Article

Enhancing Service Plans Through Advanced Learning Technologies

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Abstract

Service-learning courses often involve university students teaching needy communities, which requires well-structured planning to ensure successful outcomes.

However, challenges such as students' inexperience and limited teacher feedback hinder the effectiveness of these initiatives. To address this, we integrated various technological tools during our 2024 service-learning trips to Cambodia and Tanzania. Central to this approach were both AIReAS and Padlet, two technological tools that provided essential feedback and support to students. AIReAS, the Artificial Intelligence Review Assessment System, offered instant rubric-based feedback on students' teaching proposals and enabled iterative refinements that helped students align their strategies with community needs, enhancing their planning efficiency and proposal clarity. Equally important, we deployed Padlet to create an anonymous virtual space where peers could provide honest feedback on teaching demonstrations, fostering a collaborative learning environment. By leveraging both AIReAS and Padlet, students benefited from comprehensive feedback mechanisms that enhanced their preparation and effectiveness in delivering educational services.

The study combined quantitative survey data and qualitative interviews with students, revealing that the synergy of AIReAS and Padlet improved the quality of service delivery plans. Despite the occasional feedback vagueness of AIReAS and the need for more human intervention, the findings highlight the potential of AIReAS and Padlet to revolutionize community-based learning by balancing digital tools with personalized mentorship. These results underscore the importance of leveraging technology to improve service-learning outcomes and provide recommendations for future projects aiming to refine this balance. By combining innovation with collaboration, service-learning initiatives can better empower communities and foster meaningful educational experiences.

Keywords

Artificial Intelligence (AI), feedback, peer evaluation, learning technologies, Padlet.

Introduction

Universities worldwide have implemented service-learning programs to foster students' sense of social responsibility. In some service-learning programs, students take on the role of teachers to deliver knowledge to needy communities. Traditionally, these educational initiatives relied primarily on direct, face-to-face interactions to address civic issues. However, in recent years—particularly following the pandemic—higher education institutions have increasingly leveraged technological tools to enhance both the planning and delivery of these initiatives.

Our service-learning subject, titled “Promoting Digital Literacy in Developing Societies”, aims to equip students with essential IT knowledge to educate service recipients. Each student will assume the role of a teacher for different sessions of the IT workshops, ensuring that all students contribute to the teaching process. In 2024, we embarked on two service-learning trips to Cambodia and Tanzania to deliver the teaching service.

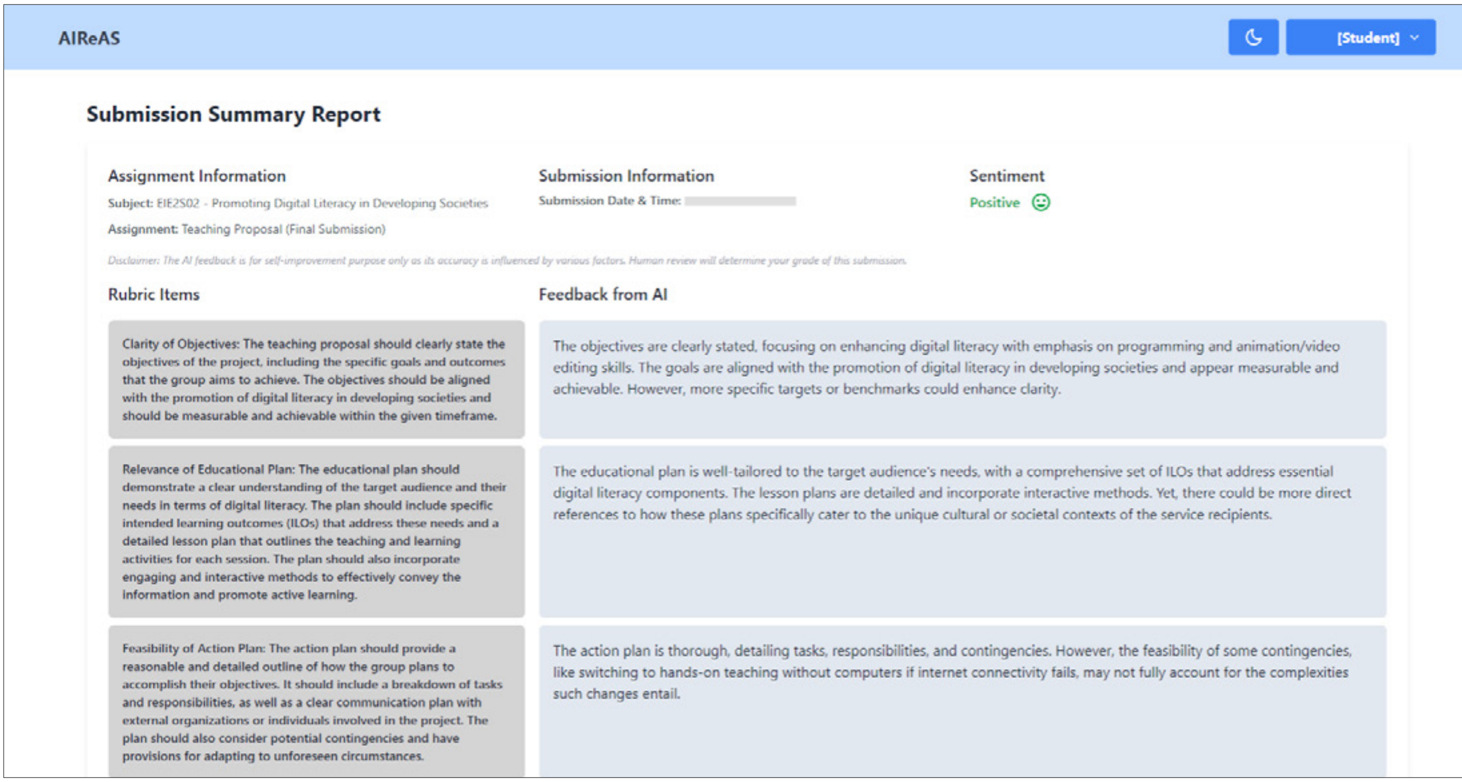
The curriculum covered basic programming tools such as Scratch, micro:bit, and Animaker. Our students worked in groups to develop and conduct IT workshops that combine lectures, tutorials, and practical exercises. Students were required to prepare teaching proposals that clearly outline the educational objectives of the service-learning project, detailing the specific knowledge they wished to convey on digital literacy and the targeted audience. Additionally, they needed to include a comprehensive lesson plan that explained the teaching methods, activities, and evaluation strategies they would use to engage and educate the needy in developing societies.

Prior to the delivery of services in the service-learning trips, students should plan how to carry out the service in the teaching proposal. Based on our previous experience, students encountered numerous problems figuring out their teaching proposals. However, teachers faced challenges in providing timely feedback on the numerous teaching proposals due to the volume and complexity of the submissions. Simultaneously, students often encountered difficulties in refining their proposals and felt hesitant to voice constructive feedback to their peers during teaching demonstrations.

To address these issues, we employed a blend of technological tools — AIReAS (Artificial Intelligence Review Assessment System) and Padlet — to help students learn with feedback and improve their planning.

We developed AIReAS as an AI platform designed to assist students in their writing assignments by providing immediate rubric-based AI feedback on tasks such as teaching proposals so that students could improve their planning according to the AI feedback, as shown in Figure 1. By enabling iterative refinements, AIReAS helped students align their strategies with the objectives, enhancing both their planning efficiency and proposal clarity. The platform took on a dual role by streamlining the project planning process and ensuring that the eventual service delivery was appropriate.

