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Integrating Sustainable Development Goals Into Teacher Education Curriculum to Strengthen Future Teachers' Sustainability Awareness

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Abstract

The study examines the integration of Education for Sustainable Development (ESD) into the Professional Teacher Education Program (PPG) curriculum to enhance prospective educators' sustainability awareness and their contribution to the Sustainable Development Goals (SDGs). Grounded in the transformative learning theory and informed by best practices from the University of Kitakyushu, the study employed a mixed methods design combining survey data (n=257) with focus group discussions (n=20). The study explored effective ESD practices, curriculum integration strategies, and implementation challenges among teacher education stakeholders. Findings reveal high awareness of SDGs (81.3%) and ESD (74.3%), though the depth of understanding varies. Strong support for ESD integration was evident, with participants highlighting alignment between global sustainability challenges and national priorities. The statistical analysis confirmed

that PPG participation significantly influenced sustainability awareness ($p < 0.01$). The proposed three-dimensional integration framework offers actionable, evidence-based strategies for curriculum developers and institutional leaders to prepare future teachers as sustainability change agents.

Keywords: Curriculum integration introduction, Education for Sustainable Development (ESD), Professional Teacher Education Program (PPG), Sustainable Development Goals (SDGs), teacher education.

Introduction

Education is increasingly essential as a mechanism to promote sustainable development, particularly in addressing global issues such as climate change, inequality, and economic growth. The Sustainable Development Goals (SDGs) emphasize this role, with SDG 4.7 stating that students should acquire the knowledge, skills, and attitudes necessary to promote sustainable development (United Nations Educational, Scientific and Cultural Organization [UNESCO], 2020; United Nations, 2015). Education for Sustainable Development (ESD) has emerged as a transformative paradigm that goes beyond simple knowledge acquisition, promoting competencies such as systems thinking, critical reflection, and anticipatory skills essential for responsible action in complex situations (Araneo et al., 2024; Martín-Sánchez et al., 2022; Olsson et al., 2022; Soto-Solier et al., 2023).

Despite growing global awareness, ESD implementation remains inconsistent. While pre-service teachers demonstrate significant awareness of sustainability, this understanding does not consistently influence their teaching practices (Bilbokaitė et al., 2024; Corres et al., 2024; Fischer et al., 2022; Koehler et al., 2023;). Teacher education frameworks such as TPACK tend to prioritize digital integration while neglecting sustainable perspectives (Pal, 2023; Sinakou et al., 2024), creating an ongoing disparity between policy goals and classroom implementation (Dumitrescu et al., 2022; Holst et al., 2024; Sever et al., 2025).

Recent developments highlight growing ESD integration in higher education. Incorporating ESD into curricula enhances pro-environmental attitudes, civic responsibility, and collaborative problem-solving (Beasy, 2024; Felix & Clayton, 2025; Ghamrawi et al., 2025). Higher education institutions are increasingly recognized as sustainability catalysts through both formal curricula and institutional culture (Drewes, 2025; Robertson, 2025; Tafese, 2025). In teacher education, a shift from fragmented, supplementary approaches toward holistic, interdisciplinary, and practice-oriented integration is evident (Sulla et al., 2024; Gesthuizen et al., 2025), with service learning, transdisciplinary projects, and institutional reforms showing positive outcomes (Boulhrir & Ait Bouch, 2025; Casanova et al., 2023; Hung & Pan, 2025; Martín-Crespo et al., 2025; Pagano et al., 2025;). However, many studies rely on self-reported outcomes, limiting generalizability across longitudinal and comparative analyses (Garrett, 2025; Leal Filho et al., 2025; Torres-Hernández & Sánchez-Gómez, 2024;).

Teachers' professional identity and leadership also remain critical. Environmental

identity, autonomy, and sense of duty are key factors influencing readiness to incorporate sustainability into practice (Imran et al., 2024; Trenaman & Loh, 2024; Triyandana et al., 2024). Case studies from Qatar and Japan demonstrate the potential of teacher leadership and institutional commitment to align curricula with UNESCO's ESD for 2030 Roadmap (Leal Filho, Azeiteiro & Ávila, 2025; Torres-Hernández & Sánchez-Gómez, 2024), while global monitoring reveals persistent discrepancies across ESD policies, curricula, and teacher training (Sever et al., 2025; Sulla et al., 2024).

