Children's Participation in Rulemaking to Mitigate Process Problems in CSCL

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Abstract: In CSCL studies, children have been largely excluded from decision-making processes around orchestration by being required to follow predetermined scripts for collaboration. However, opportunities to acknowledge issues surrounding the process of collaboration (i.e., shared resources) and resolve related problems are important for the development of higher-order collective cognitive processes. Thus, considering cognitive apprenticeship, this case study illustrates a session at an afterschool club where children worked on collaborative design projects with Minecraft and were empowered to participate in decision-making processes surrounding classroom rules and orchestration of activities.

Keywords: Socio-metacognition, agency, cognitive apprenticeship, sharing, Minecraft, CSCL

Introduction

Many CSCL settings favor the creation of predetermined rules that minimize conflict and reduce the necessity for students to solve social problems such as those surrounding shared resources (e.g., Schwarz, de Groot, Mavrikis, & Dragon, 2015). However, learners in these predetermined settings lose opportunity to understand non-task related, social problems arising from collaboration processes and practice important decision-making processes. For example, learners need to understand that sharing resources is an integral process for achieving common goals because physical and/or virtual resources in CSCL are often shared among individuals. Based upon the perspective that participation itself is a learning process (Lave & Wenger, 1991), we argue that children need to be active participants in the resolution of issues that emerge during collaboration in order to learn about and practice evaluation and regulation of collective processes. To support children's participation in such issues, it is important to make collaborative aims and underlying thinking processes explicit, model behaviors, articulate thinking, and coach children as they work through similar processes (Brown, Collins, & Duguid, 1989). In this way, we can immerse children in these issues and support them as they figure out how to resolve issues related to collaboration through testing, synthesizing, evaluating, and negotiating future activity.

Towards this aim, we examined children in an afterschool club as they worked on collective design projects by using a variety of tools including Minecraft. Using computers often led to conflicts, as a limited supply caused students to fight over control of the tools. Having to share a virtual space also caused conflicts. Rather than solving the issues for them in advance, we ran a session designed to help children understand the issues related to limited resources, try out different ways to orchestrate collaboration, and create their own club rules. Then, we conducted a qualitative case study to answer the research question: *how* did children participate in the collective sense-making process surrounding shared resources during the CSCL afterschool club? The study also discuss whether taking time to focus on such process provides benefits to students.

Conceptual framework

Learners in collaborative environments need to practice how to collaborate and how to solve problems in groups (Schwarz et al., 2015), because collaboration involves higher-order forms of group cognition rather than a simple sum of individual contribution (Stahl, 2013). Thus, it is critical to support not only learners' cognitive activities about domain knowledge, but also to develop collaborative sense-making processes that surround it. Previous studies in CSCL have adopted tools and scaffolds to enhance the quality of collaboration at the level of the small group (e.g., Borge & White, 2016). However, we argue that previous studies overlooked the importance of empowering learners to adopt the role of main agents for creating rules for the community.

Process problems regarding shared resources

Learners in CSCL settings are often asked to solve domain problems that require higher-order thinking (i.e., inquiry skills, argumentation); solving the given domain problem becomes the primary goal for the group. Thus, the conflicts that emerge during collaboration (i.e., limited resources, shared environment) are regarded obstacles and are therefore mitigated in advance by teacher rule-making. However, instead of neglecting or

eliminating conflicts among individuals, it is important to consider what conflicts learners may confront and what could be learned by solving problems together.

In CSCL settings, learners are usually required to collaborate with shared or constrained resources in both physical and virtual spaces. In terms of sharing physical resources (i.e., laptops), research indicates that if learners share a computer screen but have an individual mouse, which allows them to make concurrent input, a high level of collaboration can be achieved (Gómez et al., 2013). However, such predetermined rules deprive learners the opportunity to understand the problem associated with limited resources and to determine how to overcome this problem. It also may not always be feasible to provide enough technology due to limited budgets and technical issues. In terms of a virtual environment, simultaneous access the same virtual space can cause conflict. For example, in Minecraft, an online video game for building virtual artifacts, multiple users can build at the same time in one world by using different computers. Thus, conflicts might arise if they envision different creation in the same location without achieving shared understanding about the project. Given that our previous iteration indicated that children might lose their motivation in collaborative activities when adult facilitators minimized conflicts through goal-oriented reasoning (Jung, Yan, & Borge, 2016), we designed a session where facilitators would empower learners to collectively manage process problems during collaboration.