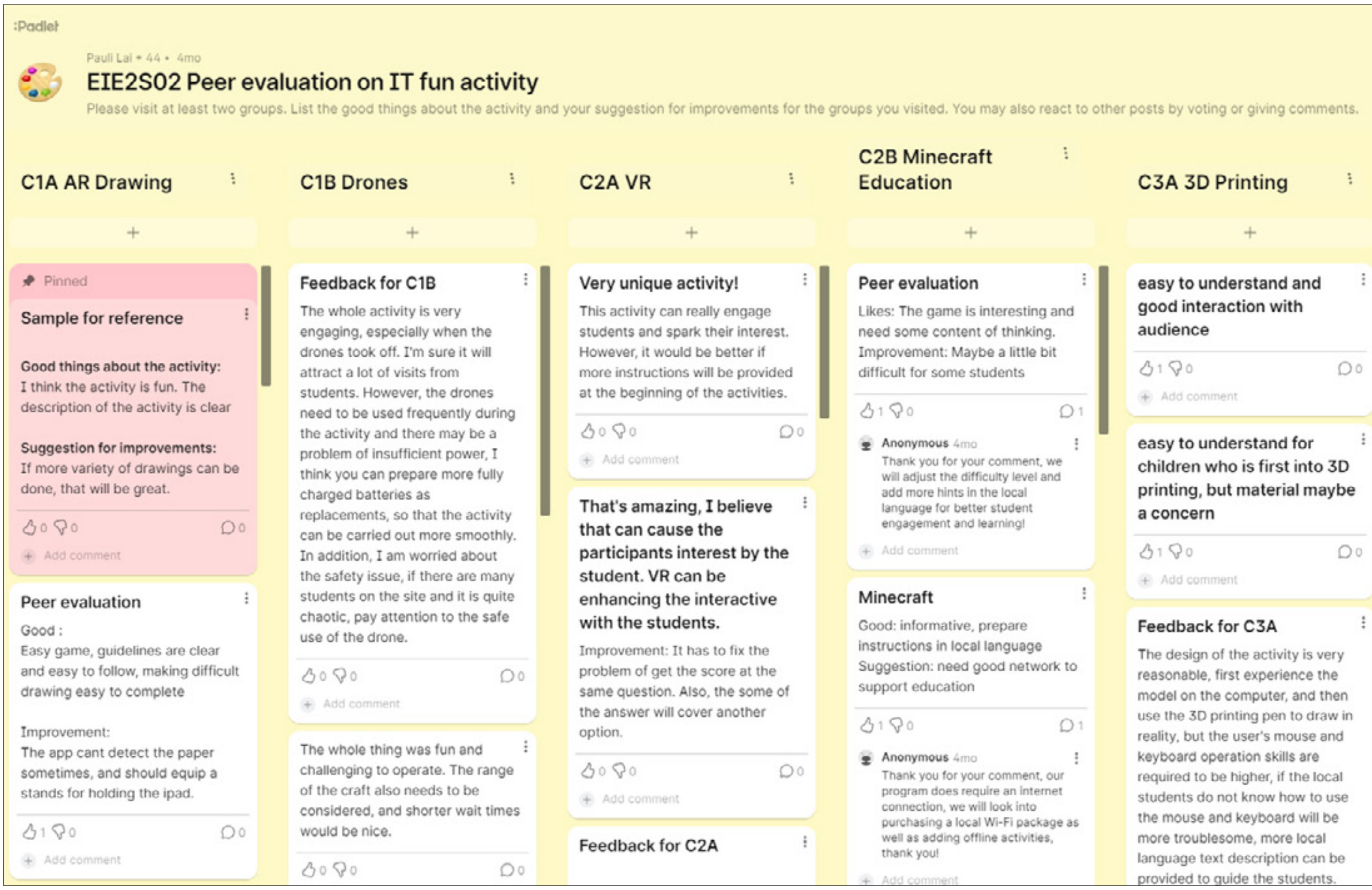
Figure 1. *Students used AIReAS to receive AI feedback on their teaching proposals.*



Note: Students used AIReAS to receive AI feedback on their teaching proposals. The AI feedback is given according to the rubrics.

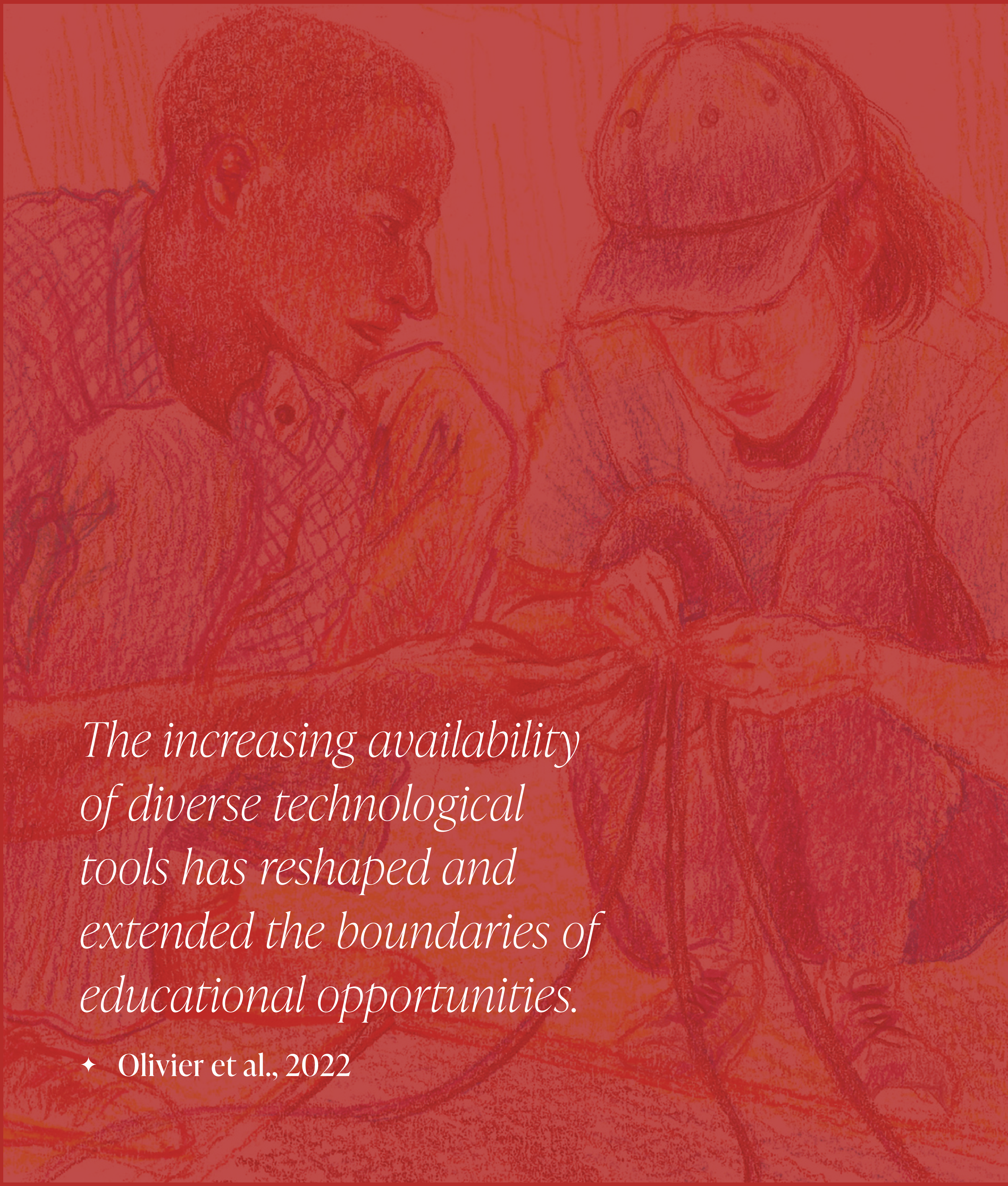
We also utilized Padlet to create a virtual bulletin board where students could post their comments and exchange ideas anonymously on their peers' demonstration of the teaching activity so that students could learn from each other, as shown in Figure 2. This anonymous virtual space encouraged honest and constructive feedback, fostering a collaborative and supportive learning environment for peer evaluation. We expected students to express concrete and pragmatic opinions without hesitation, allowing students to learn from each other effectively.