This study examines the systematic integration of ESD into Indonesia's Professional Teacher Education Program (PPG) across three dimensions: curricular integration (embedding sustainability into course content), pedagogical integration (learner-centered approaches including project-based learning and reflective practice), and institutional integration (policies and organizational culture supporting sustainability values). Comparative observations from the University of Kitakyushu, Japan – a UNESCO-designated ESD Model City – provide international benchmarks for transferable best practices, enriching local reform efforts.

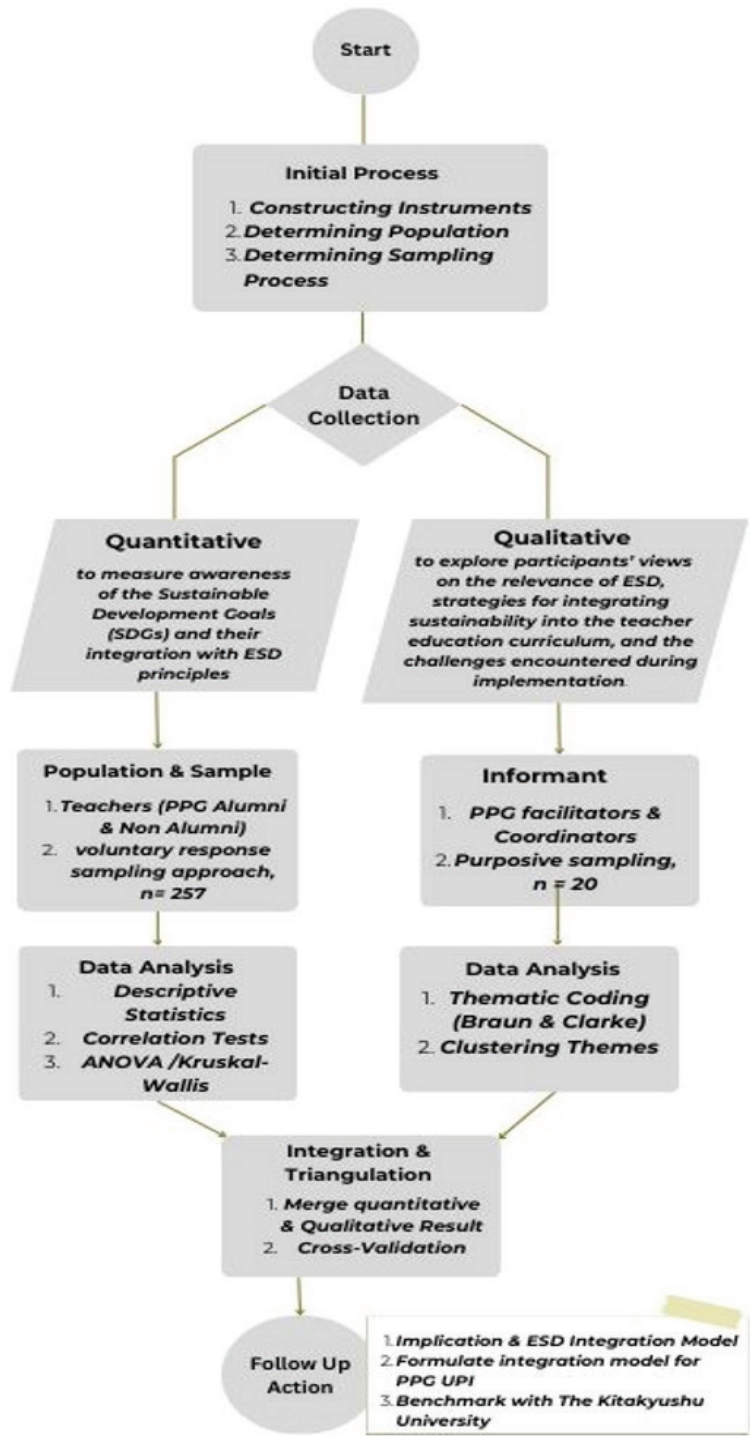
This study addresses three research questions: (1) What best practices in ESD-based curriculum and learning at the University of Kitakyushu can inform professional teacher education? (2) How can ESD principles be effectively incorporated into the PPG curriculum at curricular, pedagogical, and institutional levels? (3) What challenges and enablers affect the implementation of ESD in professional teacher education?

