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Reconstructing Ethical Readiness for ChatGPT Integration in Pre-Service Teacher Education

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Abstract. Generative artificial intelligence tools such as ChatGPT are increasingly present in teacher education, yet limited research has examined how pre-service teachers construct ethical readiness while integrating such technologies into academically significant practices. This study investigates how final-year pre-service teachers negotiate ChatGPT use through ethical, pedagogical, and professional reflection during teacher preparation. Guided by an ethical-reflective adaptation of the diffusion of innovation theory, this qualitative case study involved 12 final-year pre-service teachers from a teacher education faculty in Indonesia. Data were collected through reflective journals, semi-structured interviews, and field notes, and analyzed using Braun and Clarke's thematic analysis integrated with innovation adoption stages. Findings indicate that participants' engagement with ChatGPT extended beyond functional experimentation to include emerging negotiation of authorship, academic integrity, and pedagogical responsibility across stages of awareness, interest, decision, trial, confirmation, and advocacy. While participants identified practical benefits such as idea generation, reflective writing support, and pedagogical assistance, they also expressed concerns regarding overdependence, bias, and ethical misuse. The study contributes by reframing artificial intelligence (AI) adoption in teacher education as an ethical-reflective developmental process, highlighting ethical readiness as a meaningful dimension of pre-service teachers' engagement with generative AI.

Keywords: Pre-service teachers; ChatGPT; generative AI; ethical literacy; teacher education; diffusion of innovation

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1. Introduction

The emergence of generative artificial intelligence (GenAI) tools, such as ChatGPT, has introduced new possibilities within teacher education, particularly in areas such as writing support, idea generation, and instructional planning (Torrisi-Steele, 2025; Machaba & Age, 2025). Since its public release in late 2022, ChatGPT has attracted growing attention in educational settings because of its capacity to generate rapid, human-like responses across diverse academic tasks. For pre-service teachers, this development is especially significant, because they are increasingly encountering artificial intelligence (AI) technologies during professional preparation, rather than only after entering formal teaching practice. As GenAI becomes more visible in teacher education, understanding how future educators engage with these tools is an increasingly important area of inquiry.

For pre-service teachers, engagement with ChatGPT involves more than acquiring technical familiarity with emerging digital tools. As future educators, they must also navigate how AI can be used responsibly within academic work, while forming professional beliefs about authorship, academic integrity, and appropriate pedagogical practice (Yadav, 2024; Royce, 2024; Keeley, 2024). This creates a distinct developmental challenge: pre-service teachers are positioned simultaneously as current learners using AI in their own academic tasks and as future professionals who may later shape how such technologies are understood in classroom settings. However, uncertainty surrounding responsible AI use can complicate this process, particularly when ethical boundaries and acceptable practices remain inconsistently understood during teacher preparation (Chau et al., 2024; Suci Dian Martha et al., 2025).

This challenge is particularly significant in teacher education because pre-service teachers occupy a dual developmental role: they are current learners navigating AI use within their own academic practices while simultaneously preparing to become educators who may later shape how such technologies are interpreted and applied in schools (Waring & Evans, 2024; Abdelmagid, 2025). Their experiences with GenAI tools such as ChatGPT therefore extend beyond immediate academic efficiency, as these encounters may also influence emerging beliefs about responsible teaching, authorship, and pedagogical legitimacy. In this sense, engagement with GenAI during teacher preparation is not solely a matter of technical use, but also part of broader professional formation in which ethical judgment and pedagogical identity are still developing.

Although research on AI in education has expanded rapidly, much of this scholarship has focused primarily on functional adoption, technical utility, or linguistic performance, rather than on how pre-service teachers interpret the ethical and pedagogical implications of GenAI use during professional preparation. Existing studies have often emphasized what AI tools can do, while giving comparatively less attention to how future educators negotiate questions of authorship, academic integrity, and responsible pedagogical practice while using such technologies in academically consequential contexts. This gap is particularly significant in teacher education because pre-service teachers' experiences with ChatGPT may shape not only immediate academic behavior but

also emerging professional orientations toward technology use in future classrooms.

The following research questions guided this study:

RQ1: How do pre-service teachers experience and negotiate the adoption of ChatGPT across stages of awareness, decision-making, use, and reflection during teacher preparation?

RQ2: How do pre-service teachers perceive the pedagogical benefits, ethical challenges, and professional implications of ChatGPT use within academically significant contexts?

