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Teacher as an orchestrator of collaborative planning in learner-generated video production

Abstract

This article reports on a case study of teacher orchestration in the context of learner-generated video production. The study was conducted in a Finnish primary school, where four teachers implemented three video projects with their students. It investigated teacher scaffolding in the planning sessions of the projects, which involved creative divergent tasks in both group and whole-class settings. The videoed sessions were analyzed qualitatively to identify the types of discursive scaffolding. The study reveals the teachers' different approaches to supporting dialogue in group and whole-class settings. The findings suggest dominance and modest strategies in classroom dialogue, with the teachers occasionally adhering to traditional recitation to control the classroom talk. The study identifies scaffolding focusing on social interaction and collaboration in these divergent tasks referring to Mercer's (2000) intermental development zone. Considering the teachers' pre-project planning, the study emphasizes the tension emerging between learner-centeredness and teacher authority and freedom and structures.

Keywords: scaffolding, creative processing, pedagogical dialogue, meaning making, movie making

1 Introduction

Since the sociocultural approach to classroom education has gained footing, teachers are no longer considered mere transmitters of knowledge. Rather, teachers are encouraged to design learning situations (Kumpulainen & Wray, 2002) and provide scripts (pedagogical models) to guide interaction in both whole-class and group settings (Dillenbourg, 2013). The teacher is seen as an “orchestrator of learning” (Salomon, 1992) who creates a specific kind of intermental system among the learning community (Mercer, 2002) and scaffolds learner contributions in the interactive process of “teaching-and-learning” (Staarman & Mercer, 2010). The term “orchestrator of learning” appropriately describes the teacher’s role in the learner-centered learning model.

Nevertheless, teacher-centered instruction dominates in many classrooms (Lehesvuori, Viiri, Rasku-Puttonen, Moate, & Helaakoski, 2013), and group work is of little educational value due to the overly modest quality of discussion (Alexander, 2005). Although the Finnish national core curriculum (FNBE, 2004) entails a socio-cultural approach, spoken language, multimodality, and text production (Räsänen, Korkeamäki, & Dreher, 2015), few teachers seem to have been able or willing to utilize social practices and new media (Luukka et al., 2008). Consequently, children who have become used to consuming visual, interactive media and producing content in their leisure time may not become inspired by traditional instruction.

Hämäläinen and Vähäsantanen (2011) called for new ways, such as creative collaborative working methods, to promote 21st century skills required in the constantly-changing world (P21, 2015). Addressing this need, many researchers (e.g. Bailey, 2009; Butler, Leahy, & McCormack, 2010; Hakkarainen, 2007) have noted the pedagogical value of learner-generated digital videos (DVs) and digital stories (DSs) in diverse educational settings to enhance student motivation and creativity (e.g. Schuck & Kearney, 2006). Well suited for implementation in small groups, DV production offers various opportunities to learn and practice social skills and interaction (Robin, 2008). Hence, using these approaches could change the classroom dialogue and interaction.

This study examines two Finnish primary classrooms where the teachers had moved toward using new technology to produce video movies with their students. Focusing on teacher–student/s talk, it investigates how the teachers introduced an unconventional task to their students and scaffolded the students’ participation and dialogue to negotiate their jointly created movies. The teacher perspective on DV production has been neglected by researchers (Hakkarainen, 2007; Kearney, 2009,) just like divergent creative tasks implying multiple open-ended solutions (Rojas-Drummond, Littleton, Hernández, & Zúñiga, 2010). Hämäläinen and Vähäsantanen (2011) suggested that orchestrating collaboration in creative tasks requires a systematic examination in an integrated set of individual, small group, and class-wide activities. This study addresses these needs by shedding light on orchestrating classroom talk in whole-class and group settings. Aside from examining dialogue including features of scaffolding, the study also considers aspects related to pre-project planning. This article provides readers with experiences and perspectives to encourage them to employ DV production in a pedagogically meaningful way.

2 Revisiting teacher orchestration of collaborative classroom dialogue

The term “orchestration” has been increasingly used in contemporary educational research to describe the teacher’s role in coordinating classroom talk. Hämäläinen and Vähäsantanen (2011) claimed that the notion has been used in the literature almost synonymously with Bruner’s term “scaffolding” (Wood, Bruner, & Ross, 1976). Orchestration refers not only to the real-time management of people and activities but also to planning (Littleton, Scanlon, & Sharples, 2012). Sharples and Anastopoulou (2012) conceptualized orchestration as “orchestration design” (i.e. pre-designing the structure for learning processes) and “dynamic orchestration” (i.e. the dynamic management of a classroom with a flow between activities in different social settings). Design plays a crucial role in orchestration (Dillenbourg, Järvelä, & Fischer, 2009; Hämäläinen & Vähäsantanen, 2011), involving planned teaching activities (e.g. scripts such as individual brainstorming and pair

conversations) (Mercer, Hennessy, & Warwick, 2010). Although orchestration has been more associated with computer-supported collaborative learning (Dillenbourg et al., 2009) and inquiry learning (Sharpley & Anastopoulou, 2012), in this article, we employ the term in face-to-face settings.

Drawing from Vygotsky (1978), language, spoken and written, is regarded as a cultural tool to teach, learn and make meanings (Staarman & Mercer, 2010). Rather than sophisticated hands-on activities, it is the teacher's and students' talk around the activities that matters in teaching and learning to guide the development of learners' understanding (Mercer & Howe, 2012). The teacher's discursive scaffolding plays an important role in the dynamic orchestration of classroom interaction. Scaffolding, initially drawing on Vygotsky's (1978) "zone of proximal development" that concerns individual development, is minimal temporal guidance to assist the learners' progress (Wood et al., 1976) through a continuous, responsive monitor-analyze-assist cycle (Scott, 1998). The teacher provides spontaneous responsive interventions such as questions, feedback, and explanations (Fernandez, Wegerif, Mercer, & Rojas-Drummond, 2001; Mercer, 1995). The teacher motivates learners, guides their actions, directs their attention by highlighting critical features, and provides information and models (Wood et al., 1976). Furthermore, the teacher adapts the level of task challenge appropriately to the level of learner understanding (Fernandez et al., 2001; Van de Pol & Elbers, 2013) and fades scaffolding in response to the learner's developing skills and growing independence. This necessitates a sensitive pedagogical relation (Van Manen, 1993). By moving from explicit content-related guidance (enhancing students' knowledge) to more implicit process-related support that promotes learners' active roles (Chiu, 2004; Lin et al., 2012; Webb, 2009), the teacher leads novices to gradually take more responsibility for their learning (Wood et al., 1976).

