

Group interaction of primary-aged students in the context of a learner-generated digital video production

Abstract

Recognizing the benefits of peer interactions, collaborative problem solving, and creative processing in pedagogical settings, this study aims to understand interaction in the context of DV storyboarding, both at the individual and group level, by looking at one mixed-gender group of fourth graders faced with frequent conflicts in negotiations on the theme, ideas, events, and character roles of a jointly produced movie. The observed and video-recorded activities occurred in naturalistic settings with no pedagogical interventions or instructions for students as to how to organize themselves in a group discussion. In a mixed-method analysis, we employed Bales's IPA method to visualize the interaction and enable comparison across individuals and sessions, and wrote qualitative summaries to describe the group interactions from the perspective of collaboration, Mercer's productive talk, and Tuckman's group development. The IPA method appeared to serve as a robust interpretive framework. The study reveals the complexity of the open-ended DV assignment, initially insufficient skills to negotiate and proceed in collaborative creative processing, as well as unequal participation, but also incorporating enthusiastic task-oriented discussions and self-directed development in inter-relational skills and conflict solving. The results are worth taking into account for teachers and other practitioners in order to identify potential areas of improvement, and thus enhance the educational value of group work.

Introduction

The benefits of peer relations and peer interactions for learning among ever-younger children have attracted increasing interest among researchers and practitioners. Collaborative thinking and problem-solving skills are argued to be as important as the development of children's literacy and numeracy (Littleton & Mercer, 2013). Furthermore, in emphasizing the importance of creativity and innovation in the modern knowledge economy (Drucker, 1993), Sawyer (2006) has suggested that fostering creativity in education should be one of the key missions of school. Along with the growing interest in sociocultural practices, peer-mediated learning, and the societal need that has emerged to foster creative thinking resulting in a "revolution of creativity in education" (Craft, 2005), the significance of children's collaborative creative processing is generally acknowledged in educational settings (Hämäläinen & Vähäsantanen, 2011; Vass & Littleton, 2009).

The present study aims to understand the quality and nature of interactions among primary-aged students while planning and storyboarding fictional movies in small mixed-gender groups. This article examines young children's collaborative creative processing by looking at one group during negotiations on the theme, ideas, events, and character roles in the jointly produced movie. The empirical study contributes to the relatively under-researched field of collaborative creative processing, an area in need of further examination in order to understand individuals' behavior in group discussions, and hence identify potential areas of improvement in order to enhance the educational value of group work.

This study applies the sociocultural approach based on Vygotskian notions of learning and development (Vygotsky, 1978), suggesting that learners' thinking is shaped by social activity among peers and adults (Rogoff, 1990). However, this study focuses on more symmetrical relationships, namely primary-aged students' efforts to collaborate with each other when engaging in creative thinking. In contemporary sociocultural theorizing, the

concept of collaboration is applied to represent ideal forms of peer interaction (Vass & Littleton, 2009). As noted by Dillenbourg (1999), collaborative learning is characterized by negotiation on common goals and building knowledge on each other's suggestions. As learning has shifted from rote learning controlled by single-solution tasks to collaborative creative processing employing open-ended assignments, collaboration is examined in the context of creativity. To study how the mixed-gender group learns to collaborate, this article discusses some supplemental aspects, such as group interaction (Bales, 1950a, 1950b) and group development (Tuckman, 1965/2001), as well as relevant analysis methods.

Social learning and collaborative creative processing

The concepts of social learning (Bandura, 1977; Rogoff, 1986, 1990) and collaborative learning (Dillenbourg, 1999) are widely discussed. Bandura (1977) conceptualized social learning as an individual process that takes place in a social context through observing and imitating others' behavior. Meanwhile, Rogoff (1986) emphasized stakeholders' active participation in the cultural activities of their community through an "apprenticeship in thinking" supported by dialogues with peers and adults, with more knowledgeable individuals supporting novices (Rogoff, 1990). According to the latter perspective, which applies the sociocultural approach, the processes of learning and cognition emerge at the group level. Knowledge and understanding are jointly created through the continuous negotiation of meaning in order to attain and maintain intersubjectivity or "common knowledge" (Mercer, 2010). Thus, social interaction and activities are crucial for learning (Lave & Wenger, 1991; Stahl, 2006).

According to Dillenbourg (1999), the key features of collaboration and collaborative learning are equality, common ground, co-regulation, and mutual commitment to a shared

goal. The benefit of group work is not the number of participants, but rather the interactions that induce explanation, knowledge elicitation, or disagreement. Collaborating group members contribute to all parts of the group's task, although dynamic and horizontal task division between the participants may occur as they reason, enhance, and negotiate the joint problem in interwoven layers (Dillenbourg, 1999).

In collaboration, conflicts that promote reasoning and negotiation are considered crucial mechanisms (Azmitia & Montgomery, 1993; Dillenbourg, 1999; Kruger, 1993), since they encourage critical challenges among peers when searching for mutual understandings. Peer interaction—discussing, analyzing, negotiating, and arriving at an agreement—changes the way in which the participants make sense of the joint task, even in cases of conflicting opinions (Vass & Littleton, 2010). These ideas are consistent with the Piagetian notion of sociocognitive conflict (Doise & Mugny, 1984), suggesting that argumentation on differing perspectives promotes a child's intellectual development by prompting cognitive reorganization. Based on this, it can be argued that conflicts provide opportunities to learn to understand others' roles, thought processes, and capacities (Pahl-Wostl, Mostert, & Tàbara, 2008) and assume different perspectives (Levine, Resnick, & Higgins, 1993); in other words, conflicts stimulate learning to collaborate. Furthermore, moderate conflicts may be productive in improving the quality and creativity of decision-making (De Dreu & Weingate, 2003), commitment to fulfill joint decisions, and participation in the group (Johnson & Johnson, 1975). Whereas task-related conflicts can establish an open-minded climate of trust (Wheelan, Davidson, & Tilin, 2003) and support group cohesion, interpersonal conflicts are often harmful, increasing alienation among participants (Wheelan, 2005). Conflicts with disputational, competing talk that occur frequently during group work exercises in educational settings (Alexander, 2004) can be regarded unproductive but, particularly as they are

undoubtedly present in most human interaction, may afford opportunities to learn how to manage and avoid them.

Nevertheless, social settings do not necessarily foster collaborative learning. Effective group interaction is required to share perspectives on decision-making processes, and to collaborate successfully (Määttä, Järvenoja, & Järvelä, 2012; Underwood & Underwood, 1999). Educational success, and failure, may result in part from the quality of educational dialogues rather than the mere capability of individuals or the quality of the educational elements (Mercer 1995, 2000; Littleton & Mercer, 2010). Many studies on group talk in educational settings have revealed some shortcomings in group communication: discussions do not involve all group members, and most talk is disputative, superficial, and uncooperative by nature (Alexander, 2004; Mercer, 2002), thus being of little educational value (Alexander, 2004).

