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Problem-solving in collaborative game design practices: epistemic stance, affect, and engagement

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ABSTRACT
This article explores children’s development of problem-solving practices through multimodal engagements in digital activities. The study is based on analyses of a video recorded peer group activity in which two children, within the context of a project on computational thinking using the software Scratch, collaboratively work to solve a coding problem. Drawing on work on epistemics-in-interaction and the cooperative and transformative organization of human action and knowledge, the analyses focus on the interactional strategies that the children use to establish, sustain, and develop knowledge within the peer group and the role of affect in the unfolding organization of actions. By analyzing the multimodal cultural production in children’s interaction with digital technologies, it is shown how children learn creative and artful skills, thus positioning them as consumers as well as producers of media.

1. Introduction
This article explores the social and embodied practices through which a group of children (10 years old) engage in shared problem-solving in a collaborative game design activity, within the context of a larger school project on computational thinking using the software Scratch (Brennan and Resnick 2012; Resnick et al. 2009). Programming skills are today attributed an increasing importance. Whereas coding has been on the curriculum for primary and secondary schools in the UK for several years, in Sweden, the government decided in March 2017 that the curricula were to include a stronger emphasis on digital competence, where programming is highlighted as a crucial skill (SKOLFS 2017, 11). Although associated with computer science, the term ‘computational thinking’ is defined in a broad way and involves ‘solving problems, designing systems, and understanding human behavior’ (Wing 2006, 33). Similarly, Kafai and Burke (2014, 6) write that computational thinking covers the ability to ‘break down the constituent elements of any problem, determine their relationship to each other and the greater whole, and then devise algorithms to arrive at an automated solution’. However, computational thinking is not only related to problem-solving skills and system design, but for instance Lye and Koh (2014, 53) state that it concerns a digital literacy for creating, remixing and sharing digital resources. In other words, and important to this study, programming can be conceptualized as a form of creative media production (e.g., Kafai and Peppler 2011) and as a form of literacy.

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Advocating the more expansive view of ‘computational participation,’ Kafai and Burke (2015) call for more research that explores not only personal, but includes social and cultural dimensions of learning, aspects that the authors argue are critical to ‘understanding and designing productive and supportive learning opportunities in game making’ (Kafai and Burke 2015, 326). In such a vein, the focus of this study is on the social, collaborative, identity making, and creative processes of programming. Drawing on ethnomethodology and conversation analysis (Goodwin 2017; Schegold 2007), I will explore the social organization of participation in a game design activity by analyzing the multimodal resources (i.e., talk, embodied actions, and material environment) that the children draw upon when collaboratively working to solve a problem. Particular attention will be directed to the role of epistemic and affective stance taking, and the ways in which the children actively work to change what they know, as they engage in creative media production.

2. Dynamic literacies and creative game making

Literacy in a digital world encompasses more than the basic skills of reading, writing, listening, and speaking. In a digital media landscape, people ‘create, work, share, socialize, research, play, collaborate, communicate and learn’ (Meyers, Erickson, and Small 2013, 356). There is a large array of meanings around ‘literacies’ today and a number of literacy combinations have appeared such as digital literacy, media literacy, multiliteracies, etc. In response, Potter and McDougall (2017) suggest the concept dynamic literacies, a notion that aims to work as an umbrella term which is ‘responsive and inclusive enough to describe the changing nature of meaning-making in the context of digital media and culture’ (Potter and McDougall 2017, 15). Building on situated literacy theories, arguing that literacy is context-bound, culturally situated, and contingent (e.g., Street 1984), the concept encompasses several dimensions of literacy in flexible and changing ways, that are suited to the ‘hybrid and fast-changing ways in which meanings circulate in digital culture’ (Potter and McDougall 2017, 37). Dynamic literacies are hence not to be understood as another residual category of literacy, but as encompassing and enlarging the overall vision of ‘literacy’ (Cannon, Potter, and Burn 2018, 181).

It is common in literacy research to distinguish learning in from out of schools, as well as between informal and formal learning. However, as Meyers, Erickson, and Small (2013, 357) write, informal and formal contexts of digital literacy are better thought of as components of a ‘knowledge ecosystem’ than as clearly distinguishable entities. In a similar vein, Bulfin and Koutsogiannis (2012) argue the need for studies that explore the connections and continuities between homes and schools rather than seeing them as separate and distinct domains of practice. An important dimension of the concept dynamic literacies is that it integrates children’s skills and experiences arising out of practices which are representative of a wider culture and lived experience, what Potter and McDougall (2017) refer to as ‘third space.’ One such activity that constitutes an important part of many children’s daily lives and social relationships today is the activity of gaming. In game play, distinctions between consumption and production, players and makers, become blurred as engagement in gaming is active rather than passive and children engage not only in playing games, but in activities such as game modification (modding), that is, partial or complete conversions of a digital game in an attempt to improve or alter the game (Apperley and Walsh 2012, 119–120; Buckingham and Burn 2007; Denham and Guyotte 2018). Of particular interest to this study is also how boundary play such as cheating, scamming, and lying are common in the gaming world. These practices are often condemned in schools and the wider society, but viewed in a more nuanced way in the gaming world and even considered part of expertise (Kafai and Fields 2013, see also Kafai and Peppler 2011, 110). In such a vein, Buckingham and Burn (2007) argue that studies of game play need to address the ludic and playable dimensions of games as part of what they call game literacy, that is, a new assemblage of visual, textual, and logical forms constitutive of game play (see also Cannon, Potter, and Burn 2018, 188–193).