Along with the sociocultural approach to learning, the understanding of scaffolding has become more dynamic (Scott, 1998) and symmetrical (Fernandez et al., 2001). Scaffolding supports individual learners' development and learning as well as facilitates whole-class dialogue and peer

collaboration by prompting group interaction (Hämäläinen & Vähäsantanen, 2011). The updated notion of scaffolding refers to an “intermental development zone” (IDZ), where teaching-and-learning occurs as an “interthinking” process (Mercer, 2000). In this process, dialogue is considered not only a means to an end, but also an educational end in itself (Wegerif, 2007; see also Hämäläinen & Vähäsantanen, 2011; Webb, 2009). Teachers and learners, contributing according to their existing knowledge, capabilities, and motivations (Mercer, 2000), collaborate through dialogic interaction by integrating, elaborating, and reformulating each other’s utterances (Rojas-Drummond et al., 2010). Thus, the learning community is empowered to solve a problem to which no participant knows the solution (Fernandez et al., 2001).

Numerous empirical studies have revealed shortcomings in classroom interaction. Authoritative teacher recitation still dominates; teachers tend to talk too much (Mercer & Littleton, 2007) and pose closed-ended questions starting triadic sequences (IRE or IRF, consisting of teacher *Initiation*, student *Response*, and teacher *Evaluation* or *Feedback*) (Lehesvuori et al., 2013). Such questions, which allow just one short “right answer”, disable argumentation (Alexander, 2005), restrict the learners’ intellectual processing, and limit their contributions to the dialogue (Staarman & Mercer, 2010). To improve teacher–student/s interaction, researchers suggest employing a dialogic approach, where the teacher engages learners and stimulates and augments their thinking (Alexander 2005). Dialogic teaching is characterized by extended communicative patterns such as IRFRF or IRPRP, where P stands for teacher *Prompts* (Lehesvuori et al., 2013).

According to Lehesvuori et al. (2013), student learning can be improved by applying both dialogic and authoritative aspects: Besides dialogic interaction, teacher-led opening ups (laying the groundwork for discussion) and closing downs (demonstrating awareness of previous student contributions) are needed. Nevertheless, whole-class settings challenge classroom dialogue. Regardless of the level of interactivity of the whole-class situation, two to three students are empowered to contribute while others are muted and isolated (Lefstein, 2010). Efforts to foster

multilateral interaction between the students to solve problems are often useless, and interaction tends to remain dyadic between the teacher and one student (Kovalainen & Kumpulainen, 2005).

Many peer group studies have reported a modest quality of discussion and inactive participation. Group talk is disputative and superficial (e.g. Alexander, 2005) and lacks argumentation (Kumpulainen & Wray, 2002). As a remedy for unproductive group work, Mercer, Wegerif and Dawes (1999) introduced the rules of “exploratory talk” such as sharing ideas for joint consideration and reasoning opinions and perspectives to promote active participation, unlike in disputative or uncritical cumulative group talk. Wegerif (2005) emphasized the importance of intersubjective orientation and resonance between participants’ ideas in exploratory talk rather than mere explicit reasoning.

Many researchers have found that the nature of the learning task significantly affects the level of dialogue productivity. Closed convergent tasks, typical for science education, allow explicit reasoning-in-talk (Rojas-Drummond et al., 2010) and are thus likely to enable joint creation of a scientific story (Lehesvuori et al., 2013). In contrast, creative narrative tasks with no clear-cut answers do not support exploratory talk (Rojas-Drummond, Mazón, Fernández, & Wegerif, 2006). The group members’ relationships and group composition in terms of gender, ability, and status tend to make a difference in collaboration, but results are somewhat contradictory (Webb, 2009). Despite the dominance of research stating that single-gender friend pairs perform better (e.g. MacDonald, Miell, & Morgan, 2000; Vass, 2004), heterogeneous groups with multiple perspectives have a positive influence on group learning (Sawyer, 2004).

In these types of classroom practices, the teacher is needed to orchestrate classroom interaction to foster collaboration and creativity (Hämäläinen & Vähäsantanen, 2011) and to support the development of learner contributions through gradually fading scaffolding (Mercer & Littleton, 2007). This study integrates the ideas of teacher orchestration and the quality of teacher–student/s interaction in creative collaborative processing. It focuses on scaffolding in the

context of learner-generated DV production, which differs from traditional teaching practice aiming at finding and learning facts, as is typical of convergent tasks in science education. Rather, this teaching practice involves a learner-oriented point of departure and seeks a common understanding of an abstract, imaginary media representation for producing collaborative video movies.

In this context, we investigated what types of dialogue emerged in whole-class and group settings and how the teachers scaffolded their students to achieve the goal to create a joint storyline through dialogues. Furthermore, we considered aspects of pre-project planning.

3 Method

3.1 Settings and participants

The context of this multiple case study was learner-generated DV production at a Finnish primary school (grades 1–6). Four teachers participated in the study, implementing three DV projects. The participants were purposefully selected because the school participated in a national research program for developing ICT use in schools; the teachers, interested and experienced in learner-generated DV production, volunteered to implement a literacy curriculum that differed from the traditional one, but was familiar to them.

The three projects implemented with 10–12-year-old students in two classes, A and B, were the “Future,” “Mirror,” and “Newsroom” projects. In the Future project, Class A produced a whole-class video about a futuristic school day, whereas in the Mirror project, Class B students made fictional movies in small groups. In the Newsroom project, Class A students created documentary news clips in small groups. The students, who were somewhat familiar with DV production and collaborative learning, planned, filmed, and edited movies in whole-class and small-group settings. Each project spanned three weeks, involving five to six sessions, each two to six hours long. Both classes worked with a two-teacher team. In Class A, Teacher A and Teacher B were both in charge;

in Class B, Teacher C was in charge while Teacher D assisted. Table 1 shows the students, teachers, and time span of the DV projects.

