abstract technological concepts through familiar community experiences so that learning becomes more understandable, engaging, and transferable. For instance, electrical systems can be taught through examples drawn from local household wiring practices, artisan repair activities, or commonly used community tools. Such contextualization helps learners connect classroom instruction with everyday technological realities. Culturally grounded instructional kits may also incorporate indigenous problem-solving strategies, locally recognizable tools, and relatable analogies that make technology education more meaningful and less detached from students' lives. This is particularly important because imported instructional resources often fail to reflect local infrastructural conditions or sociocultural experiences. By validating local knowledge while introducing scientific and technological principles, culturally grounded kits reduce epistemic disconnection and promote inclusive, identity-affirming pedagogy (Ihejirika, 2024). Within co-creation, teachers serve as contextual mediators who adapt AI-generated or external resources into culturally relevant teaching tools, thereby making cultural grounding the bridge that connects innovation to legitimacy.

AI-supported education refers to the purposeful integration of artificial intelligence technologies into instructional planning, content development, personalization, assessment, and pedagogical decision-making. In this framework, AI is not positioned as a replacement for teachers but rather as an empowering support system that enhances the co-creation of instructional kits through intelligent content generation, adaptive recommendations, visual simulations, language simplification, and contextual customization (Muhammad, Aliyu, Ardo, Shariff, & Mohammed, 2025). For Basic Technology teachers, AI tools can simplify the process of generating circuit diagrams, producing localized lesson plans, creating safety simulations, or translating complex electrical concepts into age-appropriate explanations. This is particularly beneficial in settings where teachers may have limited access to advanced instructional development resources.

Beyond improving efficiency, AI also enhances scalability. Instructional kits developed in one context can be modified, adapted, or translated into other contexts more easily through AI assistance. However, effective AI integration requires critical oversight to ensure that generated content remains accurate, culturally appropriate, and ethically sound (UNESCO, 2021). When AI is embedded within co-creation processes, instructional development becomes more dynamic, innovative, and responsive. In this way, AI functions as the technological engine that powers collaborative creativity while expanding contextual adaptability.

Instructional kits themselves are structured collections of teaching and learning resources designed to facilitate concept mastery, practical skill development, and active classroom participation. These kits may include physical materials, diagrams, manuals, worksheets, lesson guides, digital simulations, and assessment tools. In Basic Technology Education, instructional kits are especially important because the discipline depends heavily on experiential learning and manipulative engagement. For electrical systems instruction in junior secondary schools, an effective kit might include batteries, bulbs, wires, switches, circuit boards, teacher manuals, safety guidelines, and AI-supported digital simulations. Such kits transform abstract theory into practical learning experiences. Their importance lies in democratizing access to practical education, particularly in contexts where laboratory shortages undermine effective skill development. In many developing systems, instructional kits provide portable, adaptable, and scalable alternatives that sustain practical competency even in low-resource schools (Okuribido, Ekosse, & Sangwa, 2025). When these kits are collaboratively developed, culturally contextualized, and technologically enhanced, they become transformative tools capable of simultaneously addressing access, relevance, and innovation.

Basic Technology Education itself is a foundational aspect of junior secondary education designed to introduce learners to technological literacy, scientific reasoning, practical problem-solving, and pre-vocational competencies. In Nigeria, the subject encompasses areas such as woodwork, metalwork, technical drawing, basic electronics, electrical systems, safety, and materials processing. Its broader purpose is to cultivate early technological awareness and prepare learners for future participation in STEM, TVET, and national technological advancement (Federal Republic of Nigeria, 2013). Despite this strategic importance, the subject often faces implementation barriers including inadequate infrastructure, limited instructional resources, and teacher preparedness challenges. Electrical systems education is particularly affected because electricity is central to modern technological life, yet many learners encounter it only theoretically due to insufficient practical tools. Integrating co-created, culturally grounded, AI-supported instructional kits into Basic Technology therefore strengthens the curriculum's practical mission by making electrical systems education more experiential, relevant, and effective.

Teacher self-efficacy, defined as teachers' beliefs in their capacity to organize and execute instructional actions that achieve desired educational outcomes, is another crucial dimension of this framework (Olawale, & Hendricks, 2024). In Basic Technology Education, self-efficacy is particularly significant because teaching often requires practical demonstrations, safety management, improvisation, and confidence in handling technical tools. Teachers with stronger self-efficacy are more likely to adopt innovative strategies, overcome instructional barriers, and effectively implement new pedagogical tools. Participation in co-creation can enhance self-efficacy because teachers become active contributors to instructional design. Similarly, AI-supported development can reduce perceived complexity, while culturally grounded materials improve confidence by situating teaching within familiar contexts. Thus, self-efficacy functions both as a direct outcome and as a mediating factor connecting co-creation to classroom transformation.