Digital game-based learning, or constructionist gaming, has received increasing attention in the literature (e.g., Denham and Guyotte 2018; Kafai and Burke 2015). These approaches emphasize the
importance of children’s participation in game design for educational purposes (for a critical discussion, see Øygardslia 2018). The online software Scratch has been the focus of a number of studies arguing, for example, the benefits of making games for learning (Kafai and Burke 2015), for promoting children and youths’ creative media production (e.g., Pepler and Kafai 2007) as well as fostering engagement in a participatory culture (Fields, Vasudevan, and Kafai 2015; Kafai and Peppler 2011). Scratch is a visual-based programming language that enables the design of interactive media – narratives, animations, games, etc. – by snapping together programming-instruction blocks, similar to LEGO bricks or puzzle pieces (Brennan and Resnick 2012; Resnick et al. 2009). Scratch was developed at MIT and launched in 2007 with the aim of making programming accessible for everyone and to create media producers rather than media consumers. Resnick et al. (2009, 80) write: “‘Digital fluency’ should mean designing, creating, and remixing, not just browsing, chatting, and interacting.” Kafai and Burke (2014) moreover argue that Scratch is not just a programming language but a tool for ‘personal expression and knowledge’ (12). The Scratch community is part of the do-it-yourself (DIY) culture (e.g., Kafai and Peppler 2011) or ‘digital maker movement’ (Potter and McDougall 2017). Thus, Kafai and Peppler (2011, 90) argue that by working with Scratch, contemporary youth communities move fluidly across blurry boundaries (cf. ‘third spaces’) to engage in creative media production activities.

Engagement in creative media production is the act of developing literacies in ‘uni- and cross-directional ways’ by making sense of individual modalities with the goal of making connections between different types of modalities (Kafai and Peppler 2011, 109). However, Fields, Vasudevan, and Kafai (2015) argue that few studies have examined how collaborative productions in online communities in which children and youth engage in programming could be leveraged for school learning. Moreover, Denham and Guyotte (2018) claim that empirical work done on constructionist gaming has mainly focused on the ability of this approach to teach coding and course content. Few studies have examined the roles of collaboration and identity making in the game making process (see also Kafai and Burke 2015).

In sum, literacy is here defined as encompassing as well technological as cultural and social skills and competencies, and as embracing the lived, aesthetic, and emotional aspects of literacy (cf. Potter and McDougall 2017). Literacy is thus about participation in a digital world where being digitally literate involves being both a consumer and a creator/producer (cf. Meyers, Erickson, and Small 2013). In line with Kafai and Peppler (2011), I associate programming and coding skills with literacy (see also Jenson and Droumeva 2017), and argue that the notion of dynamic literacies is well suited to embrace programming along with other forms of literacy skills under the same umbrella. The study aims to contribute to previous research by focusing on the role of programming as a form of creative media production and as a literacy competence by analyzing computational practices (Brennan and Resnick 2012), that is, the social and collaborative processes of solving a problem and learning.

3. Epistemics and affect in multimodal interaction

In order to analyze the interactional organization of the problem-solving activity and the role of epistemic and affective stance taking in the unfolding organization of action, the study is informed by an ethnomethodological and conversation analytic (EMCA) theoretical framework (e.g., Goodwin 2017; Heritage 1984; Mondada 2014). EMCA aims to analyze the sequential and temporal organization of mundane social activities (Schegloff 2007) and considers social interaction as it is collectively organized by co-participants by mobilizing a range of vocal, verbal, and embodied resources which are publicly displayed and monitored in situ (Mondada 2013). Building on analyses of audio/video recorded naturally occurring interaction, EMCA is concerned with examining the methods participants use to accomplish social actions and allows for the understanding of the orderliness of interaction. In other words, focus is on ‘the ways in which utterances accomplish particular actions by virtue of their placement and participation within sequences of actions’ (Heritage 1984, 245).
Drawing on current work on epistemics-in-interaction (e.g., Heritage 2012, 2013) and the cooperative and transformative organization of human action and knowledge (Goodwin 2013, 2017), I will explore how the problem-solving activity is organized interactionally as the children work to increase their knowledge about coding. In interaction, participants always display some analysis, understanding or appreciation of the prior turn in their next turn at talk. They build shared understanding by recognizing what each knows about the world, and by adjusting their actions and understandings in accordance with that recognition (Heritage 2013, 370). The production of action is thus linked reflexively to its interpretation, as speakers build action by taking into account what their addressees can and do know (Goodwin 2000, 1492). However, participants in interaction not only attend to who knows what, but also, to ‘who has a right to know what, who knows more about what, and who is responsible for knowing what’ (Stivers, Mondada, and Steensig 2011, 18), that is, they take different epistemic stances vis-à-vis each other and the evolving organization of action (cf. Goodwin 2007).

As will be demonstrated, an important aspect of the children’s participation in the activity concerns not only their epistemic, but their affective engagement. Affective experiences such as a sense of pleasure, immersion and spontaneous flow have been shown to be fundamental to the complexity of game play, where the fun of the game and high level of involvement is related to the gaming experience itself (Gee 2007; Voulgari and Komis 2010). Affect is here understood as a social phenomenon, as a situated practice and as part of the ongoing constitution of social life (Goodwin and Goodwin 2001). Ochs (1996, 410) defines affective stance as ‘a mood, attitude, feeling and disposition, as well as degrees of emotional intensity vis-à-vis some focus of concern.’ In other words, affective stance taking and emotions refer to positionings accomplished through conduct and thereby made publicly available (Sorjonen and Peräkylä 2012). In such a vein, Aarsand and Aronsson (2009) demonstrate how response cries work as public displays of emotion that are used to display engagement in gaming, tailored to surprises in the gaming activity and to the rapid tempo of the game.

The video recorded interaction to be examined occurs within what is here conceptualized as an ‘epistemic ecology,’ in which the participants take up different epistemic positions, as more or less knowledgeable, in ways that will be demonstrated to dynamically change as the children draw upon different resources in order to make the activity proceed (cf. Melander 2012). The analysis of how the participants display what they know and expect others to know, reveals the strategies that the children rely upon when they do not know, or in other words, their problem-solving strategies. In this process, affect will be shown to play an important part.

4. Research setting and analytic approach

The data are drawn from a larger video ethnographic study exploring the media literacy practices that children participate in as they use digital and mobile technologies, in school and at home (appr. 75 h of video recordings). In focus are the communicative and multimodal competencies that children develop and how different places and everyday contexts become an integrated part of these literacy practices. Fieldwork was conducted in a Swedish elementary school, in a grade 4 with children aged approximately 10 years, over a period of four months. The children were predominantly from ethnically homogenous middle-class family backgrounds. The study has been approved by a regional ethic committee. Written consent was obtained from teachers and the children’s guardians. The children were informed about the research project and their rights to decide whether they wanted to participate or not during fieldwork.