Figure 2. *Exchange of ideas on Padlet.*



Note: Students posted their comments and exchanged ideas anonymously on their peers' demonstration of the teaching activity such as AR Drawing, Drone, VR, etc., by using Padlet.

The primary objective of this paper is to explore how integrating these technological tools for the facilitation of feedback into the service-learning process contributed to better teaching plans and, thus, enhanced service delivery in Cambodia and Tanzania. Specifically, we examine the ways in which these tools facilitated the feedback processes and, subsequently, the preparation of teaching proposals, the customization of educational materials, and the overall responsiveness of our students in meeting local needs.



The increasing availability of diverse technological tools has reshaped and extended the boundaries of educational opportunities.

✦ Olivier et al., 2022

Drawing on qualitative interviews, reflective student feedback, case studies from the submission of teaching plans on AIReAS, and discussion on Padlet, the study argues that the blend of technological tools enhanced the plan of service-learning projects.

In the sections that follow, we first review the literature on service-learning, the importance of feedback, and the deployment of technology to enhance such initiatives. We then describe the methodological framework that guided our research. The results section highlights examples of how AIReAS and Padlet impacted the service-learning process—from improving proposal quality to fostering stronger community engagement. Finally, the discussion addresses both the successes and challenges of integrating these technological tools, underscoring the importance of better planning and preparation for successful service delivery.

By leveraging both AIReAS and Padlet, we found that students improved their planning and, thus, delivery of educational services. The blend of technological tools was well-received and helped students overcome obstacles in proposal development and peer feedback. We believe that this approach not only enhanced students' teaching preparation but also addressed local educational needs more effectively. This integration demonstrates a promising pathway for combining innovation with collaboration in service-learning initiatives, ultimately empowering communities and fostering meaningful educational experiences.

Literature Review

Experiential learning strengthens Higher Education Institutions' (HEIs) sustainability curricula through active methodologies that enhance Education for Sustainable Development and Sustainable Development Goals alignment while exposing students to real-world sustainability challenges through community engagement (Rodríguez-Zurita et al., 2024). Meanwhile, feedback provides insights that support learning development, connect with intended outcomes, and improve the educational process (Mapplebeck & Dunlop, 2020). In service-learning courses, instructor evaluations helped students recognize their capabilities while highlighting areas where improvement was needed (Yu et al., 2023). However, students often experience feedback as ineffective due to its poor timing, lack of relevance, and limited opportunities for implementation, resulting in mutual frustration for both educators and learners, as the current feedback practices fail to achieve their intended impact. (Carless, 2016). Well-directed feedback enables students to comprehend, interact with, and develop effective approaches for mastering learning content (Hattie & Timperley, 2007). Modern digital technologies provide educators with an expanded range of options for delivering feedback in online learning spaces (Narciss, 2013). Technology enhances assessment through dual benefits: it provides immediate and ongoing feedback that helps learners identify improvement areas, while simultaneously facilitating deeper content mastery through customized learning support (Deng & Benckendorff, 2022). The increasing availability of diverse technological tools has reshaped and extended the boundaries of educational opportunities. (Olivier et al., 2022). The evolution of technology requires educators to modernize their teaching and assessment methods, while maintaining a strong commitment to secure data management and student privacy protections (Bozkurt et al., 2023).

Technological tools like Padlet work in conjunction with AI-powered tools to foster student participation in their learning journey (Ahmad et al., 2022). A comparative study between technological tools of Padlet and Jamboard for English learning revealed that both tools could improve students' motivation in learning, with no significant difference in motivation levels between the two tools (Okmawati & Tiarina, 2022). The integration of emerging technologies with service-learning presents researchers with rich opportunities to enhance engineering education by creating immersive experiences that effectively engage, retain, preparing them for the evolving technological landscape's dynamic challenges (Narong & Hallinger, 2024). The effective technology integration in service-learning hinges on identification of common phases for service-learning implementation, which are drawn on Kolb’s (1984) experiential learning theory, technology support layer and stakeholders’ involvement patterns in service-learning (Bringle & Clayton, 2020). Service-Learning programs yield substantial improvements in students' personal growth, academic attitudes, community involvement, interpersonal abilities, and educational achievements (Burch et al., 2019). Study demonstrates that service-learning consistently enhances student learning achievements, regardless of the assessment methods employed (Warren, 2012). Service-learning can help students in two ways: they become more interested and involved in their classes, and they get better at solving complex, real-world problems that don't have clear-cut solutions (Guo et al., 2016).

Through service-learning experiences, students also develop better awareness of social issues, gain new personal perspectives, and improve their thinking skills (Yorio & Ye, 2012). Furthermore, research demonstrated that students with service-learning experience showed superior ethical decision-making capabilities through increased use of ethical sensemaking strategies, greater consideration for others' welfare, and enhanced reflective abilities that incorporated community needs and personal values, with the quality of their reflections positively correlating to their ethical decision-making performance (Sahatjian et al., 2022).

In summary, effective feedback is crucial in education, particularly in service-learning contexts where it guides students' development and enhances learning outcomes. The deployment of technology, such as digital feedback tools and collaborative platforms like Padlet, has the potential to address challenges associated with traditional feedback methods. By integrating emerging technologies into service-learning, educators can create more immersive and engaging experiences that not only improve educational outcomes but also prepare students to meet the dynamic challenges of an evolving technological landscape. This integration supports the development of essential skills such as ethical decision-making, cross-cultural awareness, and leadership competencies, which are vital for students to effectively contribute to society.

Methods

This study was conducted within the context of a service-learning course titled "Promoting Digital Literacy in Developing Societies". The course aims to equip students with essential IT knowledge to educate needy children, mainly teenagers, in Cambodia and Tanzania. The participants in this study included:

Our university students from diverse academic backgrounds (primarily engineering, electronics, and information technology), who were engaged in preparing and delivering service-learning projects.

To evaluate the impact of integrating technological tools—namely online bulletin boards and AI feedback platforms for writing assignments—on student learning and service delivery planning from an epistemological perspective, we employed a mixed-methods approach combining quantitative and qualitative techniques (Johnson et al., 2007). This comprehensive methodology enabled us to gain deeper insights into how these platforms influenced students' planning, proposal development, and execution of teaching activities.

Quantitative Data Collection

We conducted surveys to the university students participating in the service-learning course. The surveys aimed to assess changes in students' planning abilities, the quality of their teaching proposals, and their perceptions of the usefulness of AIReAS and Padlet.

Specifically:

- AIReAS Surveys: Following the implementation of AIReAS's AI feedback functionality for teaching proposals halfway through the course, we conducted a post-survey to evaluate students' perceptions of how the AI feedback impacted their service-learning outcomes.
- Padlet Survey: Pre- and post-surveys were conducted near the end of the semester to gather students' feedback on the use of Padlet during in-class teaching demonstrations.

Qualitative Data Collection

Semi-structured interviews were conducted with our students. The interviews focused on:

- The impact of AIReAS on proposal quality and how students incorporated AI-generated feedback into their proposal development processes.
- The influence of Padlet on enhancing peer feedback during teaching demonstrations and its role in fostering a collaborative learning environment.

Besides, a case study was conducted on the use of AIReAS, analyzing its capabilities in evaluating teaching proposals. We had another case study on using Padlet to inspire the flow of ideas.

Data Analysis

We utilized triangulation by cross-validating findings from multiple data sources to increase the reliability of our results. The quantitative survey data were analyzed using statistical methods to assess students' planning abilities and perceptions of the technological tools. The qualitative data from interviews and the case studies were thematically analyzed to identify common themes and insights regarding the impact of AIReAS and Padlet on the service-learning process.

