

Mindful of Process: Scaffolds for Collaboration Discourse in Design Education

Daniel Steinbock, Stanford University School of Education, steinbock@stanford.edu

Abstract: Given the critical importance of collaboration in lifelong learning, this paper highlights the need for interventions that help learners develop awareness of the social dimensions of group problem solving and adopt patterns of discourse leading to more successful collaborative learning outcomes. In pursuit of this, I present scaffolds that were piloted on students learning the practice of collaborative human-centered design, and argue for the larger significance of design as a framework for developing collaborative capacities.

Introduction

Collaboration can be thought of as involving a dual problem-space that participants must simultaneously negotiate (Barron, 2003). One is a *content space* consisting of the problem to be solved and the solutions generated. The second is a *relational space* consisting of social interactional challenges and opportunities that structure group discourse about the content space. The success of collaboration depends on the ability of a group to be mindful of and develop both spaces simultaneously. In practice, however, these spaces compete for limited attention and the salience of subject-matter in the content space typically dominates. This paper therefore highlights the need for interventions that foster collaborative capacities in the relational space. I introduce examples from elementary school students learning human-centered design practices.

Background

In her study of twelve 6th-grade triads engaged in collaborative problem solving, Barron (2003) found that between-triad differences in post-task individual learning assessments could only be accounted for by differences in groups' social interactions, i.e. how they negotiated the relational space. Two specific patterns of collaboration discourse were observed in successful groups and lacking in less successful groups. First, more successful groups were likely to discuss or accept correct proposals while less successful groups were likely to ignore or reject them. Second, utterances were more likely to build on immediately preceding utterances in successful groups, whereas conversations in less successful groups were relatively more incoherent. Barron's findings suggest that these successful patterns of discourse help groups achieve joint engagement as requisite for establishing a joint problem-solving space and group cognition (Stahl, 2006; Roschelle, 1992).

From an interventionist perspective, these findings beg the question of how we can encourage learners to adopt discourse practices that improve collaborative learning outcomes. There is evidence that through participation in intentionally designed discourse communities learners come to appropriate conventions for discussing subject-matter in the content space, such as the scholarly convention of justifying claims with evidence (Engle & Conant, 2002). What sort of intervention could encourage learners to appropriate discourse conventions in the social-relational space, specifically ones linked to collaborative learning achievement?

In the next section I introduce a collaborative learning activity highly suited for studying and supporting the social-relational space in group problem solving: groups of learners engaged in the practices of human-centered design, e.g. need-finding, brainstorming, prototyping and user-testing. Group brainstorming, for instance, rapidly generates a complex, branching stream of ideas and evaluations exhibiting discursive patterns of proposal, response and discussion. Professional designers often use "Rules of Brainstorming" as "interventions" in their own collaborative processes to codify norms of discourse during brainstorms (Sutton & Hardgadon, 1996). As it happens, two of the most important rules, "defer judgment" and "build on the ideas of others", scaffold exactly the same discourse patterns that Barron found were associated with successful collaborative learning outcomes (see Table 1).

Table 1: Comparison between two rules for brainstorming (Sutton & Hardgadon, 1996) and patterns of discourse found to be associated with more and less successful collaborative learning outcomes (Barron, 2003).

Brainstorming Rule	Successful Discourse Pattern	Unsuccessful Discourse Pattern
Defer judgment	New proposals are discussed and accepted	New proposals are ignored or rejected
Build on the ideas of others	New utterances are closely linked to the topic of immediately preceding utterances	New utterances are unrelated to the topic of immediately preceding utterances

Interventions

Intervening in the collaborative design process, in the sense used here, is what Fischer and colleagues call "metadesign" (Fischer & Giaccardi, 2006). "Metadesigners use their own creativity to create socio-technical environments in which other people can be creative. They must create the social conditions for broad participation in design activities which is as important as creating the artifact itself..." (Fischer, 2007). What follows, then, is a first

report on the development of a metadesign framework for collaborative design education.