Ever since the sociocultural approach began to gain momentum in the educational sciences, the roles of teacher and learner have changed significantly, and the child's agency and active role have come to be recognized (Vass & Littleton, 2010). Furthermore, instead of teaching and the teacher's occupation, research has focused on learning from the perspective of learner-centered active knowledge-building in social settings. Rather than perceiving separate processes, Staarman and Mercer (2010) recognized the process of education in terms of the interactive process of "teaching-and-learning", in which spoken language is crucial for joint meaning making between teacher and learners, as well as among peers. As such, the significance of educated dialogue for the quality of learning is apparent (Mercer & Littleton, 2007). Following Vygotskian ideas (Vygotsky, 1978), language is considered to be a cultural and psychological tool linking the *intermental* and *intramental* (Mercer, 2010). That is to say, there is a "relationship between language and thinking": ways of thinking are embedded in ways of using language (Mercer & Littleton, 2007). Acknowledging the significance of other

interactive modes, Littleton and Mercer (2013) view spoken language as the primary mode for intermental activity. Thus, promoting educational talk can prominently foster the learner's reasoning. In many countries, this is implemented using a specific program, known as Thinking Together (Mercer & Littleton, 2007) and Learning Together (Rojas-Drummond, Littleton, Hernandez, & Zuniga, 2010).

Group interaction

Group interaction is one of the major targets of contemporary educational research. Concepts such as group communication, peer discussion, classroom talk, and educational dialogue, though implying slightly different meanings, are employed in the literature to refer to quite the same interactive process between two or more participants. The concepts of group and interaction are intertwined: a group is created and sustained through interaction (Frey, 1999). Bales (1950a, p. 33) defined a small group as “any number of persons engaged in interaction with each other,” physically present at the same event and aware of who belongs to the group. The members, sharing a joint task, interest, or problem, want to be part of the group and derive satisfaction from participating in group activities (Johnson & Johnson, 1975). In addition to interaction and interdependence, a shared identity is a crucial characteristic that makes certain collections of individuals more like an entity. The degree of “groupness” may vary over time, as well as at the individual level (Nijstad, 2009).

Group interaction refers to two or more people communicating to one another (McGrath, 1984), exchanging, reasoning and interpreting messages in turns in a reciprocal relationship (Francis & Hester, 2004). Group members construct shared meanings, common ground and shared understanding in processes of meaning making (Littleton & Häkkinen, 1999; Stahl, 2006) in collaborative interaction (Underwood & Underwood, 1999). However,

interaction is highly spontaneous because interpretation depends on the history and perspective of the participants involved (Francis & Hester, 2004).

The group interaction process refers to interaction, leadership, debate, and decision-making (Johnson & Johnson, 1975), as well as to the behaviors of the group members in relation to each other, to the task, and environmental aspects (McGrath, 1984). The interaction process of a task group advances from orientation to evaluation and control. Group members must communicate with each other to perceive the problem, to determine what they know about it, and to decide how to handle it. To achieve the joint goal, the group must perform not only task behaviors, but also socioemotional behaviors related to sustaining group harmony. (Bales, 1950a.) During the interaction process, the group is likely to face emotional, cognitive, and interpersonal issues that challenge the group to develop in order to advance in the task accomplishment.

Group development

Group development refers to changes over time in the group as a whole. Tuckman (1965/2001), based on Bales (1950a), argued that group development tends to follow four stages: forming, storming, norming, and performing. Later, Tuckman and Jensen (1977) added a fifth stage, called adjourning. The stage titles describe the nature of the four stages that groups pass through at two parallel levels: interpersonal relations and task performance. At the beginning of collaborative activities, during the forming stage or initial group formation, confusion may occur about the joint task, goal, and ways of collaboration. Members, unsure about belonging to the group, may behave tentatively. In the storming stage, the group encounters a lack of cohesion and conflicts related to cognitive or interpersonal issues. The members compete for roles, position, and attention in the group. Over time, the

members become more confident to suggest ideas and oppose others' suggestions. During norming, joint norms are negotiated to resolve conflicts and achieve the goal. Group cohesion begins to develop as the members want to belong to the group and feel commitment to the joint goal. In the performing stage, the group members agree on the common goal, and the strategy to achieve it. They begin to collaborate and perform the task, supporting and co-regulating each other, to achieve the joint goal.

However, research has demonstrated that group development does not always occur in the linear or sequential manner suggested by Tuckman (1965/2001). Models employing cyclic or both sequential and cyclic approaches have been described. Groups may shift back and forth between the norming and performing stages of Tuckman's theory (Bales & Cohen, 1979). As noted by Wheelan (2005), cyclic models support the notion of change in groups, but not the idea that groups develop. In authentic groups, distinct stages that are qualitatively different from each other can hardly be recognized (Nijstad, 2009). Instead, various features of group development emerge in all stages to varying degrees.

Analysis of classroom talk, interaction and collaborative creative processing

As sociocultural practices have gained prominence in schools, recent educational research has been concerned with different kinds of group processes, such as collaborative learning, shared regulation, and meaning making, as well as conditions resulting in effective interaction among learning societies and peer groups (Määttä, Järvenoja, & Järvelä, 2012). Due to the increased interest in classroom interaction, a considerable number of analysis methods have been introduced. Recent educational research drawing on sociocultural approaches has typically employed qualitative methods (e.g., Kumpulainen & Wray, 2002),

though some studies have highlighted the potential of mixed methods (e.g., Hmelo-Silver, Chernobilsky, & Nagarajan, 2009).

In order to analyze productive discourse, and emphasizing the significance of productive dialogue for successful collaboration, Mercer and colleagues (Mercer, Wegerif, & Dawes, 1999) have developed a triadic typology known as the sociocultural discourse analysis tool (Mercer, 1995, 2004). The tool aims to identify three archetypical forms of talk in educated discourse, namely exploratory, cumulative, and disputational, as well as link education processes to educational outcomes. Mercer (1995) demonstrated that exploratory talk—the constructive and critical negotiation of views—resulted in the highest cognitive gains in paired learning contexts. Cumulative talk refers to the speaker’s positive, albeit uncritical, building upon what the other has said, whereas disputational talk is characterized by short turns at talk, disagreement, and individualized decision-making. The tool has been widely used in recent studies on the nature and quality of talk, including, among others, triadic groups of primary-aged students (e.g., Rojas-Drummond et al., 2010; Rojas-Drummond, Mazon, Fernandez, & Wegerif, 2006).

The elements of exploratory talk—the extension and elaboration of ideas introduced previously by one or the other, critique, and intersubjectivity—are also involved in transactive coding (Azmitia & Montgomery, 1993; Kruger, 1993). Thus, other-orientation is a key feature in both methods. Studies on dyadic dialogues have demonstrated the benefits of friendship in learning: friend pairs performed better than acquaintance pairs (Azmitia & Montgomery, 1993; Miell & MacDonald, 2000). The positive impact of friendship was explained by the ease of interacting with a friend, which facilitates transactive contributions in discussion, such as more evaluation and critique, and spontaneous justification of one’s proposals. Besides the quality of relationships between group members, the task’s nature, design, and level of difficulty have been found to influence the collaborative process. Friend pairs’ participation in

transactive conflicts and evaluating outcomes was significantly associated with good performance in problem-solving tasks (Azmitia & Montgomery, 1993). Mutual engagement during the interaction and high outcome quality among friend pairs were observed in creative, open-ended tasks (Miell & MacDonald, 2000). Furthermore, whereas tasks with problem solving seem to promote the use of explorative or transactive talk and explicit reasoning (Rojas-Drummond et al., 2010; Rojas-Drummond et al., 2006), explicit reasoning is not necessary to solve open-ended creative tasks successfully (Rojas-Drummond et al., 2008).