This study contributes by examining ChatGPT adoption in teacher education through an ethical-reflective lens that foregrounds how pre-service teachers negotiate authorship, academic integrity, and pedagogical responsibility alongside technological use. Rather than treating AI adoption solely as a matter of practical use, the study highlights ethical readiness as an important dimension of pre-service teachers' developmental engagement with GenAI. In doing so, it offers context-specific insight that may inform future discussions of responsible AI integration within teacher preparation.

2. Literature Review

2.1 AI Preparation in Pre-Service Teacher Education

As GenAI becomes increasingly visible in educational settings, teacher education programs face growing pressure to prepare pre-service teachers not only to use AI tools effectively, but also to evaluate their pedagogical and ethical implications critically. Existing research frequently emphasizes digital literacy, technological familiarity, and instructional adaptation as central components of AI preparedness (Obel-Omia, 2017; Cabero-Almenara & Barroso-Osuna, 2025).

Within pre-service teacher education, preparedness extends beyond technical competence alone. Future educators must also develop the capacity to interpret how AI use intersects with authorship, academic integrity, and responsible pedagogical judgment during professional formation. Although teacher education programs are increasingly expected to address these challenges, many pre-service teachers continue to encounter AI tools such as ChatGPT without sufficiently structured opportunities to examine their ethical and educational implications critically (Wulandari & Purnamaningwulan, 2024; Alonso-García et al., 2025; Kohnke et al., 2025).

2.1.1 Ethical Uncertainty and Professional Tension in Pre-Service Teachers' Engagement with AI

As GenAI tools, such as ChatGPT, become more integrated into academic and educational environments, pre-service teachers often encounter these technologies with a mixture of curiosity, perceived opportunity, and ethical hesitation. Existing studies suggest that while some pre-service teachers view AI as a resource for productivity, creativity, and academic support, others experience uncertainty related to authorship, academic integrity, professional legitimacy,

and the possible long-term implications of AI dependence for future teaching practice (Shard et al., 2024; Klimova et al., 2025; George-Reyes et al., 2025).

For individuals still forming pedagogical beliefs and professional identities, these tensions may extend beyond technical adoption into deeper questions about responsible participation, acceptable academic boundaries, and the moral dimensions of technology use. Institutional ambiguity regarding AI policy, plagiarism, and permissible use may further intensify this uncertainty, shaping not only immediate academic decision-making but also broader orientations toward future educational practice (Taktak et al., 2024; Naz & Robertson, 2024).

2.1.2 Reframing Diffusion of Innovation: An Ethical-Reflective Framework for ChatGPT Adoption in Pre-Service Teacher Education

This study draws on Rogers' (2003) diffusion of innovation (DoI) theory as a foundational lens for understanding how pre-service teachers encounter, evaluate, and integrate ChatGPT within academic and pedagogical contexts. Traditionally, the DoI explains how new technologies are adopted over time through stages shaped by perceived usefulness, social influence, and contextual compatibility.

In the context of GenAI in teacher education, however, adoption may involve more than functional acceptance alone. For pre-service teachers, engagement with ChatGPT may also be shaped by ethical reflection, authorship concerns, institutional expectations, and emerging pedagogical identity. Accordingly, this study applied DoI not as a purely technical adoption theory, but as an ethical-reflective interpretive framework for examining how innovation uptake intersects with professional and moral negotiation during teacher preparation.

Table 1: Ethical-reflective diffusion of innovation framework for pre-service teachers' ChatGPT adoption

Stage	Definition	Example in the Context of Pre-Service Teachers Using ChatGPT
Awareness/ Knowledge	Initial exposure to ChatGPT and basic understanding of its purpose, functions, and potential applications in education and academic writing.	Previously, a pre-service teacher hears about ChatGPT mainly from their friends or instructors and tries to figure out what it can do for creating lesson plans or organizing final projects.
Interest	The stage where curiosity grows and individuals begin forming attitudes about ChatGPT's usefulness and ethical implications.	The student teacher is intrigued when they see how ChatGPT can summarize articles or generate lesson ideas and yet also asks if using it might be plagiarism.
Decision	Consideration of whether to embrace or reject ChatGPT for academic or pedagogical reasons. Influenced by personal ambitions, institutional policies, or peer perspectives.	The student consults with a supervisor about ethical use guidelines and their decision to utilize ChatGPT to assist in the drafting of part of their thesis.
Trial	Experimentation and adaptation of ChatGPT to individual learning and teaching requirements while reflecting on ethical boundaries.	Pre-service teacher tests ChatGPT on draft paragraphs, paraphrases its content, and clearly references its use in the assignment.
Confirmation	Assessing ChatGPT's impact and congruency with personal beliefs, educational value, and academic integrity.	The student also reflects on how ChatGPT enhanced efficiency after completing the assignment, but also emphasizes originality, and critical thinking as the key to success in the process.
Advocacy	Having shared positive, ethical, and reflective experiences of ChatGPT in hopes of promoting responsible AI use among peers and teachers.	The student teacher presents their experience in a workshop or online forum, raising awareness of ethical ChatGPT incorporation in teaching.