Research Method

The research utilized a mixed-methods approach, combining quantitative survey analysis with qualitative focus group discussions (FGDs). A mixed-methods approach was selected to encompass both the extent of participants' awareness of ESD and the depth of their views on integrating ESD into the PPG curriculum. Mixed-methods research is acknowledged for its capacity to offer a more thorough understanding of intricate educational phenomena through the integration of statistical evidence and interpretive insights (Creswell & Plano Clark, 2017; Dawadi et al., 2021).

A flow diagram illustrates the methodological framework of the research (Figure 1). The diagram illustrates the sequential phases of the mixed-methods design, beginning with the preparation of instruments and sampling strategies, and subsequently involving the parallel collection of quantitative survey data and qualitative insights through focused group discussions. Data strands were analyzed using suitable techniques: descriptive and inferential statistics for the quantitative aspect and thematic coding for the qualitative aspect. The integration and triangulation stage facilitated cross-validation of results, subsequently guiding the development of an ESD integration model for the PPG curriculum, which was enhanced through benchmarking against international best practices from the University of Kitakyushu.

Figure 1
Research Flow Diagram



Participants

The study participants were selected from stakeholders directly involved in the PPG at Universitas Pendidikan Indonesia (UPI). This group comprised current PPG students enrolled in the program. These alumni completed it, practicing teachers collaborating with the PPG, and subject coordinators and facilitators overseeing academic and practical components. A total of 257 respondents were recruited to complete a structured online questionnaire, ensuring a comprehensive range of perspectives. The recruitment process used a voluntary response sampling method, distributing the survey link created in Google Forms widely through WhatsApp groups and official institutional emails. The survey was available for one week, enabling participants to submit their responses at their convenience. This approach promoted inclusivity and represented the varied perspectives of stakeholders from diverse roles and experiences within the program.

Purposive sampling was utilized in the qualitative strand to select participants whose insights were essential for examining the program's deeper dimensions. A total of 20 individuals were invited, comprising information technology (IT) support staff essential for the program's infrastructure and facilitators who directly guided the learning process. Furthermore, 70% of subject coordinators consented to participate, providing an academic leadership perspective pertinent to the research objectives. Participants convened for an in-person focused group discussion on 13 August 2025. The FGD format facilitated dynamic exchanges, allowing participants to express nuanced experiences, identify program strengths, and articulate implementation challenges that questionnaires could not easily capture. The diverse composition of respondents offered both breadth and depth, ensuring that the data captured the complexity of PPG implementation at UPI and facilitated a comprehensive understanding of the integration of ESD into the curriculum.

Instruments and Data Collection

This study employed a mixed-methods approach combining quantitative and qualitative instruments to comprehensively examine perceptions and implementation of ESD within the Professional Teacher Education Program.

The quantitative strand utilized a structured survey questionnaire assessing awareness of the SDGs and their integration with ESD principles. Items were classified into two dimensions: social sustainability and economic sustainability. Prior to deployment, reliability testing confirmed strong internal consistency, with Cronbach's alpha values of 0.902 and 0.776, respectively, both exceeding the accepted threshold of 0.70, indicating the instrument was reliable and valid for evaluating participants' awareness and understanding.

The qualitative strand comprised focus group discussions conducted in a semi-structured format, designed to elicit deeper contextual insights into participants' experiences and perspectives. The FGDs explored the relevance of ESD, strategies for integrating sustainability into the teacher education curriculum, and challenges encountered during implementation. This format allowed participants to express their views openly, identify theory–practice gaps, and critically assess current PPG delivery. Each FGD session lasted approximately 90 minutes and was audio-recorded

with participants' consent. A trained moderator facilitated each session using a semi-structured guide comprising open-ended questions aligned with the study's research objectives. The recordings were subsequently transcribed verbatim and returned to selected participants for member checking to ensure accuracy and credibility of the data.

The integration of quantitative rigor and qualitative depth enabled both the measurement of stakeholder awareness and the identification of contextual factors influencing the incorporation of ESD into teacher education at UPI.

