AI-enhanced grouping for equitable interactive learning: An action research study with EAL students in an IB Film classroom

Author note
This study was originally conducted as the capstone research project for a Postgraduate Certificate in Education (PGCE). It demonstrates my ability to design, implement, and analyze a mixed-methods intervention in an authentic classroom context.

Abstract
This action research study investigates how AI-enhanced grouping strategies can support English as an Additional Language (EAL) students in an International Baccalaureate (IB) Film classroom at a Chinese international school. Using Elliott's cyclical action research model within a Vygotskian sociocultural framework, I implemented three two-week intervention cycles: (1) AI-randomized grouping, (2) teacher-designed grouping informed by interaction data and language proficiency, and (3) student-selected grouping supported by AI writing and design tools. A mixed-methods design drew on interaction transcripts, film portfolio scores, terminology quizzes, and teacher and student reflections.

The focal EAL student increased her average verbal turns per session from 2 to 10 across the cycles, while her film terminology score improved from 75 to 92 out of 100, a statistically significant gain ($t(14) = 4.32$, $p < .01$, Cohen's $d = 1.15$). Her film portfolio score rose from 80 to 89. Surveys and reflections indicated that students valued both the perceived fairness of AI-generated groups and the safety and scaffolding created through teacher-mediated and student-selected grouping.

The findings suggest that AI is most powerful when it provides an objective baseline that teachers then refine using contextual knowledge of students' language proficiency, personalities, and social dynamics. The study proposes a three-phase "Teacher–AI Collaborative Grouping" model that can promote more equitable participation for linguistically diverse learners in arts-based interactive learning environments.

Keywords: AI in education; interactive learning environments; EAL students; grouping strategies; action research; IB Film

1. Introduction

The International Baccalaureate (IB) Film curriculum is, by design, an interactive learning environment. It seeks to cultivate creativity, communication, and intercultural competence through collaborative film production, peer critique, and multimodal analysis (International Baccalaureate Organization, 2018). In linguistically diverse classrooms, however, this collaborative ideal is difficult to realize in practice.

The focal class for this study was an IB Film course at a Chinese international school, where 42 percent of students were non-native English speakers. EAL students in this context faced a dual challenge: they were expected to engage in high-level disciplinary discourse about film form and meaning while simultaneously developing academic English. Prior research has shown that in such settings, EAL learners are at risk of peripheral participation, especially when group work is organized without careful attention to language demands, roles, and classroom norms (Klinger, Vaughn, & Schumm, 2005; Sharma & Mandal, 2021).

At the same time, AI is rapidly entering classrooms as a tool for personalization, grouping, and learning analytics (Baker, 2022; Holmes, Bialik, & Fadel, 2021). AI-based grouping tools can reduce teacher workload and mitigate some forms of human bias by producing transparent, reproducible group assignments. However, they also raise concerns about decontextualization and equity. Algorithms that ignore language proficiency, personality, and peer relationships may produce groups that appear "fair" but fail to create the safety and scaffolding EAL learners need to contribute fully (Zhang & Li, 2023).

Two gaps motivated this study. First, much of the work on AI-supported grouping has focused on STEM subjects or large online courses. Less is known about how AI can be used in arts-based interactive learning environments, such as film production, where visual and embodied work create distinctive opportunities for EAL participation. Second, there is limited classroom-based, iterative research that uses cycles of evidence and redesign to refine AI-integrated strategies in context.

This action research addresses those gaps by examining how different grouping strategies – including an AI-generated baseline, teacher-designed groups informed by interaction data, and student-selected groups supported by AI tools – shape one focal EAL student's participation and learning in an IB Film classroom. Grounded in a sociocultural perspective, the study conceptualizes AI not as a replacement for teacher judgment but as a mediating tool within a broader ecology of human relationships, classroom practices, and ethical commitments to equity.

Research questions

The study addresses two research questions:

How do different grouping strategies (AI-randomized, teacher-designed, and student-selected with AI supports) influence an EAL student's participation and learning in an IB Film interactive learning environment?

How can AI-generated groupings and interaction data be combined with teacher judgment to support more equitable participation for linguistically diverse learners?

2. Theoretical framework and literature review

2.1 Sociocultural perspectives on EAL learners

This study is grounded in Vygotsky's (1978) sociocultural theory, which views learning as a socially mediated process. For EAL learners, progress is maximized through scaffolded interaction within the Zone of Proximal Development (ZPD), the distance between what a learner can do independently and what they can accomplish with guidance from more capable peers or adults.