Implementation of Technological Tools

Implementation of AIReAS

We engineered the AI Review Assessment System, abbreviated as AIReAS, a web-based AI platform that delivers automated feedback on writing assignments using customized rubric frameworks. The project evolved from its initial focus of developing a specialized AI model for evaluating service-learning reflective journals to leveraging ChatGPT's advanced Large Language Model (LLM) capabilities, resulting in a more versatile AI platform that can provide AI feedback on various writing tasks according to specific rubrics while reducing the time-intensive processes of data collection and machine learning training.

AIReAS features:

- Submission of writing assignments
- Generation of AI feedback based on rubric items
- Summarization and key point extraction
- Sentiment Analysis
- Instant Q&A AI chatbot for teachers
- Hybrid intelligence (combining AI feedback and human feedback)
- AI-generated grades adjustable by teachers

Our implementation of AIReAS leverages Microsoft Azure's GPT-4, OpenAI's advanced language model, through a carefully structured approach to assessment and feedback generation. The process encompasses:

Prompt Engineering Framework

- Initial Development: Creating foundational prompts that define assessment parameters (such as evaluating essay clarity and analytical depth)
- Refinement Process: Conducting iterative testing of prompts against various responses to optimize accuracy
- Rubric Integration: Incorporating specific grading criteria into prompts to ensure alignment with course objectives

Customizable Rubric System

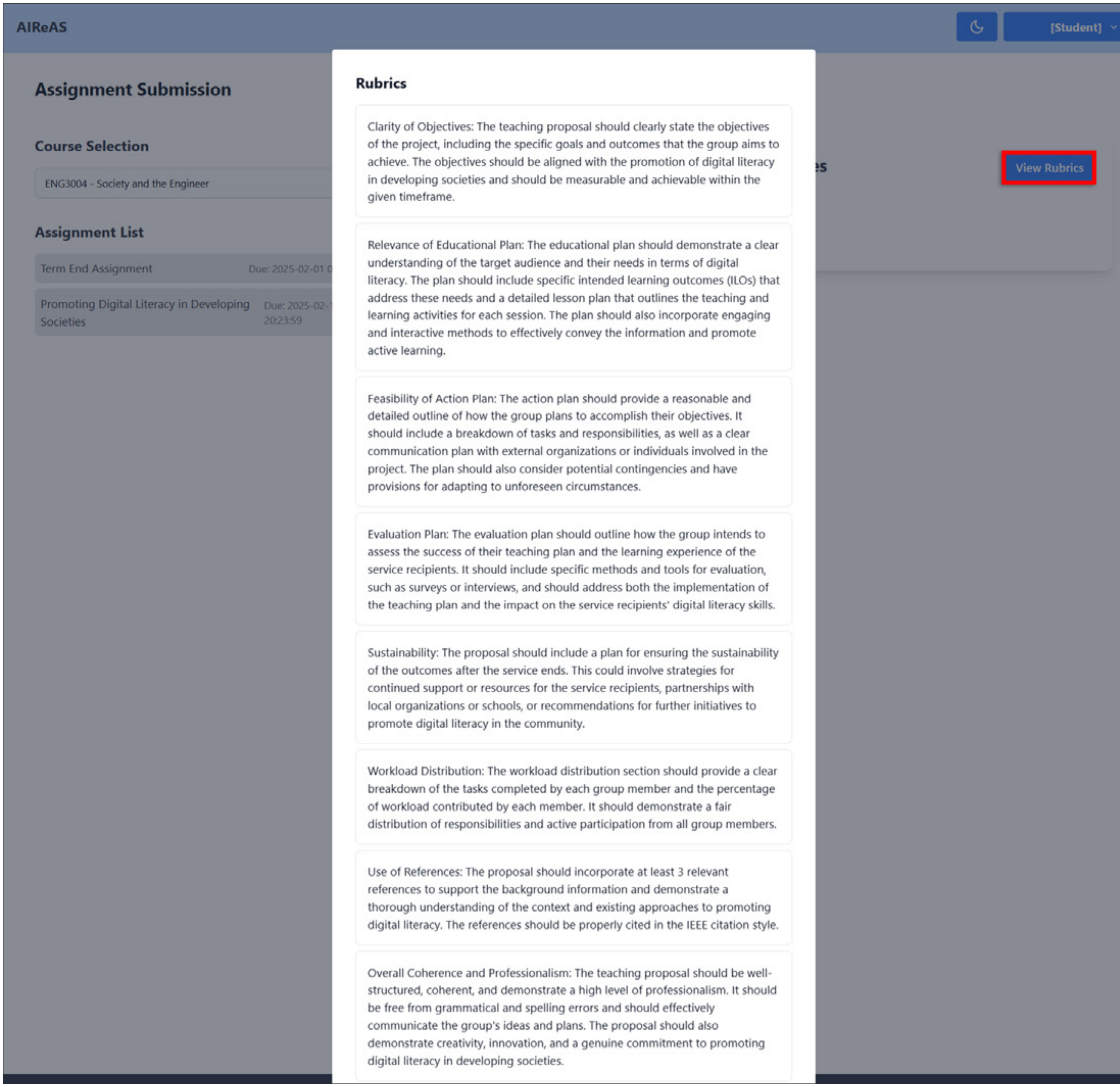
- Teachers can create and modify assessment rubrics for different writing assignments
- Each assignment type can utilize distinct evaluation criteria
- Assessment quality directly correlates with rubric design precision
- Careful consideration is required when developing rubrics to ensure appropriate evaluation of specific writing tasks

One of the writing tasks that students had to submit was the Teaching Proposal, which is our focus in this study. We rolled out the AI feedback on writing tasks midway through the course. The service-learning Teaching Proposal uses a specialized rubric framework tailored to its unique requirements. Upon logging in to AIReAS, students can view their courses and the writing assignments to submit. Students can click the “View Rubrics” button to view the rubrics, as shown in Figure 3.

As illustrated in Figure 3, the teaching proposals were evaluated using eight key rubric items: Clarity of Objectives, Relevance of Educational Plan, Feasibility of Action Plan, Evaluation Plan, Sustainability, Workload Distribution, Use of References, and Overall Coherence and Professionalism. Students could refer to detailed elaborations of these assessment criteria to write their teaching proposals.

