



Contents lists available at ScienceDirect

Learning, Culture and Social Interaction

journal homepage: www.elsevier.com/locate/lcsi

Full length article

Building agency through technology-aided dialogic teaching

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ARTICLE INFO

Keywords:

Agency
Dialogue
Positioning
Technology-aided teaching
Microblogs

ABSTRACT

Rooted in the sociocultural tradition, this article examines how one teacher helps her eighth-grade students build agency through dialogic teaching supported by technology. Students' agency is essential for their participation in dialogues and thereby their learning processes, making it vitally important to understand how teachers can support and enhance their students' development of agency. This study is a part of a design-based study introducing a dialogic approach to teaching and learning with the aid of technology. The empirical data comprise video-observations from classrooms and interviews with the teacher and students that we analysed using interaction analysis. The results show how teachers may practice specific dialogic moves, such as asking open questions and acknowledging students' contributions. Further, we show how technology may be used to position student contributions as a central focus point in the dialogue. This paper explains why these strategies work by pointing out interrelations between agency, positioning and dialogue. We emphasize both individual and social aspects of agency and show how they are intertwined.

1. Introduction

The impact of classroom talk on the standards of attainment has been thoroughly documented in recent research (Howe, Hennessey, Mercer, Vrikki, & Wheatley, 2019; Alexander, 2012; Murphy, Wilkinson, Soter, Hennessey, & Alexander, 2009; Nystrand, Gomoran, Kachur, & Prendergast, 1997; Mercer, Wegerif, & Dawes, 1999). In addition, research on dialogic teaching shows the importance of high-quality classroom interactions on student learning (Alexander, 2008; Mercer & Littleton, 2007). However, more knowledge is needed in relation to the details of classroom practices, such as how interactional moves and the use of technological tools can mediate student engagement in learning processes.

The probability of elaborated student talk increases correspondingly to the number of students who participate (Sedlacek & Sedova, 2017), and for students to actively participate in classroom activities, they need to have the agency to do so. They need to believe that their engagement matters and that they actually can influence classroom interactions (Doyle, 2015). Therefore, this study will investigate the relations between agency and dialogic teaching. Based on previous contributions, agency is defined as the socioculturally mediated capacity to intentionally initiate action (Ahearn, 2001; Giddens, 1984; Godwin & Potvin, 2017; McAdams, 2013). As a precondition for engagement, agency is fundamental for learning.

In the process of developing classroom agency, the teacher's role is essential. One central aspect of this is the strategies the teacher uses to engage students in classroom conversations (see e.g. Greeno, 2002; Snell & Lefstein, 2017; Wortham, 2004). Teachers can strengthen their students' agency by inviting participation (Clarke, Howley, Resnick, & Rosé, 2016), and they can change students'

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<https://doi.org/10.1016/j.lcsi.2020.100406>

Received 6 February 2019; Received in revised form 18 March 2020; Accepted 23 March 2020

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perceptions of their positions in the classroom by including or excluding them in whole-class conversations (Black, 2004; Snell & Lefstein, 2017; Wortham, 2004). Thus, it is crucial to investigate how the teacher's interactional moves influence the students' patterns of participation.

New technologies provide new tools that may alter teachers' and students' classroom practices. Such tools have been shown to facilitate classroom dialogues (Gao, Luo, & Zhang, 2012; Thoms, 2012). For instance, microblogs and digital whiteboards can initiate conversations and support collaborative learning and reflection (Major, Warwick, Rasmussen, Ludvigsen, & Cook, 2018; Mercier, Rattray, & Lavery, 2015). Microblogs have also been shown to open new opportunities for the orchestration of discussions, questioning and elaborations of students' contributions (Rasmussen & Hagen, 2015).

Comprehensive studies have researched classroom interactions and strategies for dialogic teaching (Alexander, 2012; Mercer et al., 1999; Mercer & Littleton, 2007; Reznitskaya et al., 2001). However, few studies connect these interactions with how the teacher positions students and the students' development of agency. Even fewer have investigated how such interactions may be mediated by technology. In this article, we explore how the building of agency through dialogic moves, positioning and technology mediation can contribute to explaining why and how dialogic teaching can support student learning. We examine how dialogic teaching, positioning and agency are intertwined and show why examining them in connection is important to developing dialogic teaching strategies. Through the analysis of one teacher's practice, we highlight technology mediated strategies that may build student agency and dialogic participation. The aim is to understand the meaning and role of teachers' dialogic moves, acts of positioning and technology mediation in the promotion of student agency and thus to help explain one aspect of how dialogic teaching mediates students' learning processes.

2. Theoretical framework

2.1. Dialogic teaching

The quality of whole-class conversations and group discussions influences students' learning and reasoning. When students are taught to think together, classroom dialogues may become tools for developing new understandings and insights (Littleton & Mercer, 2013). What constitutes educational dialogue and how the concept should be conceptualised is still discussed among researchers (see e.g. Brugha et al., 2018; Kim & Wilkinson, 2019). Our understanding is rooted in the sociocultural tradition, and language is viewed as the most important tool not only for communication but also for creating meaning and new understandings (Vygotsky, 1978). Humans create meaning in interactions with other people and the culture they are part of, and thus knowledge is viewed as shared and understandings as jointly constructed (Säljö, 2010). Meaning cannot be reduced to the utterance of the speaker or to the interpretation of the listener but emerges from the context between them (Bakhtin, 1986). As such, meaning is constructed and reconstructed in particular situations.

Our understanding of dialogic teaching follow the tradition of Nystrand et al. (1997), Alexander (2008) and Mercer and colleagues (e.g. Mercer et al., 1999; Mercer & Littleton, 2007; Mercer & Wegerif, 1999) in which dialogic teaching points to how the quality, dynamics and content of talk is facilitated by the teacher. Classroom dialogue is characterised by the meeting of different voices that are explored, compared and confronted in conversations (Alexander, 2008). For such dialogues to take place, students need to learn how to build on each other's contributions, to elaborate and to ask for justifications (Hennessy et al., 2016; Mercer et al., 1999). Opinions should be sought but also challenged (Mercer & Littleton, 2007). A prerequisite for dialogic teaching is that the teacher masters a wide repertoire of strategies for using language as a tool for learning (Alexander, 2008; Mercer & Littleton, 2007). Such strategies are discussed in the review section of this article.