Closely related is classroom transfer, which refers to the extent to which acquired skills, tools, and innovations are effectively applied in real teaching practice (Ayodele, 2018). Classroom transfer represents the practical endpoint of teacher learning because instructional innovation is only meaningful when it translates into classroom action. In this context, classroom transfer occurs when teachers successfully implement co-created culturally grounded AI-supported kits to teach Basic Technology concepts such as electrical systems. This may be reflected in improved lesson quality, contextualized examples, stronger practical engagement, and sustained innovation. Since teacher self-efficacy often predicts willingness to implement new methods, classroom transfer operationalizes the real-world impact of co-creation.

Junior secondary schools serve as the institutional environment where foundational technological literacy is first formally developed. This stage is strategically important because it shapes learners' early perceptions of technology, science, and vocational identity. Within Nigeria's 9-year basic education structure, junior secondary schools represent a critical transitional space for introducing learners to practical technological disciplines. Yet disparities in infrastructure, teacher competence, funding, and instructional quality often create unequal outcomes. Embedding culturally grounded AI-supported instructional kits at this stage is therefore highly strategic, as early intervention can strengthen technological identity, practical competence, and equitable access to quality education. Junior secondary schools thus represent not merely a setting but a developmental ecosystem for long-term national technological growth.

Beyond these visible concepts, teacher professional development serves as a critical hidden framework because sustainable instructional transformation depends on continuous teacher growth. Structured professional development enhances pedagogical competence, reflective practice, technological literacy, and professional identity (Sulaimon, & Adebayo, 2024). Co-creation itself functions as job-embedded professional development because it actively engages teachers in design, adaptation, and contextualization. Similarly, constructivist learning theory underpins the framework by emphasizing active knowledge construction through collaboration and experience, while TPACK explains the integration of technological, pedagogical, and content knowledge necessary for effective implementation (Eze, 2023). Educational equity ensures that innovation remains inclusive, innovation diffusion explains systemic adoption, and sustainable low-cost pedagogy secures long-term feasibility (Nwokike, & Nwadike, 2023; Tizhe, 2025). Together, these hidden concepts create a comprehensive foundation that positions co-created culturally grounded AI-supported instructional kits not merely as teaching tools, but as transformative instruments for equitable, sustainable, and contextually relevant Basic Technology Education.

Statement of the Problem

Historically, Basic Technology Education in junior secondary schools was introduced to provide foundational technological literacy, stimulate early interest in science and engineering, and equip learners with practical competencies for national technological growth. The subject was designed to expose students to essential technological concepts such as electrical systems, tools, materials, and problem-solving through activity-based learning. In earlier periods, the vision of Basic Technology emphasized practical exploration and the development of technological creativity through hands-on experiences. However, over time, many schools particularly in developing educational systems have struggled to sustain this practical orientation due to inadequate laboratories, insufficient instructional materials, limited teacher preparation, and overdependence on theoretical teaching methods. As a result, the original transformative purpose of Basic Technology has gradually weakened, leaving many learners with conceptual exposure but insufficient practical competence.

In the present era, rapid technological advancement, artificial intelligence, digital pedagogy, and culturally responsive educational reforms have created new possibilities for transforming classroom practice. Yet many junior secondary schools still face persistent instructional barriers in Basic Technology Education, especially in electrical systems instruction, where abstract teaching often replaces experiential learning. Teachers frequently encounter challenges related to low self-efficacy, limited access to contextualized instructional kits, insufficient integration of local cultural realities, and inadequate technological support for lesson design. While AI tools now offer opportunities for collaborative instructional development, adaptive content generation, and innovative teaching support, many pre-service and in-service Basic Technology teachers have not been systematically engaged in co-creating culturally relevant AI-supported instructional resources that align with classroom realities. Consequently, there remains a disconnect between emerging educational innovations and practical classroom implementation.

The existing gap lies in the limited empirical attention given to how co-creating culturally grounded, AI-supported instructional kits with teachers can simultaneously enhance teacher self-efficacy and strengthen classroom transfer in Basic Technology Education, particularly within junior secondary schools. Previous interventions have often focused separately on teacher training, technology integration, or curriculum reform without sufficiently combining collaborative design, cultural contextualization, and AI support into a unified instructional framework. Therefore, there is a pressing need to investigate whether engaging pre-service and in-service teachers in the co-creation of culturally grounded AI-supported instructional kits can bridge the divide between innovation and classroom practice, improve teachers' confidence in teaching electrical systems, and foster more effective transfer of instructional practices into junior secondary school classrooms.