At the school, the arts teacher worked with the children on a computational thinking theme, and one of the subthemes concerned programming in Scratch. In this study, I will focus on a subproject that took place during two weeks and in which the children redesigned an already existing game (Havet är djupt ‘The sea is deep’). The teacher instructed them to modify the visual and auditory aspects of the game design, that is, the sound, the background, the different sprites etc. They were encouraged to work thematically, and to create a coherent game. The children worked in pairs on
their games during one lesson, and the second lesson was dedicated to feedback, both by peers and
the teacher. In the analysis focus will be on two boys, here called Erik and Adam, who decide to add
features to the game that were not included in the original assignment. Both boys, and in particular
Erik, were experienced gamers. Through their actions, the children transform the activity into a
hybrid activity that transgresses distinctions made between homes and schools, and they integrate
gameplay experiences into their way of defining the school task.

The analyses are based on extracts from video recordings of the boys working on their Scratch
game and encompass the participants’ use of verbal, embodied, and material resources in situated
interaction (e.g., Goodwin 2000, 2017; Mondada 2014). The sequences chosen for analysis have
been transcribed following conventions developed within CA (see Appendix). As the participants
speak Swedish, translations into English are included. Line drawings of video frames are incorpor-
ated into the representations in order to highlight analytically relevant embodied actions and the
participants’ orientations to the material environment. As will be shown, the participants continu-
ously analyze each other’s actions in relation to an interactional context in which social and material
aspects are made relevant (Goodwin 2000). The analyses focus on the interactional strategies that the
children use to establish, sustain, and develop knowledge within the peer group in order to solve a
problem; how they orient to changing what they know by drawing upon different epistemic resources
and the role of affect in the unfolding organization of actions.

5. Analysis: problem-solving in peer interaction

The analysis will follow the sequential and temporal organization of the activity, focusing on the chil-
dren’s use of different strategies to solve the problem that they have set themselves: creating a cheat
code that makes it possible to quickly win the game that they are coding. I will begin by analyzing the
interaction between Erik and the teacher and how the participants negotiate the boundaries of the
school task (Extract 1(a)). Next, focus will be on the different problem-solving strategies that are
made relevant by Erik and Adam: (1) asking the teacher for help (Extract 1(b)), (2) looking at
another game for information about the script (Extract 2), and (3) asking a friend for help with
the cheat code (Extracts 3–5). The problem-solving sequence is concluded as the boys succeed in
coding the script (excerpt 6).

5.1. Negotiating the boundaries of the school assignment

Buckingham and Burn (2007, 327) argue that analyses of game literacy need to address the ludic or
playable dimension of games. In the problem-solving activity, one of the driving forces behind the
boys’ wish to make it possible to win the game quickly clearly draws upon their experiences of what
constitutes a good game, that is, winning as a competitive and ludic element. The problem-solving
activity is initiated as one of the boys, Erik, solicits the teacher’s attention to present the idea to her.
He calls for her attention by summoning her name, followed by a request for help: ‘can you help me
(a little)’ (line 1, Extract 1(a)).

When the teacher Anna approaches the table, Erik asks the somewhat unclear question about how
to add something in order to win (lines 3–4). The teacher sits down, rearranging the computer screen
so that she has visual access to it, as the boy initiates a clarification of what he and Adam want to do:
to make it possible to get one hundred points. In overlap, the teacher produces a continuer (line 10)
and Erik tells her that Hugo ‘has taught’, which is repaired to ‘is going to help us’ with ‘like a cheat
code’ that will make it possible to press different keys and immediately get one hundred points. The
repair changes the utterance from a claim of knowing how to do the cheat code (i.e., having been
taught), to an epistemic orientation to a peer as knowledgeable. This is interesting in relation to
the potential moral accountability linked to cheating, that could be interpreted as a blameworthy
action (cf. Kafai and Fields 2013). By not assuming epistemic responsibility and instead allocating
it to a peer, Erik positions Hugo as accountable for knowing the cheat.
Extract 1(a): Make like a cheat code [160406-18; 11.18.47-11.19.06]

1  Erik: Anna: (.) kan du hjälpa mej "lite."
Anna: (.) can you help me a 'little.'

2  (2.1)

3  Erik: hur lägger man till: om de vinner: hur
how do you add if it wins: how

4  lägger man till då. *här,*
does one add then. here,

5  "pointing with cursor on screen"

6  anna +arrives at the table and sits down on the chair beside Erik+

7  Erik: ska man (t+yp) (.) +e:: f(h)ö(h)r (.) vij: vill att
should one (like) (.) uh:: 'c(h)o(h)z (.) wg: want

8  anna +adjusts the computer screen so that she can see+

one to get: <one hundred> points. (.) 'coz (.) Hu:go=

10 ANNA: [m: ]

11 Erik: =har +£lärt- >eller< hehe ska hjälpa oss. >man kan liksom göra typ
=has £taught- >or< hehe will help us. >one can kind of make like

12 anna +turns gaze to Erik++>

13 cheat codes £*så man+ liksom kan trycka* på olika tangenter
cheat codes £: so one can like press different keys

14 anna +turns gaze to the computer++->

15 (.) så får man hundra poäng.
(.) and then one gets one hundred points.

then one gets points pretty quickly.

17 Erik: [ja:: ]
yea::h.

18 Erik: å så ska de stå o m g.
and then it should say o m g.

19 + (1.0)+

20 anna ->+turns gaze to Erik+

21 ANNA: [ja?] yeah?

22 Erik: [oh ] my god £

23 ANNA: +oh my god. m £
+turns gaze to the computer->

24 Erik: när de vinn:er. 
when it wins:

25 ANNA: j[al]vklaret. de [blir ju superläckert.] yeah of course. it'll be ju super cool.

Extract 1(a). Make like a cheat code.

Parts of the utterance are delivered with laughter particles and a smiley voice (lines 6, 9, 11, 13), in all displaying an affective stance of glee and pleasure. Jefferson (1985) has shown how laughter is methodically inserted into discrete segments of utterances as a matter of displaying a speaker’s stance toward the said as particularly sensitive. It is exactly in the moment when Erik starts talking about the cheat code that the laughter particles occur ’c(h)o(h)z’, and there is a repair from taught to help ‘has £taught- >or< hehe will help us’ at a crucial moment when epistemic responsibility is shifted between the participants. Moreover, the mention of the lexical item ‘cheat code’ is delayed by
inserting the mitigating adverbials 'liksom/kind of' and 'typ/like' ('one can kind of make like cheat codes.') and the utterance in lines 11–13 is produced in a smiley voice. Similarly, the laughter particles inserted into parts of the utterance in lines 7–13 orient toward the morally sensitive – and thus accountable – act of cheating.