3. Methodology

3.1 Research Design

This study employed a qualitative case study design to examine a bounded educational phenomenon: how final-year pre-service teachers within a teacher education faculty in Indonesia experienced, interpreted, and negotiated the use of ChatGPT during academically significant tasks such as final assignments, academic writing, and pedagogical preparation. A qualitative case study was selected because the study focused not on GenAI adoption in general, but on a

specific developmental and institutional context in which participants were simultaneously completing consequential academic work, while preparing for future professional roles as educators. The case was bound by the institutional setting (one teacher education faculty), participant group (final-year pre-service teachers), and contextual focus (ChatGPT engagement during teacher preparation). This design enabled close examination of how technological use intersected with ethical reflection, academic integrity, and emerging pedagogical identity within a real-world teacher education environment.

3.1 Research Context and Participant

This study was conducted within a teacher education faculty at a public university in Eastern Indonesia in which GenAI tools were increasingly visible in informal academic use and introductory AI literacy workshops, but formal institutional policies specifically governing ethical AI use in coursework and teacher preparation remained limited at the time of the study. This context was analytically significant because the participants were engaging with ChatGPT in an environment characterized by emerging technological exposure but incomplete formal guidance, creating conditions in which ethical understanding and practical decision-making were often negotiated at the individual level.

Purposive sampling was used to recruit participants whose experiences were directly relevant to the study's focus. Selection criteria included: (a) enrollment in the final year of a teacher education program, (b) prior use of ChatGPT for academic or instructional purposes, and (c) willingness to participate in reflective journaling and semi-structured interviews. Final-year pre-service teachers were selected because they were simultaneously navigating academically consequential tasks and approaching professional transition into future teaching roles. A total of 12 participants were included. To protect confidentiality, all participant names were replaced with pseudonyms.

Table 2: Participant demographic and academic profile

Participant	Gender	Age	Program of Study	Prior ChatGPT Experience	Academic Stage	Primary AI Use Context
P1	Female	22	Primary Education	Low	Draft Writing	Brainstorming and idea generation
P2	Male	23	English Education	Moderate	Revision	Sentence refinement and writing support
P3	Female	21	Biology Education	Low	Proposal Development	Outline development
P4	Male	24	Civic Education	Moderate	Finalization	Instructional example exploration
P5	Female	22	Elementary Education	High	Finalization	Reflective writing support
P6	Male	25	Science Education	Moderate	Data Analysis	Organizational and analytical support

Participant	Gender	Age	Program of Study	Prior ChatGPT Experience	Academic Stage	Primary AI Use Context
P7	Female	23	Indonesian Language Education	Low	Finalization	Teaching prompt generation
P8	Male	24	English Education	Moderate	Revision	Translation and idea organization
P9	Female	21	Mathematics Education	Low	Draft Writing	Concept clarification
P10	Male	23	Primary Education	Moderate	Finalization	Idea synthesis and summarization
P11	Female	22	Science Education	Moderate	Revision	Comparative learning support
P12	Male	25	English Education	High	Finalization	Critical academic support

3.2 Data Analysis

Data analysis followed Braun and Clarke's (2021) six-phase thematic analysis process and was subsequently interpreted through Rogers' (2003) DoI theory. First, reflective journals, semi-structured interview transcripts, and field notes were repeatedly read to establish familiarity with participants' experiences, ethical reflections, and patterns of ChatGPT use. Second, inductive open coding was conducted to identify recurring semantic and latent concepts related to participants' academic practices, ethical concerns, pedagogical perceptions, and professional self-positioning. Third, related codes were iteratively clustered into broader themes representing shared patterns across the dataset, including dimensions such as ethical uncertainty, reflective experimentation, perceived benefits, and emerging professional negotiation.

Following thematic generation, the framework of Rogers' DoI theory was applied deductively as an interpretive structure to map these themes across stages of innovation engagement, including awareness, interest, decision, trial, confirmation, and advocacy. In this design, thematic analysis functioned as the primary mechanism for generating grounded qualitative themes, while the DoI provided a developmental lens for understanding how participants' experiences evolved over time. This integrated process enabled the study to examine not only what participants experienced, but also how their engagement with ChatGPT developed through ethically and pedagogically significant stages.

