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## **Creating intercontextuality in students learning trajectories. Opportunities and difficulties.**

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### **Abstract**

This article explores how opportunities and limitations in creating intercontextuality between everyday and scientific ideas emerge in teacher – student interactions, with a particular focus on the teacher’s role. The article draws on data from an empirical, longitudinal, study in a lower secondary school in Norway to analyze student-teacher interactions in regular lessons. The analysis is based on sociocultural and dialogical approaches to meaning-making and learning, in which video data is subjected to interaction analysis. Our main findings illustrate that creating intercontextuality in students’ learning trajectories, by building on everyday knowledge and experiences as resources for classroom interactions, remains a complex task. In the classrooms we have followed, the findings show that the teacher’s narratives of how to frame learning activities and position the students in meaning-making process are grounded in teachers’ norms and assumptions of what constitutes appropriate resources to engage students’ in the dialogic creation of intercontextuality. These findings have implications for how teachers frame learning activities where students get opportunities to build upon relevant resources for discussing ideas brought to life in complex social interactions.

**Keywords:** dialogic; teacher-student interaction; intercontextuality; interaction analysis; everyday and scientific knowledge.

## 1. Introduction

Teachers and students move across a range of contexts during classroom-based learning, leveraging a variety of tools, dispositions and artefacts that reflect the intercultural, hybrid and multimodal practices in which they engage (Ito et al. 2013, Erstad 2012, Resnick 1987). These everyday activities contribute to rich and complex learning practices, in which teachers and students share various experiences, competencies and interests. However, empirical studies have documented the complexity of attempting to incorporate learners' outside experiences and knowledge into a more formal educational setting (Banks et al. 2007, Hull and Schultz 2002, Scribner and Cole 1973). Particularly, researchers have questioned approaches to learning that romanticise the everyday knowledge or as Gutiérrez (2014) puts it, "simply use the everyday as a fragile bridge to somewhere else" (53). Many teachers create opportunities for students to make links between learning contexts by a form of triadic discourse, which requires students to recall someone else's thinking rather than think for themselves (Hardman 2008). Consequently, fostering students' interest and engagement in bringing together and working on ideas through the process of internalisation remains a challenge in classroom interactions (Kumpulainen and Lipponen 2010, Aaberg, Mäkitalo, and Säljö 2010, Silseth and Arnseth 2011). Since we know little about the *quality of the practices in which connections are constructed*, further exploration is needed to analyse their complexity and potential for enhancing the social creation of reconstruction in students' learning trajectories.

In this article, we explore how opportunities and limitations in creating intercontextuality between everyday and scientific ideas emerge in teacher–student interactions, with a particular focus on the teacher's role. Intercontextuality refers to the ways that teachers and students make connections between ideas in the ongoing meaning-making interactions of classroom teaching and learning (Floriani 1993, Engle 2006, Bloome et al. 2009). In this effort to explore how the process of bringing into contact new and existing ideas occurs (i.e., integrating everyday knowledge into classroom dialogues to construct intercontextuality in students' learning trajectories), we employ a detailed moment-by-moment analysis of regular teacher–student interactions. We report on a case study that explores how teachers frame opportunities for connecting everyday and scientific knowledge when introducing topics and concepts in regular lessons. We explore how teacher–student interactions mediate opportunities to use students' everyday knowledge and experience as resources for creating intercontextuality in their learning trajectories.

We present a case involving two 9<sup>th</sup>-grade classes (students aged 14 to 15) at a lower secondary school, where we have analysed a large amount of lessons by observing three teachers handling science, Norwegian (L1), and religion and ethics subjects over one school year. The research questions that guide the analysis are twofold, as follows:

1. How do teachers frame opportunities for constructing intercontextuality between everyday and scientific ideas when initiating topics in regular lessons?
2. How do the participants position themselves when they interact to create intercontextuality?

## **2. Teachers' use of students' everyday knowledge and experience as learning resources**

In recent years, educational researchers have designed, enacted and explored pedagogical practices to bridge the gap between school learning and students' lives outside of school. Nonetheless, as Bronkhorst and Akkerman (2016) and Rajala et al. (2016) have documented, research in this area is diverse and disconnected, and the plethora of concept definitions makes progress difficult. Particularly, there is a lack of longitudinal research exploring regular classroom interactions where teachers and students construct robust learning activities based on knowledge and experience from a variety of contexts.

Much empirical research on classroom practices notes the importance of *teachers framing connections* between everyday and scientific knowledge, rather than treating content as entirely new and disconnected from other learning contexts (Bransford and Schwartz 1999, Cornelius-White 2007, Littleton and Mercer 2013, Erstad and Sefton-Green 2012). Extensive research in the United States, the United Kingdom and Australia has emphasised the teacher's role in improving learning and literacy instruction (Loughran 2010). By explaining instructions, outlining expected outcomes and helping students make connections, teachers can enhance students' intellectual engagement in topics, concepts and skills.

