Graduate students' sense-making processes in collaborative learning tasks

Xiaofeng Li, Rutgers University
Ross J. Todd, Rutgers University

Abstract

This current study explores how graduate students make sense together to accomplish real-life collaborative learning tasks. A class of 15 adult students at a large, public university in Northeast US is recruited. The purpose of their learning task is to work with team members and construct group presentations on their collective understandings on information behaviors within specific contexts. Data sources include pre- and post-questionnaires, classroom observations, and in-depth interviews that are structured within Dervin's (1992) Sense-Making methodology. Our findings identify several task related situations, gaps, and sense-making strategies that incorporate the social dimensions. These social dimensions and emergent collaborative/cooperative learning processes are highlighted and discussed. Overall this study has implications for educators to design socially constructed learning environment and facilitate learners' sense-making processes when undertaking collaborative tasks.

1 Introduction

1.1 Sense-making

Sense-making is an essential process in which people construct and make meanings of their everyday life experiences. It has been addressed in the fields of information science, communication, education, organizational studies and human-computer interaction (e.g., Dervin, 1992; Paul & Morris, 2009; Weick, Sutcliffe, & Obstfeld, 2005). More and more K-12 classrooms and universities encourage students to learn in groups because collaborations enable knowledge sharing, deep learning and epistemic growth (Damon & Phelps, 1989; Kuhn, Shaw & Felton, 1997). However, it is unclear how sense-making unfolds in peer groups. Hence, developing an understanding of how sense-making occurs within groups when students undertake collaborative learning tasks is critical for information scholars, system designers, educators and learners. The overall research questions guiding this study are: 1) How do students make sense together to accomplish a learning task? 2) What collaborative or cooperative learning/sense-making styles emerge among graduate students?

Dervin's (1992) Sense-Making theory and methodology are central to understand sense-making that takes place in groups, and it provides a structure that helps this present investigation. Rested on the user-centered approach, Dervin's Sense-Making theory assumes "discontinuities in all existence"(p.62). It sheds light on information needs and gaps that people encounter in a time space, and their strategies to make sense of situations and to overcome these hurdles (Dervin, 1992; Dervin & Nilan, 1986). Dervin (1994) stresses that "sense is made and unmade through communication" (p.377), indicating the social aspect of sense-making processes. A number of empirical studies in LIS address the sociocultural dimensions of sense-making. For example, Olsson (2010) shows that the professionals engage in social interactions and draw upon their prior experiences to make sense of Shakespeare plays. His findings suggest that sense-making is a complex social process that encompasses intellectual, emotional and physical factors.

1.2 Collaborative And Cooperative Learning

Many studies on collaborative and cooperative learning often use the terms "collaborative" and "cooperative" interchangeably (O'Donnell & Hmelo-Silver, 2013). Damen and Phelps (1989) argue that cooperative learning usually involves a group task that is presented by a teacher. Groups often tackle the task by dividing it into subtasks with different responsibilities. Subtasks lead to individual work, thus reducing the level of mutuality among group members. In addition, the dynamics of group members are usually at a mixed level of abilities to accomplish their shared task. In comparison, collaborative learning

involves members who are at similar levels of competence. Group members work jointly all the time on same problems. Shah (2014) denotes that compared to cooperation, collaboration leads to an end product that is more than the sum of each member's contribution. Similarly, Todd and Dadlani's (2013) empirical study addresses collaborative and cooperative learning among 13 student teams from two 9th grade English classes. They characterize collaborative learning as an interdependent process of knowledge co-constructing, whereas cooperative learning is characterized as a process of dividing workload and combining individual work at the end. Their findings suggest that these student teams largely engage in cooperative learning rather than collaborative, interdependent styles of learning.

2   Methodology

15 adult students from a graduate course on human information behavior at a large, public university in Northeast US were invited for this study. The class met on a weekly basis. At the beginning of the semester, students were asked to select a topic on human information behavior that they were interested in. Based on their topic choices, two to four students were formed as a team. The purpose of their learning task was to work with team members and construct group presentations on their collective understandings on information behaviors within specific contexts.