However, the moral accountability of the cheat code is not picked up on by the teacher, who displays her understanding of what Erik proposes to do by a neutral reformulation: "then one gets points pretty quickly" (line 16). The boy agrees and adds another element to the list of things that the boys want to do: it should say 'om g' (referring to a sign to appear when winning). Erik uses an abbreviated form, and his turn is followed by a silence during which the teacher turns her gaze toward the boy, producing what is hearable as a hesitant "yeah?". In overlap, the boy elaborates by producing the full version 'oh my god' thus orienting to the possibility that the teacher does not understand the abbreviation. The teacher repeats "oh my god." as she turns her gaze back toward the computer and the boy adds a third part to the list, which is the possibility of winning the game (line 24). Anna accepts the reformulation of the assignment with 'yeah of course' and assesses the idea in terms of 'super cool'.

In Extract 1(a), Erik negotiates the assignment with the teacher, by telling her three things that the boys want to do: (1) make it possible to win the game, (2) make a sign that shows up when the game is won, and (3) make a cheat code that makes it possible to win the game quickly. These are all game features that derive from the boys’ experiences of playing games, and the negotiation thus consists in integrating these lived experiences from the world outside the classroom into the educational setting. The teacher’s contributions consist in continuers and reformulations by which she displays her understanding of what the boys want to do. In this process, she avoids calling the cheat a cheat, but rather reformulates it in terms of getting points quickly, that is, one way of making the proposed task less morally accountable.

5.2. First strategy: ask the teacher for help

In the following sections (5.2–5.4), focus will be on the problem-solving strategies that the boys make relevant. Having finished the description of what he wants to do and received a go-ahead in terms of a positive assessment, Erik requests help from the teacher in solving the problem: 'how do you do that?' (line 26, Extract 1(b)).

The teacher frames her upcoming utterance as an act of thinking ('then I’m thinking') as she starts developing a strategy for solving the problem. She formulates what they have to do first saying that 'you ju must invent a script'; the Swedish epistemic adverbial ju stating this as a fact known by both participants (Heinemann, Lindström, and Steensig 2011). Second, Anna identifies how to find out where and what to code (i.e., by looking at the star’s script). Having identified the star’s script as the one that they need to work on (line 29), she instructs Erik to look at the script in question (lines 31–33). By framing her utterances as thinking (lines 27, 31), the teacher reinforces a logic of thinking, a way of reasoning that is made available to her co-participant through talk. Anna does three attempts to make Erik open the star, producing three directives that are accompanied by pointing gestures: (1) 'let’s go to the star’s script', (2) 'can you go and look at it', and (3) 'select the star'. Erik, however, resists acting upon the directives. This resistance is displayed by his gazing above the computer rather than at the screen and not following the teacher’s repeated directives that are accompanied by highlighting pointing gestures, designed to create a shared focus of attention (fig 1.1).

Instead, Erik formulates an alternative strategy in lines 35–36, proposing that they look at a different game, Catch the cat, to find out how to make the script. By not orienting to what the teacher is saying, not aligning with her directives and suggesting a strategy of his own, Erik is taking a strong epistemic stance claiming independent and alternative knowledge. Erik’s proposal receives an enthusiastic and affectively loaded line of assessments by the teacher, who emphatically supports his idea, exclaiming 'good solution? (.) ↑↑↑↑↑↑now then. ↑↑↑↑now we’re talking' (line 37). The utterance is produced with a high-pitched voice, emphasizing the positive assessment ‘good’ by prolonging and
stressing the vowel at several instances. The lexical item ‘talking’ is produced with a smiley voice, and a display of surprise is done by gesture and body deployment as the teacher turns to Erik, smiles and points at him, in all underlining the positive manner in which the teacher evaluates Erik’s suggestion of an alternative problem-solving strategy (fig. 1.2 and sound and pitch contour). The utterance displays a familiarity with reaction tokens which ‘register the unexpectedness of information conveyed in a prior turn at talk’ (Wilkinson and Kitzinger 2006, 154). Erik’s turn is not designed to elicit surprise, but is subsequently treated by the teacher as such, leading to a public display of something being counter to expectation. The teacher’s positive assessment is followed by an elaboration about what the proposed solution involves (lines 40–41, cf. Wilkinson and Kitzinger 2006, 159), and she orients to Erik’s alternative problem-solving strategy as a solution that is superior to her own. The concluding positive assessment ‘↑good problem-solving’ (line 42) corroborates this interpretation.

Extract 1(b): You must invent a script [160406-18; 11.19.04-11.19.43]

26 Erik:  [hur gör man dej ]
how do you do that
27 ANNA:  då tänker jag att då måste du ju hitta på nåt ↑script ()
then I’m thinking that you just must invent a ↑script ()
28 .h e:  å når man vinner de e ju faktiskt när man tar
.h uh: and when you win that’s actually when you take
29 po†ängen på själva stjärnans eller hur<r. ]
a ↑point on the star itself right.
30 Erik:  [ja,]    yea:h,
31 ANNA:  e:  å då tänker ja: () vi går till *stjärnans script å
uh: and then I’m thinking () let’s go to the star’s script and
*pointing
32 tittar om de ligger poängrä*kningen där. ↑>ka
look if the point count is there. ↑can
*pointing
33 du går å tittan på den. () marke*ra stjärnan
you go and look at it. () select the star
*pointing
34 Anton:   e: Anna: =
uh: Anna: =
35 Erik:  =annars skulje vi kunna gå in till ().
=otherwise we could go to ()
36 “fånga katten”. å kolla där?
“catch the cat”. and look there?
↑↑now: then. ↑now: we’re talking↑
38 Erik:  [mpfhen]  *begins searching for catch the cat
Sound and pitch line 37

fig. 1.1

39 ()
40 ANNA:  precis, vi vet ju att fånga katten här. () å då
exactly, we ju know that catch the cat has. () and then
↑hår du ju de scriptet då kan du ↑låt lyfta in de själv. ()
you ↑have ju that script then you can ↑easily insert it yourself. ()
41 ↑bra? ↑bra: problemlösning.
42 Extract 1(b). You must invent a script.
The choice of denoting what the boy is doing as problem-solving is hardly incidental, as one of the aims of coding and one of the competences that proponents for programming argue can improve by coding, is problem-solving skills (e.g., see Kafai and Burke 2014, 4; Lye and Koh 2014). In other words, the teacher provides a meta-perspective on the ongoing actions by commenting upon what the boy is doing in terms of problem-solving. Moreover, the task is formulated as an easy one (‘then you can easily insert it yourself’), where ‘easily’ is prosodically highlighted, and where knowing where to find the script is treated as the challenge rather than coding the script. As it turns out the problem is not that easily solved.

