

ISRG Journal of Arts, Humanities and Social Sciences (ISRGJAHSS)



ISRG PUBLISHERS

Abbreviated Key Title: ISRG J Arts Humanit Soc Sci

ISSN: 2583-7672 (Online)

Journal homepage: <https://isrgpublishers.com/isrgjahss>

Volume – IV Issue - IV (July – August) 2026

Frequency: Bimonthly



International Community Engagement for Ethical and Critical Artificial Intelligence Use: Preparing Future Teachers for Digital Transformation in Education

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| **Received:** 03.08.2026 | **Accepted:** 05.08.2026 | **Published:** 17.08.2026

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Abstract

The rapid adoption of generative artificial intelligence (AI) in education presents significant opportunities alongside ethical, pedagogical, and academic integrity challenges, particularly for future teachers. This article reports an international community engagement programme conducted through a collaboration between Universitas Negeri Jakarta, Indonesia, and Johor Business School, Universiti Tun Hussein Onn Malaysia. The programme aimed to strengthen participants' AI literacy by promoting ethical AI use, critical thinking, academic integrity, and responsible pedagogical practices. A participatory approach was employed through educational outreach, case-based discussions, collaborative group activities, presentation-back sessions, and structured reflection. Programme evaluation focused on participant engagement, authentic learning outputs, and facilitator observations rather than pre-test and post-test measurements. The findings indicate that participants developed a broader understanding of AI as a tool that should augment rather than replace human judgement. They demonstrated increased awareness of source verification, transparency, plagiarism prevention, privacy protection, and ethical decision-making while collaboratively producing classroom AI guidelines and instructional recommendations. The programme also fostered intercultural dialogue and reciprocal

knowledge exchange between Indonesian and Malaysian participants, reinforcing the role of international community engagement in strengthening teacher preparedness for digital transformation. The initiative highlights the importance of integrating AI literacy, ethical responsibility, and critical evaluation into teacher education through sustainable international collaboration and authentic learning experiences.

Keywords: artificial intelligence literacy; international community engagement; future teachers; academic integrity; ethical AI in education.

1. INTRODUCTION

1.1 Tridharma and International Community Engagement

Indonesian higher education positions teaching, research, and community engagement as an integrated Tridharma mandate through which academic expertise contributes to educational and societal development. Rather than operating independently, teaching generates transferable knowledge, research strengthens its intellectual foundation, and community engagement applies and contextualises that knowledge. Christwardana et al. (2022) demonstrate how Indonesian experiential programmes can integrate academic learning with community-oriented competence development. International community engagement extends this responsibility across national boundaries by facilitating knowledge exchange, intercultural dialogue, and institutional cooperation. Gregory et al. (2021) argue that such engagement should replace unilateral knowledge delivery with reciprocal learning and equitable partnership. Chan et al. (2021) associate international service-learning with intercultural effectiveness and global citizenship. Sors et al. (2023) further emphasise shared ownership within sustainable university–community partnerships. Visser et al. (2026) show that reciprocal engagement requires iterative learning, flexible outputs, and knowledge accumulation. Accordingly, Indonesia–Malaysia engagement should be understood as collaborative capacity development rather than one-directional academic outreach.

1.2 Artificial Intelligence and Educational Transformation

Generative artificial intelligence is transforming education by enabling conversational tutoring, rapid content production, automated feedback, translation, lesson preparation, and adaptive learning support. Kasneci et al. (2023) explain that large language models can provide personalised explanations and learning assistance, although their pedagogical value depends on careful instructional design. Lo (2023) identifies potential improvements in teaching efficiency, student support, and access to educational resources. Tlili et al. (2023) similarly show that conversational AI can support interactive and individualised learning while changing conventional relationships between learners, educators, and educational content. Grassini (2023) argues that generative AI may enhance creativity and productivity when learners remain actively involved in evaluating and refining outputs. Chiu et al. (2023) nevertheless maintain that successful adoption requires attention to technological, pedagogical, social, and ethical conditions. Within Indonesia and Malaysia, these capabilities may widen access to multilingual resources and reduce routine academic workloads. However, educational transformation should preserve human agency, contextual judgement, inclusive access, and meaningful teacher–learner interaction (Sihotang, Suhud, & Wibowo, 2025).