Quite different from the introduced qualitative approach, one of the most influential traditions in developing an understanding of interaction as part of the group process is the interaction process analysis (IPA; Bales, 1950a, 1950b). By quantifying and visualizing interactions, the method makes it possible to illustrate the distribution and differences in group interaction, which is difficult to do using mere qualitative methods. The IPA method allows for statistical investigations and examinations of individual participation and changes in group interaction over time, following the ideas of group development (Tuckman, 1965/2001) based on this method. According to Kerr, Aronoff, and Messé (2000), the IPA model can be considered classic, a perception that is supported by reprints of these ideas. In addition to Tuckman's model (1965/2001), an article on Balesian interaction and group development by Bales's colleague Hare (1973) was reprinted in 2010. Due to content-free categories, Bales's IPA system is not tied to the content of any group task or group activity, which makes it generic and universal in nature (McGrath, 1984). The method is employed in many studies investigating different types of groups in highly diverse contexts, such as in group interaction and communication research with a non-statistical purpose, to support and extend the qualitative examination (e.g., Fahy, 2006; Gorse & Emmitt, 2007; Socha & Socha, 1994).

It is worth noting that most studies mentioned above focusing on single-gender friend dyads and triads reported efficacious interaction and successful performance. Nevertheless, it is argued that children need to learn how to collaborate with peer acquaintances in mixed-gender settings. Against this background, it has become of interest to study creative group interaction in a more complex context, namely with mixed-gender groups comprising several members assigned an open-ended creative task to make a joint fictional movie. This study endeavors to examine how primary-aged students advance in their group work and achieve the stated goal by employing a methodological combination of Bales's IPA and a qualitative approach to understand interaction both at the individual and group level.

The study focuses on the interaction of one group of fourth-grade students in discussions of a learner-generated DV production project. The observed activities occurred in naturalistic settings with no pedagogical interventions or instructions for students on how to organize themselves in a group discussion, that is to say, how to share or take turns and hold the floor. The study aims to examine group interaction and its development during a series of task-based discussions. It is of interest to study how the participants learn to collaborate, but also to investigate interaction at the individual level in order to identify each student's improvement needs, and thus enhance the educational value of group work.

Design of the study

The context of the present study on small group interaction is a student-generated DV production project with fourth graders (aged 10–11 years) as participants, who worked on their DV movies in groups with minimal support from the teacher, proceeding from brainstorming and scripting to filming and editing. The duration of the DV project was three weeks, totaling 18 hours (Palmgren-Neuvonen & Kumpulainen, 2011).

The DV project was based on a literary theme employed in mother tongue education. The supervising teacher assigned the students into groups of five that were heterogeneous in terms of gender, character, and abilities. This study focuses on one of the groups. Prior to each small group session, the teacher introduced the next step in the DV project in a whole-class setting by showing a 15-minute video produced by the Finnish Broadcasting Company's media education program, and by repeating and explaining the message of the introduction video to make sure that everyone understood the task. A co-teacher assisted during the DV project.

This article reports on the interaction in the three planning sessions, the flow of which was as follows: In Session 1, the students decided on the theme and topics of the joint movie by selecting three pictures from the Internet. The students generated idea cards individually after the first group session, which allowed all children to write down exciting events as suggestions for the jointly produced movie. In Session 2, they created a storyline by selecting some of the idea cards and began generating a storyboard by drawing visual interpretations of the manuscript. In Session 3, they decided on the casting and finished the storyboard.

Video data and computer-aided interaction analysis

The activities of the DV project were video recorded to capture the process as it happened. The discussions of the target group were video recorded using one camera placed on a coat rack in the corridor where the group was working. The analysis of the video data was informed by literature on video-recorded social interaction. The relevant video data on the entire DV project were transcribed verbatim per individual speaker to enable examination of the contribution of each individual, and analyzed using QSR NVivo software.

While reviewing the video recordings, we became especially interested in one group, composed of three girls and two boys, due to its vibrant and enthusiastic interaction among

determined and inventive group members. The three planning sessions prior to the filming and editing sessions were chosen for study because the sessions were considered a relevant sample for the examination of discursive group interaction with a sub-goal for each session. The video recordings for the first three planning sessions of the DV project ranged from 22 to 33 minutes long (84 minutes in total). In the initial analysis phase, the transcriptions were analyzed qualitatively and reported through summaries of the relevant events and spoken themes, adopting the method employed by Socha and Socha (1994). When describing the sessions, the features of productive talk (Mercer, 2004), the nature of participation and content of member contributions, shared and co-regulation in the group, and the construction of a shared understanding regarding the joint DV task were taken into account. In addition, difficulties in collaboration, such as conflicts and off-task activities, were considered.

The selection of the analysis method was informed by the initial analysis phase, which revealed prominent changes in interaction across the sessions. An interest arose in examining and illustrating how the individual group members contributed to discussions, and how the group developed over the course of the discussions. The goal of this analysis would thus be to understand the interaction both at the individual and group level. To address this interest, various methods were considered. The typology of productive talk was developed for the analysis of talk as a social mode of thinking, aiming to evaluate perspective seeking and, thus, recognize exploratory features within talk on a larger scale (Mercer, 2004). Bales's IPA (1950a), and the method for systematic observation of task groups in particular, was employed as an explicit tool to study peer group interaction and, following the methodology used by Socha and Socha (1994), identify interaction trends during sessions. The IPA method enables, among other approaches, an examination of the nature and frequency of asking for information, opinions, and suggestions (Bales, 1950a), which can be regarded as indications

for perspective seeking as defined in exploratory talk (Mercer, 2004). The analysis proceeded in an intertwined dialogue between the qualitative summaries and results from IPA coding.

The twelve categories of the coding scheme of Bales' IPA method are shown in Table 1: six display task-oriented communicative actions and six represent socioemotional aspects sustaining group harmony (Bales, 1950a). The task-related activities (4–9) are in the middle of the table. The socioemotional aspects are divided into positive (1–3) and negative reactions (10–12) at the top and bottom of the table, respectively.

Table 1

The Categories of IPA (Source: Bales 1950a, p. 9, modified by first author)

[Insert Table 1 here]

The twelve categories describing the group process form a series of complementary pairs beginning from the midpoint pair (6 and 7) outward (Bales, 1950a, 1950b). The task area is divided into two domains, with its categories forming complementary pairs of asking questions (7–9) and giving answers (4–6). The interaction process in a task group advances from orientation to evaluation and control; group members interact to orientate themselves to and evaluate the joint assignment, and to control goal achievement. The positive and negative reactions, constituting similar pairs in the socioemotional area, are used to engage in and manage conflict (Gorse & Emmitt, 2007). At various times, a group will emphasize behavior in either the task area or in the socioemotional area.

In the present study, the unit of analysis was an utterance by a member, or part of it if the function changed during the utterance. Using the IPA method, the content of each

discursive act was coded into one of the categories according to quality, meaning, and its function in relation to the surrounding acts, not according to the use of specific terms. Hence, the method accomplished a type of content analysis, although interaction was classified act-by-act and was referred to as a process rather than as plain content (Bales, 1950b). Simultaneous quantification of interaction and speaker-based coding enabled us to illustrate and compare the frequency and nature of the members' participation and interactive tendencies, as well as compare them across the successive sessions, as seen in the subsequent figures.

Even though Bales (1950a) constructed the coding categories to be content-free, the method in this case was slightly modified, similarly to research conducted by Peña and Hancock (2006) and Underwood and Underwood (1999), in order to address the stated research interest: how does the group develop and learn to collaborate? Category 4 (gives suggestion) was divided into the subcategories of “gives positive suggestion” and “gives negative suggestion” to acknowledge the features of collaborative learning. A positive suggestion is an idea that is new or built upon a previous suggestion, whereas a negative suggestion competes with a previous suggestion. It is worth noting that these are features to distinguish between disputational and more productive talk (Mercer, 2004). Excerpts 1–5 are presented to illustrate the categorization and content of the discussions.

