How do types of interaction and phases of self-regulated learning set a stage for collaborative engagement?

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ABSTRACT

This study investigates how self-regulated learning phases are related to collaborative engagement in two different collaborative task conditions. It integrates SRL theory and the concept of engagement, including interaction in collaboration, as key characteristics of engagement. Forty-four second-year teacher education students worked in groups during a 7-week math didactic course. We collected 84 h of video recordings and coded the group's cognitive and socioemotional interaction and three phases of self-regulation within interaction, including forethought, performance and reflection. After that we analyzed the relationship between the interaction types representing collaborative engagement and SRL phases within two learning tasks. The results show that collaborative engagement did not differ between teacher-led and student-led tasks in terms of the interaction types. However, the results showed that the SRL phases occurred differently within cognitive and socioemotional interaction types when the two task conditions were compared. Findings concerning teacher-led tasks showed invariance in the occurrence of SRL phases across the task and highlighted the relationship between socioemotional interaction and the forethought phase. Additionally, findings concerning the student-led tasks showed systematic changes in the distribution of phases of SRL across sessions in all interaction types. Our results' theoretical and methodological implications for collaborative engagement research are discussed.

1. Introduction

Decades of research have shown that learners with a strong sense of their own competence approach difficult tasks and situations as challenges to be mastered, rather than as threats to be avoided (Zimmerman & Schunk, 2011). Successful learners have not only good learning strategies but also a will to learn. These students can be called engaged learners. They are involved behaviorally, intellectually, and emotionally in learning tasks (Fredricks, Blumenfeld, & Paris, 2004). Learners who are not engaged instead lack interest and are unmotivated. Understanding how to achieve both, maintaining students' existing interest and motivating students with less interest, is critical for engagement (Järvelä & Renninger, 2014). In all, engagement research has been one of the most productive research lines in educational psychology; for example, a recent special issue of *Educational Psychologist* (Sinatra, Heddy, & Lombardi, 2015) reported on engagement in science learning. However, there is almost no research on collaborative engagement, except for an increasing number of findings dealing with variations of regulatory processes in collaborative learning settings (e.g., Khosa & Volet, 2014; Kempler Rogat & Linnenbrink-Garcia, 2011; Volet, Vauras, & Salonen, 2009).

In our research, we have been considering engagement in collaborative learning settings, mostly because learning situations are increasingly social and interactive in nature. We have also identified students' problems with engaging in such interactions that aim for collaborative learning (e.g., Järvenoja & Järvelä, 2009; Näykki, Järvelä, Kirschner, & Järvenoja, 2014) and have focused especially on investigating and supporting the regulation of learning in collaborative contexts (e.g., Järvelä & Hadwin, 2013; Järvelä et al., 2015). Previous research has indicated that students face difficulties in effectively planning, monitoring, and adapting to collaboration (Malmberg, Järvenoja, & Järvelä, 2013; Winne, Hadwin, & Perry, 2013). For example, Miller and Hadwin (2015) found that both individual students and student groups struggle to construct task perceptions from which to launch engagement and future regulation. Research on group learning, in turn, has

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shown that individual students' interpretations can be positive, leading to increased motivation and engagement in group activities; and, alternatively, that individual students' interpretations can be negative and can lead to demotivation and withdrawal (Van den Bossche, Gijselaers, Segers, & Kirschner, 2006). Recent findings also discuss the importance of socioemotional processes of collaboration to group regulation (Linnenbrink-Garcia, Rogat, & Koskey, 2011).

The aim of this paper is to investigate how self-regulated learning phases are involved in collaborative engagement. We follow Fredericks et al.'s (2004) concept of *engagement*, which characterizes engagement as a multidimensional construct of behavioral, emotional, and cognitive dimensions. According to this definition, behavioral engagement includes actions such as attendance and participation, emotional engagement includes, a sense of belonging and of valuing learning, and cognitive engagement is described as willingness to engage in effortful tasks and strategy use.

The contribution of this paper is that we build the concept of *collaborative engagement* on SRL theory. Extending the concept of collaborative engagement in the adaptive cyclical phases of cognitive, motivational, and emotional processes (Cleary & Zimmerman, 2012) allows us to consider engagement as a process and study how it changes over time, instead of considering it as an inclusive state as major earlier research has done. *SRL phases* involve the processes of forethought, monitoring, and reflection (Zimmerman, 2000).