Data sources include pre- and post-questionnaires, classroom observations, and in-depth interviews that are structured within Dervin's (1992) Sense-Making methodology. There were 12 responses in the pre-questionnaire with two of them incomplete, and 13 complete post-questionnaires were collected at the end of their group projects. 11 individual audio-recorded interviews were conducted.

The pre-questionnaires were designed to investigate the aspects of students' perceived group tasks, interest level, knowledge levels, planned information seeking strategies, planned contributions to their group projects, positive and negative things about collaborations. Questions on the post-questionnaires corresponded to the pre-questionnaire in order to compare and measure differences after students undertaking collaborative learning tasks. The interviews included face-to-face interviews and phone interviews. In addition, when the student groups presented their final projects, class observations were conducted to obtain information on how group members interacted together and how their final group products were in terms of the design, flow and connections among team members.

Interview transcripts, questionnaires and observational notes were coded by the researcher with the aid of NVIvo. The coding process was informed by the phases of initial, focused and axial coding (Charmaz, 2006). Initial coding was conducted to discover major trends and themes and a second, more selective and focused round of coding was completed to reveal more granular themes. For pre- and post-questionnaires, responses were organized into one Excel spreadsheet that included two tabs for the pre- and post-questionnaires respectively.

3   Findings and discussion

Our findings identify several task related situations, gaps, and sense-making strategies. In the task-initiating phase, students face challenges such as how to divide workload, and their self-reported strategies include distributing responsibility evenly and securing opportunities for themselves. In the phase of actual performing, students encounter hurdles such as understanding reading materials, and their self-reported sense-making strategies include building knowledge together, identifying expertise, creating shared digital space and engaging in cooperation rather than collaboration. When completing the task, students engage in strategies such as taking a forward role in face of unfinished teamwork. The examples of each sense-making strategy are listed in Table 1.

Events	Gaps	Sense-making strategies
Task initiating	How do I know what to do for the project?	Making decisions together *(e.g. ... open to listening to the ideas and talking about how you all feel about them and coming up to a collaborative decision to move forward)*
	How do I manage project progress?	Sharing project awareness *(e.g. … knowing what you are going to do and what others going to do is very important)*
	How do I make sure I make	Securing opportunities

	contributions in group project?	*(e.g. … made the effort to carve out what I was going to do…nobody else was going to touch that and I would have something to contribute)*
	How much workload should I take?	Distributing responsibility *(e.g. …I mean it's a group, so you can divide evenly)*
	How do I handle frustration?	Communicating with others *(e,g, …we had a meeting where we sat down face to face and talked about …decided who would want to do what. at that point, I felt a little better)*
Task performing	How do I understand difficult reading materials?	Building knowledge together *(e.g. …when we got together and met in person, we talked about what each person was doing and helping each other along… she had a lot of good insights… it's good to talk to her about that)*
	How thorough do I need to search for the group's topic?	Depending on the complexity of task *(e.g. … the topic was so broad, so it wasn't really hard for anyone to find something to say…we could never cover the subject exhaustively)*
	How do I get help from others?	Identifying expertise *(e.g. …provided a lot of great input regarding the discipline…that she went through the program already helped us a lot)*
	How do I create the presentation together with my teammates?	Creating shared digital space *(e.g. … use Google doc because we could all go in… edit it or delete it… when three of us were working at the same time and it didn't interrupt the presentation itself)*
	How do I work with other teammates after dividing the labor?	Engaging in cooperation rather than collaboration *(e.g. … military does crews where everyone is trained to do one thing so you can replace them easily… our group work wasn't really like a team work, it was kind of like crew you do this, you do this, you do this and we just put together)*
Task completing	How do I deal with unfinished teamwork?	Taking a leadership role *(e.g. …I did take the lead because there was something that needs to get done and it wasn't done)*

Table 1: graduate students' sense-making strategies

Securing opportunities for oneself is seen as a strategy to seek equal contribution as well as a way to establish one's identity when working in small groups. There are two possible explanations for these strategies. First, these graduate students are in their professional development, so they are the "intellectual entrepreneurs" who take ownership of their work and are motivated to establish their intellectual identities (Cherwitz & Sullivan, 2002, p.26). Second, when working in teams, individuals construct individual identities and collective identities simultaneously (Bielaczyc, Kapur & Collins, 2013). Tensions may exist between developing individual identity and collective identities. When a collective identity is not aligned with individual identities, team members may take initiatives to establish an expected collective identity.