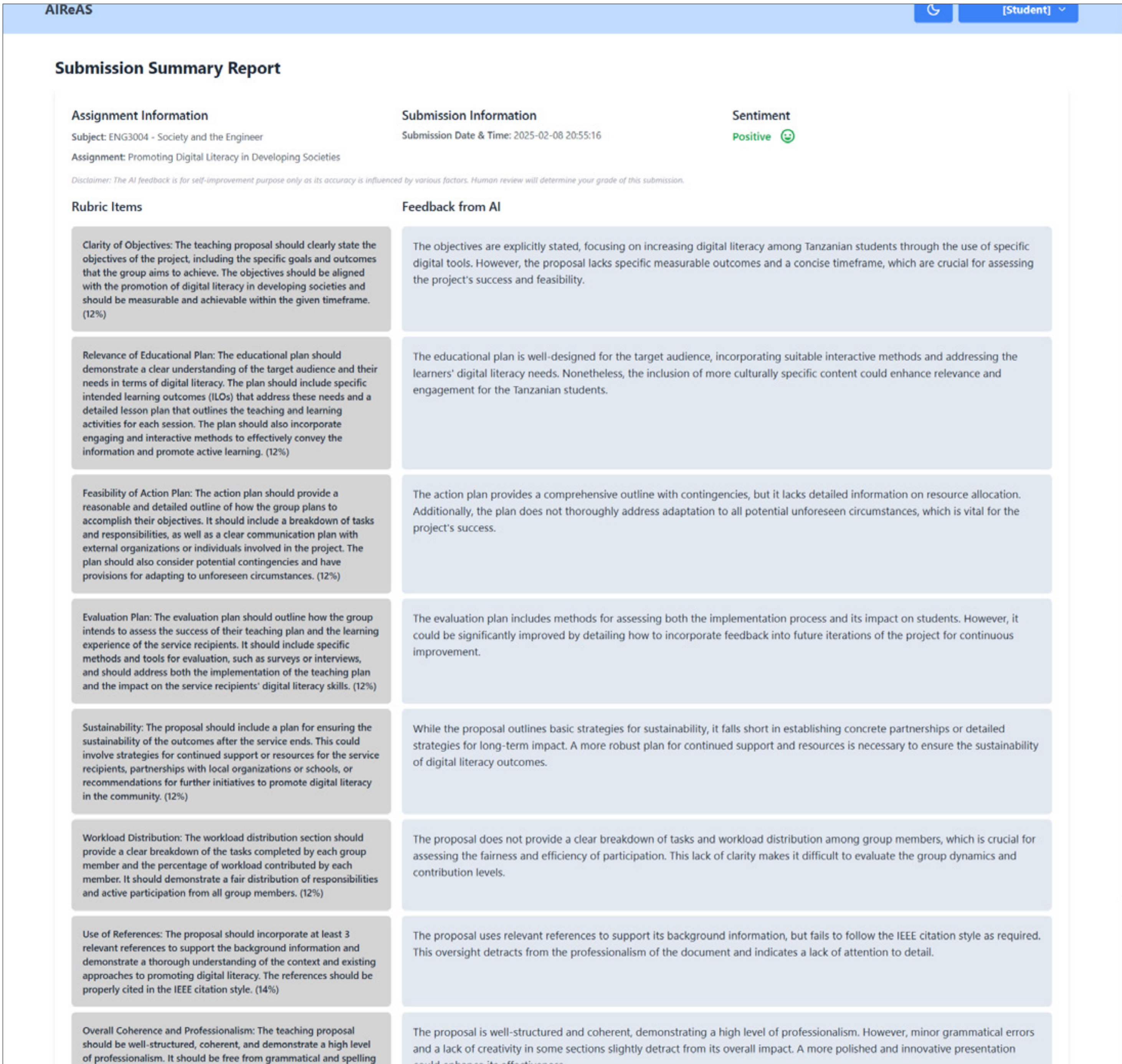
Following the submission of the Teaching Proposal as a writing assignment, students can view the instant AI feedback, as shown in Figure 4. AI feedback is given as a reference for students. Students could agree or disagree with the AI feedback. Students could refer to the AI feedback

Figure 3. *Rubrics of the Teaching Proposal on AIReAS*



Note: Students can view the rubrics of the Teaching Proposal on AIReAS to know how their writing tasks would be graded before working on it.

Figure 4. *AI feedback on the Teaching Proposal.*



Note: AI feedback for each rubric will be generated upon submission of the Teaching Proposal. Students could study the rubrics and work on their improvement.

to review the Teaching Proposals and revise them if necessary. There are no AI grades displayed for students. All teaching proposals are ultimately graded by teachers or teaching assistants.

Use of Padlet

Padlet is a digital platform that allows users to post and collaborate on virtual boards using text, images, videos, and links. It makes interacting fun and engaging for classes. Students went to the Padlet website and posted their comments anonymously.

With Padlet, we selected a template and added a title that reflects the purpose of the Padlet board for discussions on service delivery regarding the IT fun activities in Cambodia and Tanzania, respectively.

We began by sharing access to Padlet with students via a link while establishing guidelines, including posting etiquette and deadlines. We designed the peer evaluation in this way. While students were demonstrating their implementation of the IT fun activities, other students would walk around to see the demonstrations and provide some good things about the activity and suggestions for improvements for their peers on Padlet.

We divided students into twelve groups, and each group should come up with an activity called "IT fun," aiming at drawing the attention of students to technologies with the elements of fun. As shown in Figure 5, each group had its own title for the IT fun activity. For example, group C1A had AR Drawing as their IT fun activity. Meanwhile, group C1B had Drones, and group C2A had VR as the title of their activities. A sample of feedback is put on the left on a pink background for students to evaluate the pros and cons of the IT fun activities. Comments were submitted anonymously. Students could give their comments without worrying about offending their classmates.

Results and Discussion

Usage of AIReAS and Padlet

The AIReAS platform demonstrated significant student interaction through teaching proposal submissions:

- 39 total teaching proposals were received
- On average, 3.25 submission attempts per group
- This multiple submission pattern suggests students actively sought to improve their work based on AI feedback
- Of the 39 submissions, 32 students (82.1%) rated the AI feedback as valuable

The peer evaluation with Padlet for IT fun activities showed strong student involvement through Padlet. In a class of 49 students organized into 12 teams, each team showcased a distinct IT activity. The platform enabled groups to provide constructive feedback and suggestions for demonstrations. The engagement metrics were impressive:

- 102 total posts (averaging 8.5 posts per demonstrating group)
- 9 follow-up comments
- 50 voting reactions
- 46 unique student participants, representing a 94% participation rate.

Surveys of AIReAS and Padlet

The survey results in Figure 6 demonstrated the significant impact of AIReAS on students' proposal development process. An overwhelming majority of students, i.e., 93.33%, utilized the provided rubrics when crafting their proposals. AIReAS proved effective in enhancing the learning experience, with 81.82% of students confirming that AIReAS provided good ideas that deepened their subject understanding. Furthermore, 85.29% of students reported that the platform helped them identify key areas for improvement, enabling them to create more focused and effective plans. This structured guidance yielded positive outcomes, as 84.85% of students acknowledged that AIReAS assisted them in developing more comprehensive strategies for implementing digital literacy services among disadvantaged populations.

For Padlet, the pre-survey indicated that Padlet is not uncommon among the students as close to half of students used Padlet beforehand, as shown in Figure 7. In the post-survey, as shown in Figure 8, 78.38% of the students found it easy to use Padlet. 75.68% of the students agreed that it helped them understand more about their classmates' ideas than in a traditional classroom setting. 78.38% of them opined that Padlet helped them express their ideas more freely than in traditional classroom discussions. 75.68% of the students agreed that it helped them think more deeply about their classmates' responses. Overall, 78.38% of the students regarded the use of Padlet as improving their learning journey.

Case Studies of AIReAS

In a case study examining AIReAS's impact, we analyzed one group's initial and final teaching proposal submissions. AIReAS effectively identified planning weaknesses and helped improve the second submission, as detailed in Table 1. The results showed improvements in five out of eight rubric items (indicated by red italic fonts in the final Teaching Proposal column), demonstrating AIReAS's ability to help students develop stronger proposals. Manual verification confirmed the appropriateness of AIReAS's feedback, which helped students enhance both their planning and writing skills.

We noticed that the original teaching proposal of that group has 535 words while the final teaching proposal has 1,728 words. The final version of the teaching proposals exhibits notable improvements in writing compared to earlier drafts. The final teaching proposal of that student is more organized with clear section headings and a logical flow that starts with a detailed background and contextual setting, significantly strengthening the argument for promoting digital literacy in developing societies. The inclusion of precise statistical data and references enhances the credibility and depth of the content.

The student added a background in the final submission in response to the second rubric of Relevance of Educational Plan, in which there is the AI feedback of "The plan could be improved by providing a deeper analysis of the target audience's specific needs" to highlight the need for enhancement of digital literacy for the developing world:

Background:

> ***"According to the International Telecommunication Union (ITU), in 2019, an estimated 4.1billion people, or 53.6% of the world's population, had access to the internet. However, this access is not equally distributed, with developing countries lagging in terms of internet penetration and digital literacy. According to Digital Skills Gap Index (2021) by Wiley, Tanzania was ranked 13th out of 26 African countries surveyed, with a score of 3.3 out of 10 for digital skills, indicating a low level of awareness and skills among the population. According to Butt, M., almost 70% of children ranging from age 14 to 17 are not enrolled in secondary education, and these rates are significantly lower for girls."***

As mentioned in the newly added background of the final teaching proposal shown above, this lack of digital literacy has significant consequences, including limited access to information, education, and job opportunities. It also hinders the ability of individuals to fully participate in the digital economy and to benefit from the potential of technology to improve their lives. Furthermore, the COVID-19 pandemic has highlighted the importance of digital literacy, as many education systems have shifted to online learning, leaving those without access to digital tools and skills at a significant disadvantage.