The following section reports and visualizes the quantified interaction using interaction profiles generated using Bales's IPA categorization. The profiles depicting interaction and its development are discussed in light of qualitative summaries to explain and support the appearance of the quantified interaction, as well as the perspective of collaboration, productive talk (Mercer, 2004), and group development (Tuckman, 1965/2001). Thus, the IPA method serves as an interpretive framework.

Results

The study examines interaction both at the individual and group level, as well as the development of group interaction. First, this section will interpret and discuss the individual interaction profiles presented with a line connecting the data points in each category, thus allowing for multiple, distinguishable profiles on the same chart (Gorse & Emmitt, 2007). Second, the group interaction during the sessions is discussed on the basis of the group summary chart, and trends in group development are identified. To allow for comparison across the sessions, the rates representing each category were obtained by calculating percentages of the total number of acts during each session.

Session 1: Forming and (brain)storming

The task for the first group session (22 minutes) was to brainstorm the theme and main ideas of the fictional movie. The task was facilitated by the use of an artifact: the students were asked to find three pictures from the Internet representing their selections for the theme of the movie. The group sat in a semi-circle at a small table in the corridor, with the three girls next to each other and the two boys beside each other. Girl2 operated the mini laptop.

[Insert Figure 1 here]

Figure 1. The interaction profiles of individual group members during session 1

During the first session, the discussion advanced at a frequency of 12 utterances per minute, indicating short turns in talk and, thus, disputational talk as described in Mercer's typology (2004). The individual profiles shown in Figure 1 suggest that the group members'

interaction varied widely. Four of the members aimed to advance the task by giving a high rate of suggestions (up to 8%). However, their suggestions were often rejected and met with a significant amount of disagreement, which indicated frequent conflicts. In particular, the interaction profile of Girl1 shows a considerable amount of disagreement (12%) and tension (3%). The figure also shows that the participants very rarely asked for information, opinions, and suggestions (0–2%), which is typical among younger children (Bales, 1950b; Socha & Socha, 1994). Thus, it seems that the children did not support each other's participation.

The figure also reveals the unequal participation of the group members. The two boys and Girl1 spoke most, as the frequencies of their utterances are the highest in most categories. The profiles suggest that these two boys and Girl1 competed for leadership of the group, while Girl2 aimed to take care of progress in task accomplishment and used exploratory talk (Mercer, 2004) by asking for others' opinions (2%) and showing little disagreement (1%). Girl3 remained completely silent, and the examination thus centers on the remaining four members' interaction.

However, the interaction profiles may need to be discussed in light of the qualitative summaries, which confirmed that the group members continued debating in a vibrant manner. The dominant members eagerly shouted their suggestions simultaneously from the very beginning without taking turns. Frequent overlaps and interruptions occurred, reflecting competition, dominance, and a lack of balance in collaboration within the group, as noted also by Vass and colleagues (Vass, Littleton, Miell, & Jones, 2008). These children found it frustrating to wait for their turn in the discussion and to take into account others' opinions, as suggested by Socha and Socha (1994). Agreement on the themes of the joint DV movie seemed to be a challenge for the mixed-gender group.

The extent of disagreement can be explained by the fact that the discourse of the girls and boys did not converge. The boys continually suggested topics and characters such as

lions, sharks, drugs, terrorists, and explosions, whereas the girls wanted to use grannies, babies, and orphanages in the movie. It can be claimed that these suggested themes were typical of the films that the children had seen and enjoyed. The members were also quite fixated on their own ideas; the boys had a common idea for the DV movie from the beginning of the session, while Girl1 was the only one resisting their violent, madcap ideas. The contentious behavior of Girl1 can be justified by her desire to proceed in task accomplishment given the time restriction, which may have induced dominance. In this kind of situation, the more active members may take responsibility for achieving the stated goal.

Negative emotions were shown in the group's negotiations. In addition to the members' different opinions, goals, and attitudes, the unequal division of labor led to both verbally and nonverbally expressed dissonance. The boys primarily expressed irritation due to the passivity of Girl3. Still, the video recording revealed that Girl1, despite her feisty attitude toward the boys' ideas, unsuccessfully encouraged Girl3 to participate at the start of the session. Girl1 wanted to quit the group five times during the first session, while the boys wanted to make a movie on their own. Consequently, the teacher was requested to intervene and solve the conflicts on five occasions. However, the teacher provided the group with minimal guidance, and mostly observed and encouraged the group to solve their problems and make decisions on their own. For example, Boy2 asked the teacher for permission to choose four pictures instead of three, but the teacher insisted on three. The teacher suggested that the group come to a consensus, but after noticing that the group could not reach a compromise, recommended that the like-minded members (the two boys, Girl1 and Girl3 together, and Girl2 alone) should choose one picture each.

The frequency of discursive acts did not allow the members to listen to or consider the opinions and suggestions of others. Therefore, there was little effort to summarize or outline the suggestions. This may also signify their modest ability to specify the meanings to be

constructed. Boy2, who seemed to have several new ideas, was the first to summarize suggestions. Furthermore, unilateral discussion among the dominant group members did not enable argumentation. These findings are consistent with the results of Socha and Socha (1994), who concluded that children need to be guided by the teacher to regulate their own and others' participation, and moderate their dominance and interruption. However, the teacher did not aim to improve individual members' contribution, but rather supported the group's decision-making. It is also worth noting that the nature of the task may have had an effect on the group interaction, as shown in many studies (e.g., Rojas-Drummond et al., 2006; Rojas-Drummond et al., 2010) suggesting that creative open-ended tasks do not support argumentation and logical reasoning.

In the latter part of the session, the group demonstrated developing skills in strategizing. The members discussed how to make the storyline, who could influence it, and in which ways. Just three minutes before the end of the session, the group finally began to agree on the three pictures and the theme of their movie. The group eagerly worked on the storyline until the last second, despite the co-teacher's order for them to take a break. Excerpt 1 (25 seconds) reflects motivation, emergent shared understanding on the jointly produced movie, and finally, satisfaction in the consensus.

Excerpt 1. Emergent shared understanding

	Speaker	Content	Category
356	Girl1	No... the baby drops the bomb.	10 Shows disagreement 4 NEG suggestion
357	Boy2	The baby takes off the bomb...	4 POS suggestion
358	Girl1	The parents are... some kind of ... some kind of ...	4 POS suggestion
359	Boy2	... terrorists?	4 POS suggestion

360	Girl1	... terrorists with bombs...	4 POS suggestion
361	Co-teacher	The baby begins to play with the ball and it turns out to be a bomb, heh?	4 POS suggestion
362	Girl1	Oh my...	5 Gives opinion
363	Boy2	And then...	4 POS suggestion
364	Girl2	There is no Internet connection any more...	6 Gives information
365	Coteacher	Now you have to come to the classroom.	6 Gives information
366	Girl1	Now we have got it! The parents are terrorists and they steal the bomb...	2 Shows tension release or satisfaction 4 POS suggestion

Excerpt 1 reveals that the themes and ideas converged when Girl1 accepted the action-movie elements (bomb [356], terrorists [360, 366]) and Boy2 adopted the “soft” ideas (baby [367]) in their conception of the storyline. The four active members, both girls and boys, showed high motivation in storytelling and negotiation towards creating a shared understanding. The excerpt represents a promising start for creative meaning making; nevertheless, with respect to the features of Mercer’s typology of productive talk, the contributions in the transcript of Session 1 at best amount to cumulative talk with repetitions and elaborations, but with no critical consideration of ideas (Mercer, 2004).

