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Integrating Staggered and Collaborative Learning for Ethical AI-Assisted Academic Writing

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Abstract: The rapid advancement of artificial intelligence (AI) has prompted a paradigm shift in higher education, demanding innovative instructional models that not only leverage technological tools but also foster ethical, critical, and adaptive thinking among students. This study explores the implementation of a staggered and collaborative learning approach for teaching AI-assisted academic writing in the *Software Measurement and Quality* course at Universitas Ma Chung. The instructional design began with the formation of small student groups, followed by a structured introduction to generative AI tools—such as ChatGPT Plus and Consensus—paired with discussions on ethical use, fact-checking, and reference validation. Rather than emphasizing technical details, the concept of prompt engineering was taught as a set of adaptable, strategic principles, enabling students to construct effective prompts as technology evolves. Through staggered, step-by-step activities, students were guided from initial brainstorming and article drafting to in-depth literature reviews and iterative revision, with each group collaborating internally and across teams to share references and insights using tools like Mendeley Reference Manager. The lecturer's ongoing formative feedback, combined with originality checks via Turnitin, ensured both academic integrity and continuous improvement. At the end of the process, students submitted their articles to designated journals and completed a feedback questionnaire. The analysis of student responses revealed overwhelmingly positive outcomes: nearly all participants reported a clearer understanding of course objectives, increased motivation, and greater creativity. Students highlighted the ease and effectiveness of AI tools in supporting their research, the value of collaborative reference sharing, and the importance of ethical AI practices. The majority also recognized that prompt engineering requires strategic, iterative approaches rather than fixed formulas. In conclusion, the findings demonstrate that the staggered and collaborative learning model not only enhances academic writing skills and ethical awareness but also prepares students for lifelong learning and responsible technology use in an AI-driven academic landscape.

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INTRODUCTION

Artificial Intelligence (AI) has rapidly emerged as a transformative force in almost every aspect of modern life, from industry and commerce to social interaction and scientific discovery. In the context of higher education, the integration of AI technologies is no longer regarded as a mere option but as an essential step to prepare students for a future dominated by automation, data-driven decision making, and complex problem solving (Fowler, 2023; Laupichler et al., 2022). As universities and colleges adapt to this new reality, there is a growing recognition that digital literacy alone is insufficient; instead, students must be equipped with a deeper understanding of AI concepts, applications, and ethical considerations to remain relevant and competitive in the global workforce (Bearman et al., 2023; Bond et al., 2024).

The teaching of AI in higher education settings has become increasingly urgent, driven by both external demands from the labor market and internal expectations of academic excellence. Students are expected not only to utilize AI tools for academic tasks—such as essay writing, research, and project management—but also to comprehend the underlying mechanisms and limitations of such technologies (Bearman et al., 2023). However, the indiscriminate use of AI without adequate pedagogical guidance may lead to issues of academic integrity, ethical ambiguity, and even over-reliance on machine-generated content (Bin-Nashwan et al., 2023; Eke, 2023). This underscores the importance of designing effective learning experiences that guide students to become not just users but critical thinkers and responsible innovators in the AI era.

To address these challenges, a staggered learning approach has been proposed as a strategic pedagogical model for AI education. In this method, learning is structured into sequential stages, enabling students to build foundational knowledge before progressing to more advanced skills and applications (Batt & Sciences, 2023). By decomposing complex concepts into manageable steps and providing iterative opportunities for practice and feedback, students are afforded the time and support necessary to internalize key principles (Feng et al., 2019). Furthermore, a staggered approach fosters reflective thinking and gradual mastery, which are crucial for developing both technical proficiency and ethical awareness in the use of AI. This pedagogical strategy is thus seen as vital in cultivating well-rounded graduates who can navigate and contribute meaningfully to the rapidly evolving landscape of artificial intelligence.

In addition to staggered learning, the application of collaborative learning in AI education has also been identified as a critical component for student development. Collaborative learning provides a dynamic environment where students can share ideas, challenge assumptions, and collectively solve problems using AI tools (Kim et al., 2022). Through teamwork and peer-to-peer interaction, students are exposed to diverse perspectives and approaches, which in turn deepens their understanding of AI concepts and strengthens their problem-solving skills (Msambwa et al., 2025). The process of collaborating on AI-driven assignments not only promotes technical competence but also cultivates essential soft skills, such as communication, negotiation, and the ability to work effectively in multidisciplinary teams.