In partnership with a K-8 private school, a group of design educators piloted scaffolds for collaborative design discourse with approximately thirty students between 2nd and 8th grades. The students engaged in a series of design challenges over the course of a summer, the challenges themselves being prototypes for a design curriculum to be implemented in the upcoming school year. The overall goal was to help students become “mindful of process” — that is, to attend to and develop the social-relational space during their collaborations, in addition to the more salient subject matter of the problem content.

In order to scaffold the successful collaborative discourse patterns from Table 1, educators borrowed a technique from the improvisational theatre tradition. During the brainstorm, students were encouraged to begin new proposals with “Yes, and...[related proposal]”, as opposed to “Yes, but...[judgment]” or any other unsuccessful pattern. In so doing, the student verbalizes acceptance of the proposal, defers analytical judgment, and builds on the proposal with a related idea. Students role-played brainstorms with and without the scaffolds and then were prompted to reflect on the perceived differences. In succeeding brainstorms, students were widely seen to practice the intended discourse patterns even though the explicit “yes, and” construction was largely absent, suggesting it had been internalized as a group capacity for negotiating the social-relational space.

A second intervention was in the needfinding phase, where designers develop guiding insights using ethnographic research methods to discover unfulfilled user needs. For example, if a child is always getting out of bed after bed-time, needfinding may determine the underlying cause of the behavior (e.g. thirst, loud noises, fear of the dark) and guide designers toward appropriate solutions (e.g. installing a water dispenser in the room). The intervention modeled the practices of professional designers, encouraging design students to justify their design decisions by mapping them directly to identified user needs, much in the same way that science students adopted scholarly conventions of citing evidence in Engle & Conant’s study of discourse, (2002).

Two other interventions worth briefly mentioning include: 1) providing a formal step-by-step model of the human-centered design process (needfinding, brainstorm, prototype, test, iterate) so learners could verbally frame their design activities during group discussion, especially as they navigated process transitions; 2) providing an abundance of tools and materials for physical prototyping to enable collaborative thinking through embodied artifacts, role-playing of solutions in situated action, and anchoring of joint attention.

Discussion & Conclusion

This paper highlights the utility of human-centered design activity as a way to (a) foster awareness of the social dimensions of collaboration and (b) support the adoption of discourse patterns associated with more successful collaborative learning outcomes. The capacity to be mindful of the relational space is a critical component of lifelong learning as there are few human endeavors that do not involve some form of collaboration. Furthermore, the usefulness of design as a framework for collaborative learning goes far beyond material product design: “Everyone designs who devises courses of action aimed at changing existing circumstances into preferred ones.... Schools of engineering, as well as schools of architecture, business, education, law, and medicine, are all centrally concerned with the process of design.” (Simon, 1981)

This ongoing research program is aimed at discovering a framework for design-based education where developing collaborative capacities is the primary learning goal. Future communications will provide more thorough accounts of interventions and their measured effects on learners.

References

- Barron, B. (2003). When smart groups fail. *The Journal of the Learning Sciences*, 12(3), 307-359.
- Engle, R. A., & Conant, F.R. (2002). Guiding principles for fostering productive disciplinary engagement: Explaining an emergent argument in a community of learners classroom. *Cognition and Instruction*, 20, 399-483.
- Fischer, G. (2007). Meta-Design: Expanding Boundaries and Redistributing Control in Design. *Proceedings of the Interact'2007 Conference*, Rio de Janeiro, Brazil, September, 2007.
- Fischer, G. & Giaccardi, E. (2006). Meta-Design: A Framework for the Future of End User Development. In H. Lieberman, F. Paterno & V. Wulf (Eds.), *End User Development: Empowering people to flexibly employ advanced information and communication technology* (pp. 427-458). Dordrecht, The Netherlands: Kluwer Academic Publishers.
- Roschelle, J. (1992). Learning by collaborating: Convergent conceptual change. *The Journal of the Learning Sciences*, 2, 235-276.
- Simon, H. (1981). *The Sciences of the Artificial*, 2nd ed. p. 129. Cambridge: MIT Press.
- Stahl, G. (2006). *Group Cognition*. Cambridge: MIT Press.
- Sutton, R. I., A. Hardgaden (1996). Brainstorming groups in context: effectiveness in a product design firm. *Administrative Science Quarterly*, December, 1996.