In terms of the group development model by Tuckman (1965/2001), the profiles of the group members’ interaction show many typical features of the forming stage, such as confusion about the goal, the joint task, and the ways to collaborate. At first, the group members expressed substantial subjectivity, repeating their own ideas, and opposing those of others. At the inter-relational level, the group sought limits and rules for their behavior. Consequently, this session can be regarded as a storming stage, as the group encountered unproductive conflicts and a lack of cohesion.

Session 2: Planning and norming

The assignment for the second group session (33 minutes) was to create a storyline using the idea cards with individual wishes and thoughts, written after the first group session, as a facilitating artifact. The students were asked to visualize the scenes of the movie by making drawings as soon as they agreed on the ideas to be elaborated. The group sat at a small table in the corridor, with the boys opposite the girls. This time, the group worked using traditional devices, namely paper and pencils for note-taking and drawing.

[Insert Figure 2 about here]

Figure 2. The interaction profiles of individual group members during session 2

The interaction profiles in Figure 2 suggest intense negotiation among the four active group members during the second session. However, the profiles refer to like-minded and reciprocal interaction. Rates of disagreement were lower (2–3%) while rates of agreement and asking for information were higher (up to 3% and 4%, respectively) than during the first session. Disagreement was still evident, although it was shown almost equally by the four active members. While the storyboard was negotiated by giving suggestions, disagreement was still expressed, but in this case through competing suggestions representing disputational talk (Mercer, 2004). On the other hand, the increased number of negative suggestions (up to 3%) may indicate that the group members improved their discussion skills and offered other solutions, instead of merely disagreeing with others' suggestions.

Interestingly, the dominant behavior of Girl1 and the boys began to decrease as the group's understanding was about to converge. The interaction profile of Girl1 reveals that she showed agreement more (3%) than the other members did. On the other hand, she also showed the most disagreement (3%). Her role was one of active leadership in group work, as she also asked for opinions and suggestions (1–1.5%). The group was almost ready to begin performing. The profile also shows that the silent member, Girl3, had an emerging participation in the interaction.

The video recording revealed that even though the nature of the interaction in session 2 was, according to the profiles of the group members, completely different from that in session 1, the session began with a conflict between the boys' and girls' ideas. Although the boys again expressed their desire to make a movie of their own and the girls agreed, the group continued its joint efforts, but did so in competition against each other, ensuring that the other members' suggestion would not advance, particularly as the girls did not approve of themes related to violence. However, the number of conflicts decreased as the group found ways to deal with them. The group ignored the emerging conflict simply by changing the topic, which may indicate that the members wanted to settle the conflict and continue working.

Twelve minutes into the session, the members, particularly Boy1, began to listen to each other and ask questions—in other words, to seek other members' perspectives and reasoning or arguments. This may also signify their aim to employ exploratory talk in their discussions (Mercer, 2004) and construct a shared understanding on the jointly produced movie. Thus, there were emergent signs of other-orientation or intersubjectivity indicating a first step towards collective creativity (Vass et al., 2008). The group members tended to give suggestions, opinions, and information related to their movie, each taking turns in leading the task accomplishment. The following excerpts demonstrate the emerging strategy creation among the group members. Excerpt 2 shows that the group tried to vote for the best storyline.

Excerpt 2. Proposal to vote

Speaker	Content	Category
243 Boy1	Hey, I've got it! From the very beginning... each of us presents one's own story and then we vote for the best!	4 POS suggestion
244 Girl1	Yes!	3 Shows agreement
245 Boy2	Ok!	3 Shows agreement
246 Girl1	Ok! I'll start. There is a boy, about ten years. He has a sister aged three and then...	3 Shows agreement 4 POS suggestion

Maintaining that voting may result in an unsatisfied minority, Johnson and Johnson (1975) preferred consensus in group decision-making. Sometime later, as the vote turned to another conflict, a better solution was needed (Excerpt 3).

Excerpt 3. Proposal to combine the stories

Speaker	Content	Category
315 Girl2	If all these stories could be modified.	4 POS suggestion
316 Boy1	... just like to combine them somehow.	4 POS suggestion
317 Girl2	Let's take one story as a basis. And then...	4 POS suggestion

Thus, the group decided to use one member's story as the basis for their storyboard. However, the group found that this strategy needed elaboration.

Excerpt 4. Proposal to build on one member's story

Speaker	Content	Category
325 Girl2	Ok, I know... I got a big idea. Let's take one story for	4 POS suggestion

		the basis and take all poor [things out.	
326	Boy1	(grasped the drawing papers) [Ok, let's just start drawing!	3 Shows agreement 4 POS suggestion

After the crucial point (18 minutes into the session), as soon as a joint strategy was chosen, the group began to perform. The excerpts presented earlier are just examples of the numerous self-imposed strategies that the group employed to elaborate on the storyline. They demonstrate that the children's strategies developed from voting for the best idea to a more advanced practice of integrating all members' ideas. Being highly motivated, Boy1 began before Girl2 had finished her utterance (325). The group members divided the task by deciding to draw scenes of their own. Although there were some conflicts, they did not need the teacher to solve them. He visited the group only once, just before the end of the session, to discuss whether the ideas for the movie could be realized.

The beginning of the session may be interpreted as adhering to the storming stage of group development (Tuckman, 1965/2001). The members became more confident in suggesting ideas and opposing others' suggestions, as they tried to change the group to fulfill their personal needs. The members adapted to each other and felt free to show their emotions, both positive and negative. They found a way to compromise and promote shared understanding, and discussed the norms related to moviemaking in the school context. Thus, the latter part of the session was the norming stage of the group.

Session 3: Performing in storyboarding

For the third session (29 minutes), the students were assigned to finish the storyboard, create the role characters, and decide on the casting. As a concrete product, they were

required to generate a graphic manuscript to proceed to the next step of filming the joint DV movie. The idea cards were used as a facilitating artifact.

[Insert Figure 3 about here]

Figure 3. The interaction profiles of individual group members during session 3

Figure 3 indicates that the rates for positive suggestions were much higher (5–12%) and competing negative suggestions were much lower (up to 2%) in session 3 than in session 2. Furthermore, the group members asked for information and suggestions to a more equal extent, showing increased reciprocal interaction and emerging collaborative storytelling. The profiles indicate that the group turned on the effective performing gear. The slight changes in socioemotional behavior show that group identification and cohesion began to grow in a promising way. The rates for showing solidarity and tension release were higher and the rates for showing tension and antagonism were lower, compared to the previous session. The silent group member, Girl3, also began to participate in the discussion.

The video recording suggested that the members enjoyed creating their joint DV movie by asking for and giving information and suggestions to construct a shared understanding. After a few minor disputes on the character roles and casting at the beginning of the session, the group members agreed on the idea, characters, and events of the movie. Even Girl3 joined the discussion and was given tasks and roles. In this session, some overlaps and interruption occurred, but, in contrast to session 1, indicated positive intense perspective sharing and mutual focus referred to as the “collaborative floor”, a shared space where the “group takes priority over the individuals” (Coates, 1996: 133, cited in Vass et al., 2008). Instead of competing for leadership, distributed leadership was strengthened. The members

each took turns commanding the activity, organizing and motivating the others, and summarizing the agreed-upon suggestions. The boys, in particular, repeated their conception of the storyline to get it accepted by the girls.

The group discussed calmly while drawing, and laughed and joked every now and then. Drawing undoubtedly helped them make the storyline more concrete. For example, Boy2 abandoned the idea of an explosion as he found it difficult to put into effect. Excerpt 5 represents the detailed creation of the storyline characterizing session 3.

