Technology-enhanced action research for developing instructional practices that promote student engagement in ELT

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Amid increasing attention to learner engagement in technology-supported English language teaching settings, this paper presents how action research can help a university teacher refine strategies to enhance student engagement. Based on a collaborative pedagogical model, the research introduced Indexing and a structured group activity that allowed students to explore key concepts collaboratively, reflect on their progress and record their roles using digital platforms. Through repeated cycles of planning, action, observation and reflection, the teacher identified the primary barriers to engagement and adjusted instructional strategies accordingly. Data collected from classroom observations, interviews, reflective journals and surveys demonstrated that combining action research with digital tools created a more student-centred environment, indicated by greater learner agency, collaboration and motivation. The intervention transformed the classroom into a dynamic, shared learning space where students actively participated in meaningful technology-supported learning experiences.

Implications for practice and policy:

- Teachers can strengthen engagement by embedding structured reflection for both themselves and their students into routine classroom practice.
- School leaders can sustain participation by designing classrooms that intentionally promote student agency, collaboration, and digital literacy
- Professional development providers should position action research as an ongoing, adaptable process rather than a one-time initiative.
- Policymakers and curriculum designers can enhance teaching quality by supporting inquiry-driven, technology-integrated learning environments.

Keywords: action research (AR), English language teaching, technology integration, student engagement, qualitative research

Introduction

A teacher in a private university's English language education programme observed persistent low engagement among students enrolled in an online English language teaching (ELT) course. This phenomenon raises concerns that such disengagement could undermine essential development of pedagogical competence and compromise end-of-programme learning outcomes. Recognising the broader challenges documented in online ELT environments, particularly the difficulty of fostering sustained interaction and participation, the teacher (participant-practitioner) collaborated with us to initiate an action research (AR) project, grounded in the principles outlined by Kemmis et al. (2014), to examine and implement strategies to enhance students' active engagement in required learning activities. This study reports the design, implementation and evaluation of that intervention to offer empirical insights into how AR can support teachers in diagnosing classroom issues, testing contextually grounded solutions and strengthening student engagement in online ELT settings.

Research framework

AR for promoting teacher-student engagement in the classroom

AR has gained substantial recognition in education for its ability to connect systematic inquiry with classroom improvement through iterative, evidence-informed cycles. Building on Lewin's (1946) foundational model of planning, action, observation and reflection (Graumann, 2015), this methodology enables teachers to identify pedagogical challenges, design and implement targeted interventions and evaluate their effects in authentic classroom settings. Moreover, its participatory and collaborative nature (McTaggart et al., 2017) positions AR as a promising mechanism for strengthening teacher-student collaboration. Within this collaborative orientation, student participation becomes central to the learning process; when learners are invited into shared decision-making, teachers gain deeper insights into their needs and preferences (Somekh, 2005), and involving students in co-designing learning solutions further increases their motivation and sense of ownership (Alexander, 2018). These collaborative dynamics are reinforced by recent studies that active student involvement strengthens engagement and contributes to a more inclusive classroom climate (Nugroho et al., 2024). Extending this emphasis on collaboration, reflection is equally integral in AR. As another core element of the approach, reflective practice helps teachers examine and improve their instructional strategies (Lefebvre et al., 2023), and by systematically interpreting classroom evidence and responding to student feedback, they develop more adaptive and responsive pedagogical approaches, which, in turn, strengthen learner engagement (Smith et al., 2017).

Taken together, the evidence highlights how AR is increasingly viewed as a promising pathway for enhancing teacher-student interaction that promotes active participation and cultivates supportive learning environments (Buğra & Wyatt, 2021; Johannesson, 2024; Uztosun et al., 2018). Nevertheless, despite its demonstrated potential, there remains a need for further research on how diverse AR models can be adapted to varying educational contexts, particularly in systems seeking to foster sustained and meaningful teacher-student engagement.

In pursuit of an alternative research approach

In the evolving educational research landscape, the search for alternative methodologies has become imperative to address the teaching and learning complexities. Traditional positivist paradigms, including quantitative approaches, often fail to capture the depth of human experiences in educational settings (Biesta, 2007). Their structured nature often limits the ability to explore complex social dynamics, particularly in education, where human interaction and culture are central (Savela, 2018). Therefore, approaches that attend to the contextual and interpretive nature of classroom learning are needed. In response to these limitations, qualitative inquiry rooted in interpretivism and constructivism seeks to understand how learners construct meaning within social and cultural contexts. Methodologies such as grounded theory, ethnography and AR offer more flexible and participatory frameworks, allowing a deeper understanding of educational experiences (Yin, 2011). Despite their benefits, these methodologies remain insufficiently integrated into mainstream educational research, particularly with respect to methodological rigour and ethical considerations, including in ELT research. Recent studies have often focused on instructional effectiveness (e.g., Abdulaal et al., 2025; Jantakoon et al., 2025; Kusumo Adi & Ambarini, 2025) and have overlooked the cultural and relational contexts that shape the emergence of students' engagement issues. AR, as an alternative methodology, can bridge this gap by involving participants in the research process (Kemmis et al., 2019), thereby enabling them to share their experiences and contribute to the development of effective pedagogical strategies (Nugroho et al., 2020). Standardised testing and rigid surveys rarely capture the dynamic nature of classroom interactions (Savela, 2018), whereas qualitative approaches offer more adaptable frameworks that generate richer data (Nugroho et al., 2024). Additionally, quantitative methodologies often overlook the ethical implications of working with vulnerable populations, including students and teachers, while collaborative and community-based approaches can enhance ethical practice and foster trust between researchers and participants (Kemmis et al., 2019).