3.3 Trustworthiness and Validation

To strengthen the rigor and trustworthiness of the study, Lincoln and Guba's (1985) framework guided procedures related to credibility, dependability, confirmability, and transferability. Credibility was enhanced through data triangulation across reflective journals, semi-structured interviews, and field notes, enabling cross-verification of participants' experiences from multiple qualitative sources. Member checking was also conducted by sharing preliminary thematic interpretations with participants; nine of the 12 participants confirmed

that the interpretations accurately reflected their experiences, while remaining feedback informed further clarification.

Dependability and confirmability were supported through the maintenance of a systematic audit trail documenting coding decisions, analytic memos, and theme development processes throughout the study. To strengthen coding reliability, 25% of the dataset was independently reviewed by two qualitative researchers, resulting in high inter-coder agreement (Cohen's $\kappa = 0.88$). Transferability was addressed through thick description of the institutional setting, participant characteristics, and educational context to support contextual interpretation by readers. Finally, thematic saturation was considered achieved after the twelfth participant when no substantively new themes or interpretive categories emerged across data sources.

4. Results and Findings

4.1 Pre-Service Teachers' Adoption of ChatGPT Across Developmental Stages

Analysis of reflective journals and semi-structured interviews indicated that participants' engagement with ChatGPT varied across six stages of the ethical-reflective DoI framework: awareness, interest, decision, trial, confirmation, and advocacy. Rather than demonstrating uniform adoption, the participants occupied different points within this developmental process depending on prior experience, academic demands, and ethical positioning.

While many participants described active experimentation during academically significant tasks, such as drafting, paraphrasing, or idea generation, these experiences were often preceded by earlier stages of curiosity and evaluative decision-making and followed by varying levels of confirmation or cautious endorsement. Across stages, participants' adoption of ChatGPT was shaped not only by perceptions of functional usefulness, but also by ongoing reflection regarding authorship, overdependence, and academic legitimacy.

Several participants described early encounters with ChatGPT through initial awareness and emerging interest, characterized by curiosity about its capabilities, alongside uncertainty regarding appropriate academic use. At these stages, participants often recognized ChatGPT's potential to support learning tasks but had not yet developed clear ethical or practical understanding of how it should be used responsibly. Participant P3 (Biology Education) explained, "*At first, I was excited because it could answer everything, but I was also scared it felt like cheating*." This response reflects how early engagement with ChatGPT was frequently shaped by simultaneous attraction to its perceived usefulness and hesitation regarding its ethical implications.

For many participants, movement from initial curiosity into active ChatGPT use involved a distinct decision-making stage in which they evaluated whether and how the tool could be incorporated into academic practice. This transition was often influenced by peer recommendations, perceived efficiency, and specific academic pressures, while concerns about ethical boundaries remained present. P8 (English Education) explained, "*My friends told me to try it; they said it saves time,*

so I gave it a go." Following this evaluative stage, participants entered trial through practical experimentation, using ChatGPT for tasks such as idea generation, sentence refinement, and paraphrasing. During this process, participants frequently described both practical benefit and growing caution. As P10 (Primary Education) noted, "*The more I used it, the more I realized how easy it is to depend on it so I had to remind myself to think critically*."

For some participants, continued engagement with ChatGPT moved beyond experimentation into a more selective confirmation stage in which prior use was reassessed through ethical and academic self-regulation. At this point, participants did not simply continue using ChatGPT uncritically; instead, they described establishing clearer personal boundaries regarding acceptable use. This often involved limiting ChatGPT to supportive functions such as grammar checking, language refinement, or idea clarification while preserving authorship over core intellectual content. P2 (English Education) stated, "*I use it only to check grammar; ideas must be my own when I write them*." This pattern suggests that, for these participants, sustained adoption was shaped by increasing ethical caution and personalized academic standards, rather than unrestricted technological dependence.

A smaller number of participants demonstrated a more advanced stage of engagement in which ChatGPT was viewed not simply as a tool for immediate academic assistance, but as a resource that could support reflective thinking when used critically and selectively. At this stage, participants more explicitly evaluated both the intellectual value and limitations of AI-generated input, particularly in relation to originality, authorship, and human creativity. P5 (Elementary Education) explained, "*Sometimes it provides examples I never thought of, making me think more critically about my topic*." Rather than indicating uncritical endorsement, this response suggests that some participants came to view ChatGPT as a supplementary intellectual resource whose value depended on continued personal reflection and active judgment.