2.2. Agency

For productive dialogues to take place, students need to actively engage themselves, and a precondition for such engagement is agency. Different traditions and scholars have interpreted the concept of agency in various ways (Eteläpelto, Vähäsantanen, Hökkä, & Paloniemi, 2013; Matusov, von Duyke, & Kayumova, 2016). Agentic students are viewed as persons that intentionally pursue their goals and plans (Ahearn, 2001; Clarke et al., 2016; Giddens, 1984). We want to highlight that agency comprises both (a) the social structures that may influence the individual's possibilities to act and (b) the individual's perceived capacity to act (sense of agency) (Hilppö, Lipponen, Kumpulainen, & Virlander, 2016; Mäkitalo, 2016). The social dimension of agency (a) is comprised of the constraints and possibilities in the situation (Holland, Lachicotte, Skinner, & Cain, 1998). We use Hilppö et al.'s (2016, p. 51) conceptualisation, and refer to *sense of agency* (b) as 'the individual's subjective awareness of being an initiator or executor of actions in the world'.

This duality of the concept reflects the sociocultural perspective in which agency is perceived as situated, socially constructed and continuously negotiated and renegotiated. In this article, the focus is the classroom, where *sense of agency* refers to the student's perceived capability to influence classroom activities. The *social dimension* refers to the classroom environment, which is mediated by the teacher, other students, the school, social norms and the governmental curriculum. For agency to result in enactment, one needs to have agency on both an individual and a social level. In the classroom, the students' actions (e.g. how they choose to participate in classroom talk) constitutes *enacted agency*. We consider it enacted agency when students share their own opinions, attitudes and beliefs in conversations or when they use their influence to alter the direction of a conversation (Martin, 2016). As agency is viewed

as socioculturally constructed, the classroom environment becomes the setting in which the students enact agency. The teacher's role in developing this as well as in mediating the students' agency to play a productive part in these activities are vital for the students' development as learners.

2.3. Positioning

A central aspect of agency is the power to influence or even change one's surroundings (Doyle, 2015; Godwin & Potvin, 2017; Martin, 2016; McAdams, 2013). As this is closely related to authority and power relations in human activity and learning (Rajala, Martin, & Kumpulainen, 2016), we will use the term *positioning* when examining this aspect in our analysis. Positioning describes how relations between people are negotiated through interactions and is a metaphorical reference to an individual's 'relations of power, deference and entitlement, social affiliation and distance' (Holland et al., 1998, p. 127). Positions are not permanent and may even be local or momentary. They become apparent through discursive processes and may be negotiated so that a person may be repositioned with a new status (Holland et al., 1998). In the classroom context, positions may be negotiated through the distribution of talk. How teachers engage students in classroom talk contributes to positioning students with different dispositions for future participation (Martin, 2016; York & Kirshner, 2015). The way teachers invite and respond to students' contributions thus becomes decisive. In the following, studies are presented that have investigated teaching strategies in relation to dialogic participation and agentic behaviour.

3. Review

3.1. Teacher–student interactions, agency and positioning

Multiple studies have investigated how the interaction between students and their teacher may influence the students' participation behaviours (e.g. Black, 2004; Black & Varley, 2008; Clarke et al., 2016; Rajala, Kumpulainen, Rainio, Hilppö, & Lipponen, 2016; Snell & Lefstein, 2017). This research has suggested central strategies to enhance agentic participation. A teacher's initiative to engage students in discussion may alone increase students' participation. Clarke et al. (2016) found that when the teacher asks a student to contribute early on in a lesson, the student more readily initiates participation later in the same class. Clarke et al. (2016) dubbed this the 'echo-effect'. In addition, they noted that teachers could increase students' agency to participate by making the students feel that their participation is a valuable contribution.

Students may learn more when teachers display their own thinking, reflection processes and mistakes than when they teach more traditionally (Olitsky, 2006). Furthermore, such practices may reduce the distance between the teacher and the students because the teacher is positioned as a curious learner, and in this way, the teacher is modelling learning behaviour. In some situations, teachers may even frame the students as the experts and themselves as learners and thus credit their students' authority while recognising their contributions (Lipponen & Kumpulainen, 2011).

Teachers may also enhance students' agentic behaviour by letting them explore new topics based on their prior knowledge and interests (Basu, 2007; Rajala et al., 2016; Siry, Wilmes, & Haus, 2016). Greeno (2002) noted that allowing students to 'generate questions and problems that become topics for the class' (p. 5) and 'positioning students by identifying them as authors of conjectures and explanations' (p. 7) might encourage students to contribute to the classroom community. Lipponen and Kumpulainen (2011, p. 816) emphasised this aspect, arguing that 'getting your ideas through and, especially, seeing them having practical implications, should give the learner a true sense of authority and agency'. Clarke et al. (2016) referred to the case of one student who began as a low contributor but whose participation pattern changed after one episode in which they discussed a subject of which she was knowledgeable. She articulated that her contributions during this class made her 'become smart for a day' (p. 36). The authors observed that her pattern as a low contributor changed after this lesson, and they connected this shift to a change in her perception of self. This research combined shows that the way teachers position their students' prior knowledge is important for the students' sense of agency.

3.2. Dialogic moves

Important factors in developing agentic student behaviour are the interactional strategies the teacher uses in classroom conversations. Two such strategies are *open questions* (questions without predefined answers) and *uptake* (when one interlocutor asks another about something the other person said previously) (Nystrand et al., 1997). Nystrand, Wu, Gamoran, Zeiser, and Long (2003) found that these moves may open the classroom to the students' ideas, allowing students' answers to change the trajectory of the lesson. Black and Varley (2008) found that employing an enquiry-driven pedagogy where students were asked open questions made students recognise learning as 'a process of trial and error, evaluation and collaboration' (p. 220). They also found that these strategies created a sense of community among the students. Snell and Lefstein (2017) found that the way a teacher performed uptake of students' contributions by asking for elaborations and not giving them the opportunity to avoid answering questions in class contributed to positioning them as authoritative, accountable and competent members of the class.

Howe et al. (2019) found that asking for elaborations was positively associated with curriculum mastery. In their study, the code *elaboration* referred to both invitations for elaborations (e.g. 'Have you noticed anything else?') and actual elaborations, which included building on, elaborating, evaluating or clarifying their own or others' contributions. Asking for elaboration is one approach

to doing uptake of a contribution.