Data Analysis

The quantitative dataset comprised questionnaire responses from PPG alumni and non-alumni teachers. Descriptive statistics summarized participants' demographic profiles, including teaching background, experience, and alumni status, as well as overall ESD awareness levels, enabling the comparison between groups to assess the impact of professional preparation on sustainability competencies (Dawadi et al., 2021; Oranga et al., 2025). Correlation tests examined relationships among the three sustainability dimensions: environmental, social, and economic. Inferential analyses, using ANOVA or the nonparametric Kruskal–Wallis test, where assumptions were unmet, assessed whether awareness differences between alumni and non-alumni were statistically significant, thereby strengthening interpretation of results (Fowler, 2020; Field, 2018).

The qualitative dataset was derived from FGD transcripts. Purposive sampling ensured participants had direct program experience, enabling rich contextual insights (Teddle & Yu, 2007). The FGDs complemented the survey by uncovering practices, strategies, and challenges in ESD integration that quantitative measures alone could not capture. Group discussion facilitated interactive dialogue and collective reflection, revealing shared values and identifying contextual barriers and enablers in ESD integration within teacher education (Morgan, 2019). Transcripts underwent thematic coding following Braun and Clarke's reflexive approach (Braun & Clarke, 2006), enabling identification of themes related to best practices, integration strategies, and implementation challenges.

Convergence of findings was achieved through triangulation, fundamental to the study's mixed-methods design (Creswell & Plano Clark, 2017). Triangulation ensured numerical patterns from survey data were corroborated and enriched by qualitative insights, enhancing interpretive validity and yielding a comprehensive understanding of stakeholder perceptions regarding ESD integration in the PPG curriculum.

Ethical Considerations

The research received ethical approval from UPI. All participants were fully informed of the research purpose and procedures, and provided voluntary informed consent. Participants were free to withdraw at any time without consequence. Confidentiality and anonymity were strictly maintained throughout data collection, analysis, and reporting, ensuring participants' autonomy, privacy, and dignity were respected.

Researcher Positionality: The research team comprises faculty members and graduate researchers at Universitas Pendidikan Indonesia with prior involvement in the PPG program as course coordinators and instructors. This insider familiarity provided valuable contextual understanding; however, the team remained reflexive throughout

the research process to mitigate potential bias. To this end, a structured FGD protocol was employed, an external moderator facilitated the group discussions, and member checking was conducted to validate the emerging interpretations with participants.

Respondent Profile: Participation in the PPG Program

The examination of respondents’ participation status in the Professional Teacher Education Program provides a significant contextual framework for comprehending their perceptions of ESD. A total of 257 respondents participated in the survey, as indicated in Table 1. Over half of the respondents (52.1%) indicated that they had completed the PPG program, demonstrating significant exposure to structured professional teacher education. Furthermore, 21.8% of participants were currently enrolled in the program, indicating that nearly three-quarters of the sample (73.9%) had either completed or were actively participating in the PPG.

Table 1
PPG Participation Status of Respondents

PPG Status	Frequency	Percentage (%)
Never joined	48	18.7
Completed	134	52.1
Currently enrolled	56	21.8
No response	19	7.4
Total	257	100

Conversely, 18.7% of respondents indicated that they had never engaged in PPG, while 7.4% did not disclose their participation status. The data indicate that although most respondents were aware of the program, a significant portion had not directly engaged with PPG. The diversity in participation is advantageous, offering comparative insights between individuals with and without PPG experience. This also enhances the representativeness of the sample in evaluating PPG contribution to professional competencies associated with sustainability.

Awareness of SDGs and ESD

Respondents’ awareness of sustainability concepts, particularly the Sustainable Development Goals and Education for Sustainable Development, provides essential insights into the preparedness of teacher education programs to incorporate these themes. Table 2 shows that a significant majority of respondents (81.3%) reported awareness of the SDGs, indicating substantial familiarity with this global development framework among the professional teacher community. The awareness of ESD was significant at 74.3%, albeit slightly lower.

The findings indicate a high overall awareness of sustainability-related concepts, yet significant gaps persist. Approximately 18.7% of respondents reported a lack of familiarity with the SDGs, while over 25.7% reported never having heard of ESD. The observed discrepancy between awareness of the SDGs and ESD may indicate a greater

focus on promoting and prioritizing the SDGs in Indonesia, in contrast to more specialized discussions of ESD.