Of particular relevance are two major international studies that focus on how teachers use everyday knowledge and experience in natural science and literacy lessons in public schools. In a case study of five science lessons at a lower secondary school in Northern England, Scott, Mortimer, and Ametller (2011) have developed a pedagogical link-making framework. Addressing the ways that teachers and students connect ideas in the ongoing meaning-making interactions of classroom teaching and learning, the authors identify three pedagogical link-making forms: supporting knowledge building, promoting continuity and encouraging emotional engagement. In the construction of deep learning of conceptual scientific knowledge, *the teacher's expertise* in building cognitive connections among learning experiences or

conceptual understandings is considered fundamental. The findings identify the complex skills needed by teachers to determine the impact of prior knowledge on cognitive connections for link making and conceptual development. The authors' call for detailed investigations of the expertise required for teachers to use these diverse pedagogical link-making forms is directly relevant to the present study.

In the context of connected learning in literacy practices in secondary schools in Singapore, Teo (2008) investigates the teacher's role in bridging the gap between what students learn in school and their out-of-school experiences. He addresses two dimensions of connected learning: bringing students' outside or prior knowledge and experiences into the classroom and bringing the classroom out into the real world ("inside out"). Of interest in the present study is Teo's (2008) finding that deciding what outside knowledge to bring into the classroom "hinges on the teacher's knowledge of what is likely to constitute familiar knowledge for the students" (421). Teo (2008, 422) notes that the imagined worlds and vicarious experiences that teachers call on for connected learning become "surrogates" for an outside world to which disadvantaged students in particular have been denied access. According to Polman (2006), teachers who have disciplinary learning goals cannot simply hope to engage learners by importing the surface features of learners' existing interests and practices. They must also help learners recognise how their existing experiences can reinforce and combine with subject matters to produce conceptual knowledge.

Building on the research reported above, our study uses video-recorded interactions to analyse how three teachers use everyday and scientific knowledge as resources for constructing intercontextuality in students' learning trajectories.

### **3. Constructing intercontextuality dialogically**

Theoretically, our research is grounded in sociocultural and dialogic traditions. Within this theoretical framework, human activity is understood as socially mediated, and learning is perceived as a matter of participation in a social process of knowledge construction, rather than as an individual endeavour (Cole 1996, Lave 2012, Rogoff 2003). In our research, we are interested in exploring teaching that opens up the learners' process of developing rich conceptual understandings, where learners make sense of new ideas in terms of existing ones (Vygotsky 1978). Within this process, the creation of *intercontextuality* serves as a dynamic conception of how learners create meanings socially in and across contexts. Contexts are social realities that people construct through interactions (Goodwin and Duranti 1992; Leander 2001). According to Pea (1987), "contexts are *not* defined in terms of physical

features of settings, but in terms of the *meanings* of these settings constructed by the people present” (647). Engle (2006) argues that intercontextuality occurs when learning contexts are created as connected with one another and when the content established during the learning activity is considered relevant and creates links to the new context. Here, we investigate the idea that *intercontextuality* is created socially in classroom interactions; thus, for participants to engage, this intercontextuality must be acknowledged and recognised as having social significance.

Floriani (1993) introduces the concept of intercontextuality to describe how interactions are negotiated in classroom dialogues, building on past, previous and future events to guide participation in learning. The social construction of intercontextuality involves participants’ active contributions to recollections of particular past interactions, on which they build to create new events in the moment (Bloome et al. 2009). Bloome et al. highlight that the social construction of intercontextuality involves a *proposal* for connecting a specific set of events and an *acknowledgement* of the proposal by others who must *recognise* the set of events proposed for juxtaposition and the realisation of a *social consequence, value or meaning* of the juxtaposition (2009, 331). This means that the teacher must create opportunities to use resources that the students recognise and acknowledge from previous interactions as tools and contexts for present and future activities and interactions. Consequently, creating intercontextuality is a process of internalising interactions from past contexts to create new structures and orders in both the context of systematic scientific thought and the richness of everyday referents (Bloome et al. 2009, Floriani 1993, Gee and Green 1998). Furthermore, identity and social relationships are socially constructed into being in the local interactions of the classroom community (Castanheira et al. 2000, Cole 1996). In this sociocultural framework, to construct intercontextuality is to participate in a social process of assigning meaning to learning opportunities distributed within and across networks of interactions that expand the relevance of the lesson temporally, spatially and socially.