Moreover, collaborative learning encourages students to engage in constructive feedback and iterative refinement of their work, particularly when utilizing AI to generate, review, or improve academic outputs (Wang, 2024). When groups of students interact with AI systems together—whether in designing prompts, analyzing data, or co-authoring research—they become more aware of both the possibilities and the limitations of artificial intelligence (Kok et al., 2024). This collaborative engagement helps ensure that the use of AI is not merely a solitary activity but a social learning experience grounded in ethical practices and mutual support (Wicaksono & Suprapto, 2025).

Within this context, the Information Systems program at Universitas Ma Chung in Malang has positioned itself at the forefront of AI adoption in the classroom. Over the past year, AI tools and platforms have been systematically integrated into the curriculum, enabling students to experiment with generative models, literature discovery tools, and AI-powered writing assistants (Wicaksono, 2024). By leveraging both staggered and collaborative learning approaches, the program seeks to guide students through a progressive mastery of AI while fostering a culture of teamwork and responsible

technology use. This initiative reflects a broader institutional commitment to equipping graduates with the competencies needed to thrive in an increasingly digital and AI-driven world.

Despite the rapid adoption of AI in higher education, there remains a significant research gap regarding how staggered and collaborative learning methods can be systematically combined to maximize student outcomes. Most existing studies tend to focus either on the use of AI as an isolated tool or on traditional collaborative learning, without exploring how these two approaches can be integrated in a structured and meaningful way (Lin, 2024). As a result, there is still limited understanding of how students actually respond to step-by-step and group-based learning experiences when working with AI, especially in the context of academic writing and research tasks (Hu et al., 2024).

This research aims to address that gap by developing and testing a learning model that blends staggered and collaborative methods in AI-assisted learning. The novelty of this study lies in its focus on collecting direct student feedback to refine and validate the effectiveness of this combined approach. By carefully observing and documenting how students engage with both the process and their peers, the research intends to create a practical and adaptable learning model. The ultimate goal is to ensure that students not only learn to use AI effectively but also build critical thinking and teamwork skills—setting a strong foundation for future learning and responsible technology use in their academic journey.

METHOD

The research method employed in this study adopts a combined staggered and collaborative learning approach, begins by dividing students into small groups, each tasked with developing academic writing projects through a series of structured stages. At the initial stage, at least 30 students are guided to determine topics and develop foundational ideas for their scientific papers, utilizing AI tools such as ChatGPT to help generate and organize preliminary concepts. As students progress, they engage in the iterative development of their work—moving step-by-step from outlining introductions to constructing literature reviews—while continually leveraging AI applications to support information gathering and prompt refinement. Throughout each stage, regular feedback and revision sessions are conducted to ensure alignment with academic standards and ethical use of AI, as emphasized in the documented methodology.

Collaboration is embedded in every phase, with peer groups not only working together within their teams but also engaging in cross-group interactions to review, critique, and enhance each other's prompts and outputs. Tools such as Consensus and Mendeley are integrated for literature discovery and reference management, helping students develop critical information literacy alongside their writing skills. After the completion of drafts, originality is assessed using Turnitin, followed by final revisions before submission to accredited journals. The research further collects feedback from participants to evaluate the effectiveness and reception of the combined staggered-collaborative learning model, aiming to establish a robust framework for future AI-integrated academic instruction.

The implementation of this research-based learning model is designed to span a full semester, with carefully structured phases to support gradual skill acquisition and collaborative practice. During the first five weeks leading up to the midterm examination, students receive foundational instruction on academic writing, research ethics, and the responsible use of AI tools. This introductory phase emphasizes basic prompt engineering principles, familiarization with ChatGPT and Consensus, and guided discussions about the ethical boundaries and academic standards for AI-assisted writing. Group formation and initial topic selection are also conducted during this period, allowing students to establish clear goals and collaborative norms before moving into more intensive project work.

Following the midterm, the course shifts toward a more intensive application of AI tools, with students actively utilizing ChatGPT Plus and Consensus Premium for article development. Within the "Software Measurement and Quality" course, each group is tasked with progressively drafting their scientific articles—beginning with introductions, moving on to literature reviews, and iteratively refining their work based on AI-generated suggestions and peer feedback. Regular checkpoints, peer-

review sessions, and lecturer-guided revisions are embedded throughout the remaining weeks, ensuring that each group benefits from both AI-powered insights and collaborative learning experiences (Kim et al., 2024; Zheng et al., 2024). By the end of the semester, all student groups are expected to submit completed articles, which will undergo originality checks and final assessment, cementing their understanding of both software quality principles and advanced academic writing with AI support. Whole stages is resumed in following flowchart.