1.3 Educational Risks of Artificial Intelligence

The educational benefits of generative AI are accompanied by risks involving academic integrity, cognitive dependence, and unreliable knowledge production. Cotton et al. (2024) observe that easily generated assignments complicate conventional definitions and detection of plagiarism. Perkins (2023) adds that undisclosed AI assistance can blur authorship and permit forms of ghostwriting that existing institutional policies do not adequately address. Farrokhnia et al. (2024) identify fabricated information, biased responses, privacy concerns, and excessive reliance as central weaknesses of ChatGPT-supported learning. Bittle and El-Gayar (2025) further demonstrate that generative AI challenges assessment validity and requires clearer disclosure and verification practices. When learners accept fluent answers without checking evidence, analytical effort and intellectual independence may decline. Lee et al. (2025) associate greater confidence in generative AI with reduced critical engagement in some knowledge-work contexts. These risks are relevant internationally and within Southeast Asian education, where uneven AI literacy may amplify misinformation and inequity. Educational use must therefore require source verification, transparent acknowledgement, original reasoning, and critical comparison with credible scholarship.

1.4 Partner's Problems and Needs

Observations during programme preparation and interviews with representatives of Johor Business School, Universiti Tun Hussein Onn Malaysia, indicated a need to strengthen AI literacy, ethical judgement, academic integrity, and AI-supported pedagogical competence among future teachers and the wider academic community. The concern extended beyond operational knowledge because participants needed to understand how AI systems produce outputs, where inaccuracies and biases may arise, and when their use should be disclosed. Sperling et al. (2024) confirm that teacher education has not yet developed a sufficiently coherent approach to AI literacy. Karataş et al. (2024) similarly report that prospective teachers require preparation concerning accuracy, privacy, ethics, and responsible classroom integration. Kohnke et al. (2025) identify pedagogical guidance and practical experience as important foundations for future educators. Tagare et al. (2025) position fairness, transparency, privacy, accountability, and human oversight as essential teacher competencies. Zou et al. (2025) further emphasise the integration of technological understanding, pedagogical design, and ethical responsibility (Sihotang, 2027). These needs justified a contextualised international engagement programme.

1.5 Programme Objectives

The international community-engagement programme aimed to prepare future teachers and members of the academic community at Johor Business School to use and teach artificial intelligence

ethically, critically, creatively, transparently, and responsibly. The programme was designed to develop the capacity to formulate purposeful prompts, evaluate AI-generated content, verify sources, acknowledge technological assistance, protect personal information, and design learning activities that preserve human reasoning. Ng et al. (2021) conceptualise AI literacy as involving knowledge, application, evaluation, and ethical understanding rather than operational proficiency alone. Celik (2023) demonstrates that teachers require professional knowledge to connect AI capabilities with pedagogical decisions. Chan (2023) proposes an educational AI policy framework encompassing pedagogical, governance, and operational responsibilities. Laupichler et al. (2022) likewise identify critical evaluation and ethical awareness as important components of AI literacy in higher education. Molenaar (2022) argues that human–AI collaboration should augment rather than replace human intelligence. Consequently, the programme prioritised reflective judgement, academic integrity, creativity, disclosure, and teacher responsibility in AI-supported education (Sihotang, Suhud, Handaru, & Lestari, 2027).

2. PROGRAMME METHOD

2.1 Programme Design

The initiative was designed as an international community-engagement programme integrating participatory educational outreach, case-based discussion, collaborative material development, presentation-back activities, and structured reflection. Rather than treating attendees as passive recipients, the programme positioned them as contributors who interpreted educational problems, exchanged experiences, and developed contextually relevant responses. Pischetola et al. (2023) indicate that activity-oriented programme design can strengthen trust, professional dialogue, and collaborative knowledge construction. Zhang et al. (2023) demonstrate that case-based learning supports analysis, problem-solving, evaluation, and higher-order thinking. Sartania et al. (2022) similarly associate collaborative case discussion with greater participation and confidence. Collaborative material development enabled Indonesian facilitators and Malaysian participants to translate responsible artificial intelligence principles into practical educational guidance (Pertwi et al., 2026). Quinlan (2024) maintains that authentic activities become more meaningful when connected with participants' professional identities and future responsibilities. Schürmann et al. (2025) further establish that regular collective reflection can deepen awareness of group processes, individual contributions, and shared learning outcomes.