Creating intercontextuality involves the exercise of human agency; learners must choose to use what they have learned (Engle 2006). These choices can be influenced by how learning contexts are socially *framed* as interconnected (Greeno and Van de Sande 2007, Hatano and Greeno 1999) Author 2). Generally, framing refers to a set of metacommunications for interpreting how participants understand their actions by invoking certain expectations as answers to the question “What is it that is going on here?” (Goffmann 1974/1986, 8). A context is framed as interconnected when “someone uses meta-communicative signals that help establish what the participants are doing together in it, when and where they are doing it, and

how each person is participating in it, thus creating a ‘frame’ in which their activities can be interpreted” (456). This study focuses on how teachers frame everyday and scientific knowledge and experience as resources for creating intercontextuality in regular lessons, hence creating both opportunities and limitations. For this reason, teachers’ framing affects the contexts towards which students orient themselves as relevant sites for using what they have learned. A frame then contributes to structuring people’s interpretations and perceptions of events and actions (Lantz-Andersson, Linderöth, and Säljö 2009).

In analysing the role of instruction, sociocultural perspectives provide concepts for understanding how learning unfolds in specific activities and evolves along different timescales and across different settings (Ludvigsen 2009). To create intercontextuality, Engle, Nguyen, and Mendelson (2011) hypothesise that teachers can set up *expansive* learning contexts as *opportunities* for students to actively build on multiple relevant resources, thus increasing the number of contexts that can become intercontextually linked. Alternatively, teachers can define contexts narrowly in *a bounded manner*, as “individual events within a single location involving a restricted set of participants and topics, and in which learners do not play such a central intellectual role” (Engle, Nguyen, and Mendelson 2011, 606). Thus, analysing interactions that create either expansive or bounded framings provides the study with concepts to explore how teaching opens opportunities or pose limitations in contributing to the process of internalisation while constructing intercontextuality in students’ learning trajectories.

Additionally, when analysing teachers’ expansive or bounded framings of interactions, creating intercontextuality involves (as mentioned) the exercise of human agency (Engle 2006). Greeno (2006) suggests that students can develop competencies to use resources from multiple contexts when *positioned* in activity systems where they are framed as authors of their own learning. This means that teachers must address students as active contributors to the social construction of meaning, sharing their knowledge and making them accountable for using their thoughts or preliminary understandings as resources for creating new ideas. Being regularly positioned as authors socialises learners into the practice of sharing their ideas, which is a crucial aspect of displaying knowledge in learning contexts (Michaels, O’Connor, and Resnick 2008). By exploring the ways that teachers position students in classroom interactions, we can analyse how these approaches create opportunities and limitations for students in terms of actively contributing what they have learned from past places, times and people (Bereiter 1995; Brown 1989; Engle et al. 2011). Meaning is developed within socially constructed interactions through different levels of dialogue (Daniels 2001). It follows that when teachers frame opportunities to create intercontextuality, they must construct spaces where students can

participate in different levels of dialogue, involving multiple conceptual links between everyday and scientific ideas. In this article, the complexity of creating intercontextuality then involves bringing new and existing ideas into contact when framing activities at the social level, where students are positioned as authors of their own learning. Consequently, there is a dialogic relationship between framing of learning activities and positioning of students. In this study, we employ *framing* and *positioning* as analytical tools to explore the intrinsic relationship between teacher–student interactions while constructing intercontextuality in students’ learning trajectories.

## 4. Research design

### 4.1. Empirical setting and method

This empirical study was conducted in a comprehensive public school setting, in a local community (here called Soerlia) in a medium-sized city in Norway. The data was collected as part of the research project [removed for review]<sup>1</sup>, in which we investigated continuities and discontinuities across students’ participation in practices inside and outside of school. As part of this work, we observed four teachers and the two classes they were handling in different subjects. The 9<sup>th</sup>-grade students (aged 14–15) comprised 13 boys and 13 girls per class. Both teachers and students constituted a representative sample of participants in Norwegian society in terms of ethnicity and socioeconomic background. The teachers and the students volunteered to participate in the project, and the students were selected because they were members of the classes.

The research design is based on the case-study method (Yin 2009), appropriate for in-depth investigations of phenomena in real-life contexts. Drawing on the case study, we aim to explore how teachers frame opportunities for constructing intercontextuality and how the participants position themselves when they interact to create intercontextuality. To capture these naturally occurring interactions, we decided to combine observations and video recordings. We video-recorded 60 lessons from four subjects (Table 1).

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<sup>1</sup> Knowledge in Motion across Context of Learning: Investigating knowledge practices in and out of school (KnowMo 2012 – 2016), funded by the Norwegian Research Council. The project collects data from two schools, 10 teachers, 100 students and 40 families, and in three out-of-school contexts: family, media use and sports activities (football, handball and volleyball).