In a collaborative situation, *interaction* is a way to observe the adaptive cyclical phases of collaboration and to see how they develop over time. Interaction covers both the cognitive or emotional dimensions of engagement that underlie collaborative learning. It extends beyond behavioral engagement, since it involves collaborative and responsive interaction between group members. We differentiate between *task-focused cognitive* and *task-focused socioemotional interaction*. Cognitive interaction refers to task-focused or metacognitive level discussion among group members while working on a collaborative task (Dillenbourg, Baker, Blaye, & O'Malley, 1995). Task-focused socioemotional interaction characterizes discussion about emotions or motivation or a notable expression of positive or negative emotion at the group level (Kempler Rogat & Linnenbrink-Garcia, 2011; Rogat & Adams-Wiggins, 2014).

Until recently, the concept of engagement was mainly considered with regard to individual student engagement. The concept needs extension, as collaborative learning has become increasingly important in education (O'Donnell & Hmelo-Silver, 2013), and as in collaborative settings, engagement becomes a more complex phenomenon than in individual learning settings. In *collaborative learning*, engagement is dynamically influenced by a variety of social and contextual factors (Järvelä, Volet, & Järvenoja, 2010), especially the interactions between learners (Miyake & Kirschner, 2014). Interactive processes, such as common construction of knowledge (Mercer, 1994) or common concept formation (Knezic, Wubbels, Elbers, & Hajer, 2010), are processes of shared knowledge and knowledge co-construction, which are at the core of collaborative learning. Second, in our study, we use self-regulated learning theory to explain the core processes through which individual students engage in strategic actions in learning, especially focusing on the concept of a regulation as an essential mechanism to overcome the problems in collaborative engagement, determined in earlier research (e.g. Järvelä et al., 2010; Van der Haar, Segers, & Jehn, 2013). Third, since SRL is a cyclical and adaptive process that operates in a temporal sequence (before, during, and after learning activity), this means that students' past learning situations contribute to their engagement in learning (Cleary & Zimmerman, 2012). These cyclical adaptive processes are also

mechanisms through which individual students engage in strategic regulation of learning in collaboration (Hadwin, Järvelä & Miller, 2011). Therefore, the change of collaboration with long-term recurring sessions will be explored.

1.1. Characterizing engagement in collaboration

As Pressley and McCormick (1995) determined two decades ago, engaged students concentrate on their work, are enthusiastic about it, and are deeply interested in academic content. More recently, researchers have conceptualized engagement as a multidimensional concept that extends across behavioral, academic, cognitive, emotional, and psychological domains (Fredericks et al., 2004). It can be claimed that even though engagement is a useful concept for describing behavioral indicators of student participation in learning settings, it is a loosely defined term and difficult to operationalize in empirical research (Azevedo, 2015). Extant research and operationalization limit our understanding of the processes of deep-level engagement, especially in collaborative learning contexts.

Previous research in collaborative learning, computer-supported collaborative learning, and various inquiry-based learning environments suggests that there is potential to foster deep-level engagement in students (Blumenfeld et al., 1991; Renninger & Shumar, 2004; Veermans & Järvelä, 2004). The interactive features of technologies, such as scaffolding, prompts, and sociability tools, afford opportunities for learners to engage deeply with key content ideas and interactive activities (Janssen, Erkens, & Kirschner, 2011; Järvelä et al., 2015). In their studies on engagement in small-group learning, Linnenbrink-Garcia et al. (2011) argued that effective engagement in groups requires both a basic level of behavioral engagement, such as attending and responding to peers, as well as high quality forms of social participation. In conclusion, the extent to which collaboration is productive in ways that lead to common concept formation (Knezic et al., 2010) depends on high quality engagement in interactive activities.

1.2. Types of interaction characterizing collaborative engagement

Engagement as a concept is a fusion of the socioemotional and cognitive aspects of learning and it provides a richer characterization of students than is possible in research on single components (Fredericks et al., 2004). A consideration of collaborative engagement necessitates an examination of social interactions among students and their contributions to the shared nature of their engagement. As Järvelä and Renninger (2014) put it, engagement is understood to include the socioemotional and cognitive aspects of the learning environment; it is not a psychological variable, per se. Therefore, both cognitive interaction and socioemotional interaction complement successful collaborative engagement.

In their team learning model, Miyake and Kirschner (2014) specified when and how groups in collaborative learning environments engage in constructing and maintaining common knowledge for shared understanding. Their integrative perspective involved both cognitive and socioemotional aspects, including cognitive interactions that manage the co-construction of shared understanding (e.g., negotiation, co-construction of meaning, constructive conflict) (Roschelle, 1992) and conditions in the interpersonal context (e.g., psychological safety, social cohesion, group efficacy) that contribute to engagement in collaborative practices (Fransen, Weinberger, & Kirschner, 2013).

Recently, researchers have tried to understand socioemotional processes and their integration with the cognitive aspects of collaboration (Rogat & Adams-Wiggins, 2014). Research has shown, for example, that socioemotional experiences of group members