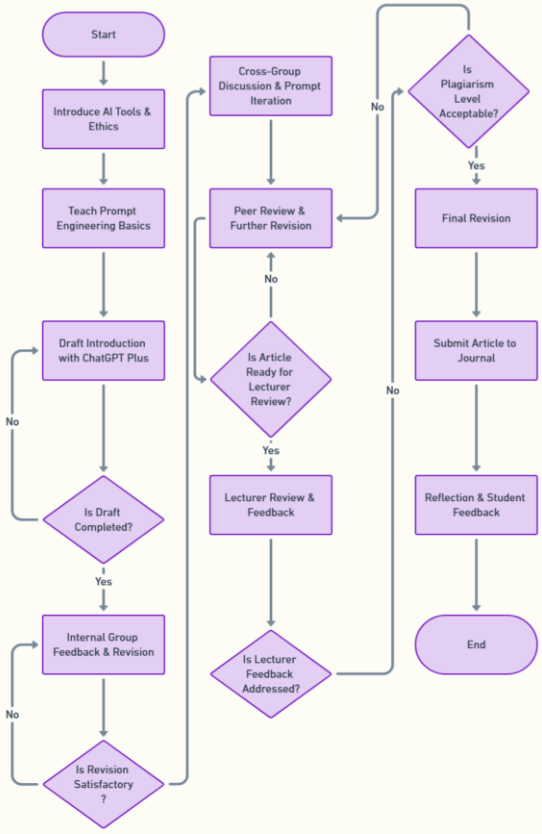

Figure 1. Stages Flowchart

RESULTS AND DISCUSSIONS

In the initial stage, 30 students were organized into small collaborative groups (2 students each group) and guided to select research topics relevant to *software measurement and quality* course. This structured group formation allowed for a diverse range of interests and skillsets within each team, facilitating richer idea exchanges and more dynamic discussions. Topic selection was conducted through a brainstorming process, supported by lecturer supervision to ensure alignment with course objectives and the feasibility of each project. The collaborative nature of this phase fostered a sense of shared responsibility and motivated students to engage actively from the very beginning, laying a strong foundation for the staggered and peer-driven learning journey that followed.

The next step involved an instructor-led introduction to generative AI tools and ethical guidelines for their academic use. The lecturer emphasized the responsible application of AI, specifically focusing on fact-checking outputs generated by ChatGPT and validating references with Consensus. Students were shown how generative AI could assist in ideation, content drafting, and literature discovery, while also being cautioned about the risks of uncritical acceptance of AI-generated information. They were instructed to cross-verify facts presented by ChatGPT against reputable sources and to use Consensus for identifying the legitimacy and scholarly standing of referenced material (Glickman & Zhang, 2024). This initial orientation was crucial in establishing a culture of critical engagement with technology,

ensuring that students approached AI not as an unquestionable authority, but as a sophisticated tool to be used judiciously in support of ethical academic work.

During the third stage of the process, students were introduced to the fundamental concepts of prompt engineering. Rather than focusing on rigid technical instructions, the instructional approach emphasized a conceptual understanding of how prompts shape the outputs generated by AI systems. Students were encouraged to explore the underlying logic of prompt construction—such as clarity, specificity, and contextual framing—so that they could flexibly adapt their prompts to different tasks and future advancements in AI technology (Msambwa et al., 2025). This foundational knowledge aimed to cultivate their critical awareness of how to communicate effectively with generative AI, equipping them with adaptable skills that transcend any single tool or platform.

The staggered learning approach was systematically applied throughout the prompt engineering instruction. Learning activities were carefully sequenced, starting with basic scenarios and gradually increasing in complexity as students became more comfortable with the concepts (Feng et al., 2019). For example, students first practiced crafting simple prompts for generating topic outlines or brainstorming key questions. As their confidence grew, they advanced to more sophisticated prompts that required nuanced instructions, multi-step reasoning, or constraints to guide the AI in producing higher-quality, context-specific academic content. At each stage, formative feedback and group discussion helped solidify learning, allowing students to reflect on their experiences and share best practices with their peers.

By integrating staggered learning with the conceptual teaching of prompt engineering, students were empowered to become independent and creative users of AI in academic writing. They learned to see prompt engineering not as a static technical formula, but as a dynamic and iterative process that evolves alongside technological change. This pedagogical strategy encouraged a mindset of continuous experimentation and lifelong learning, ensuring that students would remain agile and responsive to innovations in AI. As a result, students not only improved their ability to produce effective prompts for immediate coursework, but also developed foundational skills to navigate and harness future developments in the field of generative artificial intelligence.