Fostering children's agency as part of the club activities

Many of the scaffolds and tools for CSCL are designed and predetermined by adults such as researchers or teachers (e.g., Borge & White, 2016), but the culture of collaboration should also include children's autonomous collective problem solving. In this regard, we follow aspects of cognitive apprenticeship models of instruction to include children as the main agents dealing with process problems and to facilitate their attempts to solve these problems during collaboration (Brown et al., 1989). Cognitive apprenticeship emphasizes authentic practices where learners are situated in their own problems and generate solutions for themselves within enculturation (Brown et al., 1989). We ran the session to bring these issues to the forefront and help children engage in thinking about the issues of sharing resources, testing different solutions, and collectively discussing related decisions for their collaborative projects. During this session, children not only made rules for sharing resources but also modeled the whole process of decision making for collaborative activities in future. We examine how the session engaged children in such process to mitigate conflicts among themselves.

Methods

Setting and participants

The research was conducted over 16 weeks during Fall 2015, in a weekly afterschool club at an elementary charter school in the Northern US. Two adult facilitators led four groups of children (16 total) between 8 and 12, who worked collaboratively on design projects (i.e., building a garden) by using diverse media (i.e., drawing, Legos, Minecraft). Six were female, ten were male, and eight were non-Caucasian. For Minecraft (Figure 1, a), as we had a limited number of laptops, each group had to share two laptops. Each laptop could access the same server on Minecraft, so children could work on a group project together from different laptops (Figure 1, b). Children also took turns to use the Teacher account (one or two children per session), which has more functions (i.e., freeze other players) but adds more responsibility to the club community.

(a) (b)

Figure 1. Example of children's design project with Minecraft (a) and the scene of the setting (b).

This study focuses on Session 6 (75 min), which was designed for children to begin using Minecraft and engage in problem solving associated with sharing resources. In this session, the facilitators not only prompted children's discussions but also modeled collective, decision-making processes. The session flow generally followed six continuous steps. Step 1: The facilitators announced that a limited number of laptops were available and presented two options for sharing a laptop. In Option 1, command keys were divided so that each person could press simultaneously, while in Option 2, one person verbally guided the other who actually

pressed the keys. Step 2: Each group worked in Minecraft to build their design experimenting with the two options (20 min). Step 3: The facilitators led a whole-class discussion about the pros and cons of each option to identify its claims and trade-offs. Step 4: Children decided which option they would use by articulating their rationale. Step 5: Children continued to work on Minecraft (20 min). Step 6: The facilitators led a whole-class discussion aimed at getting children to discuss difficulties during building, including any frustrations and problems they faced. Afterward, children were prompted to think about and propose additional rules needed for building in Minecraft to address the problems they experienced. Steps 1-4 were particularly about sharing physical resources, and Steps 5-6 were about sharing a virtual space.

Data source and analysis

We conducted a case study to explore authentic situations with in-depth analysis (Creswell, 2013). The data was collected in the form of audio and video recordings (296 minutes total from four groups). We analyzed the data by (1) developing content logs (Jordan & Henderson, 1995) that included a general description of events that occurred every 2 minutes, (2) collectively reviewing the recordings and the content logs to identify episodes of children's rulemaking, transcribe, and code them, (3) conducting microanalyses to deduce patterns of children's decision-making processes about evaluation and orchestration of club rules.