<b>Video-recorded lessons during one school year</b>	
<b>Subjects</b>	<b>Video-recorded lessons</b>
Science	30
Mathematics	10
Norwegian Language and Literacy (L1)	10
Religion and Ethics	10
<b>In total:</b>	<b>60 hours</b>

The data corpus was generated over the course of one school year. In total, 60 hours of video data were collected. While video recording regular lessons, the researcher observed the classroom interactions and collected written assignments and other student artefacts. The video recordings of teacher–student interactions function as the primary data and serve as the foreground in the analytical work. Video data provides access to recordings of rich details of naturally occurring interactions, such as how teachers and students negotiate meaning, how they use artefacts and how knowledge and experience from everyday life are brought into play in regular classroom interactions (Goodwin 1994, Derry et al. 2010). To study what teachers and students actually do and how meanings are negotiated moment-by-moment in social interactions, we placed a camera with a wide-angle lens at the back of the classroom. The teacher had one omnidirectional wireless microphone, and we placed a table microphone in the middle of the classroom.

#### **4.2. Analytical procedures**

To organise the data corpus, all video recordings were reviewed, and content logs were made – comprising annotations and explications of events from the classroom interactions, indexed by the time stamp on the video tape (Jordan and Henderson 1995). To describe and explore how intercontextuality would emerge in teacher–student interactions, the video recordings were observed numerous times, with the intention of providing a more specific focus and identifying all cases of possible or candidate phenomena of interest. The explorations were related to identifying interactions, specifically focusing on the following:

- 1) episodes where teachers *initiated* a connection between everyday and scientific knowledge and
- 2) episodes where the teacher–student interactions generated classroom dialogues.

This process meant that we focused on the participants' talks during the initiation of topics in the lessons and related their actions to the resources invoked in each situation and how the interaction was constituted and emerged from the participants' orientation (Furberg and Ludvigsen 2008, Silseth and Arnseth 2016). These orientations were constituted with the teachers' *framing* of the interactions and the *positioning* of the students. We made verbatim transcripts of these recordings to gain access to how teacher–student interactions were constituted and emerged as they created intercontextuality dialogically (see the attached transcript legend). Non-verbal interactions that were significant to the analysis were added as comments in the transcriptions.

In the following sections, we present three chosen excerpts that outline key teacher–student interactions. The excerpts represent rich data, capable of illustrating the frequently occurring interaction patterns (Lantz-Andersson, Linderöth, and Saljo 2009). Such interactions display how the teachers *initiated* connections between everyday and scientific knowledge that generated *classroom dialogues* to create intercontextuality in the students' learning trajectories.

Our analysis follows a two-step process, called first-order and second-order analysis (Linell 2009). We first describe in detail how the participants respond to each utterance turn-by-turn, and then we apply the analytical categories outlined in the theory section. The analysis leads to a discussion on the possible educational challenges of such a perspective of knowledge practices for thinking more generally about teaching and connected learning.

## **5. Results**

By means of the selected episodes, we first follow teacher–student interactions as teachers initiate topics or concepts and refer to everyday knowledge to explain its relationship with the subject matter and its significance in students' wider lives. Our analysis shows that during the introduction phase of the lessons, teachers often create references to significant topics, activities or phenomena while initiating activities. However, it does not often happen that these references create connections that generate students' involvement, demonstrated as dialogues. Therefore, it is important to understand more about how intercontextuality is created dialogically in regular classroom interactions. Empirical research highlights that the social construction of intercontextuality involves students' active contributions to the construction of meaning by sharing their ideas dialogically to display their knowledge in learning contexts (Resnick, Michaels, and O'Connor 2010, Littleton and Mercer 2013, Wegerif 2007, Alexander 2006). For

this reason, our study focuses on investigating episodes that generate dialogues to explore the ways that teachers frame interactions and position students to make them accountable for using their thoughts or preliminary understandings as resources for creating new ideas.

### ***5.1. Constructing intercontextuality by building on student's authentic experience***

The following extract is from the class (here called 9B) handled by a young teacher, (here called David), who introduces literacy-writing techniques in a whole-class interaction in a regular Norwegian lesson (L1). David is a recent graduate (two years ago), whose abilities as a gamer and band player make him an unusual and popular teacher among the youth. The Norwegian topic under consideration is from the national curricula and focuses on writing techniques. In the excerpt, the teacher frames the interaction by building on Peter's experience and knowledge from reading Dan Brown's novels in his leisure time. The extract makes visible how David invites Peter to share his knowledge, positioning him to elaborate and display what he knows about writing. David tries to frame Peter's experience and the topic of writing techniques as connected with each other by introducing the technical term "cliffhanger" as a relevant concept in both contexts. As we enter the whole-class introduction, the teacher turns towards Peter and asks him a question.