Given these considerations, AR has emerged as a promising methodology for teachers to critically examine and improve their practices. It addresses gaps in traditional research while enabling real-time investigation and responsiveness to student needs. This background led to the central inquiry of this study: "How does AR help the teacher examine ways to promote students' engagement in learning?"

Method

The rationales behind the research idea

The decision to focus on teacher-student collaboration was driven by the emerging issue and growing evidence that collaborative pedagogy significantly strengthens student engagement in required learning processes (Xu et al., 2024; Yuan, 2024). AR was selected for its relevance to ELT and its capacity to address classroom challenges through iterative cycles of continuous instructional adjustment (Buğra & Wyatt, 2021; Lu, 2017; Uztosun et al., 2018). This methodology, through systematic reflection, promotes teacher professional development (Kemmis et al., 2019) while actively involving students in shaping their learning processes, thus fostering greater ownership and motivation (Esparza et al., 2022). Therefore, AR offers a coherent methodological framework for examining how teachers improve instructional strategies to enhance student engagement and contribute to broader discussions on collaborative pedagogy in ELT contexts.

Participants

This research was conducted at a private university in Central Java Province, Indonesia, from September 2024 to February 2025. It was a collaborative project with a 39-year-old undergraduate ELT teacher. Collaboration emerged from joint discussions on how to promote student engagement in the ELT course. To address these concerns, they agreed to implement a student-centred indexing method, allowing students to independently document and categorise their engagement experiences throughout the semester. The study involved 23 fifth-semester English language education students, reflecting the institution's typical diversity of language proficiency. Although the class was not homogeneous, proficiency differences were systematically monitored through continuous assessment. Tasks such as peer-led discussions, project-based activities and group reflections ensured equitable participation across levels. Students maintained individual indexing logs of key engagement moments and challenges, later reviewed in reflective meetings to identify emerging patterns. Within this process, learner engagement was conceptualised as students' behavioural participation, cognitive involvement and emotional investment in classroom activities – a construct essential for developing the future English teacher's professional competence. Collectively, these collaborative and reflective activities positioned students as active research agents, generating deeper insights into strategies for fostering a more dynamic and participatory learning environment.

To ensure ethical compliance, all students were fully informed about the research's objectives, procedures and potential benefits. Ethical approval was obtained from the University Ethics Committee (approval No. 45a/B.1/SA-LPPM/VIII/2024) prior to data collection. Each student received a consent letter outlining participant rights, including confidentiality, voluntary participation and the right to withdraw at any stage without academic consequences; only those who signed were included. Digital artefacts (Google Docs logs and Google Meet recordings) were anonymised and securely stored in password-protected institutional storage, accessible only to us. This protocol ensured transparency, protected participant rights and reinforced the collaborative nature of the research.

Intervention design

This research explored participants' perspectives in depth rather than quantifying responses, prioritising meaning and insight to produce a richer understanding of the phenomenon. In this project, AR was selected to capture diverse data, uncover new perspectives and address dynamic situations, while overcoming the limitations of traditional methods (Dusty, 2024). Investigating substantive issues and

developmental processes within this research provided deeper insight into the factors that support or hinder change (Hardy et al., 2018). The teacher and students collaborated through structured AR activities to get new insights and refine their instructional and learning practices. The research followed a cyclical process of planning, acting, observing, reflecting and re-planning to ensure continuous improvement. Guided by the central question "How does AR help the teacher examine ways to promote students' engagement in learning?", each phase focused on enhancing student engagement through reflective and responsive teaching.

Table 1
Cyclical process of AR to promote student engagement

Pre-cycle				
Plan ►	Act ►	Observe ►	Reflect ►	Time frame
Identifying challenges in prior teaching.	Designing an intervention plan aligned with SCL and student engagement.	Conducting pre-course interviews and informal discussions.	Synthesising context-specific issues to inform Cycle 1.	Pre-course (1 week)
Cycle 1				
Plan ►	Act ►	Observe ►	Reflect ►	Time frame
Introducing SCL, indexing and collaborative structures.	Students participated in group planning, micro-teaching, role-play and peer feedback.	The teacher observed participation and documented group dynamics via indexing.	Teacher-student reflection on engagement gaps and strategy effectiveness.	Weeks 1–6
Cycle 2				
Plan ►	Act ►	Observe ►	Reflect ►	Time frame
Adapting tasks based on feedback, designing problem-solving and collaborative learning elements.	Students revised and performed tasks; the teacher facilitated feedback.	Observed classroom practices and peer interactions; formative feedback provided.	Class-wide reflection; students articulated teaching growth and challenges.	Weeks 7–12
Cycle 3				
Plan ►	Act ►	Observe ►	Reflect ►	Time frame
Planning the final lesson project and evaluation process.	Students designed and presented original lesson plans; peer and teacher review.	Monitored the quality of student performance and engagement via presentations.	Students completed indexed reflections and discussed the impact of the SCL approach.	Weeks 13–16

Before the project began, early data were collected through interviews and informal discussions to identify the teacher's concerns and his past teaching experiences. From these data, challenges such as low motivation, limited interaction, reliance on teacher-centred methods and professional development needs were highlighted. These findings guided the design of Cycle 1 to address the teacher's concerns and encourage a more student-centred, collaborative learning environment. This initial phase lasted about 1 week, during which all data were carefully documented and analysed to guide the project's development.