Michaels and O'Connor (2015) pointed to *talk moves* as strategies teachers may use to orchestrate academically productive discussions. Talk moves are utterances the teacher can use to obtain more extensive answers (e.g. 'Can you say more?' and 'Can you give us an example?') or to press for reasoning by asking for justifications (e.g. 'Why do you think that?'). These moves have obvious similarities with invitations to elaboration. Another such move is *revoicing* (O'Connor & Michaels, 1996). This refers to how teachers can rephrase a student's utterance so that it becomes clearer and better phrased than the original one. When a teacher revoices, there is an implicit (or explicit) question directed towards the student in the rephrasing to ensure that it covers students' meanings. If the student confirms the rephrasing, the student implicitly receives ownership of it. Michaels and O'Connor (2015) argued that such talk moves can help change the nature of classroom talk from a traditional IRE-structure (initiation-response-evaluation) to discussions in which students have the responsibilities for explaining, justifying, critiquing and improving ideas. Thus, talk moves change the students' positions and responsibilities in the classroom.

Similar to talk moves, Snell and Lefstein (2017) showed how the probe 'tell me more' makes it easier for students to elaborate because there is no single correct response. Furthermore, they emphasised the importance of giving students a sufficient amount of time to think of an answer. This claim is supported by considerable previous research (see e.g. Black, Harrison, Lee, Marshall, & William, 2003; Cazden, 2001).

The term *dialogic moves* has previously been used to describe strict codes, which have been investigated in relation to productive classroom dialogues (Vrikki, Wheatley, Howe, Hennessy, & Mercer, 2019). In this article, it is used to describe the abovementioned strategies that previous research has shown to enhance classroom dialogues. Thus, *dialogic moves* refers to discursive acts that may serve to increase dialogic participation.

3.3. Technology aided classroom talk

We have seen how teachers can influence their students' agency through interactional patterns. Several studies have suggested that such processes may be aided by technology. Interactive whiteboards may facilitate joint attention to a shared text or contributions in classrooms (Mercer, Hennessy, & Warwick, 2010). Thus, they may function as a basis for further discussions, thereby grounding and sustaining engagement (Gillen, Staarman, Littleton, Mercer, & Twiner, 2007; Mercer et al., 2010). Furthermore, research has revealed that microblogging can initiate conversations (Gao et al., 2012), increase interaction and bring in new information (Thoms, 2012). Rasmussen and Hagen (2015) showed that sharing microblogs can place students' contributions at the core of classroom activities by displaying students' interpretations dynamically to the whole class and can allow the whole class discussion to elaborate on key elements from the work of several student groups. As technology may be a fruitful aid in classroom interactions (Major et al., 2018) and is increasingly a central part of everyday classrooms (Gilje, 2017; Rasmussen & Ludvigsen, 2010), we want to investigate how teachers can use technology as a tool in interactions to support students' agency.

3.4. Research questions

For productive classroom dialogues to unfold, students must participate and offer their opinions and viewpoints; in other words, they have to enact agency. Previous research has identified teaching strategies that may contribute to enhancing students' agentic participation. However, why and how such strategies work requires more research. In this study we try to give some answers to this by pointing to the connections between dialogic teaching strategies, agentic participation and positioning. We also examine how technology may mediate the dialogic learning process. We will address the following research questions: How can teachers enhance students' agency through (a) dialogic moves, (b) the attentive use of positioning and (c) technology-aided teaching?

4. Methods

4.1. Project and materials

The teacher whose practise is the focus of this study participated in the research project *Digitalised Dialogues Across the Curriculum* (DiDiAC). This project was a collaboration between the University of Oslo and the University of Cambridge and 22 teachers in Norway and England. The aim was to develop teaching practices that combined dialogic teaching (<https://thinkingtogether.educ.cam.ac.uk/>) with a microblogging tool called Talkwall. Talkwall was developed to support classroom talk. A task or a question is posed through the tool, and participants can post short contributions of up to 140 characters. All the contributions become visible for the participants in a 'feed', and the students or the teacher can choose to add the contributions to a wall. The wall allows for different ways of sorting the contributions. On a class screen, such as an electronic whiteboard, the teacher's or the individual students' walls can be shared with the class.

The data material consists of video recordings of lessons during which the teachers implement dialogic teaching and Talkwall, audio recordings of meetings between teachers and researchers and of interviews with the teachers and student focus groups, as well as logs from the microblogging tool. A more detailed description can be found in Appendix A.

4.2. Selection and thematic analysis

The recorded lessons were first analysed through a minute-by-minute categorisation of ongoing activities as either group, whole-class, interactive or non-interactive (Scott, Mortimer & Aguiar, 2006). Through this analysis, the lessons of the teacher whose practice is investigated in this study were distinguished by having frequent activity shifts between group and whole-class activities and being highly interactive. Such variations may reflect the active use of technology and dialogue as opposed to longer sequences of monologic discourse and indicate a broader repertoire of approaches, which are requirements for dialogic teaching (see e.g. Alexander, 2008; Mercer & Littleton, 2007). Observations over a longer period of time from the researchers present in the research lessons indicated that a high number of students participated in whole-class activities. Based on these observations, we wanted to investigate this teacher's strategies in more detail, and chose to conduct a case study (Yin, 2014). The objective was to explore the interactions by analysing the teacher's and the students' moves turn-by-turn in order to understand how the teacher created space for the students' agency to develop.

We conducted a thematic analysis (Braun & Clarke, 2006, 2012) on all the recorded lessons with this teacher, as well as on the interviews with the teacher and the students. The video recordings were viewed several times, and selected episodes were discussed with co-researchers. This work confirmed the perception of active student participation, and it led attention towards the ways in which the teacher invited the students into whole class talk. The recordings were then viewed again, and thematic patterns were inductively recognised by watching episode by episode while focusing on the interactions. The main categories that emerged from this work were the teacher's moves to acknowledge students' contributions, ask for elaborations, coordinate students' contributions, include students, ask questions as well as her use of Talkwall. The main categories that emerged from the analysis of the audiotaped interviews were student participation, inclusion of students and how students related to other students' contributions on Talkwall and to other students' comments on their contributions.