Table 2
Awareness of SDGs and ESD among Respondents

Awareness	Frequency	Percentage (%)
Heard about SDGs	209	81.3
Not heard about SDGs	48	18.7
Heard about ESD	191	74.3
Not heard about ESD	66	25.7
Total	257	100

The findings have two implications. A majority of respondents possess a foundational awareness of sustainability frameworks, which facilitates the potential for more comprehensive integration of ESD into the curriculum. The existing gaps in awareness underscore the need to integrate ESD concepts more explicitly into the PPG curriculum to ensure a uniform understanding among future teacher cohorts.

Analysis of Constructs

To evaluate the robustness of the measurement instruments used in this study, comprehensive validity and reliability analyses were performed on the survey items specifically designed to capture respondents' perceptions of sustainability-related dimensions. The analyses were essential for confirming that the items accurately measured their intended constructs and yielded consistent results across respondents. The instrument was designed around essential constructs that reflected the multidimensional framework of ESD, recognizing that sustainability encompasses multiple domains. The constructs were categorized into three interconnected dimensions: social, economic, and environmental sustainability.

The social dimension emphasized equity, inclusion, and community well-being, highlighting the role of education in cultivating socially responsible citizens. The economic dimension emphasized resource management, financial literacy, and sustainable growth, underscoring the need to equip teachers to foster awareness of responsible consumption and production. The environmental dimension encompassed issues of ecological awareness, environmental stewardship, and the advocacy of sustainable practices in both individual and institutional settings. The survey structure enabled a thorough examination of participants' awareness of sustainability. Validity testing confirmed alignment with the theoretical constructs, while reliability testing verified the internal consistency of measures. Together, these elements provided methodological rigor and conceptual relevance for enhancing ESD integration in teacher education.

Reliability Analysis

Construct validity was assessed via item-level Pearson correlations (see Table 3). In

the social dimension, coefficients ranged from 0.18 to 0.82 ($p < 0.01$), while the economic dimension ranged from 0.15 to 0.81 ($p < 0.05$ or $p < 0.01$). All items correlated positively with their respective constructs, demonstrating robust internal coherence with no negative or negligible correlations.

Table 3

Reliability Analysis of ESD Dimensions

Dimension	Cronbach's alpha
Environmental	0.912
Social	0.902
Economic	0.776

Reliability was evaluated using Cronbach's alpha for each dimension. The environmental dimension yielded the highest value ($\alpha = 0.912$), followed by social ($\alpha = 0.902$) and economic ($\alpha = 0.776$), all exceeding the accepted threshold of 0.70. These results confirm strong internal consistency across all dimensions, supporting the instrument's suitability for inferential analysis, including group comparisons and inter-dimensional correlations.

Correlation Analysis

Table 4

Correlation Analysis Among ESD Dimensions

Dimension Pair	Correlation (r)	Significance (p)
Social – Environmental	0.912	$p < 0.01$
Environmental – Economic	0.902	$p < 0.01$
Social – Economic	0.776	$p < 0.01$

Note: $p < 0.01$ (2-tailed).

Pearson's correlation coefficients were calculated to analyze the interrelationships among the three dimensions (Table 4). All dimensions exhibited robust positive correlations among themselves. All dimensions exhibited robust positive correlations among themselves, indicating a strong interconnection between social, environmental, and economic sustainability awareness.

The findings indicate that the three ESD dimensions exhibit both reliability and a strong interconnection. Participants exhibiting greater awareness in one domain, such as environmental sustainability, also reported elevated awareness in social and economic sustainability. This underscores the interconnectedness of sustainability competencies,

aligning with previous studies that stress the inseparability of the environmental, social, and economic dimensions of ESD (Berglund, 2020; Berglund et al., 2022; Parry et al., 2023; Sánchez et al., 2025).

Inferential Analysis

An inferential test was conducted to assess differences in awareness of SDGs and ESD among three groups of PPG participants: (1) those who had never joined PPG, (2) those currently enrolled in PPG, and (3) those who had completed PPG. The Kruskal–Wallis test was utilized due to the ordinal distribution of awareness scores and the disparity in group sizes (see Table 5). The results indicated significant differences in awareness levels regarding both SDGs ($H(2) = 7.32, p < 0.05$) and ESD ($H(2) = 8.14, p < 0.01$). Post-hoc pairwise comparisons indicated that participants who completed PPG exhibited greater awareness than those who had never participated, with currently enrolled individuals positioned in between. The findings demonstrate a positive correlation between PPG exposure and awareness of sustainability issues, thereby affirming the significance of curriculum integration.