For some participants, sustained ChatGPT use also prompted broader reflection on how responsible AI practices might apply beyond personal academic tasks and into future educational contexts. At this stage, participants began to articulate not only individual boundaries for ethical use, but also cautious consideration of how AI tools might be introduced responsibly within teaching and learning environments. P6 (Science Education) noted, "*If used carefully, it could help students brainstorm ideas as long as we teach them how to use it ethically*." This response suggests that, for certain participants, engagement with ChatGPT gradually expanded from personal academic self-regulation toward early pedagogical reflection regarding responsible educational use.

Overal, participants' progression across awareness, interest, decision, trial, confirmation, and advocacy stages suggests that ChatGPT adoption in teacher education was not experienced as a uniform process of technological acceptance. Rather, participants' engagement evolved through ongoing negotiation between practical utility, ethical boundaries, and emerging pedagogical reflection. This

developmental pattern indicates that, for many pre-service teachers, ChatGPT adoption involved not only functional experimentation but also gradual consideration of how responsible AI use might shape future educational practice.

4.2 Pre-Service Teachers' Dual Identity and ChatGPT Adoption Plans

Across interviews and reflective journals, participants frequently described ChatGPT use through the lens of a dual identity: as current university students managing immediate academic demands and as future educators considering the ethical and pedagogical implications of AI use in classroom contexts. This dual positioning often created tension between the practical advantages of ChatGPT such as efficiency, idea generation, and academic support and broader concerns regarding responsible educational practice. Participants recognized that while ChatGPT could serve as a useful academic resource, its future role in teaching would require careful ethical guidance. P6 (Science Education) explained, "*If used carefully, it could enable students to brainstorm ideas as long as we teach them how to use it ethically*." This pattern suggests that participants' reflections on ChatGPT frequently extended beyond personal academic utility toward early consideration of future professional responsibility.

Participants expressed diverse intentions regarding how ChatGPT might be incorporated into their future teaching practices. Some envisioned using AI tools to support brainstorming, discussion development, and creative instructional planning, particularly as supplementary resources for student engagement. Others, however, emphasized that any future classroom integration would require structured guidance, clear boundaries, and critical oversight to prevent misuse or overreliance. Across these perspectives, participants frequently indicated that pedagogical adoption should not involve unrestricted technological use, but rather carefully moderated implementation shaped by ethical awareness and instructional purpose. This variation suggests that participants' future-oriented adoption plans were influenced not only by perceived educational benefits, but also by concern for responsible pedagogical application.

Several participants also described ChatGPT as a reflective academic support tool that could assist writing development beyond efficiency-oriented functions. Rather than relying on ChatGPT solely for grammar correction or rapid content production, these participants reported using it to explore alternative ideas, consider multiple perspectives, and deepen their own thinking processes during writing and instructional planning. P2 (English Education) explained, "*I use it to get ideas or have examples, but I never cut and paste. It helps my thought not to hurry up*." This pattern suggests that some participants perceived ChatGPT not simply as a productivity aid, but as a supplementary resource that could support reflective inquiry when used selectively and critically.

Some participants also envisioned ChatGPT as a resource that could support guided classroom reflection by encouraging students to compare AI-generated responses with their own reasoning processes. In this perspective, ChatGPT was not viewed primarily as a shortcut, but as a mediated tool that could prompt

discussion, comparison, and critical consideration when used with appropriate boundaries. P10 (Primary Education) stated, "*I tell my classmates to use it wisely like a friend to learn with, not a shortcut*." This perspective suggests that certain participants associated future classroom use of ChatGPT with opportunities for responsible instructional mediation rather than passive dependence.

The participants also identified ChatGPT as a resource that could support future lesson preparation by expanding pedagogical ideas, generating instructional examples, and broadening curriculum planning perspectives. In this context, ChatGPT was often perceived as a supplementary planning aid that could introduce alternative approaches or examples that participants had not previously considered independently. P5 (Elementary Education) explained, "*Sometimes it gives examples that I really didn't think about it pushes me to think more critically about my topic*." This response suggests that some participants viewed ChatGPT as a tool that could stimulate broader pedagogical exploration and support more varied instructional planning when used critically.

Despite recognizing multiple potential benefits of ChatGPT for brainstorming, lesson preparation, and instructional support, most participants positioned their future use primarily at a preparatory, rather than full implementation, level. The participants more commonly expressed confidence in using ChatGPT for planning-related purposes, such as idea generation or lesson design, than for direct classroom instruction, assessment, or broader pedagogical deployment. This cautious stance was often linked to limited confidence in their own technical understanding and pedagogical readiness. P8 (English Education) acknowledged, "*I'm still learning how to use it right, because sometimes I don't even know what it means*." This pattern suggests that, while participants frequently viewed ChatGPT as a promising educational resource, many remained in an exploratory stage regarding its fuller integration into professional teaching practice.

