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Individual contributions in student-led collaborative learning: Insights from two analytical approaches to explain the quality of group outcome

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ABSTRACT

This study explored the characteristics of individual contributions to student-led productive collaborative learning as it takes place in real time. Two independent analytical methods grounded in different research traditions, metacognitive regulation and role analysis, were used independently and jointly to identify patterns of individual participation to collective processes within groups that differed in quality of their joint outcome. The findings provide consolidated evidence of the importance of socially shared metacognitive regulation (SSMR) in productive collaborative learning, and complementary evidence of qualitative differences in focus of individual contributions to SSMR within higher and lower performing groups. The analysis of active participatory roles to the group effort revealed individuals' flexible adoption of multiple roles, especially content-focused roles in higher performing groups, and less flexible roles focused on procedural matters in lower performing groups. Combining the meaningful findings obtained from SSMR and role analysis supports the value of researching individual and group level processes simultaneously.

1. Introduction

Interest in better understanding the nature of student-led productive collaborative learning and its relationship to quality outcome is gaining momentum. At centre stage of recent research is the construct of social regulation, broadly conceptualized as the process by which groups jointly regulate their cognitive (and other) processes to achieve the desired goal of the activity. Across theoretical perspectives on social regulation (see Schoor, Narciss, & Körndle, 2015 for a comprehensive review of the different theoretical perspectives and diverse usage of this term) is the emphasis on the group as a unity, in which learners interact with each other, the learning task and the environment. Here, a position is adopted that in real time collaborative learning, individuals and social entities must be simultaneously conceptualized as self- and socially regulated systems (Volet, Vauras, & Salonen, 2009a). The latest conceptual developments concerning, in particular, the social nature of metacognitive regulation of learning (Hadwin, Järvelä & Miller, 2011; Iiskala, Vauras, Lehtinen, & Salonen, 2011; Volet et al., 2009a), high-level metacognitive processing of learning content (Rogat & Linnenbrink-Garcia, 2011; Volet, Vauras, Khosa, & Iiskala, 2013), and situative perspectives on learning in activity (Greeno, 2006; Nolen & Ward, 2008) provide useful perspectives for exploring the nature of participation in collaborative learning. Greeno (2006) describes a situative approach as one that focuses on individual learners in activity systems, and, thus, situative analyses seek to bring together concepts from both cognitive and interactional perspectives by relating individual cognition to larger patterns of interaction (see, e.g., Horn, Nolen & Ward, 2013). Yet overall, while calls to adopt an integrative perspective (Volet et al., 2009a) and combine individual and group level analyses are widespread (e.g., Chan, 2012; Grau & Whitebread, 2012; Hadwin & Oshige, 2011; Järvelä & Järvenoja, 2011; Rogat & Linnenbrink-Garcia, 2011), empirical studies that used rigorous methods of analysis to explore the converging, complementary or diverging insights that are obtained when focusing on either the individuals within the group, or both in combination, are still few and far between.

The study reported in this article contributes to the yet scarce research exploring how to articulate the individual and the social simultaneously within an intertwined system, such as a collaborative group aiming to reach a common learning goal. More specifically, the aim was to determine the characteristics of individual patterns of participation to the group's collective effort, with a view to better understand why groups with similar background profiles could produce performance outcomes of strikingly different quality. Two independent, rigorous methods of analysis grounded in different research traditions were used. The first method involved the identification of individual

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contributions to socially shared metacognitive regulation (SSMR) and the second the analysis of self-assigned active participatory roles to the group effort. The outcomes of these analyses were treated both independently and jointly. The combined findings obtained from both methods were expected to provide in-depth insight into the multi-faceted characteristics of productive collaborative learning and provide support for the importance of studying individual and group level processes simultaneously.

1.1. Socially shared metacognitive regulation (SSMR) in collaborative groups

The notion of socially shared metacognition was originally proposed by Iiskala, Vauras, and Lehtinen (2004) and Vauras, Iiskala, Kajamies, Kinnunen, and Lehtinen (2003), while the term of socially shared metacognitive regulation (SSMR) was introduced by Volet et al. (2013). Conceptually, it captures a group of learners' goal-directed, egalitarian and complementary monitoring and regulation of their cognitive processes as they unfold in real-time during a collaborative learning activity. The term "socially shared" stresses the jointly shared regulatory processes while the qualifier "metacognitive" makes it explicit that the target of regulation is the group's cognitive activity, and not the motivational, emotional or social dynamics occurring within the group. Recent studies have provided already a large body of evidence of meaningful patterns in the focus and depth of group engagement of joint cognitive activity (e.g., Iiskala, 2015; Khosa & Volet, 2014), as well as in the focus and function of socially shared metacognitive regulation (DiDonato, 2013; Hadwin & Oshige, 2011; Iiskala et al., 2011; Lajoie & Lu, 2012; Schoor & Bannert, 2012).