Distributing workload evenly among team members is another strategy that most participants reported. Based on the students' self-reports and the distinction between collaborative and cooperative learning in terms of equality and mutuality of influence (Damen & Phelps, 1989), it appears that these graduate students mostly engage in cooperative rather than collaborative learning. Collaboration mostly occurs in task initiating situations. Nonetheless, the pre- and post-questionnaires results indicate that students have gained a lot of knowledge on their group project topics.

This present study has several strengths. First, the collaborative learning tasks are real-life tasks rather than simulated tasks. Second, rather than merely looking at individual cognitive sense-making process; we highlight the social dimensions of sense-making when people undertake collaborative and cooperative

learning tasks. However, readers should also consider several limitations to this study. One obvious limitation is the small sample size. Another limitation is that the results may not transfer to other age groups, classes or tasks. For future studies, we intend to compare and understand sense-making strategies in a variety of learning tasks and environments. Overall this study has implications for educators to design socially constructed learning environment and facilitate learners' sense-making processes when undertaking collaborative tasks.

References

Bielaczyc, K., Kapur, M., & Collins, A. (2013). Cultivating a community of learners in K-12 classrooms. In In C. E. Hmelo-Silver, C.A.Chinn, C.K.K.Chan & A. O'Donnell (Eds.), *The international handbook of collaborative learning* (pp. 233–249). New York, NY: Routledge.

Charmaz, K. (2006). *Constructing grounded theory: A practical guide through qualitative analysis*, Thousand Oaks, CA: Sage.

Cherwitz, R. a., & Sullivan, C. a. (2002). Intellectual entrepreneurship: A vision for graduate education. *Change: The Magazine of Higher Learning*, *34*(6), 22–27. doi:10.1080/00091380209605565

Damon, W., & Phelps, E. (1989). Critical distinctions among three approaches to peer education. *International Journal of Educational Research*, *13*(1), 9–19.

Dervin, B. (1992). From the mind's eye of the user: The sense-making qualitative-quantitative methodology. In J. D. Glazi & R. R. Powell (Eds.), *Qualitative research in information management* (pp. 61–84). Englewood, CO: Libraries Unlimited.

Dervin, B., & Nilan, M. (1986). Information needs and uses. *Annual Review of Information Science and Technology (ARIST)*, *21*, 3–33.

O'Donnell, A. M., & Hmelo-Silver, C.E. (2013). Introduction: What is collaborative learning. In In C. E. Hmelo-Silver, C.A.Chinn, C.K.K.Chan & A. O'Donnell (Eds.), *The international handbook of collaborative learning* (pp. 1–15). New York, NY: Routledge.

Olsson, M. (2007). Making sense of sense making: Information behaviour researchers construct an "author." *Canadian Journal Of Information & Library Sciences, 29*(3), 315–334.

Paul, S. A., & Morris, M. R. (2009). CoSense: Enhancing sensemaking for collaborative web search. In *CHI 2009* (pp. 1771–1780).

Shah, C. (2014). Collaborative information seeking. *Journal Of The Association For Information Science And Technology*, *65*(2), 215–236. doi:10.1002/asi

Todd, R., & Dadlani, P. (2013). Collaborative inquiry in digital information environments: Cognitive, personal and interpersonal dynamics. In *2ⁿᵈ Annual International Conference Incorporating The 17th International Forum On Research In School Librarianship* (pp. 1–20).

Weick, K. E., Sutcliffe, K. M., & Obstfeld, D. (2005). Organizing and the process of sensemaking. *Organization Science*, *16*(4), 409–421. doi:10.1287/orsc.1050.0133