Seeing collaboration across three layers: framing, enacting, and experiencing group work" for conference

Aims and Research Focus

Collaboration is widely promoted in contemporary education as a means to support conceptual understanding, dialogic engagement, and the development of social and cognitive competencies. In mathematics education, group work is often assumed to foster shared reasoning and collective sense-making. However, research consistently shows that collaboration does not automatically arise from grouping students or designing inquiry-oriented tasks (Barron, 2000; Gillies, 2016; Webb, 2009). Rather, collaboration must be understood as an interactional accomplishment that emerges through participants' moment-by-moment coordination, responsiveness, and shared epistemic orientation (Barron, 2003; Goodwin, 2000).

The aim of this study is to examine how collaboration is framed by teachers, enacted by students, and experienced by learners during a mathematics activity in a Norwegian Newton Room, a designed learning environment emphasising inquiry-based and dialogic STEM learning. By combining video observations of instruction and group work with stimulated recall interviews, the study explores tensions between instructional intentions, interactional practices, and students' retrospective interpretations of collaboration.

The study addresses three research questions:

1. How do teachers frame collaboration and group work in plenary instruction?
2. How is collaboration enacted during student group work?
3. How do students describe and interpret their collaborative experiences after the activity?

Method

The study adopts a qualitative, lesson study–inspired design focusing on one Newton Room mathematics session with a fifth-grade class. The analyzed lesson formed part of a day-long module on fractions and included several group activities. One activity, *Get to Know Fraction Strips*, was selected for in-depth analysis because it represented a complete instructional cycle, including teacher framing, student collaboration, and post-activity reflection.

Three complementary datasets were collected. First, plenary instruction was video recorded using a stationary camera to capture how teachers introduced learning goals and framed expectations for collaboration. Second, group work was video recorded using small GoPro cameras placed at the workstations of three student dyads, enabling fine-grained analysis of talk, gesture, gaze, and material interaction. Third, stimulated recall interviews were

conducted two days later with four students, using student-generated photos as prompts to elicit reflections on participation and collaboration (Calderhead, 1981; Lyle, 2003).

The analysis was inductive and data-driven, informed by ethnomethodological and interactional perspectives that emphasize how meaning and intersubjectivity are produced moment by moment in social interaction (Garfinkel, 1967; Heritage, 1984). Collaboration was operationalized through observable interactional features, including symmetry of participation, uptake of partners' ideas, coordination of actions, and shared versus individualized reasoning (Barron, 2000, 2003). Methodological triangulation was used to examine how collaboration appeared differently across instructional framing, enacted interaction, and students' retrospective accounts, rather than to establish a single, unified account (Denzin, 2012).

Findings

The findings reveal a layered and sometimes contradictory picture of collaboration. In plenary instruction, teachers strongly emphasized dialogic ideals, encouraging students to explain their thinking, think aloud, and develop strategies together. Collaboration was framed as a learning resource closely tied to verbal reasoning and conceptual understanding, aligning with dialogic teaching principles (Alexander, 2008, 2020; Mercer & Littleton, 2007).

During group work, however, collaboration emerged as uneven and interactionally contingent. Across the three dyads, different patterns were observed: one group engaged in shared reasoning with relatively symmetrical participation; another divided the task into complementary but largely parallel roles; and a third experienced tension and asymmetry that required repeated teacher intervention. These differences were not explained by task design alone but arose through moment-by-moment negotiation, role uptake, and responsiveness to partners' actions.

Teacher positioning during group work played an important role. When teachers addressed only one student within a dyad, participation asymmetries were sometimes reinforced, whereas addressing the dyad as a collective occasionally opened space for shared engagement.

The stimulated recall interviews added an experiential dimension to the findings. Students' retrospective accounts often focused on individual actions rather than joint reasoning, even when video data showed coordinated interaction. Few students explicitly described collaboration as a shared epistemic process, suggesting limited metacognitive awareness of how collaborative reasoning unfolds. This divergence highlights a gap between instructional framing, enacted interaction, and experienced collaboration.

Significance

The study contributes theoretically by conceptualizing collaboration as a multi-layered phenomenon that may diverge across instructional, interactional, and experiential levels. By integrating dialogic teaching theory with interactional and ethnomethodological perspectives, the study shows how collaboration cannot be assumed as an outcome of pedagogy or design but must be continually accomplished in interaction.

Methodologically, the study demonstrates the value of combining multimodal video analysis with stimulated recall interviews. Treating divergence between datasets as analytically productive provides insight into how collaboration is enacted and retrospectively constructed.

Educationally, the findings suggest that promoting collaboration requires more than encouraging students to talk or explain. Teachers may need to explicitly model collaborative practices and support students' metacognitive understanding of joint reasoning, including how to take up peers' ideas, manage asymmetry, and maintain shared responsibility. These insights are particularly relevant for learning environments that aim to prepare students for future challenges through collaboration and dialogue.

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