Based on this preliminary analysis, one particular lesson was chosen for closer analysis. The entire lesson was orchestrated as discussions in which the teacher let students' contributions guide the evolution of the lesson. The topic of the lesson was also chosen from a student contribution. We hypothesised that such placing of the students' contributions would support the development of students' agency (Clarke et al., 2016). We have focused on whole class conversations to investigate how the teacher-student interactions can contribute to building the students' agency. Naturally, these interactions are more dominant in whole-class conversations than during group work.

4.3. Analytical approach

In our further analysis, we used video-based interaction analysis (Derry et al., 2010; Jordan & Henderson, 1995; Mercer, 2004). After repeated viewings of the selected video-recorded lesson as a whole, we focused on the interactional processes in the whole-class sessions to investigate how the teacher invited and followed up on students' contributions through different dialogic moves. Furthermore, we identified episodes where she positioned either herself or the students in a way that we interpreted to influence the students' agency or in which Talkwall was used to mediate the students' contributions as central to the development of the lesson. Against this background, a selection of interactions (Enqvist-Jensen, Nerland, & Rasmussen, 2017; Furberg, Kluge, & Ludvigsen, 2013) that illustrated how she enhanced her students' agency by following specific words and concepts was analysed. In the analysis we have included the use of Talkwall as part of the interactions to investigate the role of this technology as an integrated part of the broader classroom practices.

Selected episodes from the interview material were included in the analysis as determined by the thematic analysis. We chose to include episodes in which the students discussed their uptake of the teacher's dialogic moves and demonstrated a sense of agency. The student interviews were done in focus groups in the form of student-student interactions. This material supplements the classroom observations because it offers insight into students' reflections regarding what happened in the classroom and their sense of agency. As such, it adds richness to the data.

In our analysis we had a special focus on how the teacher's use of positioning and the dialogic moves described in the review (uptake, open questions, asking for elaborations, revoicing and giving students sufficient time to think out an answer) influenced her students' agency.

5. Findings

5.1. The class and the lesson

The students in this study attended an eighth grade class in a lower secondary school (age 13/14) located in one of the largest cities in Norway. The class consisted of 27 students (15 boys and 12 girls). During the lesson in which the analysed interactions took place, the class was discussing impacts of the Industrial Revolution on society. Students had some background knowledge as they had previously worked with this topic.

An important characteristic of this teacher's strategies was that she allowed the topic of her lessons to evolve from the students' contributions by altering between group discussions and whole-class sessions using Talkwall as a tool to mediate the transition

between the activities. The lesson studied included five group activities and six whole-class sessions. [Appendix B](#) shows an overview of the lesson structure. Students worked in groups of three or four, with each group sharing one computer.

5.2. Interactions

5.2.1. Building agency by asking open questions, asking for elaborations and positioning students with authority

The teacher began this lesson by asking the students to discuss the societal consequences of inventions from the Industrial Revolution in groups. Then, she asked the groups what they had discussed.

Transcript 1:

| Turn | Speaker | Action |
|------|----------|---|
| 1 | Teacher: | You three, what did you talk about? |
| 2 | Imen: | We talked about the telegraph. Because it does have a consequence, because it has been developed to cell phones, and nearly everybody uses cell phones now. |
| 3 | Teacher: | Mhm. Why is that so important for the development of society? |
| 4 | Imen: | ((Whispers inaudible to Amina)) |
| 5 | Amina: | Not exactly on society, but without a phone it would not have been so easy to work with different stuff. |
| 6 | Teacher: | It is easy to work? |
| 7 | Amina: | ((Nods)) |
| 8 | Teacher: | And how does that influence society? |
| 9 | Amina: | Not so much, but (...) |
| 10 | Teacher: | No, ok? (...) Telegraph, the girls remembered. Can you take a look at the telegraph, everybody? |

The teacher initiated this sequence with an open question, asking the students to tell her what they talked about (T1). Imen named the telegraph and the telegraph's further development into the cell phone (T2). Her addition of 'and nearly everybody uses cell phones now' can be interpreted as an attempt to name a consequence on society. Rather than evaluating the response as right or wrong, the teacher asked for further elaborations regarding *why* this was important for the development of society. In response, Amina, another member of the group, stated that work would not be as easy without cell phones. Initially, she seemed to doubt her own answer, saying, 'Not exactly on society' (T5). Rather than responding to this hesitation, the teacher revoiced the student's answer, asking, 'It is easy to work?' (T6). She may have been making sure she had heard Amina correctly, or she may have intended to give her the possibility to elaborate. When her question was confirmed by nods (T7), she asked for even further elaboration: 'And how does that influence society?' (T8). Amina did not elaborate further but only answered, 'Not so much' (T9). The teacher then stopped questioning this group, but she did not abandon the question. Instead, she turned it into an assignment for the next group discussion, asking students to discuss the impact the telegraph has had on society. This became the topic for the entire lesson. In this way, the teacher made the whole class reflect further at the point where the group in question ended its reasoning (T10).

The open question 'What did you talk about?' that initiated this sequence allowed the students to contribute anything they might have known about the subject. Answers to this question cannot be evaluated in terms of right or wrong, and the teacher avoided such evaluations throughout the dialogue. Instead, she gave signs that she was listening carefully, using dialogic moves such as 'mhm', revoicing the student's utterance and asking for elaboration. When it seemed that the students in the group could offer no more elaboration, she used their contribution as a new task, thus constricting the original topic and giving the lesson a new framing. In this way, the teacher positioned the students with authority to contribute to the involvement of the lesson. By letting the rest of the class respond to the task, she positioned them with the opportunity to elaborate.

This transcript shows how this teacher asked students to elaborate their viewpoints and to discuss them in the following conversations and tasks. Using this strategy rather than evaluating their utterances, she build students' agency partly by positioning them with the power to influence and to define the involvement of the lesson and partly by treating their utterances as valid for further conversation.

5.2.2. Building agency by giving probes, positioning the students with authority and through the aid of technology

Following the above interaction, the class discussed the societal consequences of the telegraph in groups before they (a) posted the discussed consequences as contributions on Talkwall and (b) sorted each other's Talkwall contributions as either advantages or disadvantages, each group making its own wall using the tool. While discussing each other's digital walls in a whole-class conversation, the option of placing contributions in the middle as neither advantages nor disadvantages presented itself. This placement was not part of the teacher's assignment and was a student construction. The students' walls were presented on a shared whiteboard that everyone could see. The following transcript is from a sequence in which the teacher asked the students to justify their sorting of the other groups' contributions on Talkwall based on the preparations they had made in their prior group discussions.