Cycle 1 of the intervention spanned 6 weeks and comprised four interconnected phases: planning, acting, observing and reflecting. In the planning phase (Weeks 1–2), students engaged in open discussions to reflect on past classroom experiences, identify gaps in engagement and become familiar with the principles of student-centred learning (SCL; e.g., Lea et al., 2003) and the indexing model. Peer

collaboration was introduced to promote interaction, supported by Google Workspace tools: Google Docs for journalling expectations, Google Meet for a virtual kick-off and Google Calendar for scheduling. The indexing task involved students documenting prior learning experiences and expectations for SCL. The acting phase (Weeks 3–5) emphasised active engagement through group-based planning and practice of ELT concepts, while the observing phase was conducted concurrently to systematically document students' participation, interaction and learning processes through the activities. Students collaboratively designed micro-teaching activities, led peer discussions and prepared storytelling or role-play tasks to apply their learning in meaningful contexts. Google Slides supported content development, while Google Drive served as the main platform for weekly submissions. Indexing during this phase required students to record their roles, learning outcomes and challenges, fostering metacognitive awareness and responsibility. In the reflection phase (Week 6), students participated in a structured group reflection session led by the teacher. They reviewed their indexing entries, assessed group dynamics and identified effective strategies and areas for growth. They completed reflection logs in Google Docs and shared them with the teacher, followed by a feedback session via Google Meet. This process reinforced learning and informed planning for subsequent cycles, ensuring continued responsiveness to students' needs.

Cycle 2, conducted over 6 weeks (Weeks 7–12), aimed to refine and deepen the teaching and learning practices developed in Cycle 1. During the revised action phase (Weeks 7–9), students refined their prior teaching activities based on feedback, integrating new collaborative techniques, such as problem-solving tasks, to enhance interaction and engagement. The focus was on enhancing teamwork, instructional skills and classroom participation. Google Workspace tools supported this phase: students used Google Slides to revise lesson plans collaboratively and Google Calendar to schedule presentations. In the indexing activity, they documented revisions, decision-making processes, and the impact of changes on their performance. In the observation phase (Weeks 10–11), students implemented their revised tasks while the teacher observed and provided formative feedback. This phase was intended to strengthen their confidence in teaching and classroom management. Feedback was shared via Google Docs, and debrief sessions held on Google Meet encouraged peer learning and open reflection. Students continued indexing by recording their reflections and feedback received. The cycle concluded with a reflection phase in Week 12, featuring a class-wide discussion of their learning journey. Students shared key takeaways and began articulating their teaching philosophies. They synthesised their experiences in a "My Teaching Growth" essay (Google Docs) and compiled all indexing documents in a shared Google Drive folder. The final indexing task captured their evolving understanding, confidence and teaching competence throughout the intervention.

Cycle 3, conducted during the final 4 weeks (Weeks 13–16), showcased learning outcomes and evaluated student progress and the tools used throughout the intervention. In the showcase (acting phase) and evaluation (observing phase) (Weeks 13–14), students designed and presented original ELT lesson plans as their final project, integrating theory with practice and preparing for future teaching practicums. Peer reviews and teacher evaluations provided layered feedback, supported by Google Slides for presentations, Google Docs for review forms and Google Meet for virtual panels when needed. The indexing activity required students to document their project contributions, reflect on feedback and set goals for future teaching. The Closure phase (Weeks 15–16) involved reviewing students' indexed entries and evaluating the indexing method as a reflective learning tool. Open discussions examined the impact of SCL and collaborative work across the intervention. Students submitted a complete portfolio via Google Docs, while overall project and tool feedback were collected via Google Forms. The final indexing task captured students' reflections on their learning journey and highlighted how the process supported their growth as reflective practitioners.

AR served as the central framework guiding the teacher in facilitating student learning throughout the intervention. Rather than adopting a directive, top-down approach, he engaged in cyclical planning, acting, observing and reflecting to refine instruction based on student needs and classroom realities. This positioned him as a reflective practitioner who critically examined his teaching, made evidence-informed adjustments and fostered engagement through continuous inquiry. We did not intervene directly in classroom instruction but supported the teacher through regular discussions to help him analyse

experiences, identify challenges and refine strategies. To ensure this process remained relevant and meaningful, an appreciative inquiry model was used to encourage the teacher to draw on successful past experiences, envision effective learning environments and co-construct plans for improvement (Campbell et al., 2024). Data from these reflections were further analysed using a threshold concept framework to identify key shifts in his understanding and address persistent difficulties (Land et al., 2016). By integrating these elements into the AR cycle, the teacher could more effectively guide his students in promoting a classroom culture rooted in reflection, collaboration and active engagement.