#### Excerpt 1

- 1 Teacher: What is it that fascinates you with Dan Brown?
- 2 Peter: Well he writes very good books. He writes in a very good way.
- 3 Teacher: Yes, can you explain that?
- 4 Peter: Uhm, he describes what the main character does.
- 5 Teacher: Yes.
- 6 Peter: And then, at the end of each chapter he concludes with something exciting that makes you read further on.
- 7 Teacher: Yes, and it is called in technical terms, a cliffhanger. You have to continue to read the chapter. In addition, [TV] series and stuff [are] connected in that way. You have to watch the next episode because the end is so exciting. It can be compared with a writing technique. Precisely that was what got me to read Dan Brown even though I should have gone to sleep a long time ago. Right?
- 8 Students: Silence.

David initiates the question about what fascinates Peter regarding Dan Brown and asks him to explain (line 1 and 3). The teacher's wish for explanations can be interpreted as a way of structuring the conversation towards the frame of a school conversation, often positioning

students to recall or build on facts from previous lessons. Immediately, it seems that Peter interprets David's way of talking and orients towards a way of explaining his understanding, positioning himself as a knowledgeable student, referring to the descriptions of the main character's actions and the composition of the text (lines 4 and 6). David affirmatively evaluates Peter's answer and builds on his explanation by connecting it to the technical concept of a "cliffhanger" (line 7). By explicating and comparing writing techniques in the context of TV series, he underlines, "you have to watch the next episode because the end[ing] is so exciting". Finally, he shares his own interest in reading Dan Brown's novels by linking his personal engagement (reading all night) to the cliffhanger excitement.

What makes this excerpt interesting is the teacher's invitation to build on Peter's everyday experience from reading Dan Brown's novels into his instruction on writing techniques. The framing of the interaction and positioning of Peter as an active contributor, creates opportunities to reason about authentic experiences and connect Peter's excitement about reading during his leisure time to the conceptual understanding of a cliffhanger. David presents the concept of a cliffhanger as a technical way of explicating Peter's everyday manner of explaining why he should continue to read. David frames another context, TV series and stuff, which also use cliffhangers, thus extending and revealing the comparison to the writing technique of using cliffhangers. Finally, David frames a personal link to his own engagement in reading Dan Brown's novels and demonstrates that the content established during this learning activity is considered relevant in the context of his personal life outside of school as well. David's initiations of multiple contexts of cliffhangers and Peter's position as a knowledgeable who shares his everyday experiences create expansive frames that open up for opportunities to construct intercontextuality in the students' learning trajectories.

## ***5.2. Constructing intercontextuality with facts and guesswork***

The setting for this extract is the introduction of radical Islamism in the subject called religion, values and ethics. The lesson involves the teacher (here called Ann), a highly experienced (over 20 years) teacher working with a regular 9<sup>th</sup>-grade class (here called 9B). The topic under consideration is to initiate a writing activity of radical Islamism. The teacher's way of framing the interaction and positioning students, demonstrates a well-established triadic feature of classroom interactions in our data in which foster a rather limited kind of dialogue. We join the class as they sit in pairs in the classroom. Ann stands in front of the class, writes "radical Islamism" on the blackboard and introduces the lesson.

## Excerpt 2

- 1 Teacher: Okay, Al-Qaeda, the Muslim Brotherhood, the Taliban have you heard of any of those groups before? Anders, you nod.
- 2 Anders: Yes.
- 3 Teacher: Yes, what have you heard?
- 4 Anders: Well, I've heard like Al-Qaeda and the Taliban.
- 5 Teacher: Well, what do you associate with it?
- 6 Anders: Uhm, not so much positive.
- 7 Teacher: No, like what?
- 8 Anders: Sort of terror and war-like things. Yes, terrorism
- 9 Teacher: Yes, terror and war. Terrorism. What about the Muslim Brotherhood? Have you heard of it? (Students raise their hands) Benny?
- 10 Benny: Yes, I've heard about it.
- 11 Teacher: Yes, you've heard about it. Which countries do you think of when you hear Al-Qaeda and the Taliban? Carol?
- 12 Carol: Uhm, Pakistan and Afghanistan and, yes?
- 13 Teacher: Yes, Pakistan and Afghanistan. The Muslim Brotherhood is connected with slightly different countries where there has been very much, well, it has happened a lot in recent years. Have you heard the expression the Arab Spring? Which countries do you think of?
- 14 Students: Silence (No one raise their hands)
- 15 Teacher: Some of you might have been there on holiday, I think. Yes, Anders?
- 16 Anders: I'm not sure, but Egypt.
- 17 Teacher: Yes, Egypt. Now you are going to find out more about political Islam and Islamism. Find out about the Taliban, The Muslim Brotherhood and Al-Qaeda. Let's go to the computer lab at computer room 1. Bring your books. You are going to write a paragraph about each.