The AI feedback highlighted the absence of a contingency plan in the "Feasibility of Action Plan" rubric. In response, the student added the missing contingency plan. Additionally, we observed that the final proposal demonstrated improved language quality throughout, featuring a more professional and formal tone along with

Table 1. *Rubrics and the AI feedback comparison of the initial and final submission of the Teaching Proposal*

Rubrics	AI feedback on the first Teaching Proposal	AI feedback on the final Teaching Proposal
Clarity of Objectives:	The objectives are clearly stated, align well with the goal of promoting digital literacy, and seem achievable. However, the measurable aspect of these objectives could be further detailed to enhance clarity.	The objectives are clearly stated, focusing on imparting digital literacy skills such as coding, animation, and virtual reality to Tanzanian students. However, the specific measurable outcomes could be better defined to assess the project's success.
Relevance of Educational Plan:	The educational plan is relevant and tailored to the needs of the target audience. It includes a variety of teaching methods and intended learning outcomes that are appropriate for promoting digital literacy. The plan could be improved by providing a deeper analysis of the target audience's specific needs.	The educational plan is well-tailored to the needs of the target audience, with a comprehensive lesson plan that includes interactive methods like discussions, games, and hands-on activities. It aligns with promoting digital literacy effectively.
Feasibility of Action Plan:	The action plan is well-structured and detailed, showing a clear path towards achieving the project's objectives. However, the plan lacks a detailed contingency strategy for potential unforeseen circumstances.	The action plan is detailed and considers various aspects of implementation, including task breakdown and contingencies. However, the proposal could further elaborate on specific strategies for adapting to unforeseen circumstances.
Evaluation Plan:	The evaluation plan includes a variety of methods to assess the project's success but lacks specificity in the tools and metrics for measuring digital literacy improvements among the participants.	The evaluation plan includes diverse methods such as surveys, interviews, and project showcases to assess the impact. Yet, the proposal could enhance by detailing the evaluation criteria and how they align with the project's objectives.
Sustainability:	The proposal includes a basic framework for sustainability, such as follow-up activities and partnering with local organizations. However, it could benefit from a more comprehensive strategy for long-term impact and engagement.	The proposal outlines a basic plan for sustainability through partnerships and continued support resources. However, it lacks a clear long-term strategy and detailed steps for ensuring the durability of the program's outcomes.

Table 1 contd. *Rubrics and the AI feedback comparison of the initial and final submission of the Teaching Proposal*

Rubrics	AI feedback on the first Teaching Proposal	AI feedback on the final Teaching Proposal
Workload Distribution:	The workload distribution section is missing, making it impossible to evaluate the fairness and participation of all group members.	The workload distribution among group members is mentioned, but the proposal does not provide a detailed breakdown of specific responsibilities and percentages of workload, which makes it difficult to evaluate fairness and participation.
Use of References:	The proposal does not mention or use any references to support its background information. Incorporating relevant references would strengthen the proposal's credibility and depth.	The proposal includes more than three relevant references, which are properly cited in the IEEE style. This demonstrates a thorough understanding of the context and supports the background information effectively.
Overall Coherence and Professionalism:	The proposal is well-structured and coherent, demonstrating a professional approach. However, it lacks creativity and innovation in its approach to digital literacy, which could have made it stand out more.	The proposal is well-structured and coherent, with minor grammatical errors. It demonstrates a high level of professionalism and commitment to promoting digital literacy. However, there's room for improvement in creativity and innovation.

enhanced grammar and consistency. The narrative connects teaching activities with the overall objectives, presenting a comprehensive lesson plan that outlines interactive sessions, hands-on exercises, and clear intended learning outcomes. Overall, before teachers intervene in marking the final submission, students can revise their drafts solely by referring to the AI feedback. With the AI's suggestions, students' revised drafts align much more closely with the rubric's requirements by identifying areas needing clarification or better organization. Addressing these remaining areas would further enhance their proposals before the final submission.

Case Study of Padlet

We observed the interaction of students on Padlet and found that students had good observation of different initiatives with concerns ranging from safety, contingency, and practicality.

Take the IT fun activity of Drones as an example, as shown in Figure 9. Students opined that the drones would be engaging, but there should be a sufficient supply of batteries and power. Certain crowd control and safety measures should be taken into consideration. Other comments include the waiting time. These comments contributed to the implementation of the drone initiative.

In another initiative of Microbit Car, as illustrated in Figure 9, students provided comments that Microbit Car is easy to use, but the backward button needs improvement. In the Minecraft Education initiative, as shown in , there were comments that students should be empathetic towards the service recipients' capabilities. The comment prompted the Minecraft group to make the initiative easier by providing more hints for the service recipients.

Discussion with students on AIReAS and Padlet

In interviews with 7 students who used AIReAS for developing their teaching proposals, several key insights emerged regarding the platform's effectiveness. Students opined that AIReAS helped refine their writing and develop more effective service-learning plans. One of the primary advantages of AIReAS is its ability to provide early, automated feedback before final submission. This early intervention allows students to pinpoint areas needing improvement, especially when traditional teacher feedback is delayed or unavailable. Students appreciated that the AIReAS guided them in interpreting the provided rubrics, thereby clarifying the expectations required to craft a well-structured proposal. The majority of students referred to these rubrics during their