Data collection and analysis

Data were collected from multiple complementary sources. Classroom observations were conducted during synchronous online sessions, using a structured checklist focusing on behavioral, cognitive and emotional engagement. Both the teacher and students were informed of the observation schedule as part of the AR protocol. Students' reflective journals and indexing entries captured their evolving perceptions, metacognitive reflections and weekly engagement experiences. Semi-structured interviews with both students and teacher were conducted at the end of each cycle to obtain deeper insights into their learning behaviors and instructional decision-making. Self-evaluation reports allowed students to assess their participation and identify factors influencing their engagement. In addition, digital artefacts from Google Workspace, including collaboratively produced lesson plans (Google Docs), weekly discussion exchanges (Google Meet and Google Chat logs), project submissions (Google Drive) and cycle-end feedback forms (Google Forms), provided further evidence of students' interactive performance and participation patterns. The feedback forms also functioned as a structured perception survey administered across the three AR cycles, comprising 10 items, eight Likert-scale statements and two open-ended responses. Open-ended responses were analysed inductively to capture students' perspectives, while descriptive patterns in Likert-scale items across cycles supported the narrative interpretation and ensured transparent, systematic reporting. This multi-source approach provided rich, contextual insights and enabled data triangulation, strengthening the research findings' credibility. We collaboratively analysed the qualitative data, which often consisted of brief but focused remarks (Dong et al., 2020), using a shared codebook (see Table 2) to ensure consistency. The analysis process was iterative and cyclical, involving frequent discussions between coders to refine themes, resolve discrepancies and ensure reliability through consensus and, when necessary, code redefinition.

Table 2
Excerpts of the codebook for analysing reflective teaching for meaningful change

Theme	Code	Definition	Example quote
Reflective teaching for meaningful change	Self-reflection as a foundation for instructional change	Teacher's reflection on teaching practice	I … realised my methods weren't creating enough space for interaction.
	Pedagogical responsiveness through AR	Changes made to teaching strategies based on reflection or feedback	Open-ended questions, group-based tasks, and student-led reflections; … how students responded differently.
	Mutual reflection and metacognitive engagement	Reflections that help students realise their learning deficiencies and needs.	Weekly reflections helped me see my progress … and become more mindful in class.
	Teacher development in beliefs and attitudes	Beliefs or attitude development in teaching	The students' reflections were sincere …They helped me grow, too.

Following Braun and Clarke's (2006) six-phase framework – (a) familiriasing oneself with the data, (b) generating initial codes, (c) searching for themes, (d) reviewing themes, (e) defining and naming the themes and (f) producing the report – thematic analysis was employed to identify, analyse and report patterns emerging from the qualitative data. The process began with data familiarisation, where all transcripts were read and reread to ensure deep immersion and the generation of preliminary insights. In the second phase, meaningful data segments were methodically coded using NVivo (version 12), guided by a shared codebook to ensure consistency in identifying recurring patterns (see Table 2). To strengthen analytic rigour, two of us independently coded selected transcripts before comparing and reconciling discrepancies to enhance reliability. These initial codes were collated into potential themes in phase three, reflecting connections across the data set. In the fourth phase, themes were reviewed and refined for internal coherence and alignment with the data, with the other contributing by reviewing the coding framework and providing feedback on theme refinement. To enhance validity, findings from thematic analysis were triangulated with evidence from observations, document analysis and survey responses, ensuring consistency and strengthening the interpretive depth of the themes. Once defined and named in the fifth phase, the final themes were integrated into a detailed narrative in the reporting phase, supported by illustrative excerpts. This process provided nuanced insights into how AR helped the teacher critically examine and develop strategies that promoted active, reflective and student-centred learning environments.

Findings

This research examined how AR facilitated a teacher's critical reflection and strategic development to cultivate active, reflective and learner-centred classroom practices. The analysis revealed that student engagement emerged as a multidimensional construct shaped by the teacher's reflective practices, increased student agency, collaborative learning dynamics and purposeful integration of technology. These interrelated elements were consistently evident across the data and were synthesised into key themes. To ensure confidentiality and illustrate key insights, participant quotations are presented using pseudonyms.

Reflective teaching for meaningful change

This research examined how AR enabled a teacher to develop more effective strategies for fostering student engagement in an ELT course through reflective practice. The findings draw on triangulated data from in-depth interviews with the teacher and students, non-participant classroom observations and document analysis of reflective journals, learning artefacts and indexing entries, as well as survey responses. The emergent insights are presented through four interrelated sub-themes, revealing how reflection became a catalyst for meaningful pedagogical transformation and increased student participation.

Self-reflection as a foundation for instructional change

The teacher's reflective practice began with an honest review of his online instruction. Interviews revealed his concern about student passivity, which early observations confirmed through minimal interaction. He examined recorded lectures, participation patterns and classroom dynamics. At the same time, a brief student survey showed that many felt "unsure when to participate", and "not fully engaged". This process led him to acknowledge a core issue:

> I … realised my methods weren't creating enough space for interaction. (Interview – Teacher)

Document analysis further reinforced these insights. Reflection logs repeatedly noted "students silent throughout the session", and an "overreliance on lecture format", echoing survey responses where more than half of the students described the lessons as "too teacher-centred". The evidence signaled the need for instructional redesign, prompting the teacher to decentralise authority and amplify student voice.

Pedagogical responsiveness through AR

As his reflections deepened, the teacher began restructuring classroom practices. He used "open-ended questions, group-based tasks and student-led reflections" to test small shifts and observe "how students responded differently".

Observations showed increased use of active learning strategies, peer discussions and digital collaborative tools. Indexing entries and group task outputs indicated more varied and spontaneous contributions, while the end-of-cycle survey reported clearer expectations and greater comfort with group tasks. These signs suggested that the adjustments were positively addressing earlier engagement issues. These changes were also visible in the group Google Slides, which evolved from simple summaries to co-created visual presentations with peer comments. Students' Cycle 2 reflections described feeling "invited to participate" and "comfortable sharing opinions", and survey results echoed this progress, with higher self-reported participation and confidence in collaborative work.