Table 1

DV projects, participants, and time span.

[Insert Table 1 here]

3.2 Data collection and analysis

The first author observed and video recorded the DV production activities and took field notes to support video viewing. The aim was to capture the process as it happened without any intervention. Two cameras were placed at the back and one at the front of the classroom. In the group phases outside the classroom, each camera recorded groups randomly at first and then focusing on the groups showing interesting behavior such as needing considerable guidance or other teacher intervention.

All the video data (totaling more than 50 hours) were reviewed and the field notes were elaborated to develop an understanding of the events, themes, and nature of classroom talk, as well as to consider episodes relevant for this study. As teacher–student and collaborative interaction should not be considered separately in classroom practice (Mercer & Howe, 2012), we wanted to examine teacher scaffolding in diverse communicative settings. Thus, the first three sessions (with subtasks of brainstorming and storyboarding video movies, prior to the filming and editing sessions) of each DV project, totaling nine sessions, were chosen as the study sample, representing teacher-led whole-class introduction, teacher-guided whole-class discussion, teacher-controlled group work in the classroom, and teacher-scaffolded group work in small group spaces.

Employing QSR NVivo, the first author transcribed the videos verbatim (totaling 20 hours) and analyzed the teacher–student interaction through qualitative research coding procedures (Strauss & Corbin, 1990). The data-driven analysis focused on various kinds of discursive

scaffolding, which the four teachers used to encourage and develop both teacher–student and peer–peer dialogue (Mercer et al., 2010). Themes and patterns emerging in the data were identified through constant comparison (i.e. searching for differences and similarities) (Glaser & Strauss, 1967). Each phrase forming a single meaning was used as a unit of analysis, taking into account the preceding and subsequent utterances. The inductive analysis process generated a category system demonstrating the communicative functions of teacher scaffolding (see Appendix). Fig. 1 illustrates the formation of the category system. Examples of the meaning units have been translated from Finnish by the first author.

[Insert Figure 1 here]

Fig. 1. Meaning units forming first-level categories: Promoting student thinking.

We coded the data to form 24 first-level categories describing the diversity of teachers' scaffolding. The categories were clustered under six main types that evolved from the data (see Appendix). Although all six categories are worth scientific discussion, we chose to focus on two scaffolding types: a) *promoting student thinking* (Fig. 1) and b) *supporting group processes* (Fig. 2). The other types are *maintaining dialogue*, *facilitating and promoting task implementation*, *task assignment*, and *implementing authority*. In addition to their higher frequency in teacher talk, the selected types provide a framework to discuss orchestration design and scaffolding in both group and whole-class settings, since they represent the different approaches employed by the teachers (teacher-centeredness/student-centeredness, designed/improvisational, and explicit/implicit scaffolding).

[Insert Figure 2 here]

Fig. 2. Meaning units: Supporting group processes.

3.3 Ethical issues

Examining teachers' work is a sensitive research field due to their professional independence. As some teachers may experience competence anxiety fearing they might expose their incompetence to others or themselves (Hargreaves, 1994; Räisänen, 2014), we guaranteed the four teachers' anonymity by withholding demographic details and using code names and male personal pronouns in the text. We selected a few excerpts to illustrate the findings and enable the reader to evaluate our interpretations.

4 Findings

A pedagogical framework similar to that used in science education was employed in all the projects. Aside from facilitating group work, the teachers in the whole-class settings instructed students, introduced and recapped topics, and reviewed the group work results and discussed these results as needed to raise their educational value. Although most of the participants were enthusiastic about the discussions of DV production, the analysis revealed some shortcomings in interaction. Despite their earlier experience in DV production and group practices, the teachers seemed to follow different strategies in scaffolding. One teacher team behaved spontaneously, whereas the other used a more structured approach. This difference stimulated reflection on which setting promoted more learner-centered interaction and what kind of scaffolding was needed in the whole-class and group settings.

4.1 Promoting student thinking

We discuss scaffolding at the whole-class level through the communicative function of *promoting student thinking* (Fig. 1), suggesting two dimensions: interactive and monologic. In the interactive dimension, the teachers posed questions requiring explanation and prompted students to expound on their answers with further questions. In the monologic dimension, the teachers

enhanced students' answers by elaborating and broadening perspectives and recapitulating the themes that emerged in the joint discussions to help students make meanings and understand the issues discussed. The teachers also encouraged learners to liberate their thinking to surpass themselves.

In Class A, Teacher A started the Future project with a brainstorming task. For this phase, he assigned the students sitting next to each other to groups of three to four members and asked them to discuss the features, practices, and technologies of future schools that are similar to those of the schools today. Then, Teacher A guided them in generating new ideas, probing the students to share their views, without providing content-related introduction or authoritative framing. Closing down the group phase, Teacher A started to summarize the topic by writing the groups' ideas on the interactive whiteboard (IWB) to be discussed within the class. Excerpt 1 presents the interactive and monologic dimensions of the communicative function of *promoting student thinking*.

Excerpt 1. Session 1 of the Future project

Speaker	Speech
1	Teacher A Well, an interactive computer that could talk with you, that would be something new! Next, please! (points with finger to indicate another student's turn)
2	Girl1 Robot school assistant.
3	Teacher A Robot school assistant. Let's write robot ... teacher ... or school assistant. What [else] ¹ ?
4	Boy1 [I know]! (raises hand eagerly) Well, it just occurred to me ... As schools are so huge then, the students could have flying devices to move from a classroom to another.
5	Teacher A So they levitate in the air.
6	Boy1 Some kinda chairs ...