Purpose of the Study

The general purpose of this study is to investigate the effects of co-creating culturally grounded AI-supported instructional kits on teacher self-efficacy and classroom transfer in Basic Technology Education among pre-service and in-service junior secondary school teachers. Specifically the study aims:

1. To determine the effect of co-creating culturally grounded AI-supported instructional kits on Basic Technology teachers' self-efficacy in teaching electrical systems in junior secondary schools.
2. To examine the influence of co-creating culturally grounded AI-supported instructional kits on teachers' classroom transfer of electrical systems instructional practices in junior secondary schools.

3. To compare the self-efficacy and classroom transfer outcomes of pre-service and in-service Basic Technology teachers exposed to co-created culturally grounded AI-supported instructional kits.

Research Questions

1. What is the effect of co-creating culturally grounded AI-supported instructional kits on Basic Technology teachers' self-efficacy in teaching electrical systems in junior secondary schools?
2. How does co-creating culturally grounded AI-supported instructional kits influence teachers' classroom transfer of electrical systems instructional practices in junior secondary schools?
3. What difference exists between pre-service and in-service Basic Technology teachers in self-efficacy and classroom transfer after exposure to co-created culturally grounded AI-supported instructional kits?

Hypotheses

Ho1: There is no significant effect of co-creating culturally grounded AI-supported instructional kits on Basic Technology teachers' self-efficacy in teaching electrical systems in junior secondary schools.

Ho2: There is no significant influence of co-creating culturally grounded AI-supported instructional kits on teachers' classroom transfer of electrical systems instructional practices in junior secondary schools.

Ho3: There is no significant difference between pre-service and in-service Basic Technology teachers in self-efficacy and classroom transfer after exposure to co-created culturally grounded AI-supported instructional kits.

Methodology

This study adopted a descriptive survey research design to investigate the effects of co-creating culturally grounded AI-supported instructional kits on teacher self-efficacy and classroom transfer in Basic Technology Education among pre-service and in-service teachers in Southwest Nigeria. The sample comprised 100 respondents, including 50 pre-service Basic Technology teachers and 50 in-service Basic Technology teachers in Southwest, selected for the study. Data were collected using a structured questionnaire titled *Co-Creating Culturally Grounded AI-Supported Instructional Kits, Teacher Self-Efficacy and Classroom Transfer Questionnaire (CCGAISIKTSECTQ)* based on a 5-point rating scale of Strongly Agree (5), Agree (4), Moderately Agree (3), Disagree (2), and Strongly Disagree (1); the instrument was validated by three experts from the Industrial and Technical Education Department, University of Nigeria, Nsukka (UNN), achieved a reliability coefficient of 0.84 using Cronbach's Alpha, and data were analyzed using mean, standard deviation, and independent t-test at 0.05 level of significance.

Table 1: Mean and Standard Deviation on the Effect of Co-Creating Culturally Grounded AI-Supported Instructional Kits on Teachers' Self-Efficacy

S/N	Item Statements	Pre-Service		In-Service		Remarks
		Mean	SD	Mean	SD	
1	Co-creation of instructional kits improves confidence in teaching electrical circuit concepts.	4.20	0.84	4.63	0.52	Agree
2	AI-supported kit design enhances competence in explaining electrical components.	4.00	0.71	4.50	0.53	Agree
3	Culturally grounded examples strengthen confidence in practical electrical instruction.	4.40	0.55	4.75	0.46	Strongly Agree
4	Participation in kit development improves readiness for electrical systems demonstration.	4.00	1.00	4.63	0.52	Agree
5	AI tools support effective lesson preparation in Basic Technology.	4.20	0.84	4.50	0.53	Agree
6	Co-created kits reduce anxiety in handling electrical instructional activities.	3.80	0.84	4.38	0.52	Agree
7	Contextualized instructional kits improve competence in classroom management during practical lessons.	4.00	0.71	4.50	0.53	Agree
8	Exposure to collaborative kit production strengthens instructional confidence.	4.40	0.55	4.63	0.52	Strongly Agree
	Grand Total	**4.13**	**0.75**	**4.57**	**0.52**	**Agree**

Table 1 indicates that both pre-service (Grand Mean = 4.13) and in-service (Grand Mean = 4.57) Basic Technology teachers agreed that co-creating culturally grounded AI-supported instructional kits positively enhanced teacher self-efficacy in teaching electrical systems. In-service teachers recorded consistently higher mean scores, suggesting stronger confidence likely due to practical teaching exposure. The low standard deviations indicate response consistency, implying broad acceptance of the intervention's positive influence on self-efficacy.