Ann introduces the topic by initiating a rhetoric question; have you heard about Al-Qaeda, the Muslim Brotherhood and Taliban (line 1). Anders responds with a “yes” (line 2). Ann confirms and reframes the question to what have you heard (line 3), and Anders responds that he has heard Al-Qaeda and the Taliban (line 4). Ann confirms and initiate a new question; what do you associate with it (line 5) and Anders responds; not so much positive (line 6). The three-turn “initiation-response-feedback” (or IRF) structure continues within the introduction. The teacher initiate questions (I) and offer feedback (F), students responds with facts (R). In line 15, Ann brings into play the students’ private lives to respond to where geographically the Arab Spring can be located, offering a hint by mentioning that some have been there on

holiday. Anders responds, “I’m not sure, but Egypt” (line 16), which Ann confirms, and sum up the writing introduction by explaining the next activity.

The episode makes visible how one teacher frames interactions by making links that might recall facts or associations as resources for creating intercontextuality between dealing with Islamism in the school setting and experiencing Islamism in real life society. The teacher-student interactions result in a negotiation of a rather restricted kind. This is mainly because of a tendency on the part of the teacher to frame the interactions using closed initiatives, i.e. typically questions that permit a single answer. The episode displays that closed initiatives do not facilitate a range of contributions from students. As a result, Anders, Benny and Carol position themselves to present brief answers and there is a danger of passivity on the part of the students. To produce a relevant account, the episode makes visible that the ways of reasoning should fit into the institutionally specific traditions of structuring how to recall facts in order to answer Ann’s questions. By collecting information from experiencing Islamism in everyday life such as news, holidays or countries often mentioned in their social lives, the teacher seems to create references to what relevant links might be. Consequently, the function of using everyday knowledge and experience as resources when introducing topics seems to be hooks for recalling facts that are relevant within the instructional norms of the subject. Nonetheless, Anders and Benny seem to acknowledge the ways of responding with confirming phrases – “Yes, I’ve heard [about] Al-Qaeda and the Taliban”, or “Yes, I’ve heard about it.” Consequently, Anders and Benny seem to participate with answers that they think the teacher wants rather than participating with their knowledge, explanations or experiences to create the connections necessary for productive learning.

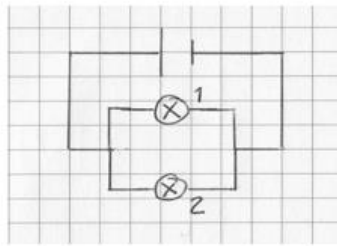
### ***5.3. Constructing intercontextuality with “surrogate” resources***

The following episode occurs during one of the experienced teacher’s (here called Mrs. Anderson’s) science lessons in the computer laboratory, in which the students (here called 9A) are engaged in an electricity project. The aim is to increase the students’ interest in the interconnectedness of scientific and real-world phenomena. The episode highlights the teacher’s use of concepts that might constitute familiar knowledge as resources for creating intercontextuality between dealing with this issue in the school setting and experiencing electricity in everyday life. The episode also reveals several difficulties in the social construction of meaning, in which the chosen explanatory resources lack intellectual relevance for Mary. The following excerpt illustrates how the teacher frames the interaction and how Mary is positioned as a learner as Mrs. Anderson is making rounds.

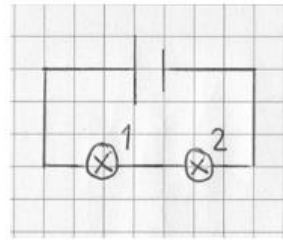
### Excerpt 3

- 1 Teacher: Now I think I want to ask you [a question].  
(She bends down on her knees next to Mary)
- 2 At home, contacts are connected at home. How do you think that they are connected?
- 3 Mary: Uhm? (Puts her hands in front of her mouth)
- 4 Teacher: Do you think that the network at home is connected as serial or parallel circuits?
- 5 Mary: Uhm, they are maybe in parallel? (Orients towards her monitor). No, uhm, because it will not get less (inaudible). (Points at a figure of serial circuits at the monitor).
- 6 Mary: No, because if one of the bulbs goes, then all of them goes.
- 7 Teacher: Yes.
- 8 Mary: It is serial (Taps at the figure of serial circuits).
- 9 Teacher: Yes?
- 10 Mary: Then it is probably parallel?
- 11 Teacher: Yes!
- 12 Teacher: Okay, but if you imagine that in your living room, you are going to connect different components. You want a charger to your mobile phone, you are going to connect the iPad, and you will attach the lamp. Finally, you are going to uhm, I do not know; charge your hairdryer or something else? Do you think that the voltage drops the more components you connect into your room?
- 13 Mary: Uhm? (Looks above the monitor and pulls her hair).
- 14 Teacher: So, when you connect a component, then another component, uhm. Well, will the currents appear weaker?
- 15 Mary: Uhm, I don't really know.
- 16 Teacher: No?
- 17 Mary: No, I have never thought about it before.