5.3. Second strategy: remixing by looking at another game

In the next section, I will focus on how the boys perform the strategy suggested by Erik in Extract 1(b), that is, to look at another game in order to find the script that makes it possible to win the game. It will be shown how the coding turns out to be difficult, and how the boys draw upon different identities as ‘gamers’ and ‘students’, as they negotiate the continuation of the activity. As Extract 2 starts, Erik has opened the game Catch the cat and reads one of the scripts out loud. However, he immediately displays some hesitation, shown by silences and the production of sound objects (e.g. ‘uh?’).

Adam, who is also looking at the screen (fig. 2.1), establishes that they cannot copy from this game and Erik agrees on epistemic grounds with an a

t atificaly resigned, ‘no: this is too difficult’ as he closes down Catch the cat and instead opens up their own game. The work area of Scratch represents a complex visual field (fig. 2.1) and it is not immediately clear to the boys which script to copy. After a silence (line 8), Erik suggests that they ask the teacher for help as one strategy of solving their problem (cf. Extract 1(a,b)). However, this is never acted upon and instead the boys continue looking at the scripts and Erik points to the new sprite that they have created and that is to appear when the game is won. After a while Adam momentarily takes over the computer (line 12), and after having read one of the scripts out loud ‘when I receive’ he draws the conclusion that it is going to be too difficult, thus tying back to Erik’s negative epistemic formulation in line 7. Both boys take up a stance toward the task they have set themselves as being beyond their knowledge. By recycling Erik’s utterance (‘no: this is too difficult’ [line 7] that is transformed into ‘but this is going to be too difficult’ [line 15]), Adam refers to the shared experience of the task being too difficult. However, both boys continue working, leaning forward and gazing at the computer screen, scrutinizing the scripts (fig. 2.2). Erik explicitly objects ‘no wait’, and taking the computer back from Adam, he finds something that they can do, and enters more information into the script of the sign-sprite as he announces what he is about to do: ‘let’s write here (1.1) omg.’ In response, Adam reads the modified script (line 19), but, as Erik becomes engaged in a line of sneezes, rather than aligning with Erik’s project, he develops his reluctance to continue working on the cheat code, arguing that it is not going to be good (line 21) and producing the imperative ‘get rid of that one’, referring to the new script (line 23). Erik again objects and openly questions Adam’s suggestion with a ‘>why,<’, and then justifies his position: ‘it’s ju gonna be fun if one can win anyway. otherwise this is the worst eternity game’. Erik here draws upon his experience of playing games, relating the importance of being able to win the game to affective and emotional qualities such as having fun. Adam maintains his skepticism, and although very mildly agreeing with the turn initial ‘<yeah:’, he develops his reluctance by repeating and upgrading the difficulty: ‘this became <really> difficult’. He proceeds to produce a complaint about not having any instructions (line 27). Erik produces a cut off ‘yeah but-’ that acknowledges the difficulties that Adam is describing, but disaligns with Adam’s utterance with the oppositional ‘but’. In response, Adam exclains ‘bloody difficult’. During the negotiation of whether to continue coding (lines 19–30), neither boy has been working. When Erik has stopped sneezing in line 24, rather than engaging with the computer he instead turns toward Adam, and both boys sit back on their chairs, momentarily disengaging from programming (fig. 2.3). However, as Adam is complaining about the lack of instructions, Erik gets ready again by placing his hands on the keyboard. The objecting quality of ‘yeah but’ is thus reinforced in an embodied way by positioning the body in a work position that contradicts Adam’s wish to get rid of the script that they are working on.
In Extract 2, an epistemic status as ‘not knowing’ is used to account for an unwillingness to continue with the project, something that would not have been acceptable had it been part of the school assignment to code a cheat. Adam is prepared to give up whereas Erik finds the prospect of being able to

Extract 2. This is too difficult.
to win the game as worth more work. The boys are drawing upon different identities, where Erik is making relevant an identity as a ‘gamer’ and orients to what constitutes a good game, whereas Adam makes relevant a ‘student’ identity, by orienting to the lack of instructions (something that they have had access to when working on a coding assignment previously).

5.4. Third strategy: mobilizing help from a peer

After a while, Erik and Adam succeed in preparing a sign on which it says ‘OMG!!!’ that appears when the player has won the game. It was a complex task to find the right script to copy, but with the help of the teacher they identified the script in another game and copied it into their own. After having tested the game, they call for Hugo, the boy mentioned to the teacher in Extract 1(a), and whom they expect to know how to make the cheat code, thereby mobilizing help from a peer (Extract 3).