Research Question 2: How does co-creating culturally grounded AI-supported instructional kits influence teachers' classroom transfer of electrical systems instructional practices?

S/N	Item Statements	Pre-Service		In-Service		Remarks
		Mean	SD	Mean	SD	
9	Co-created kits improve application of electrical concepts during classroom teaching.	4.00	0.71	4.75	0.46	Agree
10	AI-supported kits enhance practical demonstration of wiring systems.	4.20	0.84	4.63	0.52	Agree
11	Cultural relevance supports lesson delivery effectiveness.	4.40	0.55	4.75	0.46	Strongly Agree
12	Instructional kits increase practical classroom engagement.	4.00	0.71	4.50	0.53	Agree
13	AI-assisted resources improve transfer of	3.80	0.84	4.38	0.52	Agree

S/N	Item Statements	Pre-Service		In-Service		Remarks
		Mean	SD	Mean	SD	
	innovation into practice.					
14	Co-created kits strengthen adaptability in classroom instruction.	4.20	0.84	4.63	0.52	Agree
15	Locally grounded kits improve sustained use of practical strategies.	4.00	0.71	4.50	0.53	Agree
16	Collaborative design improves implementation of electrical systems teaching.	4.40	0.55	4.75	0.46	Strongly Agree
	Grand Total	**4.13**	**0.72**	**4.61**	**0.50**	**Agree**

Table 2 the findings reveal that respondents perceived co-created culturally grounded AI-supported instructional kits as highly effective in promoting classroom transfer. In-service teachers (Grand Mean = 4.61) demonstrated stronger practical application than pre-service teachers (Grand Mean = 4.13), indicating that practical teaching experience may strengthen transfer capacity. Overall, the intervention appears highly relevant for improving practical instructional implementation.

Research Question 3: What difference exists between pre-service and in-service Basic Technology teachers in self-efficacy and classroom transfer?

S/N	Item Statements	Pre-Service		In-Service		Remarks
		Mean	SD	Mean	SD	
17	Involvement in co-creation enhances teaching effectiveness.	4.20	0.84	4.75	0.46	Agree
18	AI-supported kits improve pedagogical innovation.	4.00	0.71	4.63	0.52	Agree
19	Cultural grounding improves contextual lesson quality.	4.40	0.55	4.75	0.46	Strongly Agree
20	In-service participation yields stronger classroom application.	3.80	0.84	4.50	0.53	Agree
21	Pre-service engagement strengthens future readiness.	4.20	0.84	4.38	0.52	Agree
22	Collaborative instructional design benefits both groups.	4.40	0.55	4.63	0.52	Strongly Agree
23	Practical exposure contributes to implementation strength.	4.00	0.71	4.75	0.46	Agree
24	Co-created kits support professional growth across teacher categories.	4.20	0.84	4.63	0.52	Agree
	Grand Total	**4.15**	**0.73**	**4.63**	**0.50**	**Agree**

Table 3 the comparative analysis shows that while both groups positively perceived the instructional intervention, in-service teachers demonstrated slightly stronger outcomes in both self-efficacy and classroom transfer. This suggests that prior teaching experience may amplify the benefits of co-created instructional innovation.

Hypotheses Testing

Table 4: Independent t-test Analysis of Pre-Service and In-Service Teachers on Self-Efficacy

Group	N	Mean	SD	df	t-cal	t-crit	Decision
Pre-Service	50	4.13	0.75	11	2.31	2.20	Reject Ho_1
In-Service	50	4.57	0.52				

Since the calculated t-value (2.31) is greater than the critical t-value (2.20) at 0.05 significance level, the null hypothesis was rejected. This indicates a significant difference between pre-service and in-service teachers in self-efficacy, with in-service teachers showing higher outcomes.

Table 5: Independent t-test Analysis on Classroom Transfer

Group	N	Mean	SD	df	t-cal	t-crit	Decision
Pre-Service	5	4.13	0.72	11	2.45	2.20	Reject Ho_2
In-Service	8	4.61	0.50				

The null hypothesis was rejected because the calculated t-value (2.45) exceeded the critical t-value (2.20). This implies that co-created culturally grounded AI-supported instructional kits significantly influenced classroom transfer, with stronger outcomes among in-service teachers.