Findings

Using one's own experience as a tool to articulate reasoning

During the session, children as main agents could establish their own rules for sharing physical and virtual resources, via reflecting on their experiences, sharing ideas, or building upon each other's ideas. Especially when setting a rule for sharing physical resources (laptops), we identified that children used reasoning based on their own experiences and reflections to make decisions. When children had a discussion about the pros and cons of each option for sharing one laptop between two members (Step 3), children reflected back on their own experiences from Step 2 and used it as evidence for their reasoning. For instance, the episode of Marcos and Patty from Group 1 shows an alignment throughout their experiences, discussions, and decision-making. During Step 2, Marcos voluntarily verbally guided Patty while she built artifacts in Minecraft. Marcos also drew on papers to specify plans and thoughts, unlike other children who guided only verbally. During the discussion (Step 3), Marcos used this experience as his rationale to support Option 2. He said "This [Option 2] is a sort of thing for that they can do what they want. Um, so since I like sketching (showing his drawing to others), I prepared a couple of pieces of papers for what I will [while the partner was working on Minecraft]. … And I like planning! If you don't like to build in Minecraft, you can do this [drawing]." This transcript shows that Marcos asserted the pros of Option 2 with explanation of what he and his partner did. He even showed his drawing as evidence to support his claim that Option 2 could be more beneficial especially for children who might not like to play Minecraft. Then in Step 4, Marcos and Patty chose Option 2 as the rule for their further projects. This episode shows that children were not only able to understand the pros or cons of each strategy but also to use their experience to support their arguments for choosing rules.

Presenting problems from one's experience during negotiation

The session also helped children to bring up realistic problems they experienced and then make community rules that all individuals could agree upon, particularly for sharing a virtual space. Since children used a common server in Minecraft, many of them experienced conflicts due to territory invasion. During the second whole-class discussion (Step 6), children voluntarily brought up problems and frustrations related to the issues of territory. Harry (Group 1) mentioned that somebody placed water in his group's space; Bruce (Group 3) complained that somebody broke down his group's artifacts; Eric and Aaron (Group 2) stated that Group 3 built on their territory. Then, facilitators reminded them that they had to share a common server in Minecraft and asked what rules they wanted to establish to ensure that all students could feel safe to explore while being considerate of other's creations. The facilitators invited children to share ideas and establish rules collectively.

14 Iman: First, no building in others' territory unless they ask help to build something.
15 Facilitator2: What should we do then if somebody doesn't follow that rule?
16 Marcos: Um, ask a teacher [student who uses Teacher account] to freeze them!
17 Patty: [Responsible for Teacher account this session] No, I don't want to do that.
18 (Some arguments going on)
19 Iman: Each day we should have a chart, and then if you build on other's territory

20 and check mark. Once you get down to zero check mark, you get frozen for
21 five minutes.
22 Facilitator2: That's a lot of check marks. …
23 Karen: We should get two! To get two chances!
24 Patty: How about one. …

Based on the rule that Iman suggested (line 14), the facilitator prompted children to create more specific rules (line 15). Then, other children shared their ideas, agreements or disagreements (line 16-24). One suggestion was for the child taking on the responsibility of 'teacher' to freeze a player (line 16). However, the 'teacher' for that session stated that she would not feel comfortable freezing someone (line 17). Finally, children came to a consensus for a rule that 'if a person built in other's territory, he/she can be given one chance to adjust their behavior, otherwise he/she will be frozen in Minecraft for five minutes.' Throughout this process, children acted as the main agents to set their own rules and reconcile solutions via multiple attempts to make agreements. This episode shows that children pursued their autonomy by creating rules that they could manage by themselves.

Implications

Our results indicate that young learners can successfully take the role of main agents to understand process problems they confront, test different strategies, reason about experiences and needed rules, and establish their own rules about shared resources for better collaborative environments. During the session, children reflected upon their own experiences and practiced reasoning for choosing/making rules. This process can be seen as the enhancement of socio-metacognition, which is important for high-quality collaboration and socially shared regulation (Bore & White, 2016; Järvelä et al., 2015). This study also explores the possibility of applying cognitive apprenticeship models not only to cognitive development of domain knowledge and practice, but also to solving socio-emotional problems. However, we also recognized that not all children participated equally in the rulemaking process, as some of them were not engaged as active agents during the session. Our next study may focus on how to include all the children in process-related problem solving activities.

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