Here, the teacher *frames the interaction* by saying that she wants to *ask* Mary a question, connecting the scientific topic to everyday life and making resources available for the subsequent probing question, “How do you think that they are connected?” (line 2). Mary’s response indicates uncertainty and (probably) guesswork (lines 5–10). She turns towards the computer and points at the monitor, which shows her digital Wiki blog and two illustrations of parallel and serial circuits (Figure 1).



Parallel



Serial

*Figure 1. Parallel and Serial Circuits.*

By pointing at the monitor while speaking, Mary seems to use the drawings of parallel and serial circuits as resources for sharing her construction of meaning. Mrs. Anderson seeks continuity by explaining *voltage* in terms of serial versus parallel circuits. She describes how these relate to electronic devices in Mary's living room, detailing interconnections among different devices, such as the charger and the mobile phone or the iPad and the lamp. Mrs. Anderson introduces two additional questions: "Do you think that the voltage drops the more components you connect into your room?" (line 12), and "When you connect a component, then another component, [...] will the currents appear weaker?" (line 14). Mary's non-verbal response is to put her hand in front of her mouth before slowly saying, "Uhm, I don't really know" (line 15). Finally, Mary places her hand against her cheek, saying, 'I have never thought about it before'.

This episode makes visible how one teacher frames interactions by linking scientific explanations of electricity to how electric circuits work in everyday life. However, the resources introduced by Mrs. Anderson for the dialogic construction of intercontextuality seem to create challenges for Mary, who resorts to her own laboratory report and figures on the Wiki blog as more relevant tools for displaying the development of ideas in the making. Consequently, Mary's contribution remains at the level of conversation, illuminating a scientific explanation of factual knowledge. To encourage Mary to recognise the value and meaning of parallel and serial circuits beyond the instructional context, Mrs. Anderson elaborates further on an imagined room, displacing Mary's authentic experiences and knowledge. The dialogue is framed within the teacher's expectations about appropriate ways of doing, saying and knowing in the scientific context. Mary's opportunities to actively contribute to building on relevant resources, such as her figures from the Wiki blog, are not oriented to by the teacher in this dialogue. Our analysis does not clarify whether Mrs. Anderson decides to help Mary recognise the value and meaning of electricity beyond the instructional context or whether she fails to discover Mary's need for further help, scaffolding her lack of understanding of the scientific meaning of parallel and serial circuits. Nevertheless, Mary does not use the opportunity to



participate in the ongoing negotiation of meaning, explicitly saying that these resources are unrelated to her context of understanding. This excerpt demonstrates that although the teacher may frame interactions that seem relevant for constructing connections to real-world phenomena, these resources must have relevance for the students so that they, in turn, can build contexts for the development of rich networks of concepts.

## **6. Discussion and concluding remarks**

This study has explored how everyday and scientific knowledge and experiences can be created and appropriated as resources for use in regular classroom interactions, with particular reference to how teachers and students construct intercontextuality dialogically. Using framing and positioning as analytical tools, we have examined how teachers and students use dialogues to construct relations within the students' learning trajectories. We have done so by referring to three target episodes extracted from a broader corpus of video-recorded lessons in two 9<sup>th</sup>-grade classes. Because the classroom episodes that we have analysed are not necessarily typical of episodes in other classrooms, these findings are not generalisations; rather, they provide insights into the complexity of constructing intercontextuality.

Our main findings illustrate that creating intercontextuality in students' learning trajectories, by building on everyday knowledge and experiences as resources for classroom interactions, remains a challenging task. In the classes that we have observed, the teachers have to consider the interconnectedness of several elements, such as the narratives on how to frame the learning activities, the scientific concepts to be illustrated, the role of everyday knowledge and experiences as resources for creating connections, as well as how to position students in their meaning-making process. Through detailed interaction analysis, we have shown these relations to contribute to the understanding of the complexity of how intercontextuality can be created in the social context of classroom interactions.