Transcript 2:

| Turn | Speaker | Action |
|------|----------|--|
| 1 | Teacher: | You, yes. Eh:: and you placed this in the middle. 'The telegraph developed to the cell phone, and nowadays nearly everybody has a phone which they are dependent upon' (reading the post from Talkwall). (...) Yes, why did you place this in the middle? (...) Why is it, I then think it is both::, both disadvantage, and, and (...) e:h advantage. Inaya? |
| 2 | Inaya: | Since everybody has one, you may, like, communicate with each other through it. |
| 3 | Teacher: | Mhm |
| 4 | Inaya: | But, then again it is (...) disadvantage, because of you being dependent on it. |
| 5 | Teacher: | Mhm |
| 6 | Inaya: | That is, use it too often, so that you do not concentrate so much on things around you. |
| 7 | Teacher: | Mhm |
| 8 | Inaya: | Even though, you, like, have it ((whispers)) |
| 9 | Teacher: | Yes. (...) Anybody else? Anything to say about that? (...) |
| 10 | Teacher: | We shall have a look at the other wall. And it is one more in the middle, 'you get less social physically, but more social on the internet'. Why is it both, and it is also Bit ((the name of the group)) that has written this (...). Why do you get (...), why is it both a disadvantage and, and an advantage: Anya (...), Haron and Jaamal and Inaya. (...) What did you talk about, Anya? (...) When you placed it in the middle? |
| 11 | Anya: | Eh |
| 12 | Teacher: | You get less social physically, more social on internet (...). Why is that both disadvantage and (...), a:::nd (...) |
| 13 | Anya: | Eh, because |
| 14 | Teacher: | And then of course we are talking about consequences of the telegraph, or further developments, yes (...) |
| 15 | Anya: | So, it's like a bit negative (...) |
| 16 | Teacher: | Is it negative? |
| 17 | Anya: | Yes. |
| 18 | Teacher: | Yes, why? |
| 19 | Anya: | Because when you just stay on the phone (...) that's not social (...) |
| 20 | Teacher: | It is not social on the phone? |
| 21 | Anya: | Yes, you are social on the phone, but you are like, not social with others (...) |
| 22 | Teacher: | Yes, why is it important to be social physically (...). Yes, Inaya, help Anya. |

This transcript opens with the teacher asking Inaya why they had placed one specific Talkwall contribution in the middle, interpreting that they viewed it as both an advantage and a disadvantage (T1). Inaya answered right away, pointing out one reason why mobile phones may be viewed as an advantage (T2). The teacher's reaction was 'mhm' (T3), which was a response she used frequently. The sound 'mhm' was long-drawn, the intonation was soft and the tone had a higher pitch at the end. In the context of the Norwegian language, this would give the impression that she was reflecting thoughtfully. In the following, this particular use of the utterance 'mhm' is referred to as 'pensive'. Inaya then pointed to a disadvantage (T4–T6). Again, the teacher gave a pensive 'mhm' (T7), and she also made this sound while Inaya was speaking (T5). These pensive 'mhm' sounds seemed to lead Inaya on so that she elaborated on her answer. When Inaya stopped speaking, the teacher uttered 'yes' and paused. Inaya did not say anything else. Rather than responding further to Inaya's answer, the teacher asked the class if they had anything to add (T9). In this way, she positioned the students with the authority to elaborate on Inaya's utterance. When nobody accepted the opportunity, she moved on to another wall (T10).

The teacher initiated the next conversation (T10–T22) by reading the group's Talkwall contribution aloud and asking about its placement. She started out (T10) with several unfinished sentences, moving between explaining and formulating the question. While this might initially seem unclear or confusing for students, we argue that by allowing herself to structure her thoughts out loud, the teacher is modelling reflection and thinking processes for the class. She closed this process by asking the same open question as in Transcript 1: 'What did you talk about'. Next, she specified 'when you placed it in the middle?' (T10). We interpret this utterance as the teacher's acceptance of the students' way of responding by placing contributions in the middle rather than as positive or negative consequences. She allowed their way of reasoning to lead the discussion, now asking them to justify by explaining both the positive and the negative aspects of the invention. Despite this acceptance, this question seems less open, and she interrupted Anya's answer twice by elaborating even further (T11–T14) before letting her answer (T15). The answer she finally received was short and not very elaborate (T15). The teacher then revoiced Anya's answer (T16) and received a confirmative 'yes' in response to this (T17). She then probed Anya to elaborate using the dialogic move 'Why'? Anya elaborated (T19) before the teacher once more revoiced her answer (T20), which led Anya to confirm the teacher's revoicing and then to elaborate even further (T21). Despite Anya's initially short and hesitant answers, the teacher positioned Anya as a competent member of the class by probing for elaborations and revoicing her utterances. Thus, she showed both Anya and the other students that Anya's opinion was valid and important.

Transcript 2 also shows how this teacher used Talkwall as an integrated part of the classroom ecology using two strategies. In the first strategy, Talkwall mediated a process in which the students' contributions were used as central structures in the orchestration of the lesson. Prior to this excerpt, the teacher used Talkwall to support the students' group conversations by asking them to post the advantages and disadvantages of the telegraph and then to sort each other's contributions, making their own walls. In this way, Talkwall showed the results of their talk, mediating between group- and whole-class conversations. After the group work, the teacher narrowed the students' selections further, using students' sorted walls as a starting point for new dialogues and discussions. Talkwall allowed the teacher to use the students' contributions as the core of the lesson at different stages: at the outset when they produced them and as the foundation of the lesson during discussions. This use of Talkwall gave purpose to the students' contributions. They

became resources that provided substantial content to the lesson. Such placing of students' contributions facilitates agency because the students' participation becomes decisive for the lesson involvement.

The second strategy concerns how the teacher positioned the students by using their Talkwall contributions. In T1 and T10 (Transcript 2), the teacher recognised the placement of the contributions in the middle as a statement of both an advantage and a disadvantage. In the interactions between Transcripts 1 and 2, the teacher asked the class about this student-generated strategy. Rather than correcting the students for not following her instructions, the teacher asked the students to explain their actions. Transcript 2 offers an example of this elaboration. By placing the posts in the middle, the students enacted agency. They followed their own mind and went beyond the teacher's instruction. We argue that the way the teacher responded to the students' choice of action supported their agency. She accepted the way the students turned the direction of the conversation through their placement, thus positioning them with the power to make such turns.