¹ [] indicates overlapping talk

- 7 Teacher A Let's write levitating vessels to fly with @psiiii² ... You just touch the control panel and it'll ... @psiiii@ ... You don't have to walk anymore.
- 8 Teacher A What's negative in that? Positive is that you can move easily but ...
- 9 Girl2 (raises her hand eagerly) You get no exercise!
- 10 Teacher A Yes. You can imagine how the students look (visualizes a fat stomach). You may have seen that movie ...
- 11 Boy1 Yeah, there were such [people in (name of the movie)]
- 12 Teacher A [in which everybody] just drives different vessels. But it might be possible in the future.
- 13 Boy1 Why can't we just stop making ordinary cars and produce electric cars only? As they are already available!
- 14 Teacher A Why can't we just stop ... (goes to the IWB) Well, we tend to think that electric cars are pollution-free and generate no emissions. Only electricity is needed, batteries ...
- 15 Teacher A (to all) But do you know how electricity is generated?
- 16 Girl3 (raises hand eagerly) By water.
- 17 Teacher A Yes, in Finland, by water. Have any of you been to Rhodos?
- 18 Boy1 I have ...
- 19 Teacher A There are no rivers. Electricity is generated by burning coal or oil which pollute. Or we need nuclear power stations, which don't come without problems.
-

The excerpt with a few overlaps demonstrates enthusiasm among the participants, including the teacher, in brainstorming future school practices and technology for a joint fiction DV movie. Teacher A promoted student thinking by presenting new perspectives on the assignment (turns 7, 10, and 14) and posing open questions (turn 3) and questions with no designated answerer to allow

² @ symbolizes changed quality of talk

suggestions from anyone (turn 15). Thus, the students were encouraged to develop and share their tentative thoughts. The excerpt shows that Boy1, a competent, talkative student, was especially exhilarated by the futuristic theme, keeping the floor in a way that suggested dominance. The teacher seemed to inspire Boy1's thinking, although their dyadic interaction left other students muted.

Turns 13–19 form a student-initiated sequence, which was infrequent in this whole-class discussion. Boy1 asked the teacher a question (turn 13), which enabled the teacher to broaden the discussion. Despite the fictional theme, the teacher took advantage of the opportunity to discuss various issues such as people's insufficient physical activity and environmental challenges. Holding cognitive authority, he also corrected false understanding or misleading perceptions among the students, and interpreted their ideas as adequate technological concepts (turn 5).

Despite the open-ended creative context, the teacher asked closed or leading questions to start an IRE sequence (turns 8–10). The reference to the positive aspect suggests he was expecting students to guess the "right" answer for the negative point he had in mind. The excerpt presents more dialogic patterns: Turns 3–7 inviting Boy1 to expand his thinking can be considered an IRPRP sequence. However, the teacher rushed to move on instead of prompting a reason or elaboration.

In whole-class discussions of the observed DV projects, the teachers occasionally found it challenging to encourage students, other than two to three talkative ones, to participate. Consequently, although teachers should give students thinking space, waiting for a student reply inspired the teachers to elaborate on students' ideas in a dominant manner. Timid students, particularly girls, withdrew from the common conversation. At times, the teachers strove to encourage hesitant students by calling them by name: "Now it's Patrick's turn. Come on, stand up so we can all hear your idea!" and "Kay, what do you think could be happening in these images?"

The teachers aimed to allow as many groups as possible to contribute by restricting the number of given suggestions: “First, we’ll take one idea per turn from each group. Edith’s group!”

Meanwhile, Teacher C started the Mirror project using a compact introduction agenda. He showed an introductory video, talked minimally, and gave little room for student participation and dialogue. To emphasize the pedagogical purpose of the video assignment, he described its connection to the curriculum: “You can see the headline on the whiteboard. The theme comes from our previous period in our mother tongue lessons ... We didn’t conduct any projects then. The videos that we’ll now start to make should somehow relate to it”. Before revealing the pre-designated group compositions and setting the task, he justified the mixed-gender group composition (Excerpt 2).

Excerpt 2. Session 1 of the Mirror project

Speaker	Speech
1	Teacher C I have divided you in groups with both girls and boys ... in almost every movie there are both women and men. I haven’t seen any movies with only men [or women.]
2	Boy2 [Oh yes,] I have seen.
3	Teacher C Would you please be kind enough to be quiet? It’s not your turn now.

The excerpt, revealing strict classroom management, illustrates the non-interactive/authoritative nature of the teacher-led instruction, where students are supposed to sit quietly and listen to the teacher. The excerpt emphasizes Teacher C’s plain and frank speech, which contrasts with Teacher A’s participation in the whole-class dialogue. Teacher C controlled the discussion and did not invite the students to participate. To help a few slow learners, he summarized the message of the video in simple words and invited the students to ask any task-based questions. He also clarified the task as a whole and the subtasks and goals of the prospective phases help the

students understand the meaning of each phase and subtask, and to facilitate transitions from one phase to another. Introducing and justifying the DV assignment and its structure as a whole evidently promoted student engagement and understanding of the task and group composition. For instance, he described the next step and lesson as follows: “I’ll collect these [idea cards] from you and we’ll continue the project next week by completing the storyline ... and then I’ll tell everybody how to go on.”

4.2 Supporting group processes

We report on scaffolding at the group level through *supporting group processes* (Fig. 2), focusing on enhancing group dialogue and collaboration. We examine orchestration design such as organizing group formation, group composition, and group environment and roles.

The teachers followed various strategies to scaffold groups. In response to unequal group participation, they all seemed to intervene minimally, but the Class A teachers intervened randomly, notifying the group once but not regularly observing further participation. The difference between implicit and explicit scaffolding was present in both teacher teams but prominent among the Class B teachers. Teacher D, playing an empathetic teacher role, frequently joined the groups’ discussions by talking, showing interest and dedication, and giving suggestions for the storyline (e.g. “The baby plays with the ball and it turns out to be a bomb?” or “Why not a miracle survival, just like swimming ashore?”). Although he constantly observed the groups working, Teacher C intervened as necessary, such as when his instructions on the number of laptops to use were ignored or when a group faced overwhelming disputes. The teachers followed different approaches to guide the groups in decision making and problem solving. Teacher D favored voting on suggestions and deciding according to the majority (“Each of you shall give one suggestion and then you’ll vote for the best”), whereas Teacher C preferred consensus.

Excerpt 3 from the group phase of the first lesson in the Mirror project represents the first of the frequent conflicts faced by the group in the 22-minute group session. During the session a group member, Girl4, requested on five occasions the teacher to solve the situation.