In the subsequent phase, students advanced to the task of composing the literature review section for their academic articles. To ensure the quality and legitimacy of references, students utilized the Consensus AI tool, which specializes in aggregating peer-reviewed literature and synthesizing evidence-based findings. This platform allowed students to quickly identify reliable sources relevant to their research questions, reducing the likelihood of referencing unverified or non-scholarly materials. The use of Consensus not only streamlined the literature search process, but also instilled a culture of academic rigor, as students learned to distinguish between credible, high-impact publications and less authoritative sources.

Recognizing the value of shared knowledge, the process encouraged groups working on similar themes to engage in collaborative exchange of references. Rather than operating in isolation, these groups created an interconnected learning environment where each could benefit from the discoveries and insights of their peers. Literature and references retrieved from Consensus were openly discussed and evaluated in group meetings, promoting critical dialogue and mutual support. This practice ensured that all participating students had access to a broad, validated pool of references—effectively raising the overall standard of research and preventing unnecessary duplication of effort across the class.

To facilitate seamless management and sharing of references, students utilized a joint Mendeley Reference Manager account. This collaborative tool enabled groups to store, organize, and annotate their sources collectively, making it easy to cite and cross-reference materials throughout the drafting process. By leveraging a shared platform, students could efficiently build bibliographies, track citation formats, and avoid common referencing errors. Moreover, the use of Mendeley fostered a habit of meticulous source management, which is vital for academic integrity and professional scholarly practice. In this way, both AI-driven and human collaborative tools worked in tandem, empowering students to construct well-supported, original academic articles.

In the penultimate stages of the process, each group's draft was subjected to a step-by-step review by the lecturer. The review covered all major sections of the article, beginning with the background and progressing through to the main discussion. This meticulous feedback process was designed not only to enhance the academic quality of each manuscript but also to provide formative assessment for students. Each round of lecturer review was counted as a quiz grade within the course, encouraging students to take the revision process seriously and to view feedback as an integral part of their learning journey. Through targeted comments and suggestions, students gained deeper insights into academic conventions and effective scholarly communication.

Following the lecturer's review, all articles underwent an originality check using Turnitin to ensure the integrity and authenticity of student work. The plagiarism report from Turnitin allowed both students and lecturers to identify and address any instances of improper citation or unintentional similarity with existing publications. Only after passing this originality check were students permitted to undertake their final revisions, making any necessary adjustments to content, structure, or references. This multi-step review and revision process not only safeguarded academic honesty but also empowered students to submit higher-quality, original articles ready for journal submission.

After completing the lecturer's review and passing the plagiarism check, students finalized their articles and submitted them to academic journals specified by the lecturer. This submission process marked the culmination of their collaborative and AI-assisted writing journey, providing students with a valuable introduction to the world of scholarly publication. At the end of the semester, students were also required to complete a feedback survey prepared by the lecturer. This survey served as an important tool for evaluating the effectiveness of the staggered and collaborative learning model, capturing students' experiences, challenges, and suggestions for improvement, and thus informing future innovations in AI-based academic instruction.

Table 1. Summary Results

Step	Activity	Description
1	Group Formation & Topic Selection	Students form groups and choose research topics under lecturer guidance.
2	AI Tools & Ethics Introduction	Lecturer explains generative AI use, ethics, fact-checking, and reference validation (Consensus).
3	Teaching Prompt Engineering Basics	Students learn conceptual prompt engineering, focusing on logic and adaptability.
4	Draft Introduction with ChatGPT Plus	Groups draft article introductions using ChatGPT Plus.
5	Internal Group Feedback & Revision	Groups review and revise their introductions collaboratively.
6	Develop Literature Review (Consensus Premium)	Groups use Consensus AI to find and discuss credible references for the literature review section.
7	Cross-Group Discussion & Prompt Iteration	Groups with similar topics share references and improve prompts and content through discussion.
8	Collaborative Reference Management (Mendeley)	Shared Mendeley account is used for organizing and citing references.
9	Lecturer Review & Feedback	Lecturer reviews drafts section by section, providing feedback (also graded as quizzes).
10	Peer Review & Further Revision	Groups conduct peer review and further refine articles as needed.
11	Originality Check (Turnitin)	Articles are checked for plagiarism using Turnitin.
12	Final Revision & Submission	Students revise based on feedback and originality check, then submit articles to designated journals.
13	Reflection & Student Feedback	Students complete a feedback survey evaluating the learning model and process.

Analysis

The feedback collected from students indicates a generally positive reception toward the integration of AI-based learning in the classroom, especially when structured with staggered and collaborative methods. Most students reported being able to clearly understand the learning objectives and felt that the project-based article assignments helped them comprehend the course material more comprehensively. The staggered approach—where prompt engineering and AI use were introduced gradually—seems to have enabled students to develop skills step by step, without feeling overwhelmed by complex concepts at the outset. This incremental exposure made it easier for students to adapt to new tools and methodologies while maintaining focus on academic content.