Mutual reflection and metacognitive engagement

A key outcome was the emergence of a shared reflective culture. Reflection expanded from the teacher's practice to a consistent part of students' learning routines. As a student stated:

> Weekly reflections helped me see my progress … and become more mindful in class. (Interview – Student 1)

Observation notes showed that students increasingly referred to prior feedback during discussions, suggesting stronger metacognitive awareness. Post-cycle surveys confirmed this, with students reporting that reflective writing "helped track progress", "improved understanding" and "made learning more deliberate". Student journals further echoed these developments: "I didn't understand this concept at first, but after discussing it with peers, it made more sense" (Student 11); "I plan to ask more questions next time" (Student 3). These patterns indicated a shift in learner identity, with students seeing themselves as co-constructors of learning and reporting greater learning awareness and confidence in asking questions.

Teacher development in beliefs and attitudes

Beyond instructional changes, the AR reshaped the teacher's professional identity. Through observations, student feedback and self-reflection, he shifted from seeing himself as a knowledge transmitter to a learning facilitator. This became evident as he engaged with students' input:

> The students' reflections were sincere … They helped me grow, too. (Interview – Teacher)

Final surveys reflected this shift, with students describing him as "more responsive", "more supportive", and "more open to student ideas". Later observations and observation checklist records (Cycle 2) documented increased student-initiated discussions, more balanced participation and a warmer classroom atmosphere. Field notes (Weeks 8–10) recorded students smiling more, leaning in during group work and even volunteering to lead short segments. The teacher's post-cycle reflections mirrored these changes, noting that he "no longer felt the need to control every moment" and that teaching had become "more of a dialogue" (Teacher reflection log, Cycle 2). Another survey finding reinforced this mutual growth, highlighting stronger relational connections and a more collaborative learning climate.

Fostering student agency and active participation through AR

This section presents integrated findings from triangulated data sources, teacher and student interviews, classroom observations, document analyses and surveys. It illustrates how AR enabled the teacher to critically examine and transform his teaching practice to foster student agency and active participation. The data reveal an evolving interplay among reflective teaching, pedagogical adaptation, and student empowerment, within a collaborative, technology-enhanced classroom environment.

From passive attendance to meaningful engagement

Early classroom observations revealed a concerning trend. Students attended the online class but rarely participated. The early field notes described the students as being present synchronously but socially silent, with minimal spontaneous interaction. The teacher reflected:

> I noticed students were present in the session, but not really involved … Most just listened without interaction. That's when I started questioning my approach. (Interview – Teacher)

Similarly, a student reflected:

> I felt the class was a bit monotonous … I didn't know how to contribute, so I just listened. (Interview – Student 11)

An initial perception survey also indicated that most students lacked confidence in discussions. These findings, combining observation and student input, provided an early diagnostic foundation for addressing disengagement in the AR process.

Pedagogical space for student participation

Based on the analysis, the teacher redesigned his instruction. He incorporated "open-ended questions, small-group discussions, and tasks linked to students' real-life experiences", to encourage students' more active participation. As a result, involvement increased and "those who never spoke began contributing". Observations in Cycle 2 showed more dynamic breakout groups, with students taking initiative in organising roles. One student stated:

> Leading group discussions or presentations (micro-teaching) gave us more control and made me take it seriously. (Interview – Student 3)

Document analysis supported these changes. Student-created Google Slides became more complex and showed greater ownership, while reflection journals indicated growing awareness of their role in learning. The end-of-cycle survey also indicated clearer expectations and greater comfort with group tasks, confirming the observed increase in engagement.

Empowering student voice through structured reflection

Student agency was fostered through weekly reflective writing and asynchronous forums, giving students low-pressure opportunities to express understanding, confusion or insights. The teacher used these reflections to "recalibrate my instructional methods weekly", while students became more aware of their evolving learner identities:

> Writing reflections made me realise where I struggled and where I improved… It became part of how I think about learning. (Interview – Student 1)

The reflections' coding revealed recurring themes such as increased self-confidence, a sense of belonging, and active learning responsibility. Class observations confirmed this, showing students initiating discussions and giving peer feedback. The end-of-cycle survey reinforced these findings, with students reporting that reflective writing "helped track my progress" and "made the concepts clearer", highlighting the link between reflection, understanding and participation in interactive tasks.

Shared ownership of the learning process

A notable shift occurred as students began acting not only as learners but also as contributors to classroom design. For example, some students independently developed discussion guides, while others adopted or adapted the provided version to suit their needs, a change reflected in their journals that revealed growing ownership and a shared sense of the classroom as a learning space. Moreover, "several students intentionally revise the presentation criteria to make it more helpful for their peers" (Field note, Week 9).

This change reflects a shift from compliance to collaboration, with students taking on the role of learning designers. A survey confirmed that those reporting higher ownership were also more active in peer-led sessions, highlighting the link between perception, engagement and performance.

Professional growth through student agency

Observing student transformation became a source of professional renewal for the teacher. Collecting, analysing and responding to student data challenged old assumptions and fostered a more participatory teaching approach:

> This research made me realise that student activity isn't just about motivation… It's about how I design the experience. Their agency reflects mine. (Interview –Teacher)

> I used to focus on content delivery. Now, I focus more on interaction design and feedback loops. (Teacher reflection log)

The end-of-cycle survey confirmed this shift, with students describing the teacher as "more responsive", "more encouraging" and "more flexible", demonstrating how his evolving beliefs positively influenced engagement and collaborative performance. This illustrates how AR, guided by reflection and evidence, can drive sustained pedagogical transformation.