Excerpt 3. Session 1 of the Mirror project

	Speaker	Speech
1	Girl4	Teacher! I want change to another group!
2	Boy3	(to the teacher) [We've got an excellent idea].
3	Girl4	[because we can't agree!]
4	Boy3	Why are we, me and Andy, always like-minded?
5	Girl4	No, absolutely no exploding cars!
6	Boy4	Or we could have a lion to attack (imitates an attacking lion).
7	Teacher C	Well, choose the three images from the Internet as follows: you (boys) may choose one and the (three) girls may choose two.
8	Girl4	We can never agree!
9	Teacher C	Ok. Who of you are like-minded? You girls (Girl4 and Girl5)?
10	Teacher C	Then you'll select one ... and Girl6 selects one and the boys one image. So, you negotiate all together for the storyboard.

The incompatibility of girlish “soft” and boyish “action” themes caused some disputational talk. Teacher C checked the perspectives of the group members and the strategies employed to solve the situation by asking prompting questions (turn 9). Adopting a neutral stance on the topics discussed in the group, Teacher C did not evaluate the ideas but suggested alternative ways to proceed (turns 7 and 10). As agreeing on the three images might have been a challenging task for a mixed-gender acquaintance group of that age, Teacher C helped the group advance in creating a storyline based on the images selected by the more like-minded members. He suggested that each like-minded clique select one image to build the storyline instead of all members choosing the three

images and brainstorming on the storyline based on these images; by doing so, he facilitated the collaborative task and helped the members cooperate and continue as a group. Guided towards independent problem solving, the group learned to manage conflicts and take responsibility for the activities, and the need to scaffold collaboration decreased.

Whereas Teacher C had assigned his students to five-member groups in advance, the Class A teachers aimed at student-oriented realization in group formation by allowing the students to form groups with their chosen classmates in the storyboarding phase. In Session 2 of the Future project, the students grouped themselves into three overcrowded groups. One of these groups, which included more than 10 students, mostly boys, caused excessive noise. Group work appeared uncontrollable due to some dominants holding the floor. In the Newsroom project, the students were asked to propose their favorite news genre for theme-based group selection, but they mostly grouped with their friends. This was time consuming and resulted in homogeneous groups. Some students remained excluded, which required teacher intervention: “Cathy! You don’t have a group, do you? Would you like to group with Edith and Sally?”

Teacher B reminded the group members of their responsibilities, contributions, and participation. Because some groups needed substantial guidance on practical issues due to the project’s open-ended theme, Teacher B instructed groups in topic selection by suggesting themes that would challenge the group in a pedagogical sense: “We aren’t making presentations. We make news clips!” As Teacher B gave the students concrete advice on how to proceed (i.e. select and contact an interviewee relevant to the particular news genre and make interview questions in advance), he provided explicit content-related scaffolding.

5 Discussion

This study on teacher orchestration of classroom dialogue in creative divergent tasks demonstrates the teachers’ different approaches. They either joined the learning community to

promote student thinking, or, to a minimal extent, supported peer groups to learn to interact independently by encouraging the group members to scaffold each other. In the whole-class setting, the teachers oscillated between an open dialogic approach, encouraging and supporting student participation, and an authoritative role in distributing speech turns and controlling student contributions. Their behavior in scaffolding classroom talk was situational but also reflected their individual understanding of the learner, learning, and pedagogical interaction (Webb, 2009), rather than being negotiated with their team colleague. Despite the open-ended creative context and learner orientation, the teachers frequently adhered to traditional recitation (Alexander, 2005), entailing closed or leading questions that required students to guess the answer in the teacher's mind (Mercer & Howe, 2012). Closed questions, which merely allow students "to answer questions, not to question answers" (Shor, 1992, p. 26), were used as a tool for classroom management (Scott et al., 2006). Teachers' questions with no designated answerers were an attempt to invite all students to contribute by reducing the social and cognitive pressure on individuals to answer, which students may perceive in turn allocation. However, such questions failed to motivate students to participate in the discussion but rather enabled dominance, with talkative students taking the floor.

Occasionally forgetting his task to distribute turns evenly among participants, Teacher A allowed and supported the dominance in the discussion and dominated the discussion himself. This finding emphasizes teachers' gatekeeping role in taking turns and their tendency to favor some students despite the learner-centered creative task. It may also indicate that the students are not used to utilizing their agency. We suggest turn distribution to avoid dominance and to enable all students, not just the talkative ones, to participate. Dominating students should learn to speak in turns, despite the implied teacher control over the flow of discussion, which limits when the students can talk and how their contributions influence the joint meaning making (Sawyer, 2004). The study supports the findings of Kovalainen and Kumpulainen (2005) and Lefstein (2010), which suggest complexity in orchestrating multilateral classroom dialogue.

Social activities and hands-on practice in learner-generated DV production engendered numerous unpredictable events and factors in terms of interrelational dynamics, intellectual ability, and technical challenges. Although experienced in DV projects, the teachers could not completely control such challenges, making creative teaching an improvisational performance (Sawyer, 2004) and rendering the cognitive load as a form of “orchestrating load” (Dillenbourg, 2013; see also Littleton et al., 2012). The teachers became overwhelmed by insufficiently planned activities, resulting in the need to scaffold groups on practical issues to the detriment of supporting group interaction. Thus, this study, like that of Sharples and Anastopoulou (2012), suggests that the load of dynamic orchestration can be facilitated by orchestration design (i.e. intensive planning of the whole project), taking into account the pedagogical goals. Teacher C addressed this suggestion by implementing a well-structured design with explicit subtasks and sub-goals in the whole-class, individual and group settings. Both students and teachers seemed to benefit from the design with distinct group phases and the well-timed support for group work, resulting in more structured scaffolding and equal group interaction, whereas the unscripted activities in Class A generated disorder in the classroom and called for teacher intervention.

The excess teacher-centeredness in the whole-class settings of the Mirror project was Teacher C’s strategy to prioritize group phases, as recommended by Lefstein (2010). Teacher C preferred to implement learner orientation in the project through minimal teacher talk to proceed to the group phase, direct student effort in group work, and give peer dialogue more time. He used teacher-centered instruction as a tool to manage classroom behavior, aiming to avoid disturbance from “magnets” (i.e. students who tend to draw the teacher’s and other students’ attention and talk without asking for a turn). Teacher C knew the “magnet” student of his class stood out in group work, although the student seemed to be easily agitated in teacher-led instruction.

Organizing group composition and group formation through teacher selection or learner selection evidently affected group effectiveness and classroom management. By assigning mixed-

gender groups, which was a familiar practice in Class B, Teacher C created heterogeneous groups in terms of gender, ability, and character to successfully evoke creative collaborative processes (e.g. Mercer & Howe, 2012; Sawyer, 2004). Despite the incompatible themes in the girls' and boys' ideas resulting in some conflicts, the teacher-assigned mixed-gender groups were able to start working easily, whereas in Class A, open-ended group formation took time and teacher energy from the group scaffolding.

Providing the groups with scaffolding related to group responsibilities, contributions, and participation, Teacher B aimed to support the groups' internal activity but mainly dictated what to do. In contrast, Teacher C, in standoffs, asked about the group members' ideas to understand their work and to make informed decisions about the help needed (Chiu, 2004). Suggesting ideas and solutions refers to explicit content-related scaffolding that does not support students in becoming active and self-regulated learners (Chiu, 2004; Lin et al., 2012; Webb, 2009). Although suggesting alternative ways to proceed in problem solving (Excerpt 3) may resemble a ready-made solution, Teacher C actually implemented process-related scaffolding by adapting the task challenge temporarily from collaborative to cooperative. Albeit generally following the principles of minimal temporal scaffolding, Teacher C necessitated consensus, which required more negotiation in the groups and engaged participants to argue over the solutions. By doing so, he supported the groups' independent problem solving and promoted group cohesion. However, voting for decision making according to the majority may have harmed the group's effectiveness (Johnson & Johnson, 2014).

Rather than transmitting knowledge or facilitating students' knowledge construction, as is typical in science education (Mortimer & Scott, 2003), scaffolding is especially needed in creative divergent tasks to support dialogicality, intersubjective orientation, and mutual attunement (Wegerif, 2005) in the IDZ (Mercer, 2000; Mercer & Littleton, 2007) in "intercreating" (Palmgren-Neuvonen & Korkeamäki, 2014)—that is, creating and negotiating ideas for a jointly created video. As Barnes and Todd (1977) claimed, learners are more likely to improve the quality of group

interaction outside the visible teacher control; thus, on-task groups need to be allowed to collaborate independently. The teacher must avoid intervening without reason so as not to disrupt group autonomy but must not abandon the groups. Monitoring the groups to identify unproductivity, the teacher evaluates student work through particular questions to understand their needs and promote group processes (Chiu, 2004). Furthermore, the teacher needs to sense how guidance is received and understood among the students and adapt scaffolding appropriately (Scott, 1998). Hence, scaffolding concerns reciprocity and responsiveness, not diversity and frequency.

Throughout the analysis, classroom talk appeared to lack reasoning and argumentation, suggesting modest pedagogical value compared with the dialogue with mutual reasoning commonly found in science education (Scott et al., 2006) or literature interpretation (Lefstein & Snell, 2011). This finding can be partly explained by the nature of dialogue in the creative divergent task, which hampered these learning communities. Brainstorming and designing video movies include no facts or definitive “truths” with one correct solution as one would find in concept-based learning (MacDonald et al., 2000). Rather, they involve dialogic meaning making and “co-constructive talk,” engaging the participants with similar memories and ideas to build on each other’s inter-resonating comments (Wegerif, 2005). For young producers, seeking common understanding of an abstract media representation generated disputative group interaction, as the members were challenged to have their ideas approved by their peers (Palmgren-Neuvonen & Korkeamäki, 2014). Thus, scaffolding such creative processes became a highly demanding task.

The nature of open-ended creative dialogue challenged not only the teachers and students, but also us as researchers due to the superficial talk, which initially afforded little basis for analytical considerations. However, the inductive method (Glaser & Strauss, 1967) was adequate to examine the diversity of teachers’ scaffolding in creative divergent tasks, and the nine selected sessions were a sufficient sample for theoretical replication (Yin, 2003). As is typical for inductive research, we verified the analytical interpretations of the first author throughout the process with

frequent data reviews and discussions among ourselves and colleagues within the research field (Elo et al., 2014). Moreover, the second author contributed to all phases to strengthen investigator triangulation (Yin, 2003). As this was a qualitative study, the aim was not to generalize findings but to develop a clearer understanding of teacher scaffolding in the context of learner-generated DV production. The findings, due to the contextual and situational nature of the case study, concern only these circumstances and participants.

6 Conclusions

In this study, we aimed to shed light on teacher orchestration of classroom dialogue in creative divergent tasks by examining dialogue that included features of scaffolding in whole-class and group settings. We considered aspects related to pre-project planning, a crucial part of orchestration (Hämäläinen & Vähäsantanen, 2011). Demonstrating the complexity of pedagogical models involving socio-cultural approach and technology, the study supported Sharples and Anastopoulou's (2012) recommendation to emphasize orchestration design to facilitate the load of dynamic orchestration. Teachers need to consider the topic, the learners involved, and the pedagogical goals (Hämäläinen & Vähäsantanen, 2011) instead of relying on improvisational performance (Sawyer, 2004). They must develop skilled expertise to identify the curriculum contents or, in this case, educational elements in the particular learner-oriented activity that would benefit from group work and a dialogic approach, as well as knowledge on how to involve students in dialogue (Scott et al., 2006). Besides emphasizing group work and its process-related scaffolding (Webb, 2009), teachers should minimize both whole-class instruction and their own talk and improve the quality of teacher questions and prompts to promote learners' thinking.

However, the study identified tension between learner-centered practices and teacher authority implying freedom and structure. Careful planning with a structured design, taking into account the pedagogical goal and content and group designation, is needed; the disadvantage is that

power positioning is unavoidable. Learner-centeredness entails creativity, improvisation, student agency, and empowerment, allowing students to decide more than just whether they will learn (Weimar 2013); the drawback, however, is that this may challenge classroom management and overwhelm the teacher. Thus, a balance must be found between freedom and flexible structures with scripts, combining improvisation and design (Hämäläinen & Vähäsantanen, 2011).