2.2 Institutional Partnership and Setting

The programme resulted from an institutional partnership between Universitas Negeri Jakarta and Johor Business School, Universiti Tun Hussein Onn Malaysia, under the UNJ Mobility Visit programme. It was conducted at the Al-Jazari Auditorium, UTHM, on 22 June 2026. This cross-border initiative extended the Indonesian Tridharma commitment by transferring academic expertise through reciprocal engagement with a Malaysian partner. Hackett et al. (2023) demonstrate that structured international collaboration can develop intercultural competence through purposeful interaction and shared learning. Sjøen (2023) argues that international teacher education should move beyond institutional competition towards intercultural and professional capability development. Sierra-Huedo and Foucart (2022) associate

short international mobility with communication, teamwork, adaptability, and intercultural learning. Patelarou et al. (2023) likewise identify cultural awareness, flexibility, language competence, and tolerance as essential mobility competencies. Bartel-Radic and Cucchi (2025) emphasise that meaningful intercultural development requires active engagement with unfamiliar perspectives. The auditorium setting supported direct interaction, collaborative discussion, group presentations, and reciprocal Indonesia–Malaysia knowledge exchange (Merina, Suhud, Sihotang, Hidayah, et al., 2026).

2.3 Participants and Facilitators

Participants included future teachers, university students, and academic community members interested in the educational implications of artificial intelligence. Their varied disciplinary and educational backgrounds supported discussion of AI from pedagogical, ethical, institutional, and learner-centred perspectives. Ayanwale et al. (2024) explain that prospective teachers require interconnected competencies involving AI knowledge, ethical awareness, critical evaluation, and problem-solving. Hur (2025) finds that structured AI-literacy education can strengthen future teachers' awareness and confidence while revealing persistent concerns about classroom consequences. Younis and Elbanna (2024) similarly demonstrate the importance of professional development programmes specifically designed for prospective teachers. Han et al. (2025) indicate that teacher preparation must address gaps between general AI awareness and practical AI-supported teaching competence. Al-Abdullatif and Alsubaie (2025) further underline the importance of evaluation, ethical judgement, and responsible application. The Indonesian implementation team consequently assumed responsibility for institutional coordination, programme preparation, material delivery, case facilitation, group assistance, presentation feedback, activity documentation, and collective reflection.

2.4 Programme Materials

The materials covered six interconnected topics: educational dependence on AI, ethical AI use, plagiarism prevention, preservation of thinking skills, strategies for future teachers, and responsible AI-supported learning. Educational dependence was introduced to distinguish constructive technological assistance from the uncritical replacement of human reasoning. O'Dea and O'Dea (2024) warn that generative AI presents pedagogical, privacy, copyright, equity, and governance challenges. Gonsalves (2025) shows that disclosure requirements require clear institutional expectations and appropriate assessment design. Ayanwale et al. (2024) identify ethical awareness and critical evaluation as fundamental elements of prospective teachers' AI literacy. Kim et al. (2022) recommend authentic problem-solving, creative activities, and process-oriented assessment when designing human–AI collaboration. Hur (2025) further records prospective teachers' concerns about cognitive dependence, unreliable information, and diminished critical engagement. The materials therefore addressed source verification, transparent acknowledgement, learner privacy, original explanation, and accountable decision-making. AI was presented as a pedagogical resource controlled by human judgement rather than a substitute for intellectual effort or professional teaching responsibility.