Extract 3. We only added a new sign [160406-19; 11.33.57-11.34.48]

2 [1.2]
3 Adam: [Hugo]
4 Erik: [Hugo] vi behöver hjälp med cheat code. Hugo [Hugo] we need help with a cheat code.
5 [8.3]
6 Paul: o em ge? ([Paul arrives, standing behind E & A])
7 Adam: [toh=my=god.]
8 Erik: [toh=my=god.]) (Hugo arrives, standing behind E & A))
9 Erik: nå men asså e hur gör man så så man får hundra po*äng* no but like uh: how do you do so so one gets one hundred points*.

fig. 3.1

“gaze at Hugo

10 Adam: [hur kan man vinna:] how can one win.
11 Paul: vänta () har ni gjort- wait () have you done-
12 Hugo: >för man görå så< >are you all:gewed to do that.<
13 Erik: ja, yeah, ((8 seconds omitted))
14 Hugo: får man ändra: *scripten. are you allowed to change the *scripts.
15 Erik: lite; a little; a little;
16 Paul: [ja: men de kan ja] (yea: but it kan ju-
17 Erik: [men vi: vi lagg bara till en ny skylt så man kan vinna] but we: we only added a new sign so that you can win]
18 Adam: :hhh[precis:] exactly.
19 Erik: [gännsars e de ju liksom ett evighetsspel. otherwise it’s ju like an eternity game.
20 (3.0)
21 Hugo: ok*ej, okay, *leans forward toward the computer->

fig. 3.2

fig. 3.3

Extract 3. We only added a new sign.
Initially it is Erik who summons Hugo by calling his name. Adam chimes in, and both boys call for Hugo in chorus (lines 3–4) while Erik adds that ‘we need help with a cheat code’. By using the second person plural ‘we’, the cheat code is established as a joint project. While waiting, the boys smile and switch between gazing at Hugo and each other (fig 3.1). Another boy Paul arrives at the table before Hugo, and standing behind Erik and Adam he says ‘oh my god’, with an interrogative tone of voice. Adam and Erik respond in chorus, spelling out OMG as ‘†oh=my=god’ with light voices. This is one example of the variation in children’s experiences of digital cultures within the same classroom, where some children have spent many hours playing games whereas others have limited experience, something that is here displayed in a lack of knowledge about gaming terminology (cf. Jenson and Droumeva 2017 who emphasize the importance of not taking for granted that students are ‘digitally native’).

When Hugo arrives at the table, Erik and Adam immediately direct their attention to him. Erik explains what they need help with: what to do in order to get one hundred points (line 9). In overlap, Adam reformulates the request in a condensed way by asking how one can win (line 10). The boys’ utterances that are partly produced in overlap, contribute to the establishment of the question as a joint project, with Erik producing more elaborate information about their request for help. However, Hugo’s first response is to question whether one is allowed to do what Erik and Adam are requesting in a compressed and interrogative way ‘>are you all†owed to do that<‘ (line 12). Erik initially responds affirmatively, while Adam initiates an exchange concerning the number of clicks that the cheat should include (not in the transcript). Hugo ignores their responses, and repeats his question, clarifying it by replacing parts of the utterance with a highlighting specification ‘change the †scripts†’, that makes explicit that it is the permission of changing the scripts that he is concerned with (line 14). Erik, responds with a mitigated ‘a little†’ and then provides an account that minimizes the changes they have made in the scripts: ‘but weː we only added a new sign so that you can win‘. Adam laughs and says ‘exactly’ thus supporting Erik and displaying appreciation of what they have done. With no uptake from Hugo, Erik adds another justification that is oriented to the possibility of winning the game: ‘otherwise it is just like an eternity game’ which is produced in a matter-of-fact tone of voice, presenting the said as shared knowledge. Erik’s justification in line 19 thus draws upon the children’s shared experience of what constitutes a good game where winning is important. That this is alluding to something that is treated as shared knowledge, is emphasized by the epistemic adverbial ju (Heinemann, Lindström, and Steensig 2011). After a 3 s silence, Hugo produces an acknowledgement token ‘okay’, and leans forward toward the computer preparing to do the cheat code, and the activity continues. Similar to the interaction in Extract 2, while negotiating the assignment in terms of what you are allowed to do, the boys are orienting to each other rather than the computer. The acceptance of Erik’s justifications are displayed not only by the verbal ‘okay’ but also by Hugo orienting toward the computer and the others repositioning their bodies in similar ways (figs. 3.2–3.3).

The analysis shows how the children negotiate the activity, where the participant who is summoned to help – on the basis of the assumption that he knows something that the others do not know – does not engage in helping the others until it has been established that the asked-for-action is within the frames of the assignment. Similar to Extract 2, the participants are drawing upon different identities as ‘gamers’ and ‘students’ in negotiating the activity framework. In a study about the implementation of game design in a formal learning context, Øygardslia (2018) shows how unclear activity frameworks may lead to tensions in the students’ social interactions as they position themselves as for example ‘game designers’ or ‘students,’ and where difficulties may arise in the understanding of the assignment as related to an academic content or to leisure activities. In Extracts 2 and 4, the children similarly draw on different identities to achieve various, sometimes conflicting, interactional goals, such as continuing to work on the cheat rather than the original assignment, or deciding whether to help or not.

In Extract 4, Hugo starts working on the script. However, it turns out he does not remember the combination of blocks required to code the script.
Hugo first picks one block, but retracts and picks another and reads it as he puts it on the workspace, ‘when (.) space is pressed’. He then starts looking for the second part of the cheat code, but cannot find it and says that he has forgotten which one it was: ‘wait I’ve forgotten which one it is’. As can be seen in Figure 4.1, the utterance is accompanied by an explicit thinking gesture, by putting the hand to the nose and ‘doing thinking’. While doing this gesture, Hugo momentarily retracts from controlling the keyboard, something that opens up for Erik to take over the computer. The mobility of the laptop afford the children with the possibility of taking control over the activity (cf. Extract 2) and Erik now exclaims ‘wait wait. I’m just going to do one thing’ as he rearranges the scripts that Hugo has begun working on, minimizing what he is doing by talking about it as ‘one thing’. The cheat code is in fact rather simple – a combination of two blocks (see Extract 6, Figure 6.1) – but the boys have trouble identifying the correct combination. Erik detaches a number of blocks from an already existing combination (‘now we’ll put that one (.) there’) and attaches it to the one that Hugo has already put there. The boys gaze at the screen during a 2 s silence (line 14) and then Hugo exclaims: ‘yeah you’ve already fixed it’. Erik reacts with a strong affective stance – ‘ha:ve we’ – displaying surprise and joy. Adam, who during the time that Erik has worked on the script has been looking in a different direction, slightly inattentive to the ongoing actions, now asks ‘what?’ in response to Erik’s cheering. There is no verbal uptake on Adam’s question, but Erik laughs and Hugo encourages him to test the game (lines 19–20).