In film education, visual and hands-on tasks such as storyboarding, shot composition, and editing can serve as mediational tools or "linguistic bridges" that allow EAL students to demonstrate understanding and influence group decisions even while their language resources are still developing (Brown, 2012). From this perspective, grouping is not a neutral logistical move. It is a core pedagogical decision that structures access to expert peers, meaningful roles, disciplinary language, and multimodal tools. Group composition can either activate an EAL learner's ZPD by aligning tasks and peers with their strengths, or reinforce marginalization by assigning them low-visibility roles that demand little talk or conceptual reasoning.

2.2 AI-driven grouping in education

Recent years have seen the development of AI-based tools that automate grouping decisions using data on student performance, demographics, and interaction patterns (Holmes et al., 2021; Baker, 2022). Such systems can quickly produce heterogeneous groups, reduce arbitrary teacher choices, and provide analytics about group dynamics. However, their effectiveness depends heavily on what data are collected and how results are interpreted.

In the present study, the AI tool used in the first cycle was a simple group generator that formed random groups based on student names and desired group size (Classtools, 2025). While efficient and transparent, this system did not account for language proficiency, prior collaboration history, or personality. More sophisticated systems can incorporate these variables, but they still risk reifying existing patterns if not critically examined (Holmes et al., 2021).

This has led to a growing interest in "human–AI collaboration" in grouping. Rather than replacing teacher judgment, AI is positioned as providing a baseline or set of candidate groupings that teachers can adjust based on local knowledge and pedagogical intent (Zhang & Li, 2023). This study contributes to that discussion by examining how a teacher used AI outputs and interaction data to iteratively refine group design in a specific interactive learning environment.

2.3 Ethical considerations in AI-mediated learning

AI in education raises ethical questions related to transparency, privacy, and equity (Holmes et al., 2021; Zhang & Li, 2023). Grouping algorithms can unintentionally produce "algorithmic ghettoization", systematically channeling EAL students into roles or peer constellations that limit opportunities to speak, lead, or demonstrate expertise.

Building on Zhang and Li (2023), this study adopts three guiding principles for ethical design:

Transparency: Students and parents should understand what data are collected, how groupings are generated, and how teachers will use AI recommendations.
Data minimization: Only essential, anonymized data should be collected to inform grouping decisions, reducing privacy risks.
Equity: Teachers should regularly audit AI outputs and classroom interaction patterns to ensure that EAL students are not consistently assigned to marginal roles, and should redesign tasks and groups when inequities emerge.

2.4 The present study

Taken together, these strands highlight a core tension. Sociocultural theory emphasizes context-sensitive scaffolding within learners' ZPDs, while many AI tools optimize for efficiency and statistical fairness. This study addresses that tension by examining how AI-generated groupings and interaction data can be combined with teacher knowledge to support an EAL student's participation, learning, and epistemic agency in an IB Film interactive learning environment.

3. Methodology

3.1 Action research design

The study employed Elliott's (1991) cyclical action research model (plan–act–observe–reflect) across three successive intervention cycles. Each two-week cycle involved a distinct collaborative film task, a specific grouping strategy, and structured data collection. Insights from one cycle informed modifications to the next. This design aligned with the situated, iterative nature of classroom-based design and positioned both teacher and students as co-inquirers into their learning environment.

3.2 Context and participants

The research took place in a Grade 9–11 IB Film class at an English-medium international school in Shenzhen, China. Fifteen students (ages 14–17) participated, including two EAL students who had recently joined the program. This article focuses on one focal student, "Mary" (pseudonym), a 15-year-old German–Chinese student with A2-level English proficiency and approximately three months of prior schooling in the program. She was selected for case analysis due to her initially low participation and self-reported anxiety about speaking English in group settings.

Ethical procedures followed institutional and national guidelines. Students and parents received bilingual consent forms explaining the study's purpose, data collection methods, and voluntary nature. Pseudonyms are used throughout. Participation had no impact on course grades.

3.3 Intervention cycles and data collection

Three distinct two-week cycles were implemented, each centered on a collaborative film project and a different grouping strategy. Figure 1 provides an overview of the three action research cycles and their associated grouping strategies.