Collaborative learning and shared growth

This research investigated how AR enabled a university teacher to implement collaborative learning strategies that fostered shared responsibility and mutual growth among students. Drawing from triangulated data, the findings highlight how deliberate pedagogical shifts empowered students to co-construct their learning experiences and helped the teacher grow professionally through reciprocal engagement.

From fragmented attendance to collective purpose

Initial observations showed that students attended class but engaged minimally, mainly following instructions. Early survey data revealed unclear role expectations and low confidence in expressing ideas, confirming the observational findings. In response, the teacher introduced collaborative project-based learning with stable groups and defined roles (facilitator, note-taker, presenter and evaluator), supported by rubrics co-designed with students. A student stated:

> At first, it was awkward, but it helped us become more active ... We became used to sharing ideas and helping each other. (Interview – Student 21)

Document analysis confirmed this shift, student task plans showed greater complexity and ownership, while Google Slides and Drive artefacts reflected improved collaboration. Survey data further showed clearer role distribution and stronger perceived responsibility for group outcomes.

Structuring responsibility to build trust and engagement

The teacher carefully structured collaboration, scaffolding responsibilities within each group while allowing students to design their group roles and task flow, fostering ownership and accountability:

> We were allowed to decide who moderates, and who presents …That made us feel trusted and more responsible. (Interview – Student 12)

Observations confirmed that students independently distributed roles, initiated discussions, and reflected on their teamwork. The teacher described this cultural shift:

> Participation stopped being individual. It became a shared dynamic. They listened to one another and took ownership of the outcome. (Interview – Teacher)

Reflective journals supported students' self-regulation by documenting learning progress, conflict negotiation, and contributions to shared goals. A survey aligned with these behaviours showed that students rated themselves as "active contributors", with higher confidence in collaborative decisions, linking perceived responsibility to observed performance.

Reflection as a bridge between teacher and students

Group reflections, both oral and written, were consistently integrated into collaborative learning and served as diagnostic tools for the teacher and students. From the teacher's perspective, "reflections revealed more than results". He learned about "the group's struggles, what worked, and how they (students) perceived the task". This reflection also helped him decide what to do in the next cycle.

On the other hand, students perceived valued when the teacher made changes based on their suggestions:

> Adjustments to the task showed us that our feedback mattered. (Interview –Student 13)

Documents and reflection sheets showed a shift from early uncertainty to growing confidence, cooperation, and meta-awareness. Survey data supported this trend; students reported feeling "listened to", and noted that reflective spaces improved their engagement and group performance. This highlights the connection between perceived teacher responsiveness and increased participation.

Empowering mutual growth within a learning community

As collaboration strengthened, students also built closer emotional and cognitive connections. Classroom observations revealed spontaneous peer support and ongoing discussions outside class, consistent with the following interview excerpt:

> We got used to helping each other. Even after class, we continued our discussions. (Interview – Student 10)

The teacher, observing this organic growth, remarked:

> They learned from each other … I learned from them as well. (Interview –Teacher)

Document artefacts supported this development, with later phases showing student-designed rubrics and co-authored materials. Survey results echoed these patterns, indicating that students increasingly viewed the class as a collaborative community and felt that peer support significantly boosted their confidence and performance.

A reflective shift in pedagogical identity

The AR reshaped students' learning culture and transformed the teacher's professional stance, from content deliverer to learning facilitator:

> I used to feel the need to control every part of the process … Now, I focus on structure and trust. (Teacher reflection log)

This realignment was not accidental but a product of systematic reflection, observation and feedback integration, characteristics central to AR. The teacher's transformation was further validated through student survey responses, which indicated increased perceptions of teacher support, adaptability, and trust, confirming the reciprocal relationship between shifts in teacher belief and students' engagement and performance.

Technology as a catalyst for engagement and reflection

This study examined the integration of digital tools into classroom practice to enhance student engagement and promote reflective learning. Drawing on interviews, classroom observations, document analysis and survey results, the findings illuminate how technology served as a medium for content delivery and as an active agent for pedagogical transformation, personalised interaction and learner autonomy.

Technology as a gateway to engagement

Classroom observations initially showed low engagement, particularly in synchronous sessions. To address this, the teacher redesigned activities using Google Workspace tools, including Google Docs, Google Slides, Jamboard and Google Meet breakout rooms to create more accessible spaces for participation. A survey in Cycle 1 captured students' perceptions of this digital shift, helping determine whether increased online activity matched their comfort and readiness to engage.

An interview with the teacher revealed "students who were usually passive became more vocal in online forums". A shift was also echoed by a student, who stated, "I used to be shy about speaking in class, but writing in Google Docs helped me share my ideas more comfortably" (Interview – Student 6).

Subsequent observations recorded higher digital interaction and spontaneous peer support. Task logs and reflections indicated deeper participation and rising confidence, consistent with survey findings indicating that digital tools reduced social pressure and encouraged more consistent engagement.

Technology as a medium for structured reflection and personal growth

A key shift occurred when technology was used to structure reflective practice. Students submitted weekly reflections via Google Docs, and the teacher provided ongoing formative feedback, creating a feedback-reflection loop that strengthened student self-awareness and enabled real-time instructional adjustment. Survey data from Cycle 2 supported this development, showing that digital reflection helped students track their progress and clarify task expectations, which aligned with their increased participation in interactive activities:

> I read their reflections each week to map out what confused them and what worked. (Interview – Teacher)

> Writing reflections helped me realise what I had not yet understood. I started reviewing materials more carefully. (Interview – Student 4)

Over time, reflective entries shifted from brief comments to more thoughtful insights, for example, "connecting lesson topics … to ongoing group projects" (Interview – Student 17). Survey findings confirmed that students saw reflection as contributing to personal growth, reinforcing observed gains in metacognitive engagement.