Figure 9. *Padlet's Online Bulletin Board*

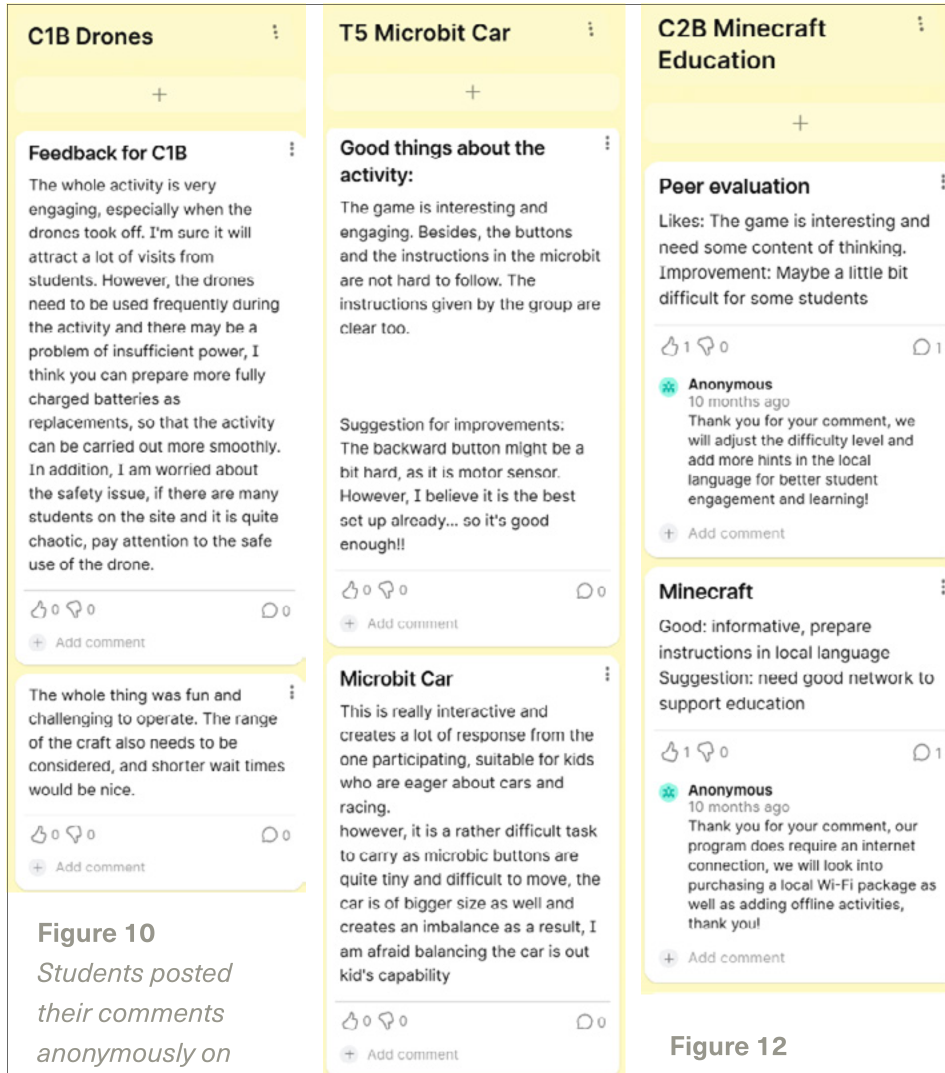


Figure 10
Students posted their comments anonymously on the planning of the Drone activity

Figure 11
Students gave suggestions on the planning of Microbit Car

Figure 12
Padlet prompted empathy from students in their planning of teaching materials

Note: Students opined that Microbit Car is easy to use while pointing out that the backward button needs improvement.

writing process. AIReAS reinforces a structured approach to developing proposals and service plans.

By offering a framework aligned with assignment objectives, AIReAS not only helped students identify core weaknesses in their drafts but also suggested potential directions for enhancing clarity and focus. This advantage is particularly important for service-learning projects that demand both technical precision and sensitivity to community needs. The AI-generated suggestions prompted students to revisit and adjust their work iteratively, leading to more comprehensive and thoughtful plans. Additionally, by facilitating a hybrid model of feedback—where AI feedback complemented traditional teacher evaluation—students experienced a more balanced review process that capitalizes on the strengths of both automated and human assessments.

However, despite these benefits, AIReAS has its limitations. A recurring concern among users is that the AI feedback provided can sometimes be overly generalized. While the system accurately identifies that changes are needed, it often lacks the specificity required to pinpoint precise areas of improvement. This vagueness can lead to confusion, leaving students unsure of how to best address the issues in their drafts. Such shortcomings underscored the need for closer integration with manual, teacher-led review to validate and refine the AI-generated comments.

Practical issues with the interface have also been raised. Students have mentioned that the extensive text output after submission can be difficult to interpret. This interface challenge, combined with the intrinsic limitations of AI understanding of context and nuance in creative writing, means that AIReAS works best as a supplementary tool rather than a standalone solution. In summary, when paired with active teacher engagement, AIReAS can significantly boost student learning and proposal quality, but its current limitations call for further refinement to fully meet the needs of service-learning assignments.

For Padlet, students opined that the process of posting feedback anonymously was a key feature that encouraged honest, uninhibited suggestions. One student noted that being able to leave anonymous messages allowed for more candid critiques, which in turn helped clarify areas for improvement in their work.

Students' opinions toward Padlet were generally positive. They appreciated Padlet enabled quick, early feedback—often even before formal teacher evaluations were available. This allowed them to identify and fix errors, adjust their writing, and fine-tune strategic elements of their IT fun proposals. The anonymity was seen as a double-edged sword; while it alleviated the pressure of being judged by peers, it also sometimes resulted in comments that were vague or lacked detail. Some students expressed that although the feedback was helpful in pointing them in the right direction, there could be more specificity. They felt that combining the anonymous peer feedback with targeted teacher input would create a more balanced review process.

Perspective of Teachers

As the service-learning teachers, we found that technological tools like AIReAS are valuable tools in facilitating student learning and engagement by providing timely and detailed feedback that helps students refine their writing and better understand assignment requirements. One of the major benefits of AIReAS was its ability to offer immediate, formative feedback during the writing process. This instant feedback allowed students to recognize and address errors early on—whether in structure, logic, or language—without having to wait for teacher comments in the traditional way of marking process. It provided students with a clear sense of what the expectations were, especially when they had to adhere to specific rubrics, thereby demystifying the grading criteria and enabling them to make focused improvements.

We also noted that the iterative nature of AIReAS was instrumental in helping


else {
return group_info;
out_undo_partial_alloc:
while (--i >= 0) {
Errors
Tasks
Console

students learn. By encouraging multiple revision cycles, the system enabled students to experiment with different ways of expressing their ideas and to view feedback as a pathway to continual enhancement rather than a final judgment. However, despite of the overall benefits of AIReAS, we were also keenly aware of its limitations. We noted about the occasional lack of specificity in the automated comments; the feedback sometimes appeared too generic or did not fully capture the subtlety of each student's work. This underscored the necessity for continued teacher involvement, ensuring that AI-generated suggestions were appropriately tailored and that deeper, discipline-specific guidance was provided when needed.

In discussing AIReAS's role in student writing assessment, we would prefer keeping the AI grades private because disputes may arise due to inconsistencies between AI and human assessments. These variations likely stem from multiple factors, particularly the limitations of AIReAS's underlying GPT4 model, which may lack crucial contextual information needed for accurate evaluation. The tool's primary value lies in its ability to provide constructive feedback rather than its grading capability. Although understanding the precise reasons for these grading discrepancies would be valuable, such analysis falls outside this paper's scope.

We also noted that Padlet's anonymous feedback feature created a comfortable environment for both positive and constructive criticism. The platform's organized display of peer comments allowed teachers to efficiently monitor feedback across different groups. This categorical presentation of comments proved valuable, as it helped identify which groups required additional guidance, especially when numerous suggestions for proposal improvements were provided. Padlet's interface made it an effective tool for managing and responding to student feedback systematically.

Overall, the blend of AIReAS and Padlet not only enhanced the learning process by promoting an environment of iterative improvement and self-directed but also supported a more balanced assessment method study with AI and human feedback. By integrating AI and human feedback into the learning cycle, students were better supported in developing clear, coherent, and comprehensive proposals that ultimately led to improved service plans and a more engaging educational experience.

Reflections on Discussion with Clients

The service-learning projects conducted by our students have garnered considerable praise from partner institutions in Cambodia and Tanzania for their transformative educational impact. In Cambodia, collaborations with New Life School and Living Water Farm revitalized local STEM education through interactive teaching methods utilizing modern tools like Micro:bit and Scratch. These interventions made learning more engaging, sparked renewed interest in STEM subjects, and established university students as relatable role models who inspired local pupils. At Living Water Farm, students developed tailored educational materials that dramatically improved learning capacity, bridged institutional gaps with local authorities, and created profound impact. Similarly in Tanzania, partnerships with Projekt Inspire introduced technology-focused initiatives that expanded service reach and addressed critical gaps despite resource limitations. The integration of modern teaching methodologies improved student engagement and teaching outcomes, with local educators expressing strong desire to extend these collaborations.

Overall, while client feedback emphasized broad gains in educational quality, cultural understanding, and community development, the role of technological tools — particularly AIReAS and Padlet — in shaping these outcomes warrants deeper exploration. Although these tools were instrumental in facilitating structured feedback that enhanced both teaching proposals and service delivery plans, clients primarily focused on the final service improvements and were unaware of the underlying technological support.