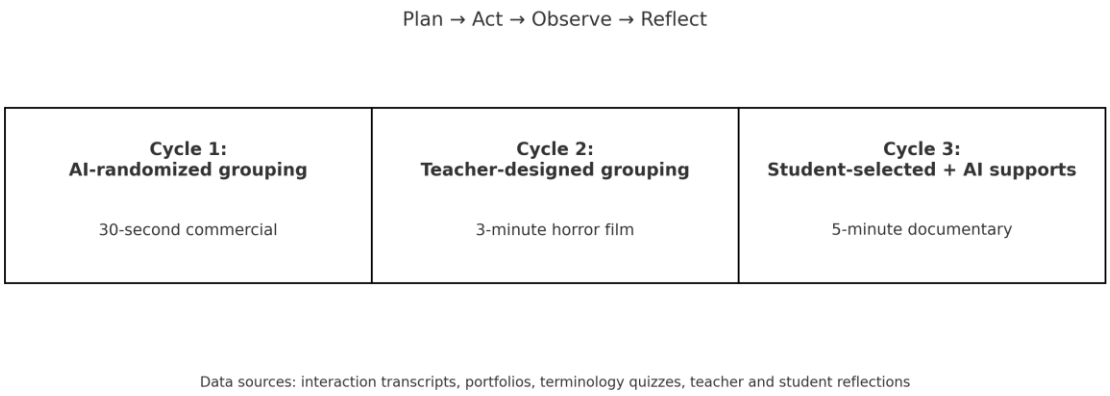


Figure 1. Overview of the three action research cycles and associated grouping strategies.
Each two-week cycle involved a different grouping approach within the IB Film interactive learning environment: (1) AI-randomized groups and a 30-second commercial, (2) teacher-designed, language-informed groups and a 3-minute horror film, and (3) student-selected groups with AI supports and a 5-minute documentary. All cycles followed Elliott's plan–act–observe–reflect structure and generated multimodal data, including interaction transcripts, portfolios, terminology quizzes, and reflections.

Cycle 1 (Weeks 1–2): AI-randomized grouping. Groups were generated using Classtools, which formed random groups based solely on student names and desired group size. No adjustments were made for language proficiency, personality, or prior collaboration. Students produced a 30-second commercial.

Cycle 2 (Weeks 3–4): Teacher-designed grouping. Using interaction data and reflections from Cycle 1, the teacher created linguistically mixed groups that balanced CEFR levels, personalities, and prior collaboration history. Mary, for instance, was placed with supportive, talkative peers and assigned the role of editor, which aligned with her visual strengths while requiring her to articulate decisions about pacing and shot selection. Students produced a 3-minute horror film.

Cycle 3 (Weeks 5–6): Student-selected grouping with AI supports. Students negotiated their own groups based on interest and rapport. Once groups were formed, they received access to AI tools such as grammar and design aids to support scriptwriting, storyboarding, and subtitles. The culminating task was a 5-minute documentary.

Table 1 provides a summary of the three intervention cycles, including grouping strategies, tasks, and key data sources.

Cycle	Grouping strategy	Main task	Duration
1	AI-randomized grouping	30-second commercial	2 weeks
2	Teacher-designed, language-informed groups	3-minute horror film	2 weeks
3	Student-selected groups with AI supports	5-minute documentary	2 weeks

Table 1. Overview of the three intervention cycles, grouping strategies, and tasks.

Data sources included:
Interactional data. Group work sessions were video-recorded. Transcripts were coded for number of verbal turns, use of film terminology, and the function of each contribution (initiating, responding, or minimal/passive).

Learning outcomes. Film portfolios were assessed using the standard IB rubric, and pre/post quizzes measured knowledge of core film terminology.
Reflective data. Teacher journals documented observations, design rationales, and emerging questions. Student surveys (Likert-scale and open-ended items) captured perceptions of fairness, comfort, and learning under each grouping condition.

3.4 Data analysis
Quantitative data from participation metrics, terminology quizzes, and portfolio scores were analyzed using SPSS 28. Descriptive statistics summarized patterns across cycles, and paired-samples t-tests examined changes in terminology knowledge. Qualitative data from transcripts, journals, and surveys were analyzed using Braun and Clarke's (2006) thematic analysis to identify patterns related to participation, agency, and perceptions of grouping strategies.
Given the small class size and the exploratory nature of a single-class action research project, statistical analyses are interpreted as descriptive evidence of change rather than as grounds for broad generalization.

4. Results
4.1 Focal student participation and learning
Mary's participation increased markedly across the three cycles. In Cycle 1 (AI-randomized groups), she averaged 2 verbal turns per session and rarely initiated contributions. Her talk primarily consisted of brief confirmations or responses when directly addressed. She did not spontaneously use technical film terminology, and peers often assigned her non-verbal roles such as acting.