Digital collaboration and shared learning responsibility

Technology also enabled real-time collaboration and helped distribute responsibility among students. Document analysis showed increasingly co-authored lesson plans and presentations in Google Slides, with clear contributions from multiple users:

> We created a shared folder in Google Drive, split the tasks, and edited documents together. (Interview – Student 2)

> They organised roles and collaborated as a team without me telling them what to do … their collaboration was maturing. (Interview – Teacher)

Observation notes confirmed this shift, showing groups initiating their own timelines, criteria, and peer feedback cycles. The survey findings further indicated that students viewed digital collaboration as increasing accountability and improving their performance on group tasks.

Responsive instruction and digital pedagogical design

Digital platforms also gave the teacher immediate insight into students' needs. When reflections showed confusion, he adjusted upcoming lessons by replacing lengthy explanations with infographics or video-based materials:

> Their reflections became my compass … If they were confused, I changed the delivery. (Interview – Teacher)

Students recognised this responsiveness as well:

> He understood when we were struggling, and by the next session, he often made adjustments to help us. (Interview – Student 10)

Document analysis and activity logs supported this pattern, showing that changes in materials and learning formats closely followed student feedback. These findings were further strengthened by students' responses, indicating that timely adjustments improved understanding and increased willingness to participate.

Empowering learner autonomy and identity

One notable outcome of the intervention was increased student ownership. Using tools such as Google Calendar, Google Docs and feedback trackers, students managed deadlines, monitored progress and set personal goals. They reported greater control over their writing and participation, shifting from passive to active involvement. The teacher also observed clearer week-to-week progress, while documents showed consistent goal-setting and self-assessment in journals. Survey results supported this trend, indicating that technology-supported autonomy strengthened engagement and improved overall performance.

Discussion

As an in-depth exploration of how AR enables the teacher to examine and refine strategies for promoting student engagement, this research identified four interconnected themes highlighting the reflective and collaborative nature of the engagement process. Drawing on the findings, this section discusses the themes summarised in Figure 1 – reflective teaching for meaningful change, fostering student agency and active participation through AR, collaborative learning and shared growth and technology as a catalyst for engagement and reflection – while also considering alternative explanations, prior research and the influence of students' varied English proficiency levels.

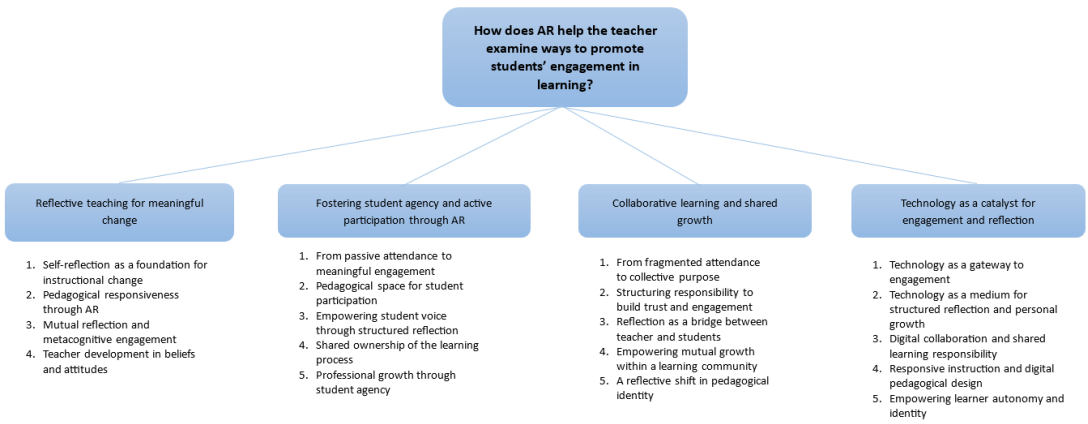

Figure 1. How AR empowers the teacher to foster student engagement

First, the study identified a major pedagogical shift captured in the theme “reflective teaching for meaningful change”. The teacher moved from primarily delivering content to becoming a reflective practitioner who regularly examined classroom interactions, student feedback and participation patterns to refine instruction. AR supported this shift by providing an iterative structure for continuous adjustment. This finding aligns with Lefebvre et al. (2023), who have argued that meaningful pedagogical change arises from a teacher’s willingness to critically evaluate practice. In this study, the teacher’s shift was motivated by both his recognising the limited effectiveness of traditional delivery methods in engaging learners and his personal commitment to improvement. Although increased engagement could be attributed to students’ gradual adaptation, the timing of instructional changes and student reflections explicitly linking engagement to these changes support the conclusion that reflective teaching was the primary catalyst (Sadigzade, 2025). Notably, students with lower English proficiency showed the greatest improvement as the teacher introduced more scaffolded, student-led activities. AR in the study functioned not only as a professional development tool but as a transformative process, shaping the teacher’s identity, instructional decisions and responsiveness to learners (Nugroho et al., 2024).