Excerpt 5. Emergent shared understanding

	Speaker	Content	Category
259	Girl1	How do they escape?	9 Asks for suggestion
260	Boy2	Look...they run away like that...let's say... I'll draw it there...	4 POS suggestion 6 Gives information
261	Girl1	They pick a lock, eh? So? Who has drawn that...?	4 POS suggestion 9 Asks for suggestion 7Asks for information
262	Boy1	How can he come out from there?	9 Asks for suggestion
263	Girl1	And when he has robbed the orphanage he...	4 POS suggestion
264	Boy1	How can he come out from there?	9 Asks for suggestion
265	Girl2	...the lock is not...the lock is there...he just manipulates the lock... and then he opens the door...	4 POS suggestion

Excerpt 5 demonstrates that the group interaction became more reciprocal. Questions reflecting a search for others' perspectives also prompted other members to participate. In this performing stage, group members agreed on the common goal and strategy, and began to

collaborate to achieve their joint goal. Finally, Boy1 could exclaim in relief, “This is going to be pretty good!”

Group development across DV production planning sessions

To discuss the interaction and its development, this section studies the group interaction profiles across the three sessions. Figure 4 demonstrates consistent changes during the sessions, suggesting a positive development in group interaction skills.

[Insert Figure 4 about here]

Figure 4. Group development based on the group interaction profiles of the three sessions

Figure 4 suggests that interaction in the group was task-oriented, as only a small proportion of behavior was categorized under socioemotional aspects. Over time, the power relations became more equal. The development in group interaction was recorded as follows: “gives positive suggestion” increased from 23% to 38%, “asks for information” increased from 5% to 11%, and “asks for suggestion” increased from 1% to 5%, whereas “gives negative suggestion” decreased from 7% to 4%. This indicates that the group learned how to collaborate and managed to construct a shared understanding of the joint task. As the group’s decision-making progressed more smoothly, the members found it easier to ask for information and suggestions. The rates for “asks for opinion” and “gives opinion” diminished (from 5% to 1% and from 18% to 8%, respectively). The rate for “gives information” likewise decreased from 17% to 12%. It can be argued that the group members’ ideas and thoughts

were accepted and that they felt satisfied with the storyboard. In addition, the atmosphere may have supported the expression of suggestions instead of opinions.

Disagreement decreased considerably (from 21% to 11%), but, interestingly, so did agreement (from 8% to 2%). The latter was expressed through positive suggestions instead of clear expressions of agreement, such as “yes” or “ok”. The rate for showing disagreement during all sessions was higher than that of agreement, which is typical for children (Bales 1950a, 1950b; Socha & Socha 1994). Socioemotional behavior improved, as “shows tension release” increased from 2% to 4%. Negative socioemotional behavior decreased (“shows tension” declined from 3% to 0.4% and “shows antagonism” from 2% to 1%), indicating progress in group cohesion. Even though “shows solidarity” was scarce, the video recordings showed that the group progressed in constructing a shared identity.

To summarize, a number of features of group developmental patterns (Tuckman 1965/2001), can be observed; however, as Nijstad (2009) points out, clear and linear stages are not recognizable. Consistent changes occurred across the three sessions, but the same features emerged in every session as the group was assigned a new sub-task. Still, conflicts became milder with each session as the young DV producers chose joint strategies to proceed with their collaborative task.

Discussion

This article aimed to examine interaction both at the individual and group level, as well as the development of group interaction in the context of collaborative creative processing. The members’ behavior suggested a high degree of engagement, enthusiasm, and motivation. The group worked in an utterly task-oriented manner, proceeding with their DV assignment despite frequent conflicts at the beginning of the project. For the most part, the

conversations remained coherent without interruption from unrelated sub-discussions or off-task activities, which Alexander (2004) found to be frequent in group work.

However, the study revealed initially insufficient skills to negotiate and agree on strategies, even though the group members knew each other, as they were used to working in groups with any combination of their classmates. Additionally, numerous conflicts, the absence of argumentation, and a lack of questions to promote intersubjectivity were prominent trends, especially during the first session. A major factor provoking conflicts appeared to be the members' different discourses representing the media or worldview of the different genders. It can be argued that the members of the mixed-gender group approached the task from the perspective of their own media experiences: the boys were in favor of themes representing action and entertainment based on violence, while the girls suggested "soft" topics. Although DV technology was not present in the planning sessions, it is obvious that the boys and girls interacted with their own perspectives and ideologies as a starting point defending their own visions for a desired product as an individual goal. The interaction does not occur in a vacuum, but as it is shaped by the shared history and joint experiences of the participants, it is always contextual and situational (Francis & Hester, 2004).

Although frequent conflicts disturbed the workflow, they were all task-related and also had positive effects on group performance. Members who had created the most disputes also expressed notable relief and satisfaction upon reaching an agreement. In addition, disputes about action movie topics made the group negotiate and agree upon norms related to moviemaking in the school context. Contrary to studies suggesting the benefits of single-gender friend pairs' learning (e.g., Azmitia & Montgomery, 1993; Underwood & Underwood, 1999), this study demonstrated that the members of the mixed-gender target group, being open to conflict, developed their discursive and collaborative skills and achieved the shared goal. Nevertheless, Alexander's (2004) argument that disputational talk is of little educational

value is worth reconsidering. Based on our findings, we argue that group work in any scenario offers opportunities to learn group skills and interaction, which have inherent educational value.

Our findings demonstrated unequal participation: three out of five group members fought for leadership, whereas one member kept mostly silent, only showing emergent involvement in session 3. In group work, passive participation may occur due to shyness or reticence. The outmost mode of inactivity, the free-rider phenomenon, refers to a group member aiming to benefit from other members' activity without making a personal contribution to a joint task (Kerr & Bruun, 1983). Nonetheless, a passive member may use a fellow member as a channel to present his/her views (Johnson & Johnson, 1975). Sutton (2001), arguing that an inactive member can learn by observing other more active members, presented the notion of vicarious interaction, referring to active observation and processing of others' interaction without direct participation in the discussion. Passive members may be prompted to express their ideas by starting the ideation phase with individual written brainstorming, which could generate more ideas than corresponding group activity (Gorse & Sanderson, 2007). In the DV project reported in this article, this was done through the individually created idea cards.

We argue that the most important aspect of learning attainment among the reported activities was the self-directed improvement of inter-relational skills in negotiation and conflict solving. Across the sessions, the nature and structure of interaction among the group became more moderate, equal, and reciprocal, as demonstrated by both the qualitative summaries and the IPA method. The students, provided with time, scaffolding, and clear sub-goals, were allowed to improve on their own terms and develop the quality of their discussions and strategies to handle problems, which was valued by Socha and Socha (1994).

Although the pedagogical goal of the DV project was, according to the supervising teacher, to improve media literacy and understand DV technology, reaching a consensus on the storyboard of a fictional DV movie was an equally significant achievement of group work. As a whole, the DV assignment, including several waypoints that required decision-making, was a very complex task for young students. Its goal was to construct a shared understanding of an abstract media representation to be created through collaboration. There were no correct answers or facts, but any ideas and thoughts were acceptable to be used in the final video movie. Instead of using the term “knowledge building”, it may be preferable to refer to the process as “shared meaning making”, signifying meanings taken as a group product constructed in a successful process (Stahl, 2006). The group independently decided whether to accept a specific idea and proceed to the next one, and, adapting Mercer’s idea of “interthinking” (Mercer, 2000), through the process of “intercreating”, finally succeeded in achieving their goal.