In Cycle 2 (teacher-designed groups), Mary's average verbal turns increased to 8 per session. She used film terminology (for example, "jump cut" and "shot–reverse-shot") 12 times across the cycle, and 40 percent of her contributions were initiating moves, such as proposing edits or suggesting shot sequences. In Cycle 3 (student-selected groups with AI supports), her average verbal turns rose further to 10 per session, with 50 percent initiating. She used film terminology slightly less frequently than in Cycle 2 (9 uses across the cycle) but in more complex combinations while planning scenes.

Mary's assessed learning outcomes showed consistent improvement. Her film portfolio score increased from 80/100 in Cycle 1 ("limited EAL contribution to script") to 85/100 in Cycle 2 ("Mary's editing enhanced suspense and narrative clarity") and 89/100 in Cycle 3 ("documentary shows EAL leadership in planning and narration"). Her film terminology quiz score improved from 75/100 (pre-intervention) to 92/100 (post), a statistically significant gain ($t(14) = 4.32$, $p < .01$, Cohen's $d = 1.15$).

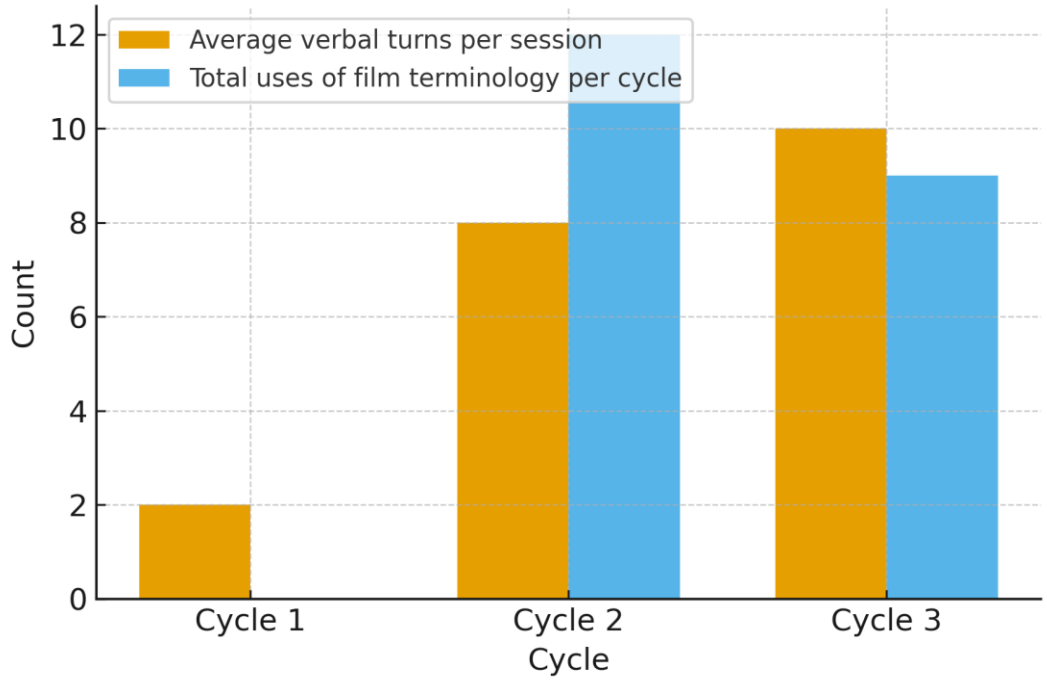


Figure 2. Changes in Mary's participation and use of film terminology across the three cycles. The darker bars show Mary's average number of verbal turns per session in each cycle (2 in Cycle 1, 8 in Cycle 2, and 10 in Cycle 3). The lighter bars show her total uses of film terminology per cycle (close to zero in Cycle 1, increasing to 12 in Cycle 2 and 9 in Cycle 3). Together, these trends illustrate a shift from minimal, largely responsive participation to frequent, more conceptually rich contributions as grouping strategies evolved.

4.2 Classroom interaction patterns

Analysis of whole-class transcripts indicated that grouping strategies shaped the distribution of talk within groups. In Cycle 1, groups were typically dominated by one or two fluent English speakers, with EAL students contributing infrequently and rarely taking leadership roles. In Mary's group, decision-making sequences often followed a pattern in which a fluent peer proposed an idea, another peer refined it, and Mary offered only brief confirmations.

In Cycle 2, linguistically mixed groups with explicit roles produced more balanced interaction patterns. In Mary's group, fluent peers frequently invited her input on editing decisions, and a recurring sequence emerged in which a peer asked a question, Mary proposed a visual or structural solution, and another peer elaborated or translated as needed.