Transcript 2 demonstrates how this teacher engaged her students in classroom dialogues in a way that enhanced their agency to participate. In Transcript 2, she invited students to partake by using several dialogic moves. She asked them open questions and encouraged them to continue their reasoning with her pensive 'mhm' sounds. She also positioned students who answered hesitantly as competent members of the class by asking them to elaborate and by revoicing their utterances. She also strengthened her students' agency by positioning them with the power to influence and partly to choose the direction of the classroom conversation. Talkwall mediated this process by making *all* student contributions visible to the rest of the class, making them content resources that became the focus point of their joint attention. The teacher also enhanced their agency by positioning the students with the opportunity to change her instruction and to develop their assignment.

5.2.3. Building agency through positioning by partaking on an equal level and allowing the students' contributions to lead the conversation

The teacher allowed the discussion about the Talkwall post concerning the development of the telegraph into the cell phone to continue for some time. The discussion evolved and drifted in the direction of communication not only related to cell phones but also to online and social media. The conversations in the following transcript took place 1 min after the one in Transcript 2. The teacher asked another group where they placed the same contribution, following the same trajectory as in the previous excerpt.

Transcript 3:

| Turn | Speaker | Action |
|------|----------|--|
| 1 | Teacher: | Can you take a look at the post? Where have you placed it (...). On disadvantage or advantage? |
| 2 | Eric: | On disadvantage. |
| 3 | Teacher: | Disadvantage. Why have you placed it on negative, Eric? |
| 4 | Eric: | It's like, better to talk to someone. |
| 5 | Teacher: | Why is it better? (...) |
| 6 | Eric: | You know each other better. So, then you know who the person is. |
| 7 | Teacher: | Mhm, mhm |
| 8 | Eric: | But then you don't know, could be, like, someone else. |
| 9 | Teacher: | Yes, it could be someone else, right, you don't see, you could have a totally different identity. Mhm (...). That is an important point (...), of course. Aisha? |
| 10 | Aisha: | Like, it's better to talk face to face than, like, through the screen, because you could like (...) |
| 11 | Jibril: | You communicate better. |
| 12 | Aisha: | Yes, you communicate better, and like, people are like, they don't dare to say it in your face, but dare more easily to the screen and so on. |
| 13 | Teacher: | Mhm. Yes. |

This sequence opened with the teacher asking one group about their sorting of the previously discussed Talkwall contribution (T1). After being told the group's placement, she asked Eric to justify his group's decision (T3). He answered (T4), and the teacher led him to elaborate further, first by asking him to justify (T5) and then by uttering her pensive 'mhm, mhm' (T7). Eric argued that it is better to talk with people in person because then 'you know who the person is' (T6, T8). The teacher then elaborated on Eric's answer herself by first rephrasing his answer and then adding, 'you don't see; you could have a totally different identity' (T9). Here, she took part in the dialogue by building on Eric's comment and adding a point that drove the dialogue further. By doing this, the teacher positioned her utterances as equal to the students' in the classroom dialogue. This was also indicated by the next student's contribution. Aisha built on the teacher's utterance, adding that it is better to talk face-to-face (T10). When attempting to justify this, she struggled for words, and Jibril elaborated for her, saying, 'You communicate better' (T11). Aisha confirmed that this was what she meant and went on to elaborate even further (T12). Aisha enacted agency by elaborating on her own initiative and giving her opinion. She also recognised Jibril's agency by accepting his contribution to her own utterance.

In this transcript, the teacher uses several dialogic moves, such as asking for elaborations and justifications and using the pensive 'mhm'. Her way of orchestrating the dialogue becomes a recognisable pattern in the interactions. Through her pensive 'mhm', she models thinking strategies and shows that she reflects upon the students' utterances. Their uptakes (T7, see also Transcript 2: T4, T6 and T8) show that the students recognise this move as a probe to continue their reasoning. We argue that this manner of interacting has become a part of the classroom culture.

The exchange shown in Transcript 3 also demonstrates how both the students and the teacher drove the dialogue by building on each other's utterances. The students built on each other's contributions by adding small details to the previous speakers' ideas. The

teacher served as a facilitator by orchestrating the dialogue, but she also partook in the conversation at the same level as the students (T9). Thus, (as in Transcript 2, T10), she is displaying her own reflection and thinking processes, and in this particular setting positioning the students' contributions as equally relevant as her own. The students positioned themselves with the authority to drive the classroom conversation and thus showed enacted agency by building on each other's and the teacher's utterances. However, this enactment would not be possible without the teacher positioning them with the authority to do so. Again, the way the teacher allowed the students' contributions to lead and to turn the conversations is demonstrated.

5.3. Interviews

The analysis of the above interactions has shown that the teacher uses a range of strategies to engage her students in classroom discussions. During the interviews, the students talked about the teacher's strategies. The following conversations are from a focus group interview with four of the students:

| Turn: | Speaker: | Action: |
|-------|----------|--|
| 1 | Amina: | The teacher is like, yes, but have you done that or, be a little more precise, or, be engaged. |
| 2 | Inaya: | Mhm. It helps when she gives such comments, then, then you understand. |
| 3 | Haron: | A lot, actually. |

The analysis of the above transcripts have shown examples of a pattern of participation in which the teacher kept the students engaged in the dialogue by asking them to elaborate or giving them probes, even though they answered quite hesitantly initially (e.g. Transcript 1: T5 and Transcript 2: T15, T17 and T19). The students expressed that they found the teachers' probes helpful (T2), and they also stated that such probes made them understand 'a lot, actually' (T3). We argue that the teacher's support helps them build agency. Although they initially might have come to terms with not understanding, the teacher's way of questioning them, making them elaborate and letting them explore the questions in dialogues and through Talkwall helped them expand their understanding. The teacher herself commented on this situation during her interview:

So, perhaps to ask these questions that promotes participation (...) sometimes we ask a question and don't get any answers or nobody knows, but just that they could write a little in advance and think a little and talk a little, that promotes the dialogue in the whole classroom.

Here, the teacher reflected that her strategies can promote dialogic participation, both with regards to her dialogic moves ('these questions') and through the way she allowed the students to prepare for whole-class discussions by thinking, talking to peers and writing in advance.

The students reflected on this process themselves:

| Turn: | Speaker: | Action: |
|-------|--------------|--|
| 1 | Inaya: | When we answer a question, it's like, now we have to remember what the teacher told us. Elaborate, but in which way? That we have to find out ourselves, but it's like, we try anyway. |
| 2 | Amina: | Yes. Yes. |
| 3 | Interviewer: | Yes. |
| 4 | Inaya: | And sometimes the answer isn't that long, but at least we try. |
| 5 | Amina: | At least we try. |

These comments show that the students were conscious of how they worked with the questions the teacher gave them. They expressed that they knew they had to elaborate and to determine how on their own (T1). These utterances demonstrate a sense of agency; in particular, the students were conscious of having to reason for themselves. Although their answers might not be 'that long', they acknowledged that 'at least we try' (T4). These responses show that they have confidence enough to participate, even though they did not necessarily know how. This shows that the classroom culture is open for trial and error.

The students also reflected on the fact that other students built on their comments:

| Turn: | Speaker: | Action: |
|-------|----------|---|
| 1 | Haron: | We have heard others say what we said. When they say, speak to the teacher. |
| 2 | Inaya: | Yes, it's like, they steal it in a way, but we don't get angry. We get like, wow, that was our contribution. We get so proud. |
| 3 | Amina: | Yes. |
| 4 | Haron: | Yes, it's nice. We get happy because it was so good. |

These responses substantiate that the organisation of the classroom in which the teacher allows the students to build on each other's Talkwall contributions gave the students a sense of reward for their participation. They felt proud when someone used their

contribution in a conversation. We argue that this experience also strengthened the students' sense of agency because it showed the students that their contributions had impacts on others.

6. Discussion

The analysis of the interactions from the classroom and the interviews has shown a teacher who practices a range of strategies that contribute to building her students' agency. She uses several dialogic moves in which she positions the students as competent members of the class, and she uses Talkwall as a mediating tool for dialogue. This is orchestrated through frequent shifts in activities that allow her to move between group and whole-class activities. These variations provide the students with diverse opportunities to participate in group conversations, through Talkwall and in whole-class conversations. Research has pointed to teachers' varied repertoires in using language as a tool for teaching and learning as a key to dialogic teaching (Alexander, 2008; Mercer & Littleton, 2007). We will now discuss how this case study confirms and adds new insight into the understanding of productive dialogues.

To promote participation in these activities, the teacher in this study practices several dialogic moves. One of the most prevalent is asking open questions. As Black and Varley (2008) pointed out, open questions make it easier to participate because they have no right or wrong answer. Such questions encourage productive dialogues (Mercer & Littleton, 2007; Mercer & Wegerif, 1999; Reznitskaya et al., 2001). Using open questions the teacher orchestrates explorations in whole-class dialogues by asking the students to contribute with ideas and elaborations that can be built on and investigated further without an evaluation from the teacher.

Moreover, researchers have emphasised the importance of giving students enough time to think before they have to answer (Black et al., 2003; Cazden, 2001; Snell & Lefstein, 2017). Significantly, thinking time must occur without the pause being awkward for the student answering. This teacher used her pensive 'mhm' to allow students time to think. This sound often functions as an uptake of the student's utterance, and the follow-up may lie with the teacher or with the student. Sometimes the student—or another student—benefits from the pause, continuing the line of reasoning by elaborating; at other times, the teacher follows up with further questions or clarifications. Through this move, the teacher models that she reflects upon the students' utterances and opens space for them to think together. We have argued that this has become a part of the classroom culture. This interpretation is supported by the observation of this teacher's lessons over time as described in the methodology section.

Elaboration was the strategy that was most strongly correlated with learning outcomes in Howe et al.'s (2019) study. Invitations to elaborate permeate this teacher's strategies. We have seen how it was incorporated as a follow-up after open questions or after the pensive 'mhm'. Often, this teacher's invitations to elaboration take the form of revoicing. This move can enhance the quality of the student's phrasing and at the same time give the student the responsibility for the utterance. Invitations to elaborations generally place the responsibility for contributions with the student, positioning them as accountable members of the class. Previous research has also pointed out that mere invitations to participation can promote students' agency to continue to participate (e.g. Clarke et al., 2016).

For this to occur, the teacher's uptake of the students' contributions is crucial. The uptake can position students as either competent or marginalised in the classroom discourse (e.g. Black, 2004; Martin, 2016; Snell & Lefstein, 2017). In the analysis of the classroom interactions we have seen how this teacher through the different ways she performed uptake of her students' contributions, made them central to knowledge building. Her revoicing of her students' answers made them the objects of further investigation. In this occasion, she also built the entire lesson from the students' contributions, first by defining the topic of the lesson based on one group's answer and then by letting the lesson evolve through the groups' contributions on Talkwall. In the uptake of the students' contributions, the teacher combined dialogic strategies and the materiality of Talkwall.

The use of technological tools can support joint attention (e.g. Mercer et al., 2010), as for example when the class is involved in discussing one Talkwall contribution displayed on the classroom screen. The Talkwall contributions serve as a basis for further discussions (Gao et al., 2012; Gillen et al., 2007; Mercer et al., 2010) in both whole-class and group talk. The way the students are led to respond to and to sort other students' contributions increases interaction (see Thoms, 2012). This use of Talkwall makes the students' thinking process more transparent in the classroom and is a highly visible and powerful uptake of students' utterances (Rasmussen & Hagen, 2015). Through this way of performing uptake, the teacher positions the students as competent members of the class by showing them that their contributions are important, giving them the power to influence the evolution of the lesson and letting their contributions lead the classroom talk. Talkwall is strongly embedded in and supports the teacher's dialogic practice.

For students to participate, they need to experience that their participation matters over time. They also need to have something to contribute. In this lesson, the class discussed consequences of the Industrial Revolution. The teacher's combination of open questions and relating to prior knowledge allowed the students to participate in subject-relevant ways, building on the knowledge they found relevant. Research has shown that letting students explore new topics based on their prior knowledge enhances students' agency (Basu, 2007; Clarke et al., 2016; Greeno, 2002; Rajala, Hilppö, Lipponen, & Kumpulainen, 2013; Siry et al., 2016). As the teacher commented in the interviews, Talkwall mediates this process by allowing the students to think and to talk in advance of the whole-class discussions, thus allowing them to be more prepared.