However, this study has limitations. First, due to the number of DV cameras available and the peer groups in the case study, the group discussions were recorded using one camera. Therefore, all nuances and richness of interaction between the participants, who moved once in a while, were not entirely captured. A few utterances remained inaudible, as the children simultaneously talked with and over each other. Second, the decision to focus on just one group, which allowed a deep investigation of it, may be criticized on account of limited results that cannot be generalized. Nevertheless, the study revealed many significant findings that obviously appear in large-scale research as well, and that are worth taking into account for teachers. However, despite the quantification of interaction, the aim was not to generalize any results; rather, by reporting on the sessions in qualitative summaries and additionally using the quantifiable IPA method, the study aimed to describe and demonstrate the nature of interaction and its development in a way that employing just one of these methods could not

have allowed. Accordingly, we cannot generalize the results even among the other groups of fourth graders involved in the DV project, nor can we give evidence to predict recurrent development. Third, it must be admitted that categorizing the rich creative group discussions into the predetermined categories of the IPA method, and thus being unable to reveal the quality or content of the discourse and shared meanings of the group discussions, may provide a somewhat restricted understanding of the interaction process. However, the combination of methods can illustrate the nature of interaction and its change in a promising way. Interaction profiles alone cannot provide comprehensive evidence of group interaction, but they can support the qualitative findings and serve as a stimulus to examine certain episodes in-depth, or as an interpretive framework for a discussion of the phenomena emerging during the group discussions. Finally, this study has shown the challenges related to coding the vibrant interactions of a natural group of primary-aged children, for example of determining the nature of separate utterances without taking into account the surrounding acts, history, and shared experiences of the participants. However, it may be demanding to code using any categorization system. In particular, it proved to be problematic to code the utterances for agreement and disagreement, as well as positive and negative suggestions, in terms of which utterance they were referring to: the previous one or “the talking point”.

To assess coding reliability, in other words, the consistency of unitizing and categorizing the selected part of the video data, namely the first session (representing 26% of the video data, measured in minutes), was coded by two raters. The inter-rater comparison conducted using the NVivo query function resulted in Cohen’s Kappa values from 0.44 to 0.90 in the IPA categories. The values show fair to excellent agreement (Robson, 1993), and thus acceptable consistency between the raters.

Bales’s IPA (Bales, 1950a) method proved to be a good instrument to systematically explore the nature and construction of task-group interaction. It has specific advantages for

contemporary interaction research: it illustrates group interaction, role differentiation, degree of participation, and task commitment, while also enabling comparison across individuals and group sessions. The method emphasized the need to improve group members' performance and promote active participation. The division of category 4 (give suggestion) into positive and negative suggestions helped identify collaborative group work.

Based on our study, we suggest that students may have less proficient interaction skills than their teachers perhaps assume, as proposed by Littleton and Mercer (2013). The identified shortcomings, such as lack of argumentation, reciprocity, and intersubjectivity, demonstrate the distinctive need for employing educational practices to promote productive talk by means of a pedagogical intervention. Following the ideas of Mercer and colleagues, these practices can include, for example, employing a specific program such as Thinking Together (Mercer & Littleton, 2007). Group interaction skills are learned in social interactions and developed throughout one's lifetime, beginning at the kindergarten stage (Socha & Socha, 1994). Consequently, primary-aged students need guidance and support in constructive discussion, negotiation, and argumentation, and require opportunities to practice these skills. Collaborative DV production, providing opportunities to acquire and practice ways of using language to "intercreate", is an option worth considering as an appropriate pedagogical activity for these purposes. On the basis of our study, we became interested in studying the role of the teacher in these kinds of creative activities and group settings.

References

Alexander, R. (2004). *Towards dialogic teaching: rethinking classroom talk*, Cambridge: Dialogos.

Azmitia, M., & Montgomery, R. (1993). Friendship, transactive dialogues, and the development of scientific reasoning. *Social Development*, 2(3): 202–221

Bales, R. F., & Cohen, S. P. (1979). *SYMLOG: A system for the multiple level observation of groups*. NY: The Free Press.

Bales, R. F. (1950a). *Interaction process analysis. A method for the study of small groups*. Cambridge, MA: Addison-Wesley.

Bales, R. F. (1950b). A set of categories for the analysis of small group interaction. *American Sociological Review*, 15(2), 257–263.

Bandura, A. (1977). *Social Learning Theory*. New York: General Learning Press.

Coates, J. (1996). *Women Talk. Conversations Between Women Friends*. Oxford: Blackwell.

Craft, A. (2005). *Creativity in Schools: tensions and dilemmas*. London: Routledge.

De Dreu, C. W., & Weingart, L. R. (2003). Task versus relationship conflict, team performance, and team member satisfaction: A meta-analysis. *Journal Of Applied Psychology*, 88(4), 741–749.

Dillenbourg P. (1999). What do you mean by collaborative learning? In P. Dillenbourg (Ed.) *Collaborative-learning: Cognitive and Computational Approaches* (pp. 1–19). Oxford: Elsevier.

Doise, W. & Mugny, G. (1984). *The social development of the intellect*. Oxford: Pergamon Press.

Drucker, P. (1993). *Post-capitalist society*. New York: HarperBusiness.

Fahy, P. J. (2006). Online and face-to-face group interaction processes compared using Bales' Interaction Process Analysis (IPA). *European Journal of Open, Distance, and E-learning*, 2006/I. Retrieved from www.eurodl.org.

Francis, D., & Hester, S. (2004). *An invitation to ethnomethodology: Language, society and interaction*. London: Sage Publications.

Frey, L. (1999). Introduction. In L. R. Frey, D.S. Gouran, & M.S. Poole (Eds.) *The handbook of group communication theory and research* (pp. i–xxi). London: Sage.

Gorse, C. A., & Emmitt, S. (2007). Communication behaviour during management and design team meetings: A comparison of group interaction. *Construction Management & Economics* 25(11), 1195–1211.

Gorse, C. A., & Sanderson, A. M. (2007). Exploring group work dynamics. In Boyd, D. (Ed.), *Proceedings of 23rd Annual ARCOM Conference*, 3-5 September 2007, Belfast, UK. Association of Researchers in Construction Management, Vol. 1, 295–304.

Hare, A. P. (2010). Theories of group development and categories for interaction analysis. *Small Group Research*, 41(1), 106–140. doi: 10.1177/1046496409359503. (Reprinted from *Small Group Behavior* 4: 259–304, 1973).

Hmelo-Silver, C. E., Chernobilsky, E., & Nagarajan, A. (2009). Two sides of the coin: Multiple perspectives on collaborative knowledge construction in online problem-based learning. In K. Kumpulainen, C. E., Hmelo-Silver & M. Cesar (Eds.) *Investigating Classroom interaction: Methodologies in action* (pp. 73–98). Rotterdam: Sense Publishers.

Hämäläinen, R., & Vähäsantanen, K. (2011). Theoretical and pedagogical perspectives on orchestrating creativity and collaborative learning. *Educational Research Review*, 6(3), 169–184. doi:10.1016/j.edurev.2011.08.001

Johnson, D.W., & Johnson, F. P. (1975). *Joining together: Group theory and group skills*. Englewood Cliffs: Prentice-Hall.

Kerr, N. L., & Bruun, S. E. (1983). Dispensability of member effort and group motivation losses: Free-rider effects. *Journal of Personality and Social Psychology*, 44(1), 78–94.