Table 5
Kruskal–Wallis Test Results of Awareness Levels Across Groups

Awareness Type	H (df=2)	p-value	Significance Differences Identified
SDGs	7.32	0.026	Completed > Never joined
ESD	8.14	0.017	Completed > Never joined; Completed > Ongoing

This finding is consistent with earlier studies indicating that structured teacher education interventions notably enhanced awareness and readiness to implement sustainability practices (Khazen et al., 2025; Muñoz-Losa et al., 2025; Rahmawati et al., 2022; Setiawan et al., 2023; Tang et al., 2025). This highlights the importance of professional development in integrating sustainability as a pedagogical competence, in alignment with UNESCO’s roadmap for ESD 2030 (Zguir, et al., 2021).

Thematic Analysis of Qualitative Data

Focus Group Discussion data (August 13, 2025) provided insights into participants’ perceptions of ESD integration into the PPG curriculum. Thematic analysis of transcribed discussions yielded three main themes and sub-themes (Table 6).

The findings indicate that participants perceive ESD as a comprehensive framework consistent with UNESCO’s tripartite view of sustainability, which includes environmental, social, and economic dimensions (Ovais et al., 2023). Participants linked ESD to values-based education, emphasizing its role in character development and the moral aspects of teaching. This viewpoint aligns with that of Huang et al. (2024), who emphasize the transformative capacity of ESD to influence attitudes and behaviors.

Table 6
Thematic Analysis of FGD Results

Theme	Sub-Themes	Illustrative Quotes (translated & summarized)
Holistic View of ESD	- Integration of environmental, social, and economic pillars - Sustainability as interconnected values	"ESD is not only about the environment but also about fairness, collaboration, and economics."
Values and Character Formation	- Cultivation of responsibility and care - Moral and cultural grounding	"Teachers must instill responsibility, discipline, and sustainability values as part of character education."
Pedagogical Integration Gaps	- Limited ability to embed ESD in lesson plans. - Lack of structured guidance in PPG curriculum	"We know ESD is important, but often we don't know how to design lessons that integrate it directly."

Participants recognized a pedagogical gap; although they possessed conceptual awareness of ESD, many expressed uncertainties regarding its operationalization in lesson plans and teaching practices. This finding aligns with previous research in teacher education, indicating that a high awareness of sustainability concepts does not necessarily result in their implementation in classroom practice (Jetly & Singh, 2019; Rundgren et al., 2023).

The qualitative data enhance the quantitative findings by indicating that, although participants advocate for the inclusion of ESD in the PPG curriculum, the practical ability to integrate it is inconsistent. Consequently, professional development and clear curriculum guidance are necessary to connect conceptual understanding with pedagogical practice.

Curriculum Integration Strategies Proposed

Participants proposed strategies for integrating ESD into the PPG curriculum (see Table 7). Two primary models emerged: infusion within existing courses and creation of a stand-alone ESD module.

The infusion model received greater support, with participants highlighting that sustainability ought to be integrated into pedagogy and classroom practice rather than treated as an “add-on.” This viewpoint is consistent with the findings of Barth and Rieckmann (2013) and Boulhrir and Ait Bouch (2025), who contend that the incorporation of ESD across various subjects improved transformative learning outcomes.

Some participants preferred a stand-alone module to enhance clarity and focus, ensuring that all teacher trainees had foundational knowledge before implementing ESD across disciplines. This aligns with the findings of Sinakou et al. (2022) who emphasize that designated curriculum spaces for ESD can mitigate inconsistencies in implementation.

Table 7
Proposed Strategies for Integrating ESD into PPG Curriculum

Strategy		Description	Strengths	Challenges
Infusion Model	Embedding ESD principles into existing courses such as pedagogy, curriculum development, and practicum.	Reduces curriculum overload; ESD taught in authentic contexts; aligns with interdisciplinary nature of sustainability.	Requires faculty training; risk of inconsistent implementation across courses.	
Separate Module	Developing a dedicated ESD-focused subject within PPG.	Provides explicit focus on sustainability concepts and practices; ensures all participants receive structured exposure.	Adds to curriculum load; potential overlap with existing subjects; limited teaching hours.	