Cycle 3's student-selected groups led to clusters of friends and familiar collaborators. For Mary, this arrangement, combined with AI-supported script drafting, resulted in high comfort and frequent initiation of ideas. In some other groups, however, student choice reinforced existing social hierarchies, with quieter students remaining peripheral.

4.3 Student and teacher perceptions

Survey responses (N = 15) showed a nuanced view of grouping strategies. A large majority of students (86.7 percent) preferred the autonomy of Cycle 3's student-selected groups, yet 73 percent agreed that "The teacher-designed grouping in Cycle 2 helped me learn more from peers" (mean = 4.2 on a 5-point scale).

Mary's reflections captured her changing experience:
On Cycle 1: "The AI groups felt fair, but I did not know how to join the talking."
On Cycle 2: "With the teacher group, my partners waited for me and helped when I forgot words. It was easier to try."
On Cycle 3: "With my friends and the AI tools, I could try more ideas and check my English before I said it."

In the teacher journal, I noted that "AI provided an indispensable objective baseline, but only teacher mediation could translate that data into a socially and linguistically supportive environment." This perception, together with student feedback, informed the development of the Teacher–AI Collaborative Grouping model discussed below.

5. Discussion

5.1 A Teacher–AI Collaborative Grouping (TACG) model

The findings provide preliminary support for a hybrid "Teacher–AI Collaborative Grouping" (TACG) model. In this model, AI-generated groupings serve as a transparent and efficient starting point, while teachers remain central in interpreting data and redesigning groups for equity. Figure 3 summarizes the main components and feedback loops of this model.

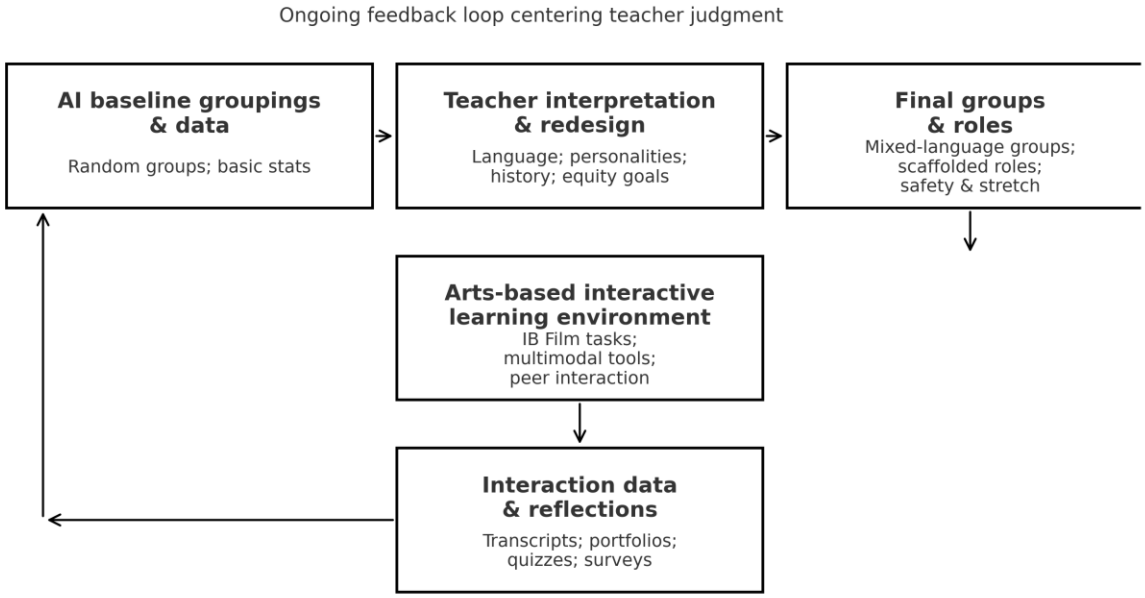


Figure 3. The Teacher–AI Collaborative Grouping (TACG) model.
In this model, AI-generated baseline groupings and simple interaction data provide an efficient and transparent starting point. Teachers then interpret these outputs through contextual knowledge of students' language proficiency, personalities, prior collaboration histories, and equity goals to redesign group compositions and roles. The resulting groups participate in an arts-based interactive learning environment, generating multimodal evidence of participation and learning (for example, transcripts, portfolios, quizzes, and surveys). These data in turn inform subsequent AI recommendations and teacher decisions, creating an ongoing feedback loop that centers teacher judgment while leveraging AI for efficiency and visibility.