Extract 4. You’ve already fixed it.
Erik starts playing the game but it turns out that the cheat code does not work. Hugo makes another attempt, but does not solve the problem. Instead, he suggests that Erik look at *Catch the cat* and walks away. Erik opens *Catch the cat* and starts playing it, doing the cheat in order to win quickly and Hugo comes back, again showing interest in Erik and Adam’s game. Extract 5 begins as Erik turns around toward Hugo, asking ‘Hugo what?’.

Extract 5: Do you remember that [160409-19; 11.38.55-11.39.42]

1 Erik: Hugo vad?
   Hugo what?
2 Hugo: åkej då gör vi så här. titta.
   okay then let’s do like this. look.
3 Erik: cheat[t, () code.]
4 Hugo: [e:: ]*när mellanslag *ändra poäng med *trehundra ()
   uh:: when space change points with three hundred ()
   *point at script *point at script *point at script
5 ’så.* £>oh my god, fem sekunder.<£ ( )
   'like that.* £>oh my god. five seconds.<£ ( )
6 (1.0)
7 Hugo: *kej, kommer du ihåg de.
   *pats Erik on the shoulder.
   kay, do you remember that.
8 Erik: *ändra poäng med;* ((enters Erik & Adam’s game))
   change points with;
   hugo *walks away->
9 *(6.2)
10 erik *codes a new script->*
11 Erik: asså.
   (xxxxx)
12 (4.2)
13 Erik: *ändra poäng med,
   change points with,
14 Adam: >vadå< aha::: kan vi inte *byta språk:: først inn†an
   >what< aha::: can’t we change sprites first. be’fore
   ->’looking at the other game->*
15 erik vi går in i ”script[t,“
   we enter the ”script.”
16 Erik: [ja men-
   yeah but-
17 (2.0)
18 Adam: de e faktiskt ganska trist.*
   it’s actually quite boring.
19 erik ->*and back again->
20 (1.0)
21 Erik: ja men de e ju kul- cool å ha cheat codes.
   yeah but it’s ju fun- cool to have cheat codes.

Extract 5. Do you remember that.
Hugo takes up a strong epistemic stance, displaying that he now knows what to do: ‘okay then let’s do like this’. Moreover, he invites Erik and Adam to watch ‘look’. Erik lets out a staccato ‘cheat code’ that displays expectations as Hugo leans forward and reads the script: ‘When space change points with three hundred’ (fig. 5.1). Hugo smiles and exclaims ‘oh my god’ and reads ‘five seconds’, ‘εö’<‘ε’. The utterance is produced with a smiley voice and strong affective stance displaying glee and joy in having identified the script. Up until now Hugo has been working on the computer, but now that the solution is found he instead encourages Erik to do the actual coding. He turns to Erik smiling widely, pats him on the shoulder and in a teacher-like manner says: ‘†kay, do you remember that’ (fig. 5.2).

By repeating ‘change points with’ (line 8), Erik confirms that he remembers, and that he knows what Hugo is referring to. Moreover, while Hugo leaves, Erik opens their game and starts working on the script. Adam, however, objects by suggesting that they change the sprites first, before entering the script. Erik minimally protests (‘yeah but–’) and keeps working, and after a brief silence Adam exclaims that ‘it’s actually quite boring’. Being the person sitting beside the one in control of the keyboard considerably limits the possibility of actively participating in the coding (cf. Extracts 2 and 4). In Goffman’s (1981) terms, Adam is assigned a paradoxical position of simultaneously acting as a ratified participant and a bystander, where he is restricted to talk and embodied actions (e.g., pointings) and the production of directives and imperatives etc., rather than being able to decide when to enter another game or which block to pick. Moreover, it is Erik who has been most active on the computer throughout the activity, only temporarily letting Adam type on the keyboard, whereas Hugo has been invited to make changes. There is a dynamic epistemic relationship between the three boys, where Hugo is oriented to as a ‘knowing’ participant, whereas Erik switches between taking up a stance as a ‘more’ or ‘less knowing’ participant. Adam is a ratified co-participant who can make suggestions, but is not oriented to as someone who knows, or can be helpful in finding out, how to solve the cheat code.

When responding to Adam’s evaluative statement (line 19), Erik first replies that it is ‘ju fun’-, that is, the direct opposite of ‘boring’ and oriented to the playful and ludic aspects of the game. However, the utterance is cut off, and fun is replaced with ‘cool to have cheat codes’. Erik thus alludes to the possibility of claiming a ‘cool’ identity as an argument for continuing to work on the cheat code. Adam is not objecting to the coding project per se, but orients to the importance of finishing the assignment in time and suggests that they change the sprites before entering the scripts (lines 14–16).

5.5. Problem solved: audible glee and epistemic euphoria

In the last part of the analytical section, focus is on how the problem-solving activity comes to a close. Shortly after Extract 5, Erik succeeds in coding the cheat. When Extract 6 begins, Adam talks to the camera, explaining what they are doing (lines 1–2).

Adam assures the camera/researcher that they are not ‘going to cheat or <anything like that> just (. ) £ <tamper> a little.£’. He explicitly orients to the question of cheating as (potentially) problematic, and downplays the moral accountability by claiming that what they are doing is about tampering. The latter is moreover produced with a smiley voice, adding a positive affective stance that may be oriented toward the moral sensitivity of cheating (cf. Extract 1(a)). At this time, Erik has managed to code the cheat, and he calls for Adam’s attention by exclaiming ‘look’ as he spreads his arms indicating the computer (fig 6.1). As can be seen in fig. 6.1 the cheat code is fairly simple, consisting of two building blocks: ‘when space is pressed’ and ‘change points with 100’. Both boys produce affectively loaded, appreciative types of public displays of emotion, what Goffman (1981) calls response cries. Aarsand and Aronsson (2009) have shown that within gaming contexts, response cries often occur as linked actions and as resources for displays of intersubjectivity. Similarly, Adam adds an ‘oh, yes’ that displays strong appreciation of Erik’s success. Erik, in turn, makes public his satisfaction of having accomplished the cheat code, by uttering self-praise produced with a smiley voice: ‘ετι’m so good.£’. Adam states in a satisfied manner that ‘it worked,’ and Erik continues with his self-praise; first saying ‘I’m so professional’ in English and then in Swedish (‘ja e så professionell’, line 7). The code switch from English to Swedish provides the possibility of uttering the same self-praise twice.
Strong epistemic claims are embedded in the self-praise: I’m so good and I’m so professional. Up until now, the boys have worked to sustain the project as a joint project, for example by using a second person plural ‘we’ when referring to what they want to do, and by collaboratively requesting help. Moreover, when helping Adam and Erik, Hugo referred to the cheat code as their shared project. However, when Erik has come up with a solution, he takes the credit for the work being done. Adam, who has not actively participated in solving the problem in the same way, at times even displaying reluctance toward the accomplishment of the project, produces the declarative assessment ‘it worked’ (line 6), that is, describing the fact that the game works in more neutral terms, neither praising Erik nor himself. Both boys, however, display audible glee and happiness in that the problem is now solved. With the cheat code in place, the boys continue working on the original school assignment, and redesign their game by changing the background, sprites, and music to create a coherent game.