The evidence indicates that both models are valid; however, the infusion model demonstrates superior sustainability and authenticity over the long term, contingent upon the provision of sufficient professional development and teaching resources for lecturers. In practice, the proposed three-dimensional integration framework can be implemented through a phased approach: institutions may begin by auditing existing PPG courses to identify natural entry points for ESD content (Social, Economic, and Environmental dimensions), followed by structured faculty professional development workshops to build pedagogical capacity, and finally by embedding sustainability-oriented assessments and reflective tasks that connect classroom learning to real-world sustainability challenges. This phased model ensures that ESD integration is systematic, measurable, and sustainable across institutional cycles.

Comparative Perspective: The University of Kitakyushu

The University of Kitakyushu in Japan serves as a significant international standard for incorporating ESD into higher education programs. The university, recognized as a UNESCO partner for ESD, has continually matched its programs with the SDGs, focusing on community participation, interdisciplinary integration, and problem-solving methodologies (Organisation for Economic Co-operation and Development [OECD], 2021). The comparison with UPI indicates that although its PPG curriculum shows an increasing understanding of ESD, its implementation remains nascent, primarily

emphasizing conceptual awareness over systematic pedagogical integration. Kitakyushu’s experience underscores the significance of experiential learning, collaboration with local populations, and interdisciplinary curriculum innovation (see Table 8).

Table 8
Comparative Perspective: Kitakyushu University vs. UPI PPG Curriculum

Aspect	Kitakyushu University	UPI PPG Program
ESD Integration Approach	Embedded across all programs; interdisciplinary and problem-based learning.	Limited awareness-based introduction; primarily conceptual.
Pedagogical Strategy	Project- and problem-based learning, involving real community issues (e.g., waste management, energy).	Conventional pedagogy with minimal sustainability-linked projects.
Community Engagement	Strong partnership with local government, NGOs, and schools to implement sustainability projects.	Few structured collaborations; potential for partnership development.
Curriculum Innovation	UNESCO ESD approach integrated with national SDGs agenda; addresses environment, energy, culture, and international issues	Curriculum focuses mainly on TPACK (Technological Pedagogical Content Knowledge); ESD not yet formally included.
Outcome	Graduates are prepared as sustainability advocates and problem solvers in diverse contexts.	Graduates demonstrate high awareness but lack consistent pedagogical strategies for ESD integration.

The evidence indicates that UPI may gain advantages from implementing Kitakyushu’s cross-disciplinary, experiential, and community-oriented models. This would strengthen student teachers’ sustainability competencies and enhance their ability to integrate ESD principles into their teaching practice. This collaboration aligns with UNESCO’s vision of promoting sustainability competencies within teacher education (Djirong et al., 2024).

Final Remarks

The paper has illustrated that integrating ESD into the Professional Teacher Education Program curriculum at UPI is both essential and transformative. Quantitative findings have revealed high sustainability awareness, i.e., over 80% of participants are familiar with the SDGs, and over 70% are acquainted with ESD concepts. The statistical analysis has confirmed the interrelation of social, economic, and environmental dimensions, and inferential results have demonstrated that PPG graduates exhibit significantly higher awareness than non-participants. The findings affirm that ESD should be treated as a holistic phenomenon rather than a fragmented set of competencies, and the gap between awareness and practice underscores the need to contextualize global frameworks within specific teacher education environments, fostering not only knowledge but also agency, attitudes, and sustainability-oriented dispositions. At the policy level, embedding ESD into existing PPG curricula prevents curriculum overload while enabling contextualized learning, aligning with Indonesia’s “*Kurikulum Merdeka*” and positioning teachers as

models of sustainability-focused character education. Benchmarking with the University of Kitakyushu further affirms the value of interdisciplinary, project-driven, and community-focused approaches adaptable to Indonesian contexts. However, the study is limited by its reliance on self-reported data and its focus on UPI's PPG stakeholders, and future research should employ multi-site, longitudinal, or cross-national methodologies to assess whether enhanced sustainability awareness translates into enduring classroom practices and student outcomes.

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