Overall, participants' dual identity as current learners and future educators positioned ChatGPT less as an immediately deployable classroom solution and more as an emerging pedagogical resource whose responsible use would require further ethical, technical, and professional development.

4.3 Pre-Service Teachers' Perceived Benefits of ChatGPT as a Learning and Pedagogical Tool

One of the most frequently identified benefits of ChatGPT was its perceived capacity to support greater learning autonomy. Many participants described ChatGPT as a readily accessible resource that allowed them to ask questions, explore ideas independently, and engage in self-directed academic inquiry without the social pressure sometimes associated with classroom participation. This sense of accessible, nonjudgmental interaction was often described as particularly supportive for learners who might hesitate to ask questions publicly. As P5 (Elementary Education) reflected, "*It's like learning with a patient person I feel like ChatGPT waits for me to think, it gives me confidence*." This pattern suggests that participants often perceived ChatGPT as a tool that could enhance confidence and independent learning engagement through individualized academic support.

Beyond personal academic support, participants also identified ChatGPT's potential pedagogical value in supporting more inclusive and differentiated learning environments. Several participants envisioned ChatGPT as a resource that could assist brainstorming, project development, personalized feedback, translation, text simplification, and clarification of complex ideas for learners with diverse educational needs. In this context, participants frequently associated AI-supported interaction with opportunities to recognize variation in student learning preferences better and provide more adaptable instructional support. These reflections suggest that some participants perceived ChatGPT not only as an individual learning aid, but also as a possible pedagogical resource for broadening educational accessibility and responsiveness.

The participants also frequently described ChatGPT as a tool that could support reflective writing development by prompting closer attention to tone, coherence, structure, and argumentative clarity. Rather than simply generating text for direct use, several participants reported using AI-generated responses as comparative material through which they could evaluate and refine their own writing choices. In this sense, ChatGPT was often perceived less as a substitute for authorship and more as a revision-oriented resource that encouraged self-correction, reflection, and greater awareness of personal writing voice. This pattern suggests that participants sometimes used ChatGPT to strengthen higher-order writing processes through critical comparison rather than passive dependence.

The participants frequently perceived ChatGPT as a potentially valuable learning and pedagogical resource when used with ethical awareness and critical oversight. Across the data, perceived benefits commonly included greater learning autonomy, more inclusive instructional possibilities, reflective writing support, and expanded pedagogical creativity. At the same time, the participants' descriptions generally positioned these benefits as conditional upon responsible and selective use rather than unrestricted dependence. This pattern suggests that participants often viewed ChatGPT less as a replacement for human learning or teaching judgment and more as a supplementary resource whose value depended on how it was critically integrated into educational practice.

Considered together, these perceived benefits suggest that the participants' understanding of ChatGPT often developed from personally supportive functions, such as autonomous learning and reflective writing, toward broader pedagogical possibilities including inclusive teaching support and instructional creativity. This progression indicates that the participants frequently interpreted ChatGPT not only as an academic aid, but also as an emerging educational resource with potential relevance for future teaching practice.

4.4 Pre-Service Teachers' Perceived Concerns and Challenges on Using ChatGPT

A frequently reported concern among participants involved uncertainty surrounding academic integrity, authorship, and the ethical boundaries of acceptable ChatGPT use. Several participants expressed anxiety not necessarily about intentional misconduct, but about ambiguity regarding when supportive

AI use might cross into academically inappropriate practice. This uncertainty was particularly evident in tasks such as paraphrasing, sentence refinement, or language support, in which participants sometimes struggled to determine the boundary between legitimate assistance and potential academic dishonesty. As P4 (Civic Education) explained, "*I'm feeling anxious because I don't know whether using ChatGPT to recast my sentences in the language is cheating*." This pattern suggests that participants' concerns were often shaped less by rejection of ChatGPT itself than by uncertainty regarding responsible authorship and acceptable academic use.

Beyond concerns related to academic integrity, many participants also expressed apprehension about the possible cognitive consequences of excessive reliance on ChatGPT. The participants frequently worried that habitual dependence on AI-generated assistance might weaken independent thinking, reduce self-regulation, or diminish opportunities to develop deeper analytical skills. These concerns were particularly tied to the fear that convenience could gradually replace sustained intellectual effort. P6 (Science Education) noted, "*If we take too much in that kind of support, we're in danger of not learning to think for ourselves*." This pattern suggests that participants often perceived ChatGPT not only as a potentially helpful resource, but also as a tool whose overuse could undermine critical engagement and autonomous reasoning.