6. Concluding discussion

This study has analyzed in detail the social organization of a game design activity, thereby demonstrating children’s problem-solving strategies as they are deployed moment-by-moment. The analyses show that the children orient to expanding their epistemic domains by mobilizing a number of resources, such as asking the teacher or a peer for help, by referring to (a lack of) instructions, by scrutinizing scripts from similar coding projects, etc. The children have been demonstrated to deploy different strategies depending on what part of the problem they are working on, as well as in relation to what they know about what their co-participants know (cf. Goodwin 2007; Heritage 2013). As the participants position themselves epistemically vis-à-vis each other as more or less knowledgeable, they occupy different participant positions within the ‘epistemic ecology.’ These epistemic relations dynamically change as the children systematically work to solve their problem. Intrinsic to the organization of action is also affective stance taking, such as response cries (‘oh yes’), audible glee, and resignation. Over the course of the activity, there is a development from

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Extract 6. I’m so professional.
high expectations over resignation to happiness once the boys succeed in coding the cheat. Affective stances play a central role in how the children align with each other’s actions, where references to affective states such as fun, cool, and boring are important resources in the negotiation of the progressivity of actions. The detailed analyses thus demonstrate the participants’ methods for changing the local epistemic framework, and make visible their practices for increasing their knowledge and learning about coding.

With an interest in game-making as a creative cultural expression, the study sheds light on children as game makers by exploring a game design practice occurring within a classroom setting. Many of the DIY culture studies discuss activities that take place at various after school centers or other contexts outside of school (e.g., Denham and Guyotte 2018; Kafai and Peppler 2011; Peppler and Kafai 2007). Moreover, in these studies researchers are often engaged in the projects themselves in the shape of interventions. Building on recordings of a naturally occurring activity in a classroom, the current study instead demonstrates some of the possibilities and challenges that the participants face in mundane activities of programming. The results show how the children, with the support of their teacher, were able to incorporate their experiences as game players into the school assignment, and how they drew upon their wider social and cultural competencies deriving from participation in gaming cultures, in order to define and complete the task that they had set themselves of being able to win the game quickly. Unpacking some of the (dis)connections that persist between schools, students and student technology use, Bullfin et al. (2016) make the claim that schools have an important role in complementing and extending students’ digital practices, rather than replicating and reinforcing how technologies are used out-of-school. Moreover, schools should remain ‘steadfast in embracing “school technology” for what it is’ (250) and take a lead in positively shaping students’ exposure to digital technology. However, the analyzed example shows how the children were able to negotiate the school task, to make space for creative engagement by bringing together school-practices and out-of-school practices in a process of combination and recontextualization. The study thus empirically demonstrates how bringing games into school may have the capacity of blurring the boundaries between homes and schools, between informal and formal learning in ways that complement the children’s everyday digital practices by encouraging and building upon their experiences. The detailed analyses show how the children orient to different identities throughout the problem-solving activity and how both game player/maker identities and student identities are made relevant. When the boys negotiate the continuation of the activity, student and gamer identities are contrasted and opposed. A cooperative, aligning stance toward coding the cheat is not shared by all participants (cf. Goodwin 2007), and instead, a continuous negotiation of the task occurs, with various degrees of commitment from the children (cf. Øygardslia 2018).

Digital media are sometimes surrounded by an evangelizing discourse with idealistic talk concerning the ‘good’ learning that is expected to result simply from working with digital technologies (Selwyn 2016). Similarly, the enthusiasm regarding the introduction of programming in schools can be criticized for its innocence with respect to the transferability of the learned skills as well as what the grounds are for assuming that coding skills will be critical in the future (e.g., see Buckingham 2015). Moreover, Jenson and Droumeva (2017, 212) challenge what they call the ‘surprisingly persistent presumption’ that students in today’s classrooms are by default ‘digitally native’ and that they are learning ‘just by playing games.’ Instead, the authors argue that many students do not have familiarity or even facility with basic computer programming skills and competencies, something that needs to be taken into account when introducing programming in schools. These are cautions that should be taken seriously. However, what the results of the current study also show, is that coding and digital game design seem to be particularly fruitful ways of incorporating children’s everyday lived experiences into school activities in ways that allow for personal agency and ownership as well as creativity. The results of the study thus corroborate what Buckingham and Burn (2007, 345–6) write about games as a significant part of the children’s cultural capital and, ‘a potential expressive form which they can develop in the classroom’ (345–6). Creativity in this context, involves the remembering of earlier experiences of games and the creative combinations of different resources.
to code a game that is worth playing – within the context of a school assignment that values other design features as well. The cheat represents competence and knowledge of the game, and was used to demonstrate ‘exceptional’ skills (i.e., to make the boys appear as skilled, cool gamers) rather than to trick or cheat someone (cf. Kafai and Fields 2013). In line with Bulfin and Koutsogiannis (2012) findings, the children were thus shown to use school literacies as a basis to re-explore their own interests. Children’s literacies are stretched across home and school domains, where ‘the definition of literacy and the operation of that definition remain of crucial importance because of the way it includes or excludes aspects of their wider social and cultural life’ (Potter and McDougall 2017, 18). To conclude, by analyzing the multimodal cultural production in children’s interaction with digital technologies, this study has shown how children learn creative and artful skills, positioning them as consumers as well as creators and producers of media.

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Notes on contributor
Helen Melander Bowden’s research interests concern knowledge and learning in interaