Participatory roles adopted by elementary students when writing collaboratively in environmental and social studies classrooms

Anne-Elina Salo[1], Sara Routarinne[1], Riitta Juvonen[2] & Arja Kaasinen[2]

[1] University of Turku | Finland
[2] University of Helsinki | Finland

Abstract: Much attention has been paid to the complexity underlying writing, but the versatile roles that collaborative writing can encourage in elementary students remain scarcely understood. In this exploratory study, we developed a framework for observing the participatory roles that elementary students spontaneously adopt as they engage in collaborative writing in environmental and social studies classrooms. To concretize the applicability of the framework, we illustrate how five students shift between the roles across task types. We identified 18 participatory roles and allocated them into six categories: content-, literacy-, performance-, process-focused, expressive, and off-task roles. While these generally align with previous research on participatory roles, literacy-focused and expressive role categories emerged as new data-driven findings. The concrete examples provided for illustrating how these roles are reflected when students engage in collaborative writing deepen the understanding of the variety and flexibility in roles adopted across the students and task types. We expect the framework to be beneficial for both teachers and researchers, to observe how flexibly students adopt roles from different categories when writing collaboratively. This can provide insights into designing instruction and selecting task types to effectively promote flexible and meaningful participation among all students when writing collaboratively in subject-area classrooms.

Keywords: collaborative writing, environmental and social studies, participatory roles, elementary students

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Writing is a necessary skill for students to be successful in school and to participate fully in society. Writing constitutes a complex skill that requires adequate practice and instruction for students to learn to use it effectively and flexibly. (Graham, 2019.) Because of this, researchers have encouraged a wide range of activities and task types to be applied when teaching writing in elementary grades. These include, but are not limited to, writing collaboratively with peers, writing for authentic purposes instead of always having the teacher as the target audience, composing longer texts that require analysis and interpretation, and encouraging connections with reading, writing, and learning (Cutler & Graham, 2008; Gilbert & Graham, 2010; Graham, 2019; see also Enright et al. (2023), and Törmälä & Kulju (2023), in this special issue).

The world is constantly changing, and the demands for students' literacy proficiency evolve accordingly. In Finland, the revised national core curriculum emphasizes multiliteracies as a key cross-curricular competency that combines all school subjects (FNBE, 2016), which broadens "the concept of texts in all subjects" and explicitly introduces "literacy as a topic for the whole curriculum, making teaching of (disciplinary) literacy skills a responsibility of all teachers in all subjects" (Välijärvi & Sulkunen, 2016, p. 18). While learning to produce various kinds of informative texts is an essential part of disciplinary-specific literacies, these genres especially challenge younger students' writing and language skills and practices (Graham et. al., 2020; Kiili et. al., 2020; Klein & Kirkpatrick, 2010; Langer, 1985; see also Meneses et al. (2023) and Alkema et al. (2023) in this issue).

As discussed by Graham (2019), "there is no single agreed-on set of skills, knowledge, processes, or dispositions for teaching writing" (p. 288). We believe that deepening the understanding of processes, strategies, and behaviors enacted and applied when students write in subject-area classrooms – approached here through participatory roles – can enhance teachers' knowledge for the basis of designing practices to promote writing in various ways and effectively. In the present study, we conceptualize roles as dynamically and spontaneously emerging through students' moment-to-moment interactions (Heinimäki et. al., 2020; Volet et. al., 2017). The aim of this paper was to identify different spontaneous roles of participation. For that purpose, we observed participatory roles during authentic environmental studies and social studies collaborative writing activities as enacted by upper elementary students, which is expected to present a wholly new contribution to research on spontaneously emerging participatory roles.

In Finland, the school subject environmental studies comprises disciplines of biology, geography, physics, chemistry, and health education, thereby making connections with natural and social science perspectives (FNBE, 2016). This means that topics to study are part of the students' life, environment, and experience, but they are related to many concepts. Although social studies (i.e., history in the present study) and environmental studies have their own disciplinary natures and

discourses, they share the aims of fostering critical information seeking and processing and applying this knowledge in producing texts (FNBE, 2016).

1. Collaborative Writing in Subject-Area Classrooms

Writing collaboratively with peers can provide an effective way to promote content knowledge, reflective thinking, and conceptual comprehension (Daiute & Dalton, 1993; Herder et. al., 2018; Nykopp et. al., 2014). However, these benefits are not automatic. Researchers have shown that when teaching writing in elementary grades, teachers often apply task types that comprise summarizing and writing short responses through one- or two-sentence replies or filling in blanks in exercise books, rather than tasks that would require composing longer texts through drafting, analysis, and interpretations (e.g., research reports) (Gilbert & Graham, 2010; Graham, 2019; Pentikäinen, 2022). Moreover, although assignments were designed to be collaborative, this does not necessarily mean that students would, in fact, write texts together (Jakonen, 2015; Nordmark, 2014). Writing collaboratively with peers requires coordinating several aspects and components, some of which may end up overemphasized, with some not receiving sufficient attention; for example, form and procedural matters may become emphasized over meaning (Calzada & García Mayo, 2021; Kumpulainen, 1994).

Existing research on collaborative writing has taken important steps toward deepening the understanding of the elements that comprise peer collaborative writing. For example, Nykopp et. al. (2019) examined collaborative online writing interactions among university students and established that the interactions consist of episodes related to coordinating and performing text-related, task-related, and social activities, as well as episodes focusing on technical problems with the platform, and off-task talk. As another example, toward a finer-grained level of analysis, Herder et. al. (2018) immersed themselves in elementary students' reflections when writing collaboratively and differentiated between reflections of appropriateness and of correctness of texts. Reflections on appropriateness were related to issues of redundancy (i.e., whether the information suggested had already been provided) and relevance (i.e., whether the suggestion fit the topic) of information, along with the suitability of words applied (e.g., whether they fit the intended audience). Reflections of correctness comprised asking for assistance on spelling, providing spelling instructions, and initiations that aimed at correcting the written text (Herder et. al., 2018). As shown in Herder et. al's study, students typically emphasized the correctness of the text, thus displaying a rather scholastic orientation to their writing.

However, more research is needed to widen further the understanding of the variety of behaviors and strategies that peer collaborative writing can encourage. In the present study, we were interested in examining the versatility of individual students' participatory behaviors and strategies across different task types. To that

end, approaching collaborative writing through observing students' spontaneously enacted participatory roles was found to be well-suited. These remain scarcely mapped in collaborative writing in subject-area classrooms, especially among elementary students, which further adds to the novelty and importance of our research efforts.

2.   Spontaneously Adopted Participatory Roles in Collaborative Writing

Roles have traditionally been conceptualized through consistent patterns of behaviors, compared to the recently emerged branch of research that defines roles as participatory, functional, spontaneously emerging, and dynamically fluctuating in situ (see Heinimäki et. al., 2019, 2020, 2021; Volet et. al., 2017). In the context of collaborative writing, we found no studies that captured roles as dynamically fluctuating in situ. As an example of a more traditional approach to roles, Lowry et. al. (2004) established a taxonomy of roles based on the common activities that collaborative writing consists of: more specifically, how individuals within teams share their work (i.e., writer, consultant, editor, reviewer, team leader, facilitator). While this typology allows for identifying common task responsibilities that group members adopt (or are assigned to), it does not aim to capture a finer-grained fluctuation in roles emerging through moment-to-moment interactions. Moreover, Lowry et. al.'s (2004) focus was on writing performance specifically, and the typology did not therefore aim to capture the richness of participatory behaviors and strategies in a wider sense (e.g., off-task behaviors, negativity).

Studies that have conceptualized roles as spontaneously enacted by students, and as dynamically fluctuating across the interactions, have been mostly conducted among older (high school and university) students and in the context of collaborative science learning (Heinimäki et. al., 2019, 2020, 2021; Volet et. al., 2017). As an example of role research among younger students, Maloney (2007) examined roles that emerged as 10-11-year-old students engaged in decision-making activities in science (e.g., chair, distracter, promoter of ideas). As the activity type observed differed from that of our study, roles related to collaborative writing were not within the scope of Maloney's (2007) study. As discussed by Heinimäki et. al. (2020), it is beneficial to differentiate between core roles that display the very nature of the discipline (e.g., knowledge provider in science-learning), and activity-specific roles that vary across activities (e.g., navigator in computer-supported science-learning environment). Given the lack of research on participatory roles in the context of collaborative writing in subject-area classrooms among elementary students, to the best of our knowledge, we expect that the existing role frameworks must be adapted by using them with data-driven observations to develop a framework for observing roles in this specific activity type and context.

We found a framework that conceptualizes roles as spontaneously and dynamically enacted by students, instead of as static or pre-assigned, well-suited for

our study (Heinimäki et. al., 2019, 2020, 2021; Volet et. al., 2017). This is because it may be questioned whether students, especially young ones who are just practicing collaboration with their peers, could even hold the roles assigned by their teachers. In a study by Wilcox et. al. (1997), half of the fourth and fifth graders working on a collaborative scientific project were assigned static roles, whereas the other half collaborated role-free. They concluded that although role-free learning might not optimally define ways of negotiation that would potentially be meaningful for groups, the static and traditional role assignments likely reinforced stereotypes of work division rather than promoting higher levels of cooperation or prosocial behavior. As discussed by Wilcox et. al. (1997), alternative solutions are needed, compared to preassigned roles, to promote equity of voice and the distribution of students' possibilities to participate. Indeed, preassigned roles can be seen as downplaying the interactional and spontaneous nature that roles, as naturally emerging, hold in collaboration (Heinimäki et. al., 2020).

Observing the roles that students spontaneously enact in classroom settings when writing collaboratively is expected to deepen our understanding of the versatility of individual students' participatory strategies and behaviors. More specifically, it allows observation of whether individual students flexibly shift between diverse types of participatory roles within and across lessons. Individual role flexibility remains scarcely mapped, as the focus has mainly been on role diversity and flexibility at the group level, compared to an individual (e.g., Heinimäki et. al., 2021; Volet et. al., 2017).

3. Aims of the Study

In the present exploratory study, we developed a coding framework to observe the participatory roles that elementary students spontaneously adopt as they engage in collaborative writing in environmental and social studies classrooms. The development of the framework was conducted by reflecting on data-driven observations in relation to existing frameworks on participatory roles established in different kinds of contexts (Heinimäki et. al., 2019, 2020, 2021; Volet et. al., 2017). To concretize further the applicability of the framework, we will illustrate how the observed five students shift between the participatory roles within and across task types. This is done by providing frequencies and distributions for roles adopted by each student across the observed lessons, and through descriptions that illustrate the qualitative differences in the enactment of these roles. These descriptions allow a deepening understanding of how the task type relates to students' enactment of specific roles, and of individual differences in students' tendencies to enact certain roles. To the best of our knowledge, research on elementary students' participatory roles during collaborative writing, and as developing in situ, is lacking, and this holds even stronger in the context of environmental and social studies.

4. Methods

4.1 Participants and Context of the Present Study

The participants were Finnish elementary school students from two general education classrooms. The students were fourth graders at the beginning of the study (approximately 10 years old). Five target students ($N = 5$) were selected for fine-grained analysis from two classrooms (Classroom 1: Ada, Maria, Daniel; Classroom 2: Emil, Anna). These students represented a culturally and linguistically diverse population. Most students have a home language different from the school language Finnish and/or English and the home languages of their peers. Before gathering the video footage, the school principal, teachers, students, and students' guardians were informed about the research project. In line with the guidelines of Finnish Advisory Board of Research Integrity 2012 (TENK, 2012) and ethical principles for research material collected before October 2019 (TENK 2009), the children were informed about the research in an age-appropriate way and gave their assent for participation. Only children who also received their guardian's informed consent were included in data collection. The guardians and students were given the opportunity to withdraw from the research at any time with no questions asked. The videos were recorded during normal schoolwork without any intervention to the pedagogical content and methods. All names mentioned in the present study are pseudonyms. The video cameras were positioned close to each target student, who was also provided with a microphone so that each target student's interactions could be clearly observed.

In our study, observations were based on video recordings that were conducted in the two classrooms where these five students were shadowed through five lessons of environmental studies and one lesson in social studies (i.e., history) across fourth through sixth grade. During the observed lessons, students worked collaboratively to seek information and write non-fictional texts. More detailed descriptions of the task type, as instructed by the teacher at the beginning of the lesson, can be found in Table 1. The teachers divided students into small groups of three to five for the collaborative writing activities. The group compositions varied across the lessons, with the target students mostly in different groups, except for lesson 2, when Maria and Ada were in the same small group. The collaborative writing activities were student-led, but the teachers now and then visited the collaborating groups. Our focus was on the target students' participatory talk instead of teacher behaviors and support. This is because our focus was on developing a framework for observing participatory roles in collaborative writing and illustrating these target students' role flexibility across task types.

Table 1. Summary of the Task Types as Instructed by Teachers Across the Three Lessons for Classrooms 1 and 2

	Classroom 1: Daniel, Maria, Ada	Classroom 2: Emil, Anna
Lesson 1 (4th grade)	Topic: Sweden Tools: Notebooks, textbooks Aim: Compiling travel guides Written product: Informational texts in notebooks (with similarities of texts expected)	Topic: Air pollution Tools: Textbooks, iPads Aim: Replying to questions in textbooks Written product: Whole sentence replies on iPads
Lesson 2 (5th grade)	Topic: Food production Tools: Textbooks, notebooks Aim: Becoming experts in the topic to teach it to peers in different groups Written product: Reports in notebooks	Topic: Student-selected topics related to history randomly assigned for each group Tools: Notebooks, textbooks, iPads Aim: Compiling a joint presentation on the topic on iPads Written product: Individual notes and a joint presentation on the iPad
Lesson 3 (6th grade)	Topic: Senses Tools: Notebooks, iPads Aim: Compiling presentations on iPads Written product: Individual notes and presentations on iPads	Topic: Continents Tools: Notebooks, iPads Aim: Compiling a joint presentation on one iPad Written product: Individual notes and a joint presentation on the iPad

4.2 Development of the Framework for Observing the Participatory Roles

To capture the natural fluctuation in the target students' participatory roles from the dynamic group interactions, a systematic video-based role analysis was conducted, and all observable verbal student utterances of the five target students were coded. This resulted in 2241 verbal turns (302–686 per student, $M = 448$). Each verbal turn was then allocated a role in separate transcribed sheets. These sheets entailed the target students' verbal utterances during the collaborative writing interactions, as well as a short description, or citations, where necessary, for preceding and following verbal utterances by other group members. These transcribed sheets enabled comparisons and shared discussions of researchers on each role's boundaries, along with the ongoing refinement of the coding categories. Throughout the actual coding of the roles, video-footage was simultaneously reflected on using these transcribed sheets. This was done to

ensure that those aspects meaningful for understanding the function of the contributions, such as gestures and tone of voice, as well as the social embeddedness of the roles enacted, were acknowledged.

The development of the framework was conducted through multiple steps of refinement in collaboration with the first author and three researchers highly familiar with the data of the present study. A clear research framework enables a better comparison of empirically observed patterns with patterns established in previous studies and in different contexts (see Heinimäki et. al., 2020). The steps for the development and refinement of the coding framework are summarized in Figure 1. When developing the framework, data-driven observations were reflected on in relation to existing role frameworks that have been developed from older students in the context of science learning (Heinimäki et. al., 2019, 2020, 2021; Volet et. al., 2017). These existing frameworks were adapted to the characteristics of the context (i.e., environmental and social studies in Finnish elementary education classrooms) and task activity (i.e., collaborative writing activities in small groups). The conceptual framework for spontaneously enacted core and activity-specific functional participatory roles (Heinimäki et. al., 2020) formed the basis for adapting previous role categorizations for the present study. Similar key roles were expected to be identified, as the processing of content is at the heart of environmental and social studies, similar to science learning. However, activity-specific roles were presumed to stem more independently from the data, given that previous role frameworks have not been implemented specifically in the context of collaborative writing activity (except for the more static role patterns, see, e.g., Lowry et. al., 2004).