Another strategy this teacher uses to support her students in developing substance to their contributions, is modelling thinking strategies. Through the way the teacher pauses to think about the students' ideas, the way she is reflecting on their contributions and partaking in the conversations, she is making processes of reasoning explicit. She demonstrates that there is no given answer and that it is okay to participate without having thought everything through before entering one's contribution. By participating in the discussion in this way, she models learning approaches by displaying thinking strategies (Olitsky, 2006). The teacher positioning herself as a conversational partner strengthens the students' positions as competent members, and thus, their authority (Lipponen & Kumpulainen, 2011).

The way this teacher orchestrates her classroom facilitates the social structures in a way that enhances the enactment of agency. The frequent activity shifts and the activation of prior knowledge combined with the modelling of thinking processes help the students prepare for participation in whole-class discussions. In addition, her range of dialogic moves facilitates an environment that motivates agentic participation. Research shows that the social dimensions of the classroom influence students' sense of agency (Clarke et al., 2016; Doyle, 2015). As such, the individual and social dimensions of agency are intertwined (Clarke et al., 2016). In this study, we have performed detailed analysis of interactions that shows how a teacher can develop students' agency. The presented analysis shows how the students enact agency through dialogic participation by putting forward their own opinions, views and insights and occasionally shifting the classroom dialogue. The dialogues become a collaborative effort that move beyond direct instruction through the students' and teacher's moves. The interview statements support these findings, indicating that the students experience a strong sense of agency. In sum the analysis shows that the teacher supports her students' sense of agency through the way she facilitates the classroom environment with multiple strategies and dialogic moves.

7. Conclusion

Building on previous research and new empirical findings, this study shows how particular dialogic moves and acts of positioning can contribute to promoting students' agency. Few studies have investigated similar issues. Lipponen and Kumpulainen (2011) showed that through the creation of interactional spaces educators could change the positions of students and student teachers from the traditional expert-novice boundaries as well as mediate students' agentic participation. Clarke et al. (2016) found that positioning high school students as knowledgeable contributors in class could have a lasting impact on their sense of agency, and that by engaging students early on in one lesson, teachers could enhance their later agentic participation in the same lesson.

However, both of these studies were situated in different contexts than ours. Our study offers insight into the work of younger students, demonstrating specific strategies based on the teacher's understanding of the students capacities in the particular subject and situation. Furthermore, neither of the two mentioned studies have our focus on dialogic moves at a micro level. To fully understand how these strategies work, the broader practices of the teacher's instructional work must be considered. We show how several dialogic moves including the pensive 'mhm', open questions, asking for elaborations and revoicing, contribute to building agency. Through a detailed analysis of these moves and the students' uptake of them, we show how these interactions contribute to form a classroom culture in which agentic students are positioned as important contributors in dialogic explorations.

Further, the way Talkwall is integrated into the teacher's practices as a mediational tool for dialogue facilitates the use of productive dialogical moves. This use of technology is unique, and creates a trajectory where the students' contributions become the core resources in the construction of new understandings. The students are positioned with authority to define and to evolve discussions, and in this particular situation, even the topic of the lesson. By positioning her students' contributions as central to such an extent, this teacher creates a classroom culture with multitudes of opportunities for agentic participation.

Acknowledgements

We are particularly grateful to the teacher and the students who participated in this study for letting us into their classroom. We also want to thank Sten Ludvigsen and the two anonymous reviewers for their helpful comments. This work was funded by the Research Council of Norway [FINNUT/Project No: 254761].

The funding source had no involvement in study design; in the collection, analysis and interpretation of data; in the writing of the report; and in the decision to submit the article for publication.

Appendix A. The project and the data material

The teachers participated in workshops organised by the researchers in which they were introduced to dialogic teaching and to the digital tool. The research team filmed one lesson before the intervention and three research lessons from each participating teacher. The lessons were filmed using two cameras, one focusing on the teacher and the other focusing on a group of students during group work sessions. Between the research lessons, teachers and researchers met to discuss the lessons in terms of dialogic practice and the use of Talkwall. The teachers and two focus groups with students from each class were interviewed towards the end of the project period.

The material from the teacher in this case-study comprised of two follow-up lessons in addition to the three core research lessons. These are lessons that addressed the topic from the core research lessons and that were chosen to be filmed in order to follow a thematic trajectory from introduction to closure. In total, there were five recorded research lessons from this teacher that this case-study follows. The lesson chosen for closer analysis is the 3rd of the recorded lessons, and it is one of the follow-up lessons.

After recording the research lessons, interviews with the participating teachers and student focus groups were conducted. Students who had been participating in the groups that were filmed by the group cameras were invited to participate. They were asked about their opinions regarding classroom talk and the use of Talkwall. The interviews were semi-structured, and the conversations sometimes moved beyond the questions asked.

Appendix B. Overview of the focus lesson

| Minutes | Content description |
|---------|---|
| | Greetings. The teacher asks the students about the last lesson, and they repeat what they talked about then. |
| | Assignment 1: The teacher asks students to discuss impacts of inventions from the Industrial Revolution in groups. |
| | Students discuss the assignment in groups. |
| | The teacher asks two groups about their discussions. The second one discusses the telegraph. Transcript 1 is from this sequence. |
| | Assignment 2: The teacher asks the groups to discuss the impacts of the telegraph on society. |
| | The students work in groups of two to four and discuss the assignment. |
| | Assignment 3: The teacher instructs groups to post on Talkwall their responses to: 'What did the telegraph do for society'? |
| | The groups create posts on Talkwall that discuss the impacts of the telegraph on society. |
| | Assignment 4: The teacher asks the class to sort each other's posts into positive and negative consequences in Talkwall. |
| | The groups sort each other's contributions. |
| | The teacher reads posts from the groups' Talkwall posts. The students comment on their own and other groups' contributions and sortings. |
| | Transcripts 2 and 3 are from this sequence. |
| | Assignment 5: The teacher asks groups to discuss the positive consequences of the fact that the telegraph made it easier to communicate with others and what impact this had on society. |
| | Students discuss the assignment in groups. |
| | The teacher asks the students what they talked about. She receives answers from different students. |
| | Consolidation: The teacher asks the students to summarise the lesson by giving three positive and three negative consequences of the telegraph. |

Fig. 1. Overview of the lesson. Each of the squares in the first column represents 1 min of the lesson (of a total of 45 min). The white squares represent minutes used in whole-class conversations, and the grey squares represent group work. The second column provides a short description of the activities in the different sequences.

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