This study represents a step toward building an understanding of scaffolding in creative divergent tasks involving interaction that differs from that of convergent tasks (Rojas-Drummond et al., 2006). The findings suggesting tenuous interaction call for improving the students' discussion skills. As exploratory talk (Mercer et al., 1999) has been proven to enhance the quality of group interaction and promote active participation (Fernandez et al., 2001) even in creative divergent tasks (Rojas-Drummond et al., 2006), conducting research with an intervention to make participants aware of the ground rules of productive interaction and the significance of dialogue would definitely enhance learning. It would be interesting to know how the participants in this study would have benefited from the ground rules or how these teachers used language in their science teaching. In this study, we were unable to compare teachers' patterns in teaching the same topic (Lehesvuori et al., 2013). Future research could examine authority and power relations, group settings, and teacher-designated scripts.

This study shows that changing the context to creative media production did not make the classroom culture dialogic. Transforming the teacher profession takes time and requires iterative collaborative endeavors in various complex dialogic situations to improve teachers' competence in situational, interactional, and linguistic models. Many teachers, fearing the orchestration load, may still prefer traditional textbook-based instruction to time-consuming learner-centered activities to cope with strict timetables and curriculum goals and content and to adhere to routines and remain within their comfort zones. Teachers must have strong professional self-esteem to throw themselves into such projects and address the need for change in daily practice. Nevertheless, the teachers in

this study addressed the challenge to continuously pursue professional transformation by employing DV production in their curriculum. They offered their students an opportunity to learn creativity, a crucial 21st century thinking skill that is, contrary to common belief, not hereditary but can be learned (e.g. Sawyer, 2011). Despite some shortcomings, they demonstrated strong experience and competence in the demanding settings. They succeeded in orchestrating the learning communities to put ideas together, stimulate each other's imagination, and achieve the project goal to produce unique collaborative media products. As teacher work involves a variety of ethical considerations, we appreciate these teachers for making the study possible and report the findings with respect for their professional integrity.

7 References

- Alexander, R. (2005). *Culture, dialogue and learning: Notes on an emerging pedagogy*. Keynote at IACEP conference. Durham, UK.
- Bailey, B. (2009). *Reel literacies: Digital video production as a literacy practice*. Rochester, NY: University of Rochester.
- Barnes, D., & Todd, F. (1977). *Communication and Learning in Small Groups*. London: Routledge & Kegan Paul.
- Butler, D., Leahy, M., & McCormack, C. (2010). Redefining book reviews for the digital age. *Contemporary issues in technology and teacher education*, 10(1), 80–99.
- Chiu, M. M. (2004). Adapting teacher interventions to student needs during cooperative learning: How to improve student problem solving and time on-task. *American Educational Research Journal*, 41(2), 365–399.
- Dillenbourg, P. (2013). Design for classroom orchestration. *Computers & Education*, 69, 485–492.
- Dillenbourg, P, Järvelä, S., & Fischer, F. (2009). The evolution of research on computer-supported collaborative learning: from design to orchestration. In N. Balacheff, S. Ludvigsen, T. de

- Jong, T. A. Lazonder, & S. Barnes (Eds.) *Technology-enhanced learning. Principles and products*. (pp. 3–19). Netherlands: Springer.
- Elo, S., Kääriäinen, M., Kanste, O., Pölkki, T., Utriainen, K., & Kyngäs, H. (2014). Qualitative content analysis: A focus on trustworthiness. *SAGE Open*, 4(1), 1–10.
- Fernandez, M., Wegerif, R., Mercer, N., & Rojas-Drummond, S. (2001). Re-conceptualising scaffolding and the Zone of Proximal Development in the context of symmetrical collaborative learning. *Journal of Classroom Interaction*, 36(2), 40–54.
- FNBE (Finnish National Board of Education). (2004). *Perusopetuksen opetussuunnitelman perusteet* [National core curriculum for basic education]. Helsinki, Finland: The Finnish National Board of Education.
- Glaser, B. S., & Strauss, A. A. (1967). *The discovery of grounded theory*. New York, NY: Aldine de Gruyter.
- Hakkarainen, P. (2007). *Promoting meaningful learning through the integrated use of digital videos*. Rovaniemi, Finland: University of Lapland.
- Hargreaves, A. (1994). *Changing teachers, changing times: Teachers' work and culture in the postmodern age*. New York, NY: Columbia University.
- Hämäläinen, R., & Vähäsantanen, K. (2011). Theoretical and pedagogical perspectives on orchestrating creativity and collaborative learning. *Educational Research Review*, 6(3), 169–184.
- Johnson, D., & Johnson, F. (2014). *Joining together: group theory and group skills*. (11th ed.). Harlow, UK: Pearson Education.
- Kearney, M. (2009). Towards a learning design for student-generated digital storytelling. In S. Bennett et al. (Eds.), *Proceedings of The Future of Learning Design conference*, University of Wollongong, pp. 25–39.