The interplay between AIReAS, Padlet, and client feedback reveals a dynamic feedback ecosystem that supported students in developing more effective service-learning plans. In effect, while good planning is essential, the delivery of service-learning depends on a multitude of factors, including the efforts and participation of all stakeholders. AIReAS and Padlet have proven to be valuable tools in facilitating the planning process, but their role in addressing the dynamic and context-specific needs of clients remains an area for further investigation. Without a robust mechanism to integrate client feedback into the feedback loop, the full potential of these technologies in enhancing service-learning outcomes may not be realized.

Conclusions

Our service-learning project embodied contributions to a world of common destiny. The integration of AIReAS and Padlet created a synergy that enhanced students' teaching proposals and service delivery planning.

AIReAS served as a structured framework that systematically identified areas for improvement and ensured alignment with key objectives. While students occasionally found AI feedback somewhat vague, the system successfully prompted deeper consideration in proposal writing and guided meaningful improvements. The platform evolved from simply assessing reflective journals to becoming a comprehensive rubric-based system capable of evaluating various writing tasks. Although participation in submitting teaching proposals through AIReAS was voluntary—making it challenging to quantify its overall impact—our post-survey revealed positive student perceptions of the AI feedback's influence on their service-learning outcomes. Importantly, we maintained a policy of non-disclosure regarding AI grades, emphasizing the platform's role in supporting writing development rather than assessment.

Complementing AIReAS, Padlet proved helpful as an interactive collaboration platform. Its ability to organize content, facilitate real-time interaction, and enable asynchronous contributions made it an effective hub for idea sharing and project tracking. Students can use Padlet to share resources, document project progress, and engage in peer feedback. The platform's anonymity feature fostered a transparent and inclusive environment where students felt comfortable expressing their ideas and suggestions for improving the IT fun activities. This peer feedback remained accessible throughout the planning and implementation phases, contributing to proposal refinement.

Despite certain limitations, the integration of AIReAS and Padlet into our service-learning curriculum successfully supported students in developing their teaching proposals and subsequent service delivery. The challenges encountered underscore the importance of hybrid intelligence—effectively merging AI capabilities with human feedback.

For future projects, we recommend several key improvements to enhance our service-learning initiatives. Enhancing digital support with personalized mentorship alongside AI feedback would create a more comprehensive learning environment. We also see value in investigating the discrepancies between human and AI grades on the AIReAS platform, as understanding these differences could lead to more effective assessment methods. Teachers' regular review of rubrics remains essential to ensure continued alignment with service-learning objectives. Finally, these collective insights should guide the development of better tools and approaches to facilitate teaching and learning activities, ultimately strengthening the overall educational experience.

This experience demonstrates that while technology can significantly enhance service-learning outcomes, its greatest value emerges when thoughtfully combined with human guidance and peer collaboration. Moving forward, understanding these dynamics will be crucial in developing more effective educational tools and approaches that enhance both teaching and learning activities, ultimately leading to more refined service-learning plans.

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References

Ahmad, A., Mukhaiyar, & Atmazaki. (2022). Exploring Digital Tools for Teaching Essay Writing Course in Higher Education: Padlet, Kahoot, YouTube, Essaybot, Grammarly. International journal of interactive mobile technologies, 16(13), 200-209. https://doi.org/10.3991/ijim.v16i13.30599

Bozkurt, A., Xiao, J., Lambert, S., Pazurek, A., Crompton, H., Koseoglu, S., Farrow, R., Bond, M., Nerantzi, C., Honeychurch, S., Bali, M., Dron, J., Mir, K., Stewart, B., Costello, E., Mason, J., Stracke, C. M., Romero-Hall, E., Koutropoulos, A., . . . Jandric, P. (2023). Speculative Futures on ChatGPT and Generative Artificial Intelligence (AI): A Collective Reflection from the Educational Landscape. Asian Journal of Distance Education, 18(1), 53.

Bringle, R. G., & Clayton, P. H. (2020). Integrating Service Learning and Digital Technologies: Examining the Challenge and the Promise. Revista iberoamericana de educación a distancia, 23(1), 43-65. https://doi.org/10.5944/ried.23.1.25386

Burch, G. F., Giambatista, R., Batchelor, J. H., Burch, J. J., Hoover, J. D., & Heller, N. A. (2019). A Meta-Analysis of the Relationship Between Experiential Learning and Learning Outcomes. Decision sciences journal of innovative education, 17(3), 239-273. https://doi.org/10.1111/dsji.12188

Carless, D. (2016). Feedback as Dialogue. In M. A. Peters (Ed.), Encyclopedia of Educational Philosophy and Theory (pp. 1-6). Springer Singapore. https://doi.org/10.1007/978-981-287-532-7_389-1

Deng, R., & Benckendorff, P. (2022). Technology-enabled learning. In Handbook of e-Tourism (pp. 1687-1713). Springer.

Guo, F., Yao, M., Wang, C., Yan, W., & Zong, X. (2016). The Effects of Service Learning on Student Problem Solving: The Mediating Role of Classroom Engagement. Teaching of psychology, 43(1), 16-21. https://doi.org/10.1177/0098628315620064

Hattie, J., & Timperley, H. (2007). The Power of Feedback. Review of educational research, 77(1), 81-112. https://doi.org/10.3102/003465430298487

Johnson, R. B., Onwuegbuzie, A. J., & Turner, L. A. (2007). Toward a Definition of Mixed Methods Research. Journal of mixed methods research, 1(2), 112-133. https://doi.org/10.1177/1558689806298224

Mapplebeck, A., & Dunlop, L. (2020). Student Learning in STEM, Feedback Practices. In M. A. Peters (Ed.), Encyclopedia of Teacher Education (pp. 1-6). Springer Singapore. https://doi.org/10.1007/978-981-13-1179-6_447-1

Narciss, S. (2013). Designing and Evaluating Tutoring Feedback Strategies for digital learning environments on the basis of the Interactive Tutoring Feedback Model. Digital Education Review(23), 7-26. https://doi.org/https://doi.org/10.1344/der.2013.23.7-26

Narong, D. K., & Hallinger, P. (2024). The evolution of service learning in engineering education: a bibliometric review of research (1995–2023). European Journal of Engineering Education, 49(5), 834-855. https://doi.org/10.1080/03043797.2024.2368148

Okmawati, M., & Tiarina, Y. (2022). A Comparative Study on the Implementation of Padlet and Jamboard Toward Students' Motivation. In (pp. 367-375). https://doi.org/10.2991/978-2-494069-85-5_39

Olivier, J. A. K., Oojorah, A., & Udhin, W. (2022). Multimodal learning environments in Southern Africa : embracing digital pedagogies. Palgrave Macmillan. https://doi.org/10.1007/978-3-030-97656-9

Rodríguez-Zurita, D., Jaya-Montalvo, M., Moreira-Arboleda, J., Raya-Diez, E., & Carrión-Mero, P. (2024). Sustainable development through service learning and community engagement in higher education: a systematic literature review. International Journal of Sustainability in Higher Education, 26(1), 158-201. https://doi.org/10.1108/IJSHE-10-2023-0461

Sahatjian, Z., Macdougall, A. E., & McIntosh, T. (2022). BENEFITS BEYOND SERVICE: THE FACILITATIVE EFFECTS OF SERVICE-LEARNING PEDAGOGY ON NUANCED REFLECTION AND ETHICAL SENSEMAKING. Academy of Management learning & education, 21(1), 7-34. https://doi.org/10.5465/AMLE.2019.0248

Warren, J. L. (2012). Does service-learning increase student learning?: a meta-analysis. Michigan journal of community service learning, 18(2), 56.

Yorio, P. L., & Ye, F. (2012). A meta-analysis on the effects of service-learning on the social, personal, and cognitive outcomes of learning. Academy of Management learning & education, 11(1), 9-27. https://doi.org/10.5465/amle.2010.0072

Yu, L., Du, M., & Zhou, X. (2023). E-Service-Learning during the COVID-19 Pandemic: The Experiences of Mainland Chinese Students Enrolled at a University in Hong Kong. Sustainability, 15(12).

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