The largest gains in Mary's participation and terminology use occurred in Cycle 2, when AI-derived baseline information about interaction patterns was combined with teacher knowledge of students' language levels, personalities, and relationships. The teacher's role was not simply to override AI decisions but to interpret data through a sociocultural lens and redesign groups to provide both safety and challenge. In this sense, the TACG model operationalizes a form of human–AI collaboration in which teachers remain central as ethical and pedagogical decision-makers.

5.2 Epistemic agency and AI-mediated scaffolding
Mary's trajectory illustrates a shift from presence to epistemic agency. In Cycle 1, AI-randomized grouping placed her in a formally fair group, but the arrangement did little to support

her in initiating ideas or claiming authorship. Cycle 2's teacher-designed grouping, with a carefully chosen role and supportive peers, created conditions in which she could experiment with new discursive moves. Cycle 3 then combined that growing confidence with peer choice and AI supports, allowing her to use tools to draft, revise, and present ideas.

These shifts highlight the importance of viewing AI not only as a mechanism for distributing students across groups, but also as part of a broader ecology of tools that can scaffold planning, language rehearsal, and multimodal expression. For EAL learners, AI-based writing aids and templates can reduce affective barriers to speaking by enabling them to rehearse language and content before entering live interaction.

5.3 Ethical design: transparency, data minimization, and equity

The study also underscores ethical considerations in AI-mediated grouping. Mary reported feeling more comfortable once she understood what data were being collected, how they would be used, and that her language level would not be publicly displayed or used to "label" her. Transparent communication about AI tools and data practices was essential for building trust. Regularly monitoring groups for patterns of marginalization – such as EAL students consistently occupying non-verbal roles – emerged as an ongoing teacher responsibility. In this study, interaction transcripts functioned as a simple but powerful audit tool, making visible who spoke, when, and in what roles. This aligns with calls to pair AI analytics with critical, equity-focused teacher inquiry (Holmes et al., 2021; Zhang & Li, 2023).

5.4 Implications for interactive learning environments

For educators designing interactive learning environments, particularly in arts-based subjects, several implications follow:

Treat AI as a draft generator. Use AI-generated groups as an initial proposal, then refine them using knowledge of students' ZPDs, language proficiency, and social dynamics.

Design roles as scaffolds. Assign roles that both leverage EAL students' strengths (for example, visual design) and gradually increase linguistic demands, aligning with their ZPD.

Pair grouping with AI-mediated scaffolds. Provide AI tools that help learners plan and rehearse contributions, lowering the risk of public failure in live interaction.

Make AI visible and discussable. Involve students in reflecting on how AI and human decisions shape their opportunities to speak, lead, and learn.

5.5 Limitations and directions for future research

This study has several limitations. The sample size was small, and the research focused on a single IB Film class in one international school, limiting the generalizability of findings. The AI tool used for initial grouping was relatively simple and did not incorporate language or

behavioral data beyond student names. Moreover, the in-depth case analysis centered on one EAL student; other learners may have experienced the interventions differently.

Future studies could implement the TACG model in larger and more diverse cohorts, across both arts and STEM subjects, and in different cultural contexts. Research using more sophisticated adaptive grouping systems could explore how integrating language proficiency and interaction data directly into group formation affects participation. Longitudinal designs following EAL learners over multiple years would also help clarify how AI-mediated grouping influences identity, agency, and achievement over time.

6. Conclusion

This classroom action research demonstrates that AI-enhanced grouping strategies, when embedded in a thoughtful framework of human–AI collaboration, can support more equitable interactive learning for EAL students in an IB Film classroom. The study suggests that the central design question is not whether to trust AI or teachers more, but how to orchestrate their complementary strengths.

AI excels at providing an efficient, transparent baseline for group composition. Teachers remain indispensable in interpreting data, honoring students' lived experiences, and designing socio-emotional and linguistic scaffolds. When used together, as in the Teacher–AI Collaborative Grouping model outlined here, they can help move EAL learners from the edges of classroom talk toward positions of authorship, leadership, and epistemic agency.

For my emerging research trajectory, this project marked a shift from viewing AI as a technical add-on to understanding it as a deeply social and ethical tool. It laid the groundwork for my ongoing agenda on AI-mediated literacies, multimodal traces of learning, and research–practice partnerships across schools, industry, and community settings. I hope to continue refining and testing such designs with educators and learners, contributing to interactive learning environments that amplify, rather than erase, students' diverse ways of knowing.

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