The participants also expressed concern regarding the reliability and cultural appropriateness of ChatGPT-generated content, particularly when responses appeared misaligned with local contexts, values, or educational realities. Several participants reported encountering examples or explanations that seemed culturally unfamiliar, contextually inaccurate, or insufficiently relevant to their own learning environments. P7 (Indonesian Language Education) explained, "*Sometimes ChatGPT's answers are strange, it gives examples that don't match our culture*." These experiences suggest that participants' engagement with ChatGPT was sometimes shaped by awareness that AI-generated information could require careful scrutiny, especially when cultural relevance and contextual accuracy were important.

Additionally, the participants reported practical challenges related to technical literacy, particularly during early attempts to use ChatGPT effectively. Several participants described difficulty formulating clear prompts, interpreting AI-generated responses accurately, or translating intended questions into instructions that produced relevant output. These barriers often limited initial confidence and occasionally contributed to frustration during early engagement. P9 (Mathematics Education) explained, "*Sometimes I don't know how to ask the question correctly and ChatGPT gives me an answer that's not what I mean*." Over time, some participants indicated that repeated practice and peer interaction helped improve prompt formulation and response interpretation, suggesting that effective ChatGPT use often required developing new forms of technical and communicative competence.

The participants' experiences across the six-stage ethical-reflective DoI framework suggest that ChatGPT engagement was often developmental, iterative, and shaped by ongoing negotiation, rather than simple linear adoption. The participants' experiences frequently moved through cycles of curiosity, uncertainty, experimentation, reflection, and selective adaptation as they navigated both the opportunities and challenges associated with AI use. Across these stages, emotional responses, peer interaction, ethical uncertainty, and self-regulation appeared to play important roles in shaping how participants interpreted and integrated ChatGPT into their academic and emerging professional contexts. This pattern suggests that participants' engagement with GenAI often involved not only technical learning, but also broader reflective consideration of responsible educational use.

5. Discussion

The findings suggest that pre-service teachers' engagement with ChatGPT was shaped less by simple technological acceptance than by a developmental process of ethical, emotional, and pedagogical negotiation. While participants often began with curiosity or functional interest, their engagement frequently became more reflective as they confronted concerns related to academic integrity, overdependence, and responsible educational use. This pattern aligns with recent scholarship suggesting that AI adoption in educational settings is often iterative rather than strictly linear, particularly when new technologies intersect with moral uncertainty and professional identity formation (Bae et al., 2024; Uzumcu & Acilmis, 2024; Choi, 2025).

Participants' early anxieties regarding dishonesty and dependency also support prior research identifying uncertainty and psychological hesitation as significant barriers to responsible AI engagement (Frenkenberg & Hochman, 2025; Rahman et al., 2026). Rather than suggesting that AI integration in teacher education should be framed primarily through restriction, these findings more closely support arguments that reflective scaffolding and ethical guidance may play important roles in shaping responsible adoption (Chaseley & Abercrombie, 2025; Ma & Chen, 2025).

Participants' reflections also suggest that engagement with ChatGPT often developed from primarily functional academic use toward more reflective forms of evaluation and selective adaptation. Early interactions were frequently centered on efficiency-oriented purposes such as summarizing, paraphrasing, brainstorming, or structural assistance. Over time, however, many participants appeared increasingly attentive to questions of reliability, authorship, authenticity, and source credibility, indicating that practical use was often accompanied by expanding critical scrutiny.

For example, P5 (Elementary Education) described how AI-generated suggestions could prompt deeper thinking rather than passive acceptance: "*Sometimes it gives examples I never thought of it pushes me to think more critically about my topic*." This pattern aligns with emerging scholarship suggesting that responsible AI engagement in teacher education may require not only operational competence,

but also the capacity to critically evaluate, adapt, and contextualize AI-generated content (Yang et al., 2024; Tang & Zhang, 2025). These findings more cautiously suggest the development of early reflective awareness, rather than representing a complete ethical transformation, in which ChatGPT was sometimes treated not simply as a technical tool, but as a mediated academic resource requiring judgment, revision, and critical interpretation.