Collaborative elements within the learning process were also well received. Students appreciated the opportunity to work in groups, not only to divide tasks but to exchange insights and references, particularly when using tools like Consensus and Mendeley for literature management. Many students noted that sharing references with peers broadened their perspective and allowed them to build higher-quality bibliographies. This environment encouraged peer support, active communication, and the emergence of creative problem-solving as students iterated on their drafts and prompts in response to feedback from both lecturers and classmates.

A significant majority also acknowledged that the use of AI tools such as ChatGPT, Consensus, and Gemini enhanced their learning process, improved their creativity, and expanded their access to relevant information. They felt more motivated to seek out additional resources beyond the classroom and believed that fact-checking and reference validation using AI tools helped ensure the legitimacy of their academic writing. The feedback further highlighted that the explicit instruction on ethical AI use and prompt engineering—delivered in a non-technical, conceptual manner—was sufficient to empower students to continue applying these skills in other courses, reinforcing the long-term impact of the teaching model.

Finally, students expressed satisfaction with the guidance and objectivity of the lecturer, as well as the practical benefits of integrating AI in project-based assignments. Most respondents suggested that AI learning should be extended to other subjects in the curriculum, emphasizing the importance of continued development in this area. A few comments also pointed out that optimal prompt engineering requires specific techniques and iterative practice, supporting the notion that a staggered, feedback-rich approach is most effective. This collective feedback underscores the value of combining staggered and collaborative learning in AI education, and it validates the relevance of the implemented model for broader academic adoption.

Table 2. Survey Summary Results

Aspect	Yes (Count)	Yes (%)
Clear understanding of course objectives	30	100
Assignment helped comprehensive understanding	29	96.7
Motivation to seek info outside class	26	86.7
AI helped in completing assignments	30	100
AI expanded perspective and creativity	30	100
Prompt engineering needs specific technique	28	93.3

The analysis of students' feedback reveals a highly positive perception of the staggered and collaborative learning model for AI-integrated academic writing. Most students affirmed that the structured approach, starting with foundational concepts and progressing through collaborative assignments, fostered not only a comprehensive understanding of course objectives but also increased motivation and engagement. The combination of gradual skill development and group work appears to have provided a supportive environment in which students felt empowered to experiment with new tools, share insights, and learn from both their peers and the instructor.

A significant highlight from the comments is the transformative impact of AI tools such as ChatGPT, Consensus, and Mendeley on students' academic experience. Students consistently reported

that these tools made the process of finding credible sources, generating content, and validating references both easier and more effective. The collaborative sharing of resources via Mendeley, in particular, allowed students to broaden their academic horizons, ensuring access to a diverse set of references and perspectives. This, in turn, helped raise the overall quality of their academic writing and deepened their analytical thinking.

Ethical use and prompt engineering also emerged as key themes in the feedback. Students acknowledged that being guided in ethical fact-checking and source validation with AI not only increased their trust in the process but also prepared them to apply these principles across other courses. There was a clear consensus that prompt engineering is not a purely technical process, but one that requires strategic thinking, iteration, and creativity—a perspective made possible by the staggered learning design. Thus, the feedback demonstrates that integrating staggered and collaborative approaches with AI tools leads to a more engaging, effective, and responsible learning environment. Students' comments suggest that such a model does not just enhance their immediate academic outcomes, but also lays the groundwork for adaptive, lifelong learning skills—equipping them for future challenges as digital transformation continues to reshape higher education.

CONCLUSIONS

The integration of artificial intelligence into higher education, particularly through staggered and collaborative learning models, responds to the evolving needs of students in the digital era. By gradually introducing students to generative AI and embedding ethical guidelines from the start, the instructional model ensures that learners not only become adept at using AI tools but also develop a strong sense of academic integrity. The approach of teaching prompt engineering conceptually, rather than focusing solely on technicalities, enables students to adapt to ongoing advancements in AI technology. Collaborative group work, supported by platforms such as Consensus and Mendeley, further enriches the learning experience by promoting knowledge sharing, critical dialogue, and peer feedback—key competencies for success in academic and professional settings.

Feedback from students reveals that this model significantly enhances comprehension, motivation, and creativity while reinforcing the importance of ethical AI use and strategic prompt engineering. The overwhelmingly positive responses indicate that the staggered, collaborative approach not only improves immediate academic outcomes but also prepares students for lifelong learning in an increasingly technology-driven world. These findings validate the effectiveness of the combined instructional strategy, suggesting that similar models could be broadly adopted across curricula to foster responsible, adaptive, and high-quality learning in higher education.

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