- Kovalainen, M., & Kumpulainen, K. (2005). The discursive practice of participation in an elementary classroom community. *Instructional Science*, 33(3), 213–250.
- Kumpulainen, K. & Wray, D. (Eds.). (2002). *Classroom interaction and social learning*. London: RoutledgeFalmer.
- Lefstein, A. (2010). More helpful as a problem than a solution. In Howe, C. & Littleton, K. (Eds), *Educational Dialogues: Understanding and Promoting Productive Interaction* (pp. 170–191). London, UK: Routledge.
- Lefstein, A., & Snell, J. (2011). Classroom discourse: The promise and complexity of dialogic practice. In S. Ellis, E. McCartney & J. Bourne (Eds.), *Applied linguistics and primary school teaching* (pp. 165–185). Cambridge, UK: Cambridge University Press.
- Lehesvuori, S., Viiri, J., Rasku-Puttonen, H., Moate, J., & Helaakoski, J. (2013). Visualizing communication structures in science classrooms: Tracing cumulativity in teacher-led whole class discussions. *Journal of research in science teaching*, 50(8), 912–939.
- Lin, T., Hsu, Y., Lin, S., Changlai, M., Yang, K., & Lai, T. (2012). A review of empirical evidence on scaffolding for science education. *International Journal of Science and Mathematics Education*, 10(2), 437–455.
- Littleton, K., Scanlon, E., & Sharples, M. (Eds.). (2012). *Orchestrating inquiry learning*. Abingdon, UK: Routledge.
- Luukka, M. R., Pöyhönen, S., Huhta, A., Taalas, P., Tarnanen, M., & Keränen, A. (2008). *Maailma muuttuu—mitä tekee koulu?* [The world changes—what does the school?] Jyväskylä, Finland: University of Jyväskylä.
- MacDonald, R., Miell, D., & Morgan, L. (2000). Social processes and creative collaboration in children. *European Journal of Psychology of Education*, 15(4), 405–415.
- 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*. New York, NY: Routledge.
- Mercer, N. (2002). Developing Dialogues. In G. Wells & G. Claxton (Eds.) *Learning for life in the 21st Century: Sociocultural perspectives on the future of education* (pp. 141–153). Oxford, UK: Blackwell Publishing.
- Mercer, N., Hennessy, S., & Warwick, P. (2010). Using interactive whiteboards to orchestrate classroom dialogue. *Technology, Pedagogy and Education*, 19(2), 195–209.
- Mercer, N., & Howe, C. (2012). Explaining the dialogic processes of teaching and learning: The value and potential of sociocultural theory. *Learning, Culture and Social Interaction*, 1(1), 12–21.
- 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.
- Mortimer, E., & Scott, P. (2003). *Meaning making in secondary science classrooms*. Maidenhead, UK: Open University Press.
- Palmgren-Neuvonen, L., & Korkeamäki, R.-L. (2014). Group interaction of primary-aged students in the context of a learner-generated digital video production. *Learning, Culture and Social Interaction*, 1(3), 1–14.
- Robin, B. R. (2008). Digital storytelling: A powerful technology tool for the 21st century classroom. *Theory Into Practice*, (47)3, 220–228.
- Rojas-Drummond, S., 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* (pp. 128–148). London: Routledge.

- Rojas-Drummond, S., Mazón, N., Fernández, M., & Wegerif, R. (2006). 'Explicit reasoning, creativity and co-construction in primary school children's collaborative activities'. *Thinking Skills and Creativity (1)*, 84–94.
- Räisänen, S. (2014). Teacher emotions and change in literacy learning. Insights to literacy learning in the contemporary world through self-reflection of teacher emotions. *Reflective Practice, (16)2*, 155–170. DOI: 10.1080/14623943.2014.982527
- Räisänen, S., Korkeamäki, R.-L., & Dreher, M. J. (2015). Changing literacy practices according to the Finnish core curriculum. *European Early Childhood Education Research Journal*, 1–17.
- Salomon, G. (1992). The changing role of the teacher: From information transmitter to orchestrator of learning. In F. Oser, A. Dick, & J.-L. Patry (Eds.), *Effective and responsible teaching: The new synthesis* (pp. 35–49). San Francisco: Jossey-Bass.
- Sawyer, R. K. (2004). Creative teaching: Collaborative discussion as disciplined improvisation. *Educational Researcher, 33*(2), 157–175.
- Sawyer, R.K. (2011). *Explaining creativity: The science of human innovation*. New York, Oxford University Press.
- Scott, P. (1998). Teacher talk and meaning making in science classrooms: A Vygotskian analysis and review. *Studies in Science Education, (32)1*, 45–80.
- Scott, P., Mortimer, E., & Aguiar, O. (2006). The tension between authoritative and dialogic discourse: A fundamental characteristic of meaning making interactions in High school science lessons. *Science Education, (90)4*, 605–631.
- Schuck, S., & Kearney, M. (2006). Capturing learning through student-generated digital video. *Australian Educational Computing, 21*(1), 15–20.
- Sharples, M., & Anastopoulou, S. (2012). Designing orchestration for inquiry learning. *Orchestrating inquiry learning: contemporary perspectives on supporting scientific inquiry*

- learning. In K. Littleton, E. Scanlon, & M. Sharples (Eds.), *Orchestrating inquiry learning* (pp. 69–85). Abingdon, UK: Routledge.
- Shor, I. (1992). *Empowering education: Critical teaching for social change*. University of Chicago Press.
- Staarman, J. K., & Mercer, N. (2010). The guided construction of knowledge: Talk between teachers and students. In K. Littleton, C. Wood, & J.K. Staarman (Eds.), *International handbook of psychology in education* (pp. 75–104). Bingley, UK: Emerald.
- Strauss, A., & Corbin, J. M. (1990). *Basics of qualitative research: Grounded theory procedures and techniques*. Sage Publications.
- Van de Pol, J., & Elbers, E. (2013). Scaffolding student learning: A micro-analysis of teacher–student interaction. *Learning, Culture and Social Interaction*, (2)1, 32–41.
- Van Manen, M. (1993). *The tact of teaching: The meaning of pedagogical thoughtfulness*. 2nd ed. New York, NY: Althouse Press.
- Vass, E. (2004). Understanding collaborative creativity: Young children’s classroom-based shared creative writing. In D. Miell, & K. Littleton (Eds.), *Collaborative creativity: Contemporary Perspectives* (pp. 79–95). London, UK: Free Association Books.
- Vygotsky, L. (1978). *Mind in society: The development of higher psychological processes*. Cambridge, MA: Harvard University Press.
- Webb, N. M. (2009). The teacher's role in promoting collaborative dialogue in the classroom. *British Journal of Educational Psychology*, 79(1), 1–28.
- Wegerif, R. (2005). Reason and creativity in classroom dialogues. *Language and Education*, 19(3), 223–238.
- Wegerif, R. (2007). *Dialogic education and technology: Expanding the space of learning*. New York, NY: Springer Science.

Weimer, M. (2013). *Learner-centered teaching: Five key changes to practice*. Wiley & Sons. 2nd ed.

Wood, D., Bruner, J., & Ross, G. (1976). The role of tutoring in problem solving. *Journal of Child Psychology and Psychiatry*, (17)2, 89–100.

Yin, R. (2003). *Case study research: Designs and methods*. (3 ed). Sage Publications.