Empirical studies systematically exploring the contribution of individuals to group regulation to explain the quality of engagement and outcomes are far scarcer. Volet, Summers, and Thurman's (2009b) theoretical framework conceptualized social regulation as an umbrella construct for a continuum of regulatory processes taking place in group activities. At one end of that social regulation continuum is an individual effort to regulate peers' understanding, which contrasts to the other end of the continuum, where a collection of individuals jointly regulate their group activity as a single entity. The coding scheme derived from Volet et al.'s (2009b) framework, which also integrated different levels of depth in processing learning content, revealed meaningful differences in the distribution of individual contributions within groups that differed in their academic performance quality (Summers & Volet, 2010), and some significant relationships between aggregate measures of individual pre-task appraisals and group level engagement in content processing. Volet et al.'s (2009b) framework does not, however, address the issue of qualitative differences or how individual students contribute to the collective regulatory effort. This issue was investigated in Rogat and Adams-Wiggins' (2014) study, which revealed variations in regulation quality at the group level that could be traced to different forms of 'other regulation' enacted by individuals. Other evidence of qualitative differences in individual contributions to the shared regulatory effort, with impact on the group's cognitive processes and outcomes, is mainly presented as illustrative cases (e.g., Barron, 2003; DiDonato, 2013; Iiskala, Volet, Lehtinen, & Vauras, 2015; Rogat & Linnenbrink-Garcia, 2011; Summers & Volet, 2010; Volet et al., 2009b).

Overall, the ways in which individual contributions affect a group's social regulation is still not well understood. This may be because research so far has concentrated on the distribution of participation and underestimated the specific roles that individuals play in the evolution of the cognitive activity. The conceptual and empirical value of using alternative analytical methods to explore the articulation of individual and group level regulation was highlighted in recent research (Iiskala, 2015; Iiskala et al., 2015). Iiskala and colleagues combined systematic analyses of individual and group engagement in socially shared metacognitive regulation with social network analyses. This multi-method approach provided complementary insights into different aspects of individual participation in socially shared metacognitive regulation, raising caution about interpreting findings obtained from a single analytical method. Emerging from this research and that of other scholars is the need to explore the roles that students play within the group as the learning activity evolves, and the possible impact of some key roles, played flexibly and strategically, in productive engagement and successful performance.

1.2. Participatory roles in productive small groups

Roles can be defined as specific strategies and behaviours used by an individual in a particular situation, resulting from interaction with others and characteristics of the individual in question (Biddle, 1979; Chiu, 2000; Stewart, Fulmer, & Barrick, 2005). This definition highlights the dynamic and interactional nature of roles. Roles have been used in various ways and studied at societal, organizational and small group level of analysis. Researchers have taken different perspectives on roles. In the sociological literature, roles have traditionally been seen as organizational roles, into which individuals are placed and that pose certain demands and expectations, depending on the organization in question (e.g., Goffman, 1959). The concept of roles has also been used to identify individual tendencies to behave and interrelate with others in particular ways, and then use this information to form efficient work teams that include all the necessary significant roles (e.g., Belbin, 1993). At the level of individual contributions to a collaborative activity within a small group, which is the focus of this article, researchers have been interested in understanding effective teamwork and productive small groups through the investigation of roles (e.g., Cohen, 1994; DeWever, VanKeer, Schellens & Valcke, 2009; Meslec & Curşeu, 2015; Strijbos, Martens, Jochems & Groers, 2004; Cohen, 1994; Zigurs & Kozar, 1994).

No universally accepted role taxonomies exist (Stewart et al., 2005) and since roles are contextual and situational, simplifying a taxonomy for all contexts would not serve to cover the variance. Different typologies of roles have been introduced, including Benne and Sheats' (1948; re-printed 2007) typology of functional roles of group members, upon which also this study is conceptually built. Benne and Sheats' widely cited typology of roles was developed by observing the functional roles that emerged in interacting groups, and then allotting them into three categories — task roles, building and maintenance roles, and individual roles. Consisting of 27 different roles altogether, this typology of roles covers large number of specific, detailed behaviours. *Task roles* entail twelve roles aimed at selecting, defining and solving common problems (e.g. Initiator/contributor and Information seeker). *Group building and maintenance roles* entail seven roles that relate to regulating, strengthening and maintaining group-centred attitudes and orientation (e.g. Harmonizer and Compromiser) whereas the *individual roles* entail eight roles, consisting of behaviour and actions that are irrelevant to the group task and merely aim at satisfying the needs of single group members (e.g. Dominator and Recognition seeker).

Mudrack and Farrell (1995) examined how Benne and Sheats' typology of functional roles operates in empirical data from small group settings. Their study confirmed the relevance of functional roles in general, though some changes were suggested since some roles were not consistent with the original categories and others had to be deleted due to redundancy. In their study, the emergence of roles was studied by asking peers to evaluate if the group member was playing a particular role or not, which did not allow fine-grained distinctions in roles played by an individual. Later, Chiu (2000) proposed five collaboration roles (facilitator, proposal, supporter, critic, recorder), paired with the strategies that collaborators can implement through specific actions. According to Chiu, individual actions entail three different domains in which