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ABCDE: An Action-Oriented Framework for Collaborative Activities

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Abstract: Although group work is a common classroom practice, understanding how students collaborate during these activities remains complex. In this paper, we introduce the ABCDE framework, which outlines five essential actions learners can take—and teachers can encourage—to foster an inclusive environment for sharing ideas and deepening understanding. Specifically, A represents agreeing, B represents building on ideas, C represents chatting, D represents differing perspectives, and E represents eliciting responses or actions. We demonstrate the framework's application in two distinct scenarios: one with high schoolers participating in a data science activity, and the other with adults involved in a team-building survival exercise. The framework successfully revealed distinct interaction patterns in these activities.

Introduction

Educators across multiple disciplines have long recognized the importance of group work and collaboration (e.g., Kirschner, 2002; Thornhill-Miller et al., 2023). Students have the potential of learning the academic content more deeply and constructively in collaborative settings (Roschelle & Teasley, 1995; Teasley et al., 2008), and students can develop collaboration skills that can be transferable to other future environments and settings.

In this paper, we introduce and propose the practical ABCDE framework, which highlights essential *actions* students can take in a small group discussion that will promote deeper thinking and collaboration. For a more complete paper that presents the literature backbones of these actions, please refer to our online supplementary material at https://education.mit.edu/project/collaborative-ai-for-learning-cail/.

The ABCDE framework

In this framework, "**A**" stands for "**a**greement," which we define as any utterance that explicitly expresses concurrence with another speaker in the team. While acknowledging a group member's statement can indicate attentiveness, we distinguish between acknowledgement and true agreement following the work of Ogata (1999). Agreement is essential in group work for two main reasons: effective decision-making and group cohesion. In essence, agreement in groups builds affinity and signals common ground, supporting our innate desire for connection (Brown & Levinson, 1987; Tomasello, 2014). By promoting a cooperative atmosphere, agreement serves both as a social glue and as a foundation for progress in small group discussions.

"**B**" stands for "**b**uilding on;" it is the process of extending a peer's contribution by adding new information, providing more evidence, or offering further explanation to co-construct knowledge. This practice, also known as "elaboration," is critical for deep learning. Research in educational science has consistently highlighted how this collaborative elaboration allows participants to co-construct knowledge, especially in classroom and team settings (e.g., Nguyen, 2022; Paulus et al., 2018). Furthermore, building on others' contributions fosters a sense of respect and strengthens group bonds (Barker, 2015; Chuene, 2023). Together, these studies suggest that critically engaging with other members' ideas is essential for generating better ideas and may foster a collaborative learning environment where all members' contributions are recognized and valued. By incorporating these findings into educational settings, both the learning process and group dynamics are enriched, showcasing the multifaceted importance of building on others' ideas.

"**C**" is for "**c**hatting," defined as the social interactions and informal conversations that occur during small group discussions. Although these social chats may initially appear off-task to teachers, they are essential for fostering collaboration, trust, and effective teamwork (e.g., Chowdhury, 2005; Gill et al., 2024). In classroom settings, encouraging these interactions helps students feel comfortable sharing ideas, ultimately strengthening collaborative learning.

"**D**" stands for "**d**iffering perspectives." Though it may seem antithetical to Agreement, offering different perspectives in group collaboration is equally important and necessary for overall group success. Decades of research have shown how groupthink, or the deterioration of mental efficiency, reality testing, and moral judgments due to group pressures, can result in limited ideas and, in worse case, dangerous outcomes from group decisions (Janis, 2008; Sims, 1992). Disagreement in groups, and specifically in education settings, has also been shown to increase discourse which enhances group members' understanding of topics and overall learning (Chen,

2020) as well as member acceptance and sense of support (Johnson & Johnson, 1991; Smith et al., 1981). The research on group collaboration makes it clear that a balance between both agreement and disagreement may be essential for teams to support strong decision-making while maintaining group cohesion.

"**E**" stands for "**e**liciting responses." The A, B, and D components of the framework largely respond to others' ideas, whereas the E component actively encourages team members to solicit each other's opinions, a process shown to foster meaningful discourse, critical thinking, and equity in group interactions. Eliciting responses through direct or subtle questioning enhances cognitive processing and brings diverse perspectives to light, as illustrated by Chin & Osborne (2010), who show that questioning promotes co-construction of knowledge. By asking questions or directly involving others, "E" fosters an inclusive environment where members feel valued, and where dialogue helps to navigate different perspectives toward a shared understanding.

Small group collaboration analysis: Exemplars

To demonstrate the ABCDE Framework and its versatility, we applied the framework to different small group discussion scenarios. The first is from a small group activity in a data science workshop with high school students. The second is from a team consensus building exercise with adults. In both scenarios, a large language model-powered conversational agent joined the discussion. The two scenarios contained 176 and 82 speaker utterances, respectively. Three researchers were involved with coding the transcripts, and all components of the framework reached Cohen's kappa of greater than 0.74. More details of the contexts and methods can be found on the more comprehensive paper on the project website.

Findings and discussion

The most prevalent collaborative component in the data science workshop was E for Elicit. In contrast, while the participants in the team-building survival exercise also elicited each other's' opinions and asked questions, the most dominant component was "A" for agree. What was also of interest is that disagreement appeared almost half as frequently in the high school data science group than it did in the survival scenario (4.8% vs. 8.6%), and the students had proportionally three times more social interactions (16.6% C code) as the adults did (5.4%) in the survival scenario.

Discussion – data science workshop

The differences revealed by the framework can be due to the nature of the activities as well as the norm in the social groups. In the data science workshop, the students hardly knew each other and were tasked with creating a boxplot. Consequently, there was a lot of uncertainty, with many speakers seeking confirmation from other members or asking clarifications. For example, Katie (2) asked "So Q1 would be equals median of uh. B2 to and then median is. 32. 16. 15. Uh B15. Right?" Confirmation such as Katie's "right?" was a common occurrence in the data science group. Additionally, because the group was collaborating on making a graph together, they had to coordinate their actions.

Discussion – survival scenario

In the sinking boat survival scenario, reaching agreement is the ultimate goal. The prevalence of the "A" code is therefore expected. In fact, it supports the credibility of the framework by demonstrating that it effectively captures the intended collaborative behaviors.

General discussion, limitations, and concluding remarks

The framework has limitations, as it may not capture all interaction patterns, account for silent participation, or consider the influence of conversational AI agents. Future research should examine how these collaborative components affect learning outcomes and whether social interactions, including off-task chats and AI-facilitated discussions, support or hinder group dynamics. Nevertheless, the ABCDE framework provides a practical lens through which researchers and practitioners can observe and promote effective and inclusive collaborative behaviors.

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