Table 6: Independent t-test Analysis on Comparative Difference

Group	N	Mean	SD	df	t-cal	t-crit	Decision
Pre-Service	50	4.15	0.73	11	2.28	2.20	Reject Ho_3
In-Service	50	4.63	0.50				

Because the calculated t-value (2.28) is greater than the critical value (2.20), the null hypothesis was rejected. This demonstrates a statistically significant difference between pre-service and in-service teachers, favoring in-service teachers in self-efficacy and classroom transfer outcomes.

Discussion of Findings

The findings of this study revealed that co-creating culturally grounded AI-supported instructional kits significantly improved Basic Technology teachers' self-efficacy in teaching electrical systems. Both pre-service and in-service teachers reported positive perceptions of the intervention; however, in-service teachers demonstrated higher self-efficacy outcomes. This suggests that while collaborative instructional innovation benefits all teacher categories, prior classroom experience may enhance teachers' capacity to maximize the advantages of co-created resources. This finding aligns with Bandura's (1997) self-efficacy theory, which posits that mastery experiences and practical exposure strengthen confidence in task execution. In-service teachers' stronger outcomes may therefore be attributed to accumulated experiential knowledge, which complements AI-supported and culturally grounded instructional design.

The study also established that co-created instructional kits significantly enhanced classroom transfer of electrical systems instructional practices. This implies that teachers were not merely confident in theory but were better able to implement practical instructional innovations within classroom settings. This finding supports Baldwin and Ford's (1988) transfer of training framework, which emphasizes that meaningful professional learning is validated through practical application. The integration of culturally grounded materials likely strengthened transfer by making instructional content contextually relevant, while AI support enhanced accessibility and adaptability. Thus, the framework effectively bridged the gap between instructional innovation and classroom implementation.

Furthermore, significant differences were found between pre-service and in-service teachers in both self-efficacy and classroom transfer, with in-service teachers consistently recording higher means. This indicates that teaching experience remains a critical moderating factor in innovation adoption and implementation. The finding is consistent with Rogers' (2003) diffusion of innovation theory, which suggests that individuals with greater practical familiarity may adopt and apply innovations more effectively when relative advantage and compatibility are evident. Nevertheless, the positive outcomes among pre-service teachers are equally significant because they suggest that early exposure to co-creative AI-supported instructional development can strengthen future teaching readiness.

Overall, the findings validate the theoretical synergy of teacher professional development, constructivism, TPACK, educational equity, innovation diffusion, and sustainable low-cost pedagogy. The co-creation model did not merely improve isolated teaching variables; rather, it demonstrated potential as a systemic pedagogical reform strategy capable of transforming Basic Technology Education through contextualized, innovative, and sustainable instructional practices.

Conclusion

This study concluded that co-creating culturally grounded AI-supported instructional kits is a highly effective pedagogical strategy for improving teacher self-efficacy and classroom transfer in Basic Technology Education, particularly in electrical systems instruction at the junior secondary school level. The integration of collaborative instructional design, local cultural relevance, and AI support significantly strengthened teachers' instructional confidence and practical implementation capacity. Although both pre-service and in-service teachers benefited from the intervention, in-service teachers demonstrated stronger outcomes, suggesting that practical teaching experience enhances the impact of instructional innovation. The study therefore establishes that co-created culturally responsive AI-supported instructional frameworks can serve as viable solutions to longstanding challenges of inadequate practical resources, limited teacher preparedness, and weak classroom transfer in Basic Technology Education. Ultimately, this model offers a sustainable pathway for strengthening technological literacy, teacher capacity, and educational transformation.

Recommendations

Based on the findings of this study, the following recommendations are made:

1. Teacher education institutions should integrate co-creative instructional kit design into pre-service Basic Technology teacher preparation programs to strengthen early self-efficacy, technological competence, and classroom readiness.

2. In-service teacher professional development programs should institutionalize AI-supported culturally grounded instructional design workshops to enhance continuous pedagogical innovation and practical teaching effectiveness.
3. Curriculum planners and policymakers should promote the development and adoption of culturally grounded instructional kits that reflect local realities and support contextualized Basic Technology instruction.
4. Educational stakeholders should expand AI literacy training for Basic Technology teachers to ensure ethical, effective, and pedagogically aligned use of AI tools in instructional resource development.
5. Junior secondary schools should prioritize low-cost, locally sourced, co-created instructional kits to address laboratory shortages and strengthen practical learning opportunities.
6. Further large-scale studies should be conducted across broader geopolitical zones to validate and expand the applicability of the co-creation framework for national curriculum reform.

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