2.5 Implementation Stages

Implementation followed seven consecutive stages. Preparation covered institutional coordination, participant identification,

material development, classroom-case selection, division of responsibilities, and logistical arrangements. Pischetola et al. (2023) emphasise that collaborative programmes require alignment among objectives, learning activities, participant roles, and educational environments. The opening and problem-orientation stage introduced dependence on generative AI and connected the issue with participants' educational experiences. Educational outreach then examined ethical use, academic integrity, thinking skills, and future teachers' responsibilities. Group discussion enabled participants to analyse classroom cases, consistent with Koehler et al. (2022), who associate case-based dialogue with collaborative problem interpretation. Presentation development converted group conclusions into practical AI-use guidance. Toogood et al. (2025) show that carefully facilitated case activities encourage engagement with complex educational problems. Presentation-back provided opportunities to explain proposals and receive feedback. Iraola et al. (2024) associate professional dialogue with the reconsideration of established assumptions, while Schürmann et al. (2025) demonstrate that structured reflection strengthens awareness of collaborative learning. Collective reflection concluded the programme.

2.6 Evaluation Approach

The programme did not employ pre-tests or post-tests because evaluation focused on demonstrated reasoning, participant engagement, and authentic programme outputs. Learning developments were examined through observations, group presentations, classroom-case responses, proposed guidelines for AI use, reflective discussion, and facilitator feedback. Vlachopoulos and Makri (2024) explain that authentic evaluation enables participants to apply knowledge through realistic and contextually meaningful tasks. Ajjawi et al. (2024) emphasise that authenticity depends on the relationship between assessment activities, learners' identities, and relevant professional practices. Hu et al. (2025) similarly show that digitally supported authentic assessment can reveal applied knowledge and professional capability. Schellekens et al. (2023) argue that evaluation should stimulate learning and improvement rather than merely generate numerical classifications. Zhan et al. (2025) further recommend incorporating realistic problems, participant agency, feedback, and reflection into authentic assessment design. Presentations and proposed guidelines were therefore considered in relation to conceptual clarity, ethical awareness, feasibility, source verification, and learner autonomy. Conclusions were restricted to developments observable during the programme.

3. PROGRAMME IMPLEMENTATION AND RESULTS

3.1 Delivery of the International Programme

The international programme was delivered through an orderly sequence comprising institutional opening, problem orientation, educational outreach, case-based group work, presentation development, feedback, and collective reflection. The atmosphere remained participatory, with Indonesian facilitators and Malaysian participants exchanging perspectives on artificial intelligence in teaching and learning. Fernández-César et al. (2024) explain that cross-border educational collaboration creates meaningful opportunities for intercultural knowledge construction. Wimpenny et al. (2024) similarly associate international collaborative learning with global citizenship and engagement across cultural boundaries. Participants attended the principal sessions and contributed to

discussions, group activities, and presentations. The Malaysian partner facilitated the venue, participant coordination, and local academic interaction, while the Indonesian team delivered materials, guided cases, and provided feedback. Sieglóvá et al. (2026) show that cross-border cooperation can connect cultural diversity with socially responsible solution development. Yusuf et al. (2024) emphasise that cultural context influences attitudes towards generative AI. Rahiem (2026) further identifies responsible institutional adaptation as an important concern in Indonesian higher education.

3.2 Participant Engagement

Participant engagement was reflected in questions, case discussions, comparisons of Indonesian and Malaysian educational experiences, solution development, and group presentations. Participants raised questions about acceptable AI assistance, verification of generated information, learner dependence, and teachers' continuing authority. Li et al. (2025) establish that collaborative learning can increase behavioural, cognitive, emotional, and social engagement. Kővári et al. (2025) similarly demonstrate that AI-supported collaboration becomes educationally meaningful when technological assistance is accompanied by purposeful interaction. During the case exercises, participants considered situations involving AI-generated assignments and jointly formulated appropriate responses. Hu et al. (2025) show that cognitive, metacognitive, and social scaffolding can strengthen collaborative participation. Pahi et al. (2024) indicate that combining human facilitation with AI-supported feedback can promote active learning. The development and presentation of group solutions also required participants to explain and defend their reasoning. Sevnarayan (2024) associates collaborative inquiry with stronger cognitive, social, and teaching presence. These activities demonstrated engagement without implying statistically measured learning improvement.