Our findings displays that teachers frame interactions expansively and position students as active contributors, illustrated by the observation of how the teacher exploit Peter's experience from reading Dan Brown's novels into his instruction on writing techniques. From an analytical perspective, introducing Peter's experience and the topic of writing techniques as connected with each other, represent opportunities for students to actively build on relevant resources, thus increasing the number of contexts that can become intercontextually linked. Alternatively, teachers can define contexts narrowly in a bounded manner and position students as passive contributors, illustrated by the observation of how the

teacher frame questions to recall facts of radical Islamism. The teacher uses different strategies to invoke student's engagement of Al-Qaeda, the Muslim Brotherhood and the Taliban in the IRF-structured classroom dialogue. As a result, the bounded manner of framing the interactions, gives student opportunities to build on someone else's knowledge. Consequently, they pose limitations in positioning students in developing rich conceptual understandings where they make sense of new ideas in terms of their existing ones. Positioning the students as passive participants in creating intercontextuality situates them as receivers of others' knowledge (Engle 2006). This episode clearly shows that constructing intercontextuality requires more than the mere repositioning of factual or authoritative scientific knowledge framed by the teacher. Rather, it necessitates the use of everyday knowledge and experience as dialogic resources that are relevant for discussing ideas brought to life in complex social interactions.

Moreover, the results show that creating intercontextuality also involves responsiveness to students' diverse levels of understanding. This is illustrated by the observation of how the science teacher's chosen explanatory resources (at home and in your living-room) created challenges to Mary, who oriented to her own laboratory report and figures on the Wiki-blog as more relevant tools for displaying her development of ideas. Teo (2008) describes these kinds of resources as "surrogates" for authentic student experiences and knowledge. Our findings show how surrogate examples, created as learning resources, can become decoupled from students' authentic repertoires. In fact, the challenges of acknowledging students' accurate everyday referents or explaining how these relate to the subject matter make it difficult for students to recognise and acknowledge the imagined everyday life as a resource, as notably illustrated by Mary's comment: "I have never thought about it before".

We argue that the construction of intercontextuality involves both teachers' and students' active contributions by recollecting particular interactions and building on these to create new events in the moment. Scott et al. (2011) point out that acquiring scientific conceptual knowledge poses the possible danger of students' failure to make links to real-world phenomena, such that their developing system of scientific concepts becomes edifices of scientific explanations and generalisations, with no practical foundation. Our findings highlight that teachers across subjects, need to be more conscious of the challenges of framing interactions that students consider significant as resources for their engagement in the social creation of intercontextuality. We have argued that intercontextuality must be acknowledged, recognised and have significance for the students' engagements.

In the classrooms we have followed, the results show that the teachers' narratives of how to frame learning activities and how to position the students in the meaning-making process are grounded in the teachers' norms and assumptions of what constitutes appropriate resources for constructing intercontextuality. This study illustrates what Engle (2006) problematises as a purely content-oriented explanation of intercontextuality creation that makes one "crucially flawed assumption: If learners have the right kind of knowledge at hand and know that it is in a particular context, then they are going to use it" (455). Engle (2006) argues that creating intercontextuality involves not only knowing but also doing and that doing inherently entails the exercise of human agency. We claim that learning contexts designed to enhance intercontextuality must to be fostered by framing contexts expansively and positioning students as responsible and active learners in the dialogical construction of intercontextuality.

We do not contradict the argument that using students' everyday knowledge and experiences is valuable when creating supportive learning environments in schools. On the contrary, such resources might function as tools to support learners in different subjects. However, the findings in this study reveal the *complexity* of constructing intercontextuality dialogically. First, our findings show that the teachers seldom explicitly request examples from the students' everyday interests and experiences or build on their repertoires in order to connect their everyday knowledge and experiences to the scientific concepts that are relevant to the lessons. Additionally, it is a challenge to explain and make visible the interconnectedness between scientific concepts and students' multiple cultural experiences. Finally, framing learning activities that position students to combine their intellectual resources for creating new ideas requires further investigation of teacher–student dialogues and their functions to provide sufficient dialogic space in order to create intercontextuality in classroom interactions (Gutiérrez 2014; Littleton and Mercer 2013; Rogoff 2003; Wegerif 2007). Particularly, there is a need to study in detail how teachers and students use talks and resources that are significant for the students' meaning-making process to negotiate a common understanding in order to create intercontextuality dialogically.

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## **Appendix: Transcription Conventions**

<b>Sign</b>	<b>Explanation</b>
(text)	Gives a description of an activity or something that is hard to phonetically write out in words.
[text]	Explain words and expressions that is missing in the talk.

The research was conducted in Norway as part of the longitudinal project Knowledge in Motion across Context of Learning: Investigating knowledge practices in and out of school (KnowMo 2012 – 2016), funded by the Norwegian Research Council. The project collects data from two schools, 10 teachers, 100 students and 40 families, and in three out-of-school contexts: family, media use and sports activities (football, handball and volleyball).

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