Kerr, N. L., Aronoff, J. & Messé, L. A. (2000). Methods of Small Group Research. In H. T. Reis, & C. M. Judd, (Eds.), *Handbook of Research Methods in Social and Personality Psychology* (pp. 160–189). Cambridge: University of Cambridge.

Kruger, A. C. (1993). Peer collaboration: Conflict, cooperation, or both? *Social Development*, 2, 165–182.

Kumpulainen, K., & Wray, D. (Eds.) (2002). *Classroom interaction and social learning*. London: RoutledgeFalmer.

Lave, J., & Wenger, É. (1991). *Situated Learning: Legitimate Peripheral Participation*. Cambridge: Cambridge University Press. ISBN 0-521-42374-0

Levine, J., Resnick, L., & Higgins, E. T. (1993). Social foundations of cognition. *Annual Review of Psychology*, 44, 585–612.

Littleton, K., & Häkkinen, P. (1999). Learning together: Understanding the processes of computer-based collaborative learning. In P. Dillenbourg (Ed.) *Collaborative learning: cognitive and computational approaches* (pp. 20–31). Oxford: Elsevier.

Littleton, K. & Mercer, N. (2010). The significance of educational dialogues between primary school children. In C. Howe and K. Littleton (Eds.), *Educational Dialogues*. London: Routledge.

Littleton, K. & Mercer, N. (2013). *Interthinking: putting talk to work*. Abingdon: Routledge.

McGrath, J. E. (1984). *Groups: Interaction and Performance*. Inglewood, N. J.: Prentice Hall, Inc.

Mercer, N. (1995). *The Guided Construction of Knowledge: talk amongst teachers and learners*. Clevedon: Multilingual Matters.

Mercer, N. (2000). *Words and Minds: how we use language to think together*. London: Routledge.

Mercer, N. (2002). Developing dialogues. In G. Wells & G. Claxton (Eds.) *Learning for Life in the 21st Century*. Oxford: Blackwell.

Mercer, N. (2004). Sociocultural discourse analysis: analysing classroom talk as a social mode of thinking. *Journal of Applied Linguistics*, 1(2), 137–168.

Mercer, N. (2010). The analysis of classroom talk: Methods and methodologies. *British Journal of Educational Psychology*, 80(1), 1–14. doi: 10.1348/000709909X479853

Mercer, N. & Littleton, K. (2007). *Dialogue and the development of children's thinking. A sociocultural approach*. London: Routledge.

Mercer, N., Wegerif, R., & Dawes, L. (1999). Children's talk and the development of reasoning in the classroom. *British Educational Research Journal*, 25(1), 95–111.

Miell, D. & MacDonald, R. (2000). Children's creative collaborations: The importance of friendship when working together on a musical composition. *Social Development* 9(3), 348–369.

Määttä, E., Järvenoja, H., & Järvelä, S. (2012). Triggers of students' efficacious interaction in collaborative learning situations. *Small Group Research* 43(4), 497–522.

Nijstad, B. A. (2009). *Group performance*. New York: Psychology Press.

Pahl-Wostl, C., Mostert, E., & Tàbara, D. (2008). The growing importance of social learning in water resources management and sustainability science. *Ecology and Society* 13(1): 24. [online] URL: <http://www.ecologyandsociety.org/vol13/iss1/art24/>

Palmgren-Neuvonen, L. & Kumpulainen, K. (2011). Acquiring learning skills by making movies – DV production in mother tongue education. In M. Koehler & P. Mishra (Eds.), *Proceedings of Society for Information Technology & Teacher Education International Conference 2011* (pp. 1182-1189). Chesapeake, VA: AACE.

Peña, J., & Hancock, J. T. (2006). An Analysis of Socioemotional and Task Communication in Online Multiplayer Video Games. *Communication Research* 33(1), 92–109. doi: 10.1177/0093650205283103

Robson, C. (1993). *Real World Research*. Cambridge, MA: Blackwell.

Rogoff, B. (1986). Adult assistance of children's learning. In T. E. Raphael (Ed.), *The contexts of school-based literacy* (pp. 27–40). New York: Random House.

Rogoff, B. (1990). *Apprenticeship in Thinking: Cognitive development in social context*. New York: Oxford University Press.

Rojas-Drummond, S. M., Albarrán, D., & Littleton, K. (2008). Collaboration, creativity and the co-construction of oral and written texts mediated by ICT. *Thinking Skills and Creativity*. In Special Issue: K. Littleton, S. M. Rojas-Drummond & D. Miell. (Eds.). *Creative collaborations: Sociocultural perspectives*, 3(3), 177–191.

Rojas-Drummond, S. M., Littleton, K., Hernández, F., & Zúñiga, M. (2010). Dialogical interactions among peers in collaborative writing contexts. In Howe, C. & Littleton, K. (Eds.) *Educational Dialogues: Understanding and Promoting Productive Interaction*. London: Routledge.

Rojas-Drummond, S. M., Mazón, N., Fernández, M. & Wegerif, R. (2006). Explicit reasoning, creativity and co-construction in primary school children's collaborative activities. *Journal of Thinking Skills and Creativity*, 1(2), 84–94.

Sawyer, K. (2006). Educating for innovation. *Thinking Skills and Creativity*, 1(1), 41–48.

Socha, T. J., & Socha, D. M. (1994). Children's task-group communication: Did we learn it all in kindergarten? In L. R. Frey (Ed.) *Group communication in context: studies of natural groups* (pp. 227–246). Hillsdale, N.J.: L. Erlbaum Associates

Stahl, G. (2006). *Group cognition: Computer support for building collaborative knowledge*. Cambridge, MA: MIT Press.

Sutton, L. A. (2001). The principle of vicarious interaction in computer-mediated communications. *International Journal of Educational Telecommunications*, 7(3), 223–242. Norfolk, VA: AACE.

Tuckman, B. W. (2001). Developmental sequence in small groups. *Group Facilitation: A Research and Applications Journal*, 3, 66-81. (Reprinted from *Psychological Bulletin*, 63(6), 384–399, 1965).

Tuckman, B. W., & Jensen, M. (1977). Stages in small group development revisited. *Group and Organizational Studies*, 2, 419–427. doi:10.1177/105960117700200404

Vass, E., & Littleton, K. (2009). Analysing role distribution in children's computer-mediated collaborative creative writing. In K. Kumpulainen, C. E. Hmelo-Silver, & M. César (Eds.), *Investigating classroom interaction: methodologies in action* (pp. 99–120). Rotterdam: Sense Publishers.

Vass, E. & Littleton, K. (2010). Peer collaboration and learning in the classroom. In Littleton, K. Wood, C. and Kleine Staarman, J. (Eds.) *International Handbook of Psychology in Education*. Leeds: Emerald, pp. 105–136.

Vass, E., Littleton, K., Miell, D., & Jones, A. (2008). The discourse of collaborative creative writing: peer collaboration as a context for mutual inspiration, *Thinking Skills and Creativity*, 3(3), 192–202.

Vygotsky, L. (1978). *Mind in society: The development of higher psychological processes*. Cambridge, MA: Harvard University Press.

Wheelan, S. A. (2005). *The handbook of group research and practice*. Thousand Oaks, CA: SAGE Publications, Inc. doi: 10.4135/9781412990165

Wheelan, S., Davidson, B., & Tilin, F. (2003). Group development across time: Reality or illusion? *Small Group Research*, 34(2), 223–245.

Underwood, J., & Underwood, G. (1999). Task effects on co-operative and collaborative learning with computers. In K. Littleton, & P. Light (Eds.), *Learning with computers: analysing productive interaction* (pp. 10–23). London, UK: Routledge.