3.3 Development of AI Literacy and Ethical Awareness

Participants demonstrated developing AI literacy by distinguishing technical proficiency from critical, pedagogical, and ethical competence. Their responses positioned AI as an aid for exploring ideas, preparing examples, improving explanations, and supporting lesson planning, but not as a replacement for teachers or independent reasoning (Wibowo et al., 2026). Alfredo et al. (2024) argue that educational AI should remain human-centred and preserve meaningful human control. Dilek et al. (2025) likewise show that critical co-discovery can help educators examine AI capabilities, limitations, and social implications. Human judgement was evident when participants recommended checking accuracy, recognising bias, protecting privacy, and revising generated material. Sari et al. (2025) identify awareness, application, evaluation, and ethics as complementary elements of AI literacy among Indonesian university students. Huynh et al. (2025) emphasise the importance of a responsible and human-centred mindset among teachers. Liu et al. (2025) further associate collaborative professional learning with stronger critical engagement in AI-supported material development. Collectively, these responses showed an understanding that teachers retain pedagogical responsibility and accountability.

3.4 Plagiarism Prevention and Academic Integrity

The groups proposed classroom rules requiring learners to acknowledge AI assistance, verify sources, preserve evidence of their working process, and explain submitted content in their own

words. These proposals treated plagiarism prevention as an educational responsibility rather than a matter of technological detection alone. Luo et al. (2024) show that higher-education policies increasingly require transparent guidance defining permitted, restricted, and prohibited generative-AI practices. Dai et al. (2025) similarly identify disclosure, ethical training, curriculum integration, and institutional accountability as important elements of Asian university policies. Participants also recommended authentic assignments connected with personal experience, classroom observation, oral explanation, and contextual problem-solving. Kofinas et al. (2025) warn that authenticity alone cannot guarantee integrity unless assessment processes make learners' reasoning visible. Elkhatat et al. (2023) demonstrate that AI-content detectors remain insufficiently reliable for high-stakes judgements. Scarfe et al. (2024) further reveal the difficulty of identifying AI-generated examination answers through ordinary marking. Consequently, the proposed rules prioritised transparent authorship, source checking, process documentation, and learners' capacity to defend their conclusions.

3.5 Critical and Creative Thinking

Critical and creative thinking activities followed the sequence of asking, understanding, analysing, creating, and evaluating. Participants initially formulated questions about a classroom problem and clarified what educational, ethical, and academic-integrity issues were involved. They subsequently analysed possible consequences, compared alternative responses, developed practical guidance, and evaluated whether each solution preserved learner agency. Gonsalves (2024) argues that generative AI requires a reconsideration of Bloom's taxonomy because technological assistance can influence activities at every cognitive level. Larson and Moser (2024) emphasise that critical thinking remains indispensable when AI produces fluent but potentially inaccurate arguments. Lee (2024) recommends using generative AI to challenge learners' reasoning and strengthen human interaction rather than merely accelerate answer production. Fan et al. (2025) warn that poorly structured AI use may encourage metacognitive laziness. Conversely, Rana et al. (2025) demonstrate that carefully designed AI-supported design thinking can enhance creativity, critical analysis, and ethical reasoning. The programme therefore required participants to interrogate, transform, and justify ideas instead of reproducing generated outputs.

3.6 Programme Outputs

The programme generated educational materials, five-to-seven-slide group presentations, proposed classroom AI guidelines, AI-assisted learning activities, facilitator feedback records, activity documentation, and a draft publication. The presentations condensed each group's problem analysis, ethical considerations, proposed solutions, and implementation recommendations. Belkina et al. (2025) show that effective generative-AI integration depends on explicit pedagogical design rather than unrestricted technological adoption. Br  nner et al. (2025) demonstrate that interactive professional-development workshops can produce practical AI-literacy resources while encouraging pedagogical reflection. The classroom guidelines addressed disclosure, verification, privacy, authorship, responsible prompting, and preservation of independent reasoning. Barus et al. (2025) report that Indonesian university students support clear governance, ethics education, curriculum integration, and proportionate responses to misuse. Song et al. (2024) emphasise that AI-supported learning materials should also accommodate diverse learner needs. Ali et al.

(2024) further recommend organisational strategies addressing ethics, access, reliability, and educator preparedness. Together, the outputs provide adaptable resources for subsequent teaching, institutional discussion, community engagement, and scholarly dissemination (Cholifah et al., 2026).

4. DISCUSSION

4.1 Participatory Outreach and Authentic Learning

The programme indicates that participatory outreach can transform educational material from abstract information into knowledge applicable to professional practice. Presentation-back required participants to reorganise ideas, justify proposed solutions, and respond to questions, thereby making their reasoning visible. Guo et al. (2021) found that project-based activities promote cognitive, behavioural, and emotional learning when participants create meaningful outputs. Case analysis likewise situated ethical AI principles within realistic educational dilemmas rather than presenting them as decontextualised rules. Yew and Goh (2021) explain that problem-based learning facilitates knowledge construction through contextual inquiry and reflection. Collaborative problem-solving enabled participants to compare interpretations and negotiate workable responses across different educational experiences. Hadwin et al. (2022) associate socially shared regulation with collective planning, monitoring, and evaluation. Indonesian evidence reported by Suryanti et al. (2021) further demonstrates the contribution of collaborative problem-based learning to solution construction. Authenticity was strengthened because the resulting guidelines addressed responsibilities that participants could encounter as future teachers, consistent with the professional relevance principles discussed by Ashford-Rowe et al. (2021).

4.2 Future Teachers' AI Competence

The findings suggest that future teachers' AI competence should combine operational knowledge with pedagogical judgement, critical evaluation, ethical responsibility, and human-centred values. Ng et al. (2021) conceptualise AI literacy as the capacity to understand, use, evaluate, and ethically engage with artificial intelligence. This broader understanding was reflected when participants considered verification, bias, privacy, learner autonomy, and the limitations of generated content. Mishra et al. (2023) argue that generative AI requires renewed technological pedagogical content knowledge because effective application depends on disciplinary and instructional context. Critical thinking remains essential because plausible AI outputs may contain inaccuracies or unsupported claims, as Farrokhnia et al. (2024) emphasise. Academic integrity therefore requires assessment redesign, transparent acknowledgement, and evidence of learners' reasoning rather than dependence on detection technologies. Cotton et al. (2024) similarly advocate institutionally coherent guidance and authentic assessment. For Indonesian teacher education, AI competence must remain connected with equitable access, local curricula, linguistic diversity, and professional ethics (Sihotang, 2026). Chiu et al. (2023) accordingly position teacher capability and human agency as central conditions for educationally responsible AI adoption.

4.3 International Knowledge Exchange

Interaction between Indonesian and Malaysian institutions supported international knowledge exchange through dialogue, comparison, and contextual interpretation. Participants did not

merely receive externally formulated AI principles; they considered how these principles related to educational practices, institutional expectations, and cultural values within Southeast Asia. Vahed and Rodriguez (2021) demonstrate that structured international collaboration can develop intercultural competence through meaningful disciplinary engagement. Leask and Green (2021) argue that internationalisation becomes educationally significant when global perspectives are embedded within purposeful learning activities. The programme's case discussions allowed similarities and differences in Indonesian and Malaysian experiences to become resources for joint learning. O'Dowd (2021) explains that well-designed virtual and international exchange can encourage perspective-taking, intercultural dialogue, and critical reflection. Huertas-Abril et al. (2024) similarly associate collaborative international learning with linguistic, digital, and intercultural development. However, principles concerning AI ethics, integrity, and teacher responsibility required contextual adaptation rather than direct transfer. Mittelmeier et al. (2021) emphasise that international learning should recognise cultural differences within educational participation. The partnership consequently strengthened regional collaboration while preserving institutional and national relevance.