Secondly, the findings indicate a clear shift in students' learning involvement and responsibility, as captured in the theme "fostering student agency and active participation through AR". Initially, they participated passively with minimal interaction. As the teacher introduced structured reflection, choice and co-planning, the students gradually took greater ownership of their learning. This development resulted from intentional pedagogical changes that encouraged them to express ideas, monitor progress and influence classroom decisions. This aligns with self-determination theory (Ryan & Deci, 2020), which highlights autonomy, competence and relatedness as drivers of intrinsic motivation. While increased agency could be attributed to growing peer familiarity, student journals and interviews consistently linked their participation to opportunities for choice and contribution. Proficiency differences also shaped the process: higher-proficiency students led early discussions, but reflective and co-planning tasks helped lower-proficiency students participate more confidently. The agency grew because of structured opportunities, not language ability, marking a cultural shift from teacher-directed routines to a more collaborative learning environment shaped by students’ voices.

Thirdly, the research demonstrated that collaborative learning played a significant role in reshaping how students worked together (Sufian & Rahman, 2024), as reflected in the theme "collaborative learning and shared growth". Early in the process, group work was uneven and disconnected, with students contributing individually rather than truly cooperating. As the teacher introduced clearer roles and shared assessment tasks, groups became more cohesive and interdependent. This shift marked the emergence of a genuine learning community, where students supported one another both academically and emotionally. These findings align with sociocultural perspectives (Daniels, 2016; Luguetti et al., 2019), which view learning as socially mediated and strengthened through shared activity. Proficiency differences also shaped collaboration: higher-proficiency students naturally scaffolded peers, enabling lower-proficiency students to participate more fully. Instead of widening gaps, collaborative structures reduced linguistic barriers by distributing expertise across the group. Although increased familiarity among students was considered as an alternative explanation, the documented changes in group roles, structures and co-assessment practices indicate that intentional instructional design, not familiarity alone, drove this development. Collaborative learning enhanced student engagement while simultaneously strengthening the teacher’s evolving pedagogical approach (Buğra & Wyatt, 2021).

Finally, the research reveals that technology played a central role in strengthening engagement and reflection, as revealed in the theme “technology as a catalyst for engagement and reflection”. Rather than serving only as a content-delivery tool, digital platforms were used purposefully to support reflection, collaboration and ongoing feedback. This integration created more inclusive spaces for participation, especially for students reluctant to speak in class. The findings also indicate that technology helped bridge proficiency differences. Lower-proficiency students contributed more confidently in digital environments. They could work at their own pace and use built-in scaffolds such as revision tools and peer feedback. This supports Li and Walsh's (2023) view that purposeful technology use can deepen interaction and personalise learning. Alternative explanations, such as students simply preferring digital tools, were

considered but contradicted by reflections linking their engagement to structured opportunities for scaffolding and revision. Thus, technology enhanced not only efficiency but also how students interacted with the content, their peers and their own learning processes.

The four themes highlight that AR functions not just as an instructional tool but as a transformative professional learning process. It provides a systematic yet flexible structure helping the teacher navigate classroom complexities, make evidence-based adjustments and keep students' experiences at the centre, even in online settings. In this process, engagement emerges as a dynamic outcome shaped by reflection, student agency, collaboration and pedagogical innovation. The findings also show that these shifts were influenced by students' varied English proficiency, with the AR cycle helping reduce proficiency-related gaps. Rather than linear, the process is adaptive and continuously shaped by the evolving realities of both the teacher and students.

Conclusion, limitations and implications

This research positions AR as a catalyst for pedagogical transformation, enabling the teacher to critically examine and refine strategies that foster authentic student engagement. Key themes emerged from comprehensive qualitative analyses of interviews, classroom observations, document reviews and surveys. The findings illustrate that engagement is not a static outcome of instructional design but an evolving relational process shaped through iterative reflection, pedagogical responsiveness and shared responsibility between teacher and learners. Through cyclical, evidence-informed AR, the teacher became more sensitive to students' complex needs and better designed inclusive, learner-centred environments. Simultaneously, students shifted from passive attendance to active participation, strengthening autonomy, collaboration and reflective awareness. The resulting conceptual model (Figure 1) offers a framework for reimagining engagement not as a surface behavioral indicator, but as a deep dialogic practice grounded in co-construction, mutual growth and the intentional use of digital technologies to support meaningful learning.

Despite its contributions, this research has several limitations. The findings are based on a single case within one institutional and disciplinary context, which may limit generalisability, and rely solely on qualitative data without complementary quantitative measures. Although digital tools enhanced engagement, the research did not explore variations in digital access, digital literacy or long-term engagement beyond the intervention. Future research should examine reflective, student-centred approaches across diverse educational levels, disciplines and delivery modes, including hybrid and asynchronous learning environments.

This research has both practical and theoretical implications. For educators, incorporating structured teacher and student reflection into daily practice strengthens instructional responsiveness and engagement, while classroom designs that promote agency, collaboration and digital literacy support sustained participation. For researchers and policymakers, AR should be embedded in professional development as an ongoing, adaptable process rather than a one-time initiative. Ultimately, this research reinforces that effective teaching involves not only delivering content but also co-creating transformative learning environments through inquiry, connection and technology integration.

Author contributions

Kurniawan Yudhi Nugroh: Conceptualisation, Investigation (leader), Data curation and analysis, Writing, Review, Editing; **Muh. Syafei:** Conceptualisation, Investigation, Data analysis, Writing, Review, Editing; **Muhamad Rifqi Bakhtiar:** Investigation**,** Data analysis, Writing, Review, Editing.

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