The first author spent considerable time going back to the videos to review the soundness of the interpretations. Across the iterative coding process by the first author, three of the co-authors commented on the categories, role definitions, and sample of data excerpts for each role, and actively discussed their respective comments to align the definitions of categories and roles within them. This kind of approach was found to be beneficial at this stage of an exploratory research, where an inventory of possible participatory roles was a primary focus. Resemblance and differences from previous participatory role frameworks are briefly discussed when presenting the results. Finally, 18 roles were identified and allocated to six broader categories. The final coding framework, including the categories, roles within, role descriptions, and example quotes for each role, is presented in Table 2.
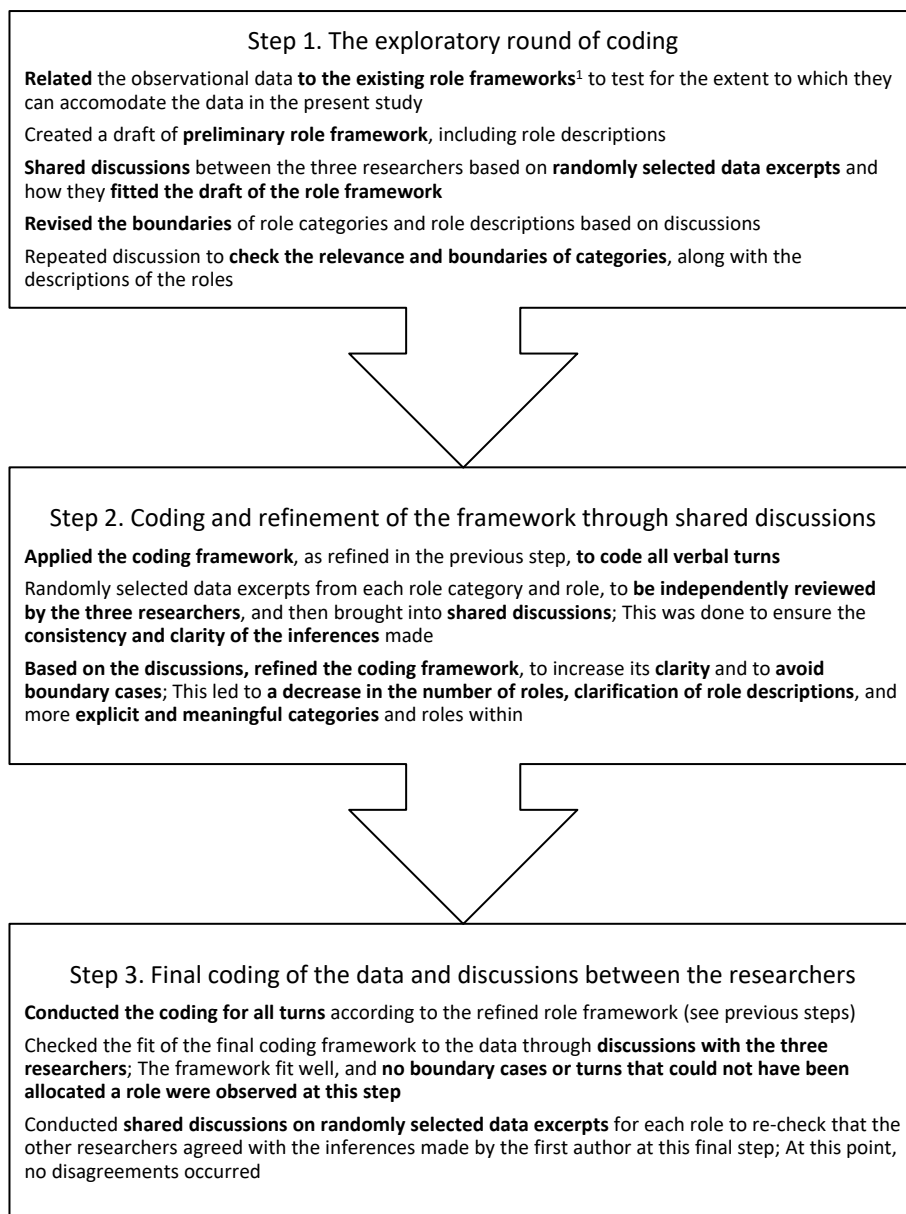
Step 1. The exploratory round of coding

Related the observational data **to the existing role frameworks**[1] to test for the extent to which they can accomodate the data in the present study

Created a draft of **preliminary role framework**, including role descriptions

Shared discussions between the three researchers based on **randomly selected data excerpts** and how they **fitted the draft of the role framework**

Revised the boundaries of role categories and role descriptions based on discussions

Repeated discussion to **check the relevance and boundaries of categories**, along with the descriptions of the roles

Step 2. Coding and refinement of the framework through shared discussions

Applied the coding framework, as refined in the previous step, **to code all verbal turns**

Randomly selected data excerpts from each role category and role, to **be independently reviewed by the three researchers**, and then brought into **shared discussions**; This was done to ensure the **consistency and clarity of the inferences** made

Based on the discussions, refined the coding framework, to increase its **clarity** and to **avoid boundary cases**; This led to **a decrease in the number of roles, clarification of role descriptions**, and more **explicit and meaningful categories** and roles within

Step 3. Final coding of the data and discussions between the researchers

Conducted the coding for all turns according to the refined role framework (see previous steps)

Checked the fit of the final coding framework to the data through **discussions with the three researchers**; The framework fit well, and **no boundary cases or turns that could not have been allocated a role** were observed at this step

Conducted **shared discussions on randomly selected data excerpts** for each role to re-check that the other researchers agreed with the inferences made by the first author at this final step; At this point, no disagreements occurred

Figure 1. Overview of the Steps of Refinement and Development of the Role Framework and Coding of the Turns as Guided by Shared Discussions Between the Three Researchers.

Note. [1] Heinimäki et. al., 2019, 2020, 2021; Volet et. al., 2017

Table 2. Roles, Descriptions, and Data Examples

Categories	Roles	Descriptions	Data examples
Content-focused roles	*Information provider (IP)*	IP offers information, explanations or facts related to the content without a critical approach. This information may also be provided in question form when seeking confirmation.	*"Gutting a fish means that you remove the guts." "Sweden has coniferous forests in the northern areas."*
	Information seeker (IS)	IS seeks for information, explanations, or facts related to the content without a critical approach.	*"What does it mean to fertilize?" "Who is the king of Sweden?"*
	Evaluator (EV)	EV evaluates or seeks others to evaluate the content provided. Evaluations may be supportive additions or proposals, disagreements with the content presented, or calls for exploration of multiple possibilities. EV may thus either support or challenge content-related suggestions.	*"Are you sure that Zlatan plays for Sweden?" "There's tundra as well, not just conifers." "No, that's not Africa, it's South America."*
Literacy-focused roles	*Genre convention contributor (GC)*	GC provides or seeks suggestions related to the organization of text and genre-related matters. GC may also seek to evaluate writing conventions in the discipline or sources of information.	*"We must explain it, we cannot just copy it." "What is a report?" "Wikipedia cannot be our primary source."*
	Proofreader (PR)	PR catches or seeks for spelling, grammar, and punctuation errors.	*"Remember to capitalize that word." "No, use a comma!"*
	Designer (DE)	DE provides or seeks suggestions related to the modalities of the presentation, including audio and visual. DE may also provide or seek suggestions on matters such as which template to choose for	*"Should we choose this template?" "Should we have one page for pictures only?" "You cannot use*

		presentation, which colors to use, or which font to select.	*that picture. That's protected by copyright and for restricted use only."*
Performance-focused roles	*Reader (RE)*	RE reads aloud text which may be from the book, tablet, notebooks, or instructions.	*"North America is a continent in the Northern Hemisphere and - - - "* [reads from the tablet]
	Text producer (TP)	TP speaks out loud while taking notes or writing down text in the notebook or iPad, for instance. TP may also dictate what to write down based on the decisions made. All contributions related to writing performance, whether using a pen, typing, or dictating, are coded as TP. TP does not provide new content, nor does TP contribute through literacy- or process-focused suggestions.	*"- - - and you should eat it twice a week."* [dictating what was agreed before] *"Sweden has coniferous forest in the northern areas."* [talking out loud while writing what has been previously agreed upon].
	Material manager (MM)	MM seeks to make sure that everyone in the group has the material and tools needed, and that they know how to use them. MM may also focus on technological matters, such as helping or seeking to solve technology-related issues related to task performance. MM may also ask to borrow tools.	*"Don't' you have your book with you?"* *"Can I borrow your pencil?"* *"If you click twice, it should open up."*
	Attention focuser (AF)	AF draws other group members' attention to something task related. Verbal utterances may be supported by non-verbal ones (e.g., pointing at a book chapter with a finger).	*"It starts right here"* [pointing at a book with a finger] *"Look, here it is!"*
Process-focused roles	*Opinion giver (OG)*	OG provides opinions related to procedures. For example, OG may	*"It's my turn now, you already read*

		suggest a solution or an alternative approach. OG does not contribute through content- or literacy-focused suggestions. OG may also share their own progress with others.	*one chapter."* *"We don't have much time left."* *"I think we should start now."*
	Opinion seeker (OS)	OS invites others to express their opinions on something related to procedures. OS does not seek content- or literacy-focused suggestions. OS may want to know, for example, what others have written down or how the group should proceed.	*"What do we have to do?"* *"Do we have to present this today?"* *"What did you write?"*
	Follower (FO)	FO displays listening to the course of the discussion but does not aim to contribute through suggestions. FO rather indicates being ready to go along with the decisions of others or can admit the lack of a personal contribution or just repeat statements by others.	*"I don't know."* *"Okay."* *"Mmm."* *"Whatever you want."*
	Self-talker (ST)	ST speaks out talk that is not clearly addressed to others (i.e., "thinking aloud"). This talk displays others, for instance, that ST is not able to follow the course of discussions, or has difficulties, although not explicitly expressing it to others.	*"Why did I put it like that…"* *"Mmm, what was I doing…"* [whispering] "*Oops.*"
Expressive roles	*Positivity expressor (PE)*	PE expresses positivity towards the task or group members. PE may also make task-related jokes or aim to harmonize the group. PE may also express joy or encouragement, or use polite language, apologizing, or saying thank you, for instance.	*"This was a nice 20 minutes."* *"Thank you."* *"Luckily, our group is so clever."*

	Negativity expressor (NE)	NE expresses negativity towards the task or the group. NE may use harsh language, try to discourage others, or try to exclude members of the group from participation.	*"I'm so stupid…"* *"I don't feel like doing this anymore."*
	Experience expressor (EE)	EE shares own personal experiences and or affective orientation that cannot be clearly identified as positive or negative, related to the task or other group members. EE may also evaluate the emotions that the topic raises. If experiences contribute to the content, they are coded as IP.	*" I kind of feel sorry for those fishes."* *"Those pyramids are so beautiful, aren't they?"* [pointing at a picture in the book]
Off-task roles	Off-tasker (OT)	OT discusses issues that seem topically irrelevant for the task at hand. OE may, for instance, start a conversation related to leisure time or personal experiences that are not related to the task at hand.	*"Did you see that movie yesterday?"* *"I want to be a police officer when I grow up."*

5. Results

After establishing the coding framework and allocating a discrete role to each verbal turn, we observed how these roles were distributed across the students and lessons (see Table 3). Due to the small number of students observed and the exploratory nature of the study, these are applied to describe, using simple counts, how the students enacted different types of roles across the task types, instead of conducting statistical analyses. This will provide concrete examples of the applicability of the framework developed in this study.

Table 3. The Frequency of Each Role and Percentage of all Verbal Turns during a Lesson Across the Students

	Ada (Classroom 1)			Maria (Classroom 1)			Daniel (Classroom 1)			Emil (Classroom 2)			Anna (Classroom 2)		
	Lesson 1	Lesson 2	Lesson 3	Lesson 1	Lesson 2	Lesson 3	Lesson 1	Lesson 2	Lesson 3	Lesson 1	Lesson 2	Lesson 3	Lesson 1	Lesson 2	Lesson 3
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
Content-focused roles	22 (26.8)	23 (11.1)	8 (6.6)	5 (9.1)	17 (9.9)	4 (5.3)	20 (16.1)	18 (8.6)	11 (7.9)	2 (6.7)	12 (4.5)	47 (12.1)	4 (40.0)	23 (15.6)	40 (18.9)
Information provider (IP)	9 (11.0)	10 (4.8)	5 (4.1)	3 (5.5)	12 (7.0)	4 (5.3)	13 (10.5)	12 (5.7)	9 (6.4)	2 (6.7)	8 (3.0)	26 (6.7)	2 (20.0)	9 (6.1)	13 (6.1)
Information seeker (IS)	1 (1.2)	–	2 (1.7)	1 (1.8)	2 (1.2)	–	3 (2.4)	1 (0.5)	–	–	1 (0.4)	3 (0.8)	2 (20.0)	2 (1.4)	8 (3.8)
Evaluator (EV)	12 (14.6)	13 (6.3)	1 (0.8)	1 (1.8)	3 (1.8)	–	4 (3.2)	5 (2.4)	2 (1.4)	–	3 (1.1)	18 (4.6)	–	12 (8.2)	19 (9.0)
Literacy-focused roles	7 (8.5)	31 (15.0)	22 (18.2)	–	23 (13.5)	8 (10.5)	2 (1.6)	9 (4.3)	14 (10.0)	6 (20.0)	49 (18.4)	53 (13.6)	1 (10.0)	30 (20.4)	69 (32.5)
Genre convention contributor (GC)	4 (4.9)	22 (10.6)	8 (6.6)	–	14 (8.2)	2 (2.6)	–	7 (3.3)	9 (6.4)	1 (3.3)	4 (1.5)	5 (1.3)	1 (10.0)	9 (6.1)	3 (1.4)
Proofreader (PR)	2 (2.4)	8 (3.9)	3 (2.5)	–	5 (2.9)	–	2 (1.6)	2 (1.0)	1 (0.7)	3 (10.0)	11 (4.1)	11 (2.8)	–	6 (4.1)	35 (16.5)
Designer (DE)	1 (1.2)	1 (0.5)	11 (9.1)	–	4 (2.3)	6 (7.9)	–	–	4 (2.9)	2 (6.7)	34 (12.7)	37 (9.5)	–	15 (10.2)	31 (14.6)
Performance-focused roles	30 (36.6)	61 (29.5)	42 (34.7)	9 (16.4)	48 (28.1)	16 (21.1)	39 (31.5)	70 (33.3)	46 (32.9)	12 (40.0)	79 (29.6)	109 (28.0)	3 (30.0)	52 (35.4)	45 (21.2)
Reader (RE)	–	16 (7.7)	8 (6.6)	5 (9.1)	7 (4.1)	5 (6.6)	6 (4.8)	19 (9.0)	4 (2.9)	1 (3.3)	10 (3.7)	21 (5.4)	2 (20.0)	–	1 (0.5)
Text producer (TP)	11 (13.4)	24 (11.6)	12 (9.9)	2 (3.6)	25 (14.6)	1 (1.3)	13 (10.5)	24 (11.4)	4 (2.9)	1 (3.3)	32 (12.0)	51 (13.1)	1 (10.0)	30 (20.4)	22 (10.4)
Material manager (MM)	4 (4.9)	17 (8.2)	12 (9.9)	2 (3.6)	8 (4.7)	7 (9.2)	8 (6.5)	8 (3.8)	23 (16.4)	2 (6.7)	19 (7.1)	17 (4.4)	–	9 (6.1)	13 (6.1)
Attention focuser (AF)	15 (18.3)	4 (1.9)	10 (8.3)	–	8 (4.7)	3 (3.9)	12 (9.7)	19 (9.0)	15 (10.7)	8 (26.7)	18 (6.7)	20 (5.1)	–	13 (8.8)	9 (4.2)
Process-focused roles	23 (28.0)	69 (33.3)	26 (21.5)	41 (74.5)	48 (28.1)	39 (51.3)	50 (40.3)	98 (46.7)	42 (30.0)	4 (13.3)	99 (37.1)	168 (43.2)	2 (20.0)	29 (19.7)	58 (27.4)
Opinion giver (OG)	6 (7.3)	34 (16.4)	7 (5.8)	1 (1.8)	17 (9.9)	9 (11.8)	18 (14.5)	30 (14.3)	18 (12.9)	2 (6.7)	21 (7.9)	45 (11.6)	2 (20.0)	18 (12.2)	17 (8.0)
Opinion seeker (OS)	4 (4.9)	5 (2.4)	4 (3.3)	7 (12.7)	10 (5.8)	6 (7.9)	3 (2.4)	24 (11.4)	1 (0.7)	1 (3.3)	17 (6.4)	19 (4.9)	–	3 (2.0)	17 (8.0)
Follower (FO)	12 (14.6)	27 (13.0)	14 (11.6)	17 (30.9)	19 (11.1)	21 (27.6)	27 (21.8)	41 (19.5)	23 (16.4)	1 (3.3)	59 (22.1)	103 (26.5)	–	7 (4.8)	24 (11.3)
Self-talker (ST)	1 (1.2)	3 (1.4)	1 (0.8)	16 (29.1)	2 (1.2)	3 (3.9)	2 (1.6)	3 (1.4)	–	–	2 (0.7)	1 (0.3)	–	1 (0.7)	–
Expressive roles	–	6 (2.9)	2 (1.7)	–	10 (5.8)	2 (2.6)	11 (8.9)	13 (6.2)	5 (3.6)	2 (6.7)	10 (3.7)	5 (1.3)	–	4 (2.7)	–
Positivity expressor (PE)	–	3 (1.4)	2 (1.7)	–	2 (1.2)	–	8 (6.5)	7 (3.3)	4 (2.9)	1 (3.3)	7 (2.6)	3 (0.8)	–	1 (0.7)	–
Negativity expressor (NE)	–	–	–	–	–	–	1 (0.8)	–	–	–	1 (0.4)	1 (0.3)	–	–	–
Experience expressor (EE)	–	3 (1.4)	–	–	8 (4.7)	2 (2.6)	2 (1.6)	6 (2.9)	1 (0.7)	1 (3.3)	2 (0.7)	1 (0.3)	–	3 (2.0)	–
Off-tasker role (OT)	–	17 (8.2)	21 (17.4)	–	25 (14.6)	7 (9.2)	2 (1.6)	2 (1.0)	22 (15.7)	4 (13.3)	18 (6.7)	7 (1.8)	–	9 (6.1)	–
Total verbal turns (N)	82	207	121	55	171	76	124	210	140	30	267	389	10	147	212

5.1 Content-Focused Roles

Content-focused roles fall into the core roles in collaborative learning interactions, entailing the provision of, seeking for, and evaluating topic knowledge (Heinimäki et. al., 2020). The data-driven observations showed that these elementary students only rarely delved deeply into the information. Therefore, we did not make a distinction between roles based on the depth of content, unlike in studies among older students (e.g., information giver vs. knowledge provider) (Heinimäki et. al., 2019, 2020; Volet et. al., 2017). Moreover, contrary to previous studies, no distinction was made between different forms of evaluations (e.g., challenger, supporter) (Heinimäki et. al., 2019, 2020; Volet et. al., 2017), and the evaluator role covers all evaluative aspects related to content.

Observations showed variance in content-focused roles across both task types and students. Content-focused roles were most typical when students produced reports (classroom 1, lesson 2), and collaborated on a joint iPad presentation on continents (classroom 2, lesson 3). Daniel, however, adopted an even higher number (and proportion) of content-focused roles when the topic entailed writing an informational text on what Sweden is famous for (classroom 1, lesson 1). Here, Daniel applied his extra-curricular knowledge of sports: "*Well, he plays football, and then this one ice hockey, and this one is a skier.*" [IP]. Then again, compiling separate iPad presentations (classroom 1, lesson 3) and replying to questions in the textbook (classroom 2, lesson 1) encouraged the lowest number of content-focused roles. However, when the percentage of content-focused roles are viewed in relation to all verbal turns during the lesson, almost half (40 percent) of Anna's contributions were content focused during the first lesson when collaborating on a more scholarly task type. Notably, Anna's participation during this lesson was, overall, minimal (only 10 verbal turns altogether), and thus, despite the high proportion of content-focused roles, these were low in number ($n = 4$).

Information providers were generally the most typical content-focused role, and all students enacted it to some degree. Conversely, the information seeker role was the least typically enacted content-focused role. It was mainly applied to seek isolated facts ("*Who is the king of Sweden?*" [IS]) and when not familiar with a concept applied in the textbook ("*What does organ mean?*" [IS]). Students only rarely engaged in efforts to seek more in-depth knowledge. Providing isolated facts was perhaps most prominent when replying to the questions in the textbooks; here, students provided isolated facts with practically non-existent elaborations ("*Well, a rowing boat doesn't pollute.*" [IP]). This occurred even though the topic (i.e., what pollutes the air) might have carried the potential for deeper elaborations. For Emil and Anna, the number and diversity of content-focused roles adopted significantly increased after this lesson.

The evaluator role was the most typical content-focused role for Ada when writing informational texts on Sweden (lesson 1) and reports on food production (lesson 2). Although writing reports encouraged the evaluator role in Maria and Daniel, to some degree, they were not enacting this role as actively as Ada, if at all (see Maria, lesson 3). Emil's and Anna's (classroom 2) participation was devoid of the evaluator role when replying to questions in the textbook, but Anna enacted it actively when compiling the joint iPad presentation on history (lesson 2) and continents (lesson 3). Emil, similarly, increasingly adopted this role after the first lesson. The evaluator role was enacted for different purposes: agree ("*Mmm, fishes come, yes, fishes come from waters!*"), disagree ("*No!*"), challenge ("*No, it's different vegetable species, but grows in the same field.*"), prompt the group to reconsider what they were about to write ("*But is skating a sport?*"), discuss the boundaries of the content ("*Can we also write something about the nervous system, because it... I think relates to touch?*"), elaborate on suggestions made by others ("*No but, wasn't it something to do with the money thing?*"), and encourage deeper elaboration of the topic instead of listing facts ("*Yes, but how? I mean, some reasons behind it.*" [as an evaluative reply to another student's suggestion to write down that the population in Africa grows fast] [EV].

5.2   Literacy-Focused Roles

Literacy-focused roles emerged as a new, data-driven role category. Establishing a new role category and roles within fits the premise of understanding some roles as activity-specific, compared to the core roles (Heinimäki et. al., 2020). Roles in literacy-focused category were enacted to contribute through genre-related matters, through multiliteracies and multimodal writing, as well as to ensure the correctness of text in terms of spelling, grammar, and punctuation errors. Thereby, these roles greatly align with the elements that have been suggested to be crucial components of writing in general (see e.g., Cope & Kalantzis, 2009; Fischer et. al., 2002; Fung, 2010; Herder et. al., 2018; Kumpulainen, 1994; Lowry et. al., 2004; Mackenzie et. al., 2013; Olinghouse et. al., 2015; Storch, 2005; Zhang, 2019, 2021).

Literacy-focused roles were only enacted infrequently (if at all, see Maria) during the first lesson, when students were fourth graders. Given that the task types within the classrooms differed during this lesson (i.e., writing informational texts vs. replying to questions in the textbook), relative absence of literacy-focused roles might, at least to a certain degree, relate to students' relatively young age. All students enacted literacy-focused roles more often, and more flexibly, after the first lesson. However, although replying to questions in the textbook encouraged only a limited number of participatory roles, a fifth of Emil's participation comprised literacy-focused roles during the lesson. Literacy-focused roles followed somewhat similar patterns to content-focused roles, being most typical (in number) when

students wrote reports (classroom 1, lesson 2) and compiled a joint iPad presentation on continents (classroom 2, lesson 3). Daniel, again, made an exception here. He enacted more literacy-focused roles when compiling iPad presentations on the senses (classroom 1, lesson 3).

The genre convention contributor role was barely enacted during the first lesson: Maria and Daniel did not enact it at all, Anna and Emil enacted it once, and Ada enacted it four times. However, this was Ada and Maria's most frequently adopted literacy-focused role when writing reports (classroom 1, lesson 2). For example, Ada kept track to ensure that her own and her group members' texts would follow the conventions of a report ("*It's a report, so that's not enough. You must write more!*"), and Maria contributed through conventions on searching for information ("*I think all the important things should be found here. Because here is, this kind of a summary*" [GC]). As for Daniel, presentations on iPads (classroom 1, lesson 3) especially encouraged this role, and he would, as an example, reflect on what it means to build a vocabulary ("*But hey, you can't just write 'outer ear, middle ear, inner ear'. You must also write what they mean.*" [GC]). Genre convention contributor was not a very typical role for Emil and Anna. However, compiling joint iPad presentations in lessons 2 and 3 increased instances of this role, compared to replying to questions in the textbook (lesson 1). For example, during the history lesson, Anna encouraged elaborations on whether the pictures they found on rock paintings were authentic or fake, thus indicating critical thinking related to the source of information ("*It should be very fuzzy, so that you don't really see the paintings that well. Then you know it's not fake.*" [GC]). As another example of this role in classroom 2, Emil discussed task requirements regarding the genre of writing ("*I think it's ok if we use bullet points here*" [GC]).

Ada and Maria enacted the proofreader role most frequently when writing reports (classroom 1, lesson 2), and Daniel, in addition to this lesson, when writing informational texts (lesson 1). Ada attended to not just her own but also her group members' spelling ("*Remember, with lowercase letters!*"). Maria was observed to consult the textbook to ensure correctness in spelling ([reading the book] "*Mmm, no, there's only one 'r' letter in that word*"), and Daniel mostly ensured that his own spelling was correct (e.g., "*Is fair trade with or without space?*") [PR]. Students in classroom 2 were observed to enact this role to a higher number compared to those in classroom 1. The proofreader role comprised half of Emil's literacy-focused roles during the first lesson when replying to questions in the textbook (classroom 2, lesson 1) ("*There is a comma between the words*" [PR]). Anna, then again, took secretarial responsibilities, especially when jointly compiling the iPad presentation on continents: while writing the texts on behalf of her group, she ensured the correctness of her own writing, while also elaborating on the correctness of suggestions made by others ("*But then it would stand for meters.*" [when her group mate suggested that they could use '*m*' to indicate millions] [PR]).

The frequency with which the designer role was enacted was greater than the rest of the literacy-focused roles combined. Aligning with the task types, this role was observed to be more typical in classroom 2, where students used iPads across all lessons, either when responding to questions [lesson 1] or making presentations [lessons 2 and 3]. However, students in classroom 1 only applied their iPads during lesson 3. The designer role was generally enacted to inform or agree on choices related to the modalities of the presentation ("*Let's take a picture that shows the border of Africa.*"), to comment on the visual look of the presentation ("*I think it looks okay like that.*"), to challenge suggestions ("*No, let's not place any pictures* [here]"), and to remind others of regulations concerning the use of pictures ("*You cannot use that picture. That's protected by copyright and for restricted use only.*") [DE].

5.3   Performance-Focused Roles

Performance-focused roles fall into activity-specific roles, as they closely relate to performing the task at hand, as reflected through students' verbal contributions (e.g., reading the text aloud) (Heinimäki et. al., 2020). While the reader and attention-focuser roles closely align with those identified in previous role research (Heinimäki et. al., 2020; Volet et. al., 2017), the boundaries and descriptions for the text producer and material manager roles more strongly emerged through our data-driven interpretations. Here, all contributions that were observed to strive toward performing writing (i.e., using a pencil, typing with an iPad, or dictating content to be written) fell into the text producer role. Through this conceptualization, we emphasize that the performance of writing can occur in multiple ways when students write collaboratively. The material manager role, then again, was conceptualized to cover a wide range of contributions related to the tools and equipment (e.g., pencils, books, iPads).

Performance-focused roles were adopted least during the first lesson, which was related to the overall lowest number of participatory turns during that lesson. However, when viewed through the percentage of all verbal turns, Ada's and Emil's participation through performance-focused roles was at its highest during the first lesson (i.e., writing informational texts, classroom 1; replying to questions in the textbook, classroom 2). Performance-focused roles were adopted most often when students wrote reports (classroom 1, lesson 2) and when jointly working on a presentation on an iPad (classroom 2, lessons 2 and 3).

The reader role was generally the least typically enacted role in this category. Students in classroom 1 were most active in reading texts aloud when seeking information for their reports (lesson 2). In classroom 2, Emil only enacted one single reader role during the first lesson but adopted this role more actively when seeking information for the joint iPad presentation (lessons 2 and 3). The reader role was

atypical for Anna across all observed lessons. The text producer role was generally the most frequently enacted performance-focused role for these students. It was enacted most often when students wrote reports and informational texts, compared to iPad presentations (classroom 1, lesson 3). In classroom 2, both Emil and Anna contributed through the text producer role during lessons 2 and 3, either through dictating text for others to write or by taking responsibility for writing the text, as jointly agreed.

Qualitative differences were observed in how the material manager role was enacted. Ada adopted it to ensure that everyone had the correct book and tools and, if not, advised them to collect the tools needed. Maria enacted it to borrow tools from others, or lend them to others (e.g., a rubber). Daniel adopted this role, especially when working on iPads, to supervise technical matters ("*I know how to save the pictures, let me do that.*" [MM]). In classroom 2, during the more traditional task type (i.e., replying to questions in the textbook, lesson 1), participation in this role was nonexistent (Anna) or infrequent (Emil). Anna and Emil adopted this role more when compiling the iPad presentations. During these lessons, this role was enacted to seek technical assistance from peers and attend to technical matters, especially.

Differences were also observed in how the attention-focuser role was adopted. Ada most actively enacted it during the first lesson to draw attention to certain parts of the text, but also to justify her content-related suggestions ("*Mm, look, right here! There is tundra in Sweden* [like I said]." [AF]). In Ada's case, adopting the role seemed to relate to ensuring the similarity of texts, which was a requirement for this lesson. Maria, on the other hand, did not enact the attention-focuser role at all during this lesson, but was observed to adopt it when her group was active in reading the text aloud (i.e., lesson 2). Then, she ensured that everyone knew where to continue reading ("*Here, the next chapter starts here.*" [AF]). Daniel adopted the attention-focuser role across the task types in a variety of ways. For example, he ensured that everyone had the correct page in their book and guided them as to where to find topic information ("*Here, these ones are famous* [points the book with a finger]."[AF]). In classroom 2, the attention-focuser role formed the majority of the performance-focused roles for Emil when replying to questions in the textbook ("*Here, page 68. Look here!*" [AF]), whereas Anna's participation was devoid of this role during the first lesson. However, Anna adopted this role to some degree in the latter two observed lessons, for instance, to show where to retrieve information.

5.4   Process-Focused Roles

Roles identified in the process-focused category align with those roles that have been identified as core roles in collaborative learning settings (Heinimäki et. al., 2020), except for the self-talker role, which was identified as a new role here.

Aligning with previous studies, opinion giver and seeker roles relate to providing and seeking views on performing the task and procedures (e.g., what to do first, how to divide responsibilities). The follower role was mainly observed to be adopted to indicate the position of a listener in the process of collaboration (see Zhang, 2021). The new self-talker role was observed potentially to reflect efforts to display struggles in following what others were doing, for instance, due to being in the middle of a process of thinking, or perhaps in need of help, although not explicitly expressing it.

Process-focused roles were highest in number when students wrote reports (classroom 1, lesson 2) and collaboratively compiled a presentation on the iPad (classroom 2, lesson 3). Ada adopted these roles least frequently when writing informational texts (lesson 1), and Maria and Daniel when compiling presentations on iPads on the senses (lesson 3). However, when approached through the percentage of all verbal turns, Maria's participation in process-focused roles was highly prominent (74.5%) during the first lesson, when her participation, overall, was rather low. In classroom 2, process-focused roles were only enacted to a limited extent when replying to questions in the textbook (lesson 1), but the joint work on iPad presentations (lessons 2 and 3) encouraged these roles so their incidence was higher, especially in the case of Emil.

All students adopted the opinion-giver role to some degree, with it occurring more, compared to the opinion-seeker role. Maria's participation in the opinion giver role was low in the first lesson but increased after that. From this point onwards, she more actively started to make suggestions on what the group should do ("*Now, let's start with the notes.*" [OG]) while continuing to seek others' opinions ("J*ust one of us writes, or are we supposed to write all, individually?*" [OS]). Ada was especially keen to lead discussions on how tasks should be completed when students wrote reports (lesson 2). Ada would supervise to ensure that everyone worked on the task ("*Are you doing anything that would make sense?* [OS]") and provided her opinions on how to complete the task ("*No, we work independently now!*" [OG]). Daniel enacted the opinion-giver role mainly to monitor group members' participation ("*Okay, you read now*") and to ensure that everyone knew what to do ("*We must share the important things with each other*") [OG]. He would also ensure that things flowed smoothly when taking turns reading aloud ("*Who wants to read first?*" [OS]). Anna and Emil enacted only a few process-focused roles altogether during the first lesson when replying to questions in the textbook. For both, the versatility and frequency of process-focused roles increased after that. Not only were they willing to provide their own views ("*Yes, but let's write this one first!*" [OG]), but they were also interested in hearing those of their group members ("*Okay, so what do we write now?*" [OS]). This role was also enacted to supervise the group's progress and efforts (*"How much time do we have left?"*

[OS]) and to agree on how to share responsibilities (*"I would like to read this one. And if you want to read too, you could read from here."* [OG]).

The follower role was generally the most typical process-focused role. Almost one-third of Maria's participation during the first lesson was enacted through the follower role. She mostly adopted the role to indicate to others that she was ready to go along with their decisions ("*Okay*" [FO]). Maria's participation was further combined with an almost equally large proportion of the self-talker role, which might have displayed to others that she was not sure what to do or that she was in the middle of a thinking process or had made a mistake. Ada enacted the follower role, especially when writing informational texts and compiling presentations on iPads, to display having registered others' suggestions, through short verbal utterances such as "*mm*" [FO]. The self-talker role, then again, was rare for Ada. Daniel participated flexibly in all process-focused roles across the lessons, except for the self-talker role which was rare for him. The follower role became more typical for Emil and Anna after the first lesson and formed the majority of their process-focused roles after that. This aligns with their increasingly taking responsibility for writing down what had been agreed on, and thus repeatedly displaying others having caught what had been said ("*Mmm*" and "*Okay*" [FO]). The self-talker role, on the other hand, was almost non-existent for Emil and Anna, except for isolated reactions to one's own mistake or inattention ("*Oh no!*"; "*Oops, I skipped one page*" [ST]).

5.5   Expressive Roles

Previous studies have identified roles that carry affective valence, such as frustration, boredom, or, on the other hand, attempts to alleviate potential tensions, and these have typically been placed under a category of social roles (Heinimäki et. al., 2019; Volet et. al., 2017). In our study, in addition to the negativity and positivity expressor roles, we also identified a new role: the experience expressor. This role was observed to reflect student's personal experiences toward the topic at hand, instead of the group members or task itself; as examples, admiration ("*Those pyramids are so beautiful, aren't they?"*) or empathy ("*I kind of feel sorry for those fishes*") [EE]. This role can be seen to stem from both affectional and experiential functions of talk (see, Kumpulainen, 1994). Therefore, we found the category 'expressive' to illustratively describe the three roles identified here.

Expressive roles were, altogether, only infrequently adopted. This was especially true for the negativity expressor role. The positivity expressor role formed the majority of roles enacted in this category and was generally related to making task-related jokes, especially in Daniel and Ada's cases, and to being polite, such as when Maria said "*thank you*" when receiving her pencil back. Experience expressor roles were most frequent when writing reports on food production, which encouraged empathic (see above) reactions, along with students' reactions of disgust to gutting

a fish, as well as sharing personal experiences related to the topic ("*My dad likes fishing*") [EE]. The isolated negativity expressor roles were related to a temporary lack of motivation or tiredness, which were quickly resolved ("*No, no, I don't' feel up to this*" [NE]). In classroom 2, the history lesson evoked the highest number (although still low) of expressive roles from Emil and Anna. Emil enacted the positivity expressor role and a couple of experience expressor roles, whereas Anna adopted only one positivity expressor ("*Thank you*" [PE]) and three experience expressor roles. Emil mostly adopted the positivity expressor role to express politeness as well as excitement over the task at hand ("*Good! I was hoping we would get this topic!*" [when hearing that their topic was the Olympics] [PE]). The experience expressor role was enacted, for example, to share experiences of visiting the city that the group was reading about, or to describe how it would feel to work as an archeologist (when reading about archaeological excavation).

5.6   Off-Task Roles

Our solution for keeping the off-task role as its own category differs from those that have placed off-task utterances into the social role category (Heinimäki et. al., 2019), left them out of the analysis (Heinimäki et. al., 2020), or identified them as carrying their own function in distracting the group from working on task (Heinimäki et. al., 2021). Off-task utterances can be seen to carry various purposes and functions (see also Sabourin et. al., 2011), as will be discussed here and in the discussion. Therefore, we found this role to be well-suited to a category of its own.

Students were observed to be highly on task. However, in classroom 1 (Ada, Maria, Daniel), the number of off-task roles increased after the first lesson. Ada and Daniel enacted the highest number of off-task roles during the third lesson. This was observed to be related to the teacher placing written notes on each student's back toward the end of that lesson, advising them not to look at the notes until they finished working on the presentation. Ada and Daniel struggled to follow these directions, which led to the observed off-task roles being enacted ("*Tell me what it is, tell me. You can tell me!*" [OT]). For Maria, off-task roles increased simultaneously with her overall increasing participation, and her off-tasker roles were highest during the second lesson. Through enacting the off-task role, Maria was observed to bond with her group members; she would, for instance, ask her group mate: "*Would you pick a regular kind of Christmas cookie or one with pink and white on it? Or maybe a Christmas cookie house?*", and excitedly agreed ("*Me too!*"), when her group mate replied that she would pick the cookie house [OT]. Notably, Ada and Maria's verbal participation was devoid of an off-task role during the first lesson, and Daniel's enactment of an off-task role was almost non-existent during the first and second lessons. Emil enacted the highest number of off-task roles during the history lesson (classroom 2, lesson 2). During that lesson, Emil engaged in social discussions (e.g., what he had in his backpack). However, when

considering the off-task role as a proportion of all verbal contributions, Emil enacted this role more during the first lesson. At the beginning of this lesson, Emil somewhat struggled to get started with the task. As an example, when another student started by asking, "*So you were writing that - - -*", Emil interrupted him with an initiation of an off-topic conversation, "*I want to be an engineer when I grow up.*" [OT]. Anna's participation was devoid of the off-task role in lessons 1 and 3, and she only enacted the off-task role minimally, overall.

6. Discussion

In the present study, we aimed at developing a framework of spontaneously emerging and dynamic participatory roles during elementary students' collaborative writing activities in environmental studies and social studies classrooms. This was done by reflecting on data-driven video observations of the five students in two classrooms, together with existing frameworks on participatory roles, established among older students in the context of science learning (Heinimäki et. al., 2019, 2020, 2021; Volet et. al., 2017). We further illustrated how and when students contributed through content, literacy, performance, process, expressive, and off-task roles. As shown through the qualitative descriptions, we observed differences in roles enacted across the task types (i.e., certain task types encouraged some roles over others, in general) and students (i.e., some students more typically enacted some roles over others). This exploratory study deepens the understanding of individual students' role flexibility within and across task types, as previous research has mainly focused on role diversity at the group level, as well as its effects on the group outcome (e.g., Heinimäki et. al., 2021; Volet et. al., 2017).

Our observations show that students participated more actively (and flexibly) through content-focused roles when compiling joint presentations on iPads, instead of each student making his/her own. This somewhat aligns with the understanding that working toward shared aims can be especially beneficial for successful collaboration (Barron, 2003). Moreover, the task type that required writing reports that the students would need to be able to teach the topic to their peers in other groups, encouraged a high number of content-focused roles overall. This task type invited students not only to provide, but also to evaluate, information provided by others. The more traditional task type, that is, replying to questions in the textbook, only invited a low number of participations overall, although the proportion of all contributions was high for Anna. It could be that this type of task guides students readily to provide facts to complete the task instead of planning, drafting, or engaging in agreeing on procedures with peers. This kind of variance across task types, that our observations tentatively indicate, aligns with the understanding that distinct kinds of assignments can promote distinct kinds of practices and use of knowledge (Olinghouse et. al., 2015).

Overall, students most actively provided isolated facts through the information provider role, and only rarely engaged in back-and-forth loops, which explains the relatively low number of these roles overall. This aligns with findings that suggest that students often approach texts by retrieving information that they find topic and task appropriate, instead of employing a deeper approach that includes extended dialogues to understand, analyze, and reflect on the content together (see Hayes, 2011; Kiili et. al., 2020; Olinghouse et. al., 2015). Therefore, increasing students' content-focused participation to promote content knowledge and conceptual comprehension (Nykopp et. al., 2014) in subject areas might be beneficial. As part of increasing content-focused participation comes knowing and using the subject specific vocabulary (Törmälä & Kulju, 2023 - this issue).We further observed that opportunities to apply extra-curricular knowledge can encourage students to share and evaluate information. This suggests that providing students with topics that they find interesting, and that allow them to be knowledgeable and experience success, might be important in encouraging participation through content-focused roles (in regard to student perspectives, see Hamre et. al., 2013; see also Graham, 2019). Helping students make connections with the topic at hand and their personal experiences and interests (see high-quality instructional support, Hamre et. al., 2013) might also be helpful in this regard (see also Enright et al. (2023), this issue).

We identified a wholly new role category: literacy-focused roles. These roles deepen the understanding of the literacy practices that students spontaneously adopt when writing collaboratively with their peers in subject-area classrooms. Importantly, not only did the literacy-focused roles reflect students' efforts for correct spelling (i.e., proofreader role), but also, and perhaps even more importantly, their understanding of the unique ways of communicating in the disciplines (i.e., genre convention contributor), and acknowledgment of multiliteracies and multimodal writing (i.e., designer). While the proofreader role comes close to the observations by Herder et. al. (2018) on reflections of the correctness of text, the genre convention contributor can be seen to share some similarities with the reflections of appropriateness of information, as described in the study by Herder et. al. (2018), especially regarding the intended audience. The designer role was found helpful in observing how multiliteracies and multimodal writing were reflected through students' collaborative writing interactions. Concerns have been raised that multimodal writing and the use of technologies might not be sufficiently acknowledged when teaching writing, which emphasizes the need to increase task types that encourage this kind of participation (Graham, 2019; see also Törmälä & Kulju (2023) in this special issue). Our observations show that writing reports, along with compiling a joint presentation on iPads, especially encouraged literacy-focused roles (as observed through number and variety). These findings encourage versatile application of different forms of expository writing, such as reports, as well as writing with iPads, especially when jointly

compiling text. Although students' contributions were generally rather superficial, these kinds of tasks might have the potential to invite students' reflective and even critical thinking regarding genre-related requirements and multiple modalities of writing, especially when combined with high-quality teacher support. Thus, our results have potential to contribute to the pedagogy of collaborative writing in subjects: especially the spontaneously emerging literacy-focused roles may provide a basis for strengthening the learning-to-write perspective to writing in subjects.

Students flexibly shifted between different roles within the performance-focused category. These ways of participating might be more familiar and easily accessible for young students. Even if hesitating to contribute through content, a student might take up opportunities to participate through performance-focused roles, such as drawing others' attention to specific parts of the text (i.e., attention focuser) or ensuring that all have the materials needed (i.e., material manager). The task type was also observed to be associated with the kinds of performance-focused roles that emerged. Notably, students were not very active in enacting the reader role (i.e., reading materials, such as the textbook, aloud). This might reflect a tendency to retrieve only information that is quickly and easily accessible (e.g., titles, captions, bullet points) instead of immersing oneself in reading longer paragraphs of text. As writing and reading are connected, it would be important to elaborate further on how students could be helped to connect the two meaningfully when writing collaboratively (Fitzgerald & Shanahan, 2000; Graham, 2019).

Qualitative differences in participation were visible in how students enacted process-focused roles. Some students took more active participation by providing their views (e.g., Ada), compared to others (e.g., Maria). Although the opinion giver role was clearly more typical, compared to the opinion seeker, all students were observed to adopt both to some degree. Thus, not only did the students provide their opinions, but they also showed interest in the views of others. We further identified a new process-focused role: the self-talker role. It was observed most frequently for one student (Maria) in fourth grade; it was seldom enacted in fifth and sixth grade. This might suggest that this role is perhaps more typical for younger students who are taking their first steps in this kind of more demanding collaboration with their peers. Perhaps older students are more familiar and confident with this type of peer collaboration. It seemed that the self-talker role functioned as a safe way for Maria to move toward collaborating with others in a more explicit and active manner. Indeed, Maria's participation clearly grew more active after the first lesson. In general, process-focused roles indicate that students as young as 10-11 years-old have emerging skills in managing collaborative writing, exchanging views that feed writing, and enriching textual content by listening to the views of peers.

Expressive roles were enacted relatively infrequently. Negativity was only observed through isolated expressions that indicated a temporary lack of motivation but were solved very quickly as the group moved on with the task. It can therefore be presumed that the tasks were, overall, designed and implemented in ways that promoted students' functioning collaboration (i.e., devoid of frustration), at least from the observed students' points of view. Expressions of positivity were, similarly, low in number. The experience expressor emerged as a new role. Although it was enacted only occasionally, we expect that it can provide interesting insights in future research. It was observed to be associated with the task type (or perhaps with the topic at hand, more specifically) and was adopted most often when students wrote about food production. This topic invited students to share their experiences on fishing; in addition, the topic surfaced affective experiences, including empathetic reactions. The ongoing discussions on climate change and the ethics of food production, as examples, are topical in subject areas, and observing how the experience expressor role emerges in peer discussions could deepen understanding of how students process the concepts and ideas within these topics when writing collaboratively. Helping students make connections with the content-focused and experience expressor contributions might help students to express themselves more skillfully through argumentative and persuasive texts on topics that raise affective experiences. This idea provides an interesting venue for future research. These roles also demonstrate the potential of collaborative writing as an assignment that connects to students' living world and experiences.

Students' participation was demonstrably on task, suggesting that the activities at hand encouraged task-related collaboration. It was, however, observed that teacher practices related to transitions and preparations, if not carefully and sensitively implemented, can lead to an increase in students' off-task interactions. More specifically, the off-task role was observed to relate to struggles when the teacher provided the materials for the next task before students had finished the ongoing activity. For one of the students (Maria), the higher number of off-task roles seen during the second lesson may have been related to her increasing efforts to connect with other students. We presume that the off-task role helped her gain a more active role in the group, as observed through increasing content-focused and literacy-focused roles and more active sharing of her own opinions and views, compared to the first lesson. Therefore, instead of placing too much weight on evaluating whether students are working on a task or not, we encourage teachers to strive for awareness of underlying reasons (e.g., establishing meaningful relationships with others that can, eventually, promote participation overall). This emphasizes the importance of a deeper awareness of students' participation, overall – that is, not just based on what they are 'doing' and 'talking about', but also how it relates to their underlying needs for belonging and thinking (for various combinations of expressing participation, see Wenger, 1998).

Much attention has been paid to how complex a process writing is (Graham, 2019). In collaborative writing, this complexity is reflected in the multiple roles taken. Observing participatory roles in authentic learning situations, such as environmental and social studies, convincingly illustrates the richness and variety underlying students' participation when writing collaboratively. This leads us to presume that tasks involving collaborative text production may help even young students to practice versatile sub-processes required for writing, especially when combined with high-quality support.

7.   Limitations and Future Directions

Our focus was on establishing a framework for observing participatory roles in collaborative writing among young students and concretizing the applicability of the framework through illustrative examples. Our study was exploratory, and the data sample was small. We relied on qualitative descriptions of the roles and observations made when presenting our findings. We arrived at the categorizations through expert-informed discussions to gain consensus. An obvious restriction of our study is that we did not have resources for more traditionally expected independent coding. To take that step, we have data from two other classrooms to test the categorizations. Further, to generalize, there is a need for research with larger datasets, accompanied by quantitative analysis. This will be an important next step in research to increase further understanding of the variance in role enactment across task types as well as across students. We encourage testing the framework in different kinds of collaborative writing contexts and among different kinds of learners, as examples, during collaborative writing in different subject-area classrooms (e.g., Civics, Crafts). Moreover, collaborative writing, just like learning interactions in general, occurs in a specific educational context and is influenced by wider cultural and social aspects. Therefore, conducting research in other cultural and educational contexts is important.

As another limitation, the present study did not immerse itself in the group dynamics in a wider sense, nor the role that the teacher plays. Thus, future studies are encouraged to combine the understanding of these factors. Examining enactment of roles, combined with understanding teacher support, is expected to provide a more holistic understanding of why students participate in certain ways. As an example, previous research shows that a teacher's high-quality emotional support promotes students' functioning peer dyadic collaboration when reading and writing collaboratively (Salo et. al., 2022). It can therefore be presumed that emotionally supportive interactions constitute a crucial building block for a favorable context for students to participate when writing collaboratively with their peers. Additionally, teacher's instructional support, such as the degree to which students   are   encouraged   in   planning   and   brainstorming   when   writing

collaboratively and helped to make connections with the topic and their lives and experiences (Graham, 2019; for instructional support, see Hamre et. al., 2013), is expected to provide further insights into how teachers can promote different kinds of participation in their students.

We hope that our study encourages efforts to explore and increase understanding of how to promote meaningful participation of all students when writing collaboratively in subject-area classrooms. Encouraging role flexibility might be beneficial in ensuring that students are better prepared to face the increasing future demands in multiliteracies. The framework developed in the study, along with the concrete descriptions of the diverse behaviors and strategies that participating in collaborative writing can raise among students, can provide beneficial tools for teachers to observe how flexibly their students adopt roles from different categories when writing collaboratively. This can inform the teacher on whether students are paying (sufficient) attention to various aspects (e.g., content, literacy) of writing, and enable the teacher to encourage more frequent use of some roles through selection of the task type, along with differentiated instruction based on students' individual needs.

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