4.4 Tridharma Integration

The programme demonstrates Tridharma integration by connecting university teaching expertise, international community engagement, reflective evaluation, and prospective research development. Knowledge developed through teaching and academic practice was translated into accessible materials, classroom cases, collaborative activities, and AI-use guidelines for future educators. Tijsma et al. (2023) explain that institutionalised community-engaged learning requires alignment among curricula, partnerships, organisational support, and reciprocal benefits (Merina, Suhud, Sihotang, Abdillah, et al., 2026). Community engagement also created opportunities for lecturers to reconsider whether established teaching materials adequately addressed participants' practical and cultural circumstances. Kelly et al. (2024) propose that engagement impact emerges through relationships connecting institutional conditions, individual capabilities, and collaborative processes. Programme observations and participant reflections can therefore identify curriculum gaps involving AI literacy, integrity, assessment, and teacher preparation. Olcoñ et al. (2023) describe community-engaged teaching as a reciprocal process that can transform academic practice as well as community learning. Plummer et al. (2022) further emphasise systematic reflection when evaluating university–community partnerships. In Indonesia, this cyclical relationship accords with Tridharma by allowing education, engagement, and research to generate mutually reinforcing academic and social value, as Mbah et al. (2022) recommend.

4.5 Programme Sustainability

Programme sustainability requires the initial workshop to develop into an institutional learning relationship rather than remain a single international event. Follow-up workshops could examine specific applications, including assessment design, inclusive AI-supported learning, source verification, and curriculum integration (Sihotang, Suhud, Handaru, Futuwah, et al., 2027). Philipsen et al. (2023) indicate that sustained professional development benefits from continuing support, institutional commitment, collaboration, and opportunities for practice. Virtual mentoring could maintain communication between Indonesian facilitators and Malaysian

future teachers while reducing geographical and financial barriers. Mullen and Klimaitis (2021) describe mentoring as a developmental relationship strengthened by reciprocity, reflection, and shared professional learning. Collaborative lesson design and common resource repositories could convert broad ethical principles into adaptable classroom practices. Tondeur et al. (2021) emphasise modelling, authentic experience, reflection, and cooperation in developing teachers' digital competence. Joint publications and teacher exchanges could broaden the partnership's scholarly and intercultural value, while shared AI guidelines could establish consistent expectations for privacy, integrity, transparency, and human oversight. Tijsma et al. (2023) stress that sustained engagement depends on curricular and organisational embedding. Kelly et al. (2024) similarly highlight leadership, resources, relationships, and impact evaluation as necessary institutional conditions.

5. CONCLUSION, IMPLICATIONS, AND RECOMMENDATIONS

5.1 Conclusion

The programme aimed to strengthen future teachers' capacity to use artificial intelligence ethically, critically, and pedagogically through international community engagement involving Indonesian and Malaysian institutions. Its implementation combined educational presentations, classroom-case analysis, collaborative problem-solving, group presentations, and reflection. Participants actively questioned AI-generated information, compared national educational experiences, formulated solutions, and communicated practical recommendations. These activities correspond with Celik's (2023) view that teachers require pedagogical knowledge for interpreting and managing AI-supported learning. Kasneci et al. (2023) emphasise that educational benefits depend on critical evaluation and human supervision. Participants' guidelines prioritised source verification, acknowledgement of AI assistance, authentic authorship, learner autonomy, and teacher accountability. Tlili et al. (2023) similarly position human judgement as essential when generative AI enters education. The practical outputs included educational materials, presentation slides, classroom guidelines, documented feedback, and a publication draft. Chan (2023) supports institutionally coordinated responses to generative AI, while Moorhouse et al. (2023) underline the importance of teacher-guided, context-sensitive implementation.