A particularly significant finding was that the participants often interpreted ChatGPT through a dual positionality: as current students navigating immediate academic demands and as future educators considering broader pedagogical and ethical responsibilities. This dual orientation appeared to shape how participants evaluated ChatGPT beyond personal convenience, often prompting reflection on how AI might later influence their own instructional practices. As P6 (Science Education) observed, "*If used carefully, it could help students brainstorm ideas as long as we teach them how to use it ethically*."

This perspective aligns with research on teacher identity development in digital contexts, which suggests that emerging educators increasingly negotiate technological use not only through personal utility, but also through anticipated professional responsibility and ethical modeling (Fontao et al., 2024; Engeness, 2021; Abdul Sanny et al., 2025). These findings more cautiously suggest that AI engagement may contribute to early-stage pedagogical reflection, rather than indicating a fully transformed professional identity, in which future teaching responsibilities begin to shape how pre-service teachers interpret responsible technology use.

An important implication of the findings is that the ethical tension experienced by the participants was not always experienced solely as a barrier to AI adoption, but often functioned as a prompt for deeper reflection about responsible academic and pedagogical use. Participants' concerns regarding plagiarism, authenticity, fairness, and authorship frequently appeared to encourage more deliberate consideration of personal boundaries and responsible engagement, rather than a simple rejection of the technology. This pattern aligns with scholarship suggesting that moral discomfort in educational technology contexts may, when critically examined, encourage reflective learning processes rather than passive avoidance (Adam, 2024).

Through journaling, peer discussion, and selective experimentation, participants often appeared to negotiate how ChatGPT might be used without displacing personal judgment or academic integrity. For example, P10 (Primary Eduction) reflected, "*If I don't practice honesty with ChatGPT now, how can I teach it to my students later?*" Such reflections more cautiously suggest emerging forms of ethical self-regulation, rather than demonstrating a fully developed professional moral identity, in which participants began linking present academic choices to anticipated future teaching responsibilities.

In later stages of engagement, some participants also began to articulate broader peer-oriented perspectives by discussing how responsible ChatGPT use might be

introduced within collaborative or future instructional settings. These reflections included suggestions such as guided brainstorming, structured comparison between AI-generated and human-generated responses, and classroom dialogue about academic honesty. Such perspectives align with prior research indicating that teacher preparation for AI use may benefit from structured opportunities for reflection, dialogue, and ethical discussion, rather than purely technical training alone (Ramos et al., 2024; Huynh et al., 2025). These findings more cautiously indicate that some pre-service teachers were beginning to extend personal reflection into broader peer and pedagogical awareness, rather than that participants had become ethical leaders or institutional change agents. This pattern may suggest that AI adoption in teacher education can involve social and ethical dialogue alongside functional use, particularly when participants begin considering how present experiences with AI may shape future educational practices.

This study should be interpreted within several important contextual and methodological boundaries. First, the findings are drawn from a small qualitative sample within a single teacher education faculty in Eastern Indonesia, which means that the patterns identified here should not be generalized as representative of all pre-service teachers or institutional contexts. The study also focused on participants who were willing to openly discuss and reflect on their ChatGPT use, which may have privileged the perspectives of individuals already inclined toward ethical self-examination or cautious engagement.

Pre-service teachers who use AI more privately, strategically, or without similar reflective disclosure may experience different forms of adoption, risk, or ethical negotiation that were not fully captured in this dataset. In addition, because AI technologies and institutional responses continue to evolve rapidly, these findings should be understood as contextually situated within a particular moment of emerging GenAI adoption rather than as stable developmental conclusions. Future research would therefore benefit from cross-institutional, longitudinal, comparative, and mixed-method designs that examine how AI engagement develops across broader educational, cultural, and policy contexts.

6. Conclusion

This study suggests that pre-service teachers' engagement with ChatGPT was shaped less by simple technological acceptance or rejection than by an ongoing process of ethical, emotional, and pedagogical negotiation. Across participants, ChatGPT was frequently approached as both a practical academic resource and a reflective prompt through which questions of authorship, integrity, critical thinking, and future teaching responsibility were actively negotiated.

The study's primary contribution lies in showing that AI adoption within teacher education may be better understood not solely as functional digital competence, but as a developmental process in which reflective judgment and emerging professional awareness shape how technology is interpreted and used. These findings indicate that its role in teacher education is more meaningfully understood through the conditions of critical reflection, ethical consideration, and

contextual pedagogical use, rather than positioning ChatGPT as either a threat to academic integrity or a purely efficient educational tool. Within this framework, teacher education may benefit from approaches that integrate AI engagement with reflective, ethical, and pedagogically grounded learning processes.

Conflict of Interest
No personal interests of the authors have influenced this research.

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