5.2 Practical Implications

The programme provides practical value for future teachers by demonstrating how AI can support lesson preparation, idea exploration, differentiated explanation, and learning-material development without replacing professional judgement. For teacher-education institutions, these outcomes indicate that AI competence should be developed through classroom cases and authentic pedagogical problems. Celik et al. (2022) show that teachers' interaction with AI requires professional knowledge extending beyond technical operation. Chounta et al. (2022) similarly emphasise that educators need sufficient understanding to evaluate AI's pedagogical relevance. Lecturers can apply the programme materials when designing assignments that require source checking, reflective explanation, and transparent disclosure. Community-engagement organisers may adapt the participatory format for different educational and cultural contexts. International partners can use collaborative workshops to compare policies and

develop locally appropriate practices. Salas-Pilco et al. (2022) highlight the importance of contextual conditions in technology-supported teacher development. Trust et al. (2023) identify educators' critical agency as necessary when using generative tools, while Strzelecki (2024) confirms that adoption decisions reflect both technological and educational considerations.

5.3 Institutional Implications

Teacher-education institutions should integrate AI ethics, academic integrity, critical thinking, source verification, and human-centred pedagogy across curricula rather than confining them to standalone technology courses. Akgun and Greenhow (2022) identify privacy, bias, autonomy, accountability, and equity as central ethical concerns in educational AI. Nguyen et al. (2023) similarly establish transparency, fairness, responsibility, privacy, and human agency as internationally recognised principles. These concerns should be embedded within educational assessment, teaching methodology, professional ethics, and curriculum-development subjects. Borenstein and Howard (2021) argue that ethics education is necessary before AI systems become normalised in professional decision-making. Academic-integrity provisions should require disclosure of AI assistance, verification of citations, and evidence of intellectual contribution. Perkins (2023) recommends a graduated institutional approach that differentiates acceptable assistance from inappropriate substitution. Critical-thinking activities should require future teachers to challenge generated claims, examine bias, and justify instructional decisions. Aler Tubella et al. (2024) further demonstrate that responsible AI education requires interdisciplinary competence, practical ethical deliberation, and accessible institutional guidance rather than reliance on abstract principles.

5.4 Limitations

Several limitations restrict the interpretation of the programme outcomes. First, the short duration provided only a bounded view of participant engagement and did not establish whether the observed learning developments persisted in later teaching practice. Ventista and Brown (2023) indicate that professional learning should be examined through its subsequent translation into classroom activity. Second, implementation within one specific Indonesia–Malaysia institutional partnership limits transferability to other universities, school systems, and cultural environments. Richter et al. (2024) emphasise that professional-development quality depends partly on programme and contextual characteristics. Third, the absence of pre-test and post-test measurement prevents quantitative claims regarding improvement in AI literacy, ethical awareness, or critical thinking. Morina et al. (2025) demonstrate the value of pre–post designs when estimating professional-development outcomes. Evaluation instead relied on observed engagement and authentic participant outputs, which remain susceptible to interpretative judgement. Van Vijfeijken et al. (2024) recommend linking programme activities with an explicit theory of change. Amemasor et al. (2025) additionally call for longitudinal evaluation of sustained instructional integration.

5.5 Recommendations

Future implementation should extend beyond a single workshop through continuing mentoring, classroom-practice observation, follow-up interviews, reflective journals, and collaborative teaching projects. Arnsby et al. (2025) show that mentor education can support continuing professional learning beyond the formal programme. Classroom observation would reveal whether ethical

principles influence actual lesson planning, assessment, and interaction with learners. Siyam and Abdallah (2025) recommend connecting technology-focused professional development with evidence of classroom application. Follow-up interviews could clarify contextual barriers, institutional support, and changes in professional judgement, while reflective journals could document developing awareness of AI-generated inaccuracies, bias, and learner dependence. Chaseley et al. (2025) demonstrate the value of structured prompts for strengthening reflection among prospective teachers. Collaborative Indonesia–Malaysia lesson-design projects should produce adaptable teaching materials and comparative educational insights. Glover et al. (2024) associate effective mentoring with relational support and professionally relevant learning. Finally, broader partnerships should include virtual mentoring, teacher exchanges, joint publications, shared resources, and periodically reviewed institutional guidelines. Amemasor et al. (2025) emphasise sustained, context-specific professional development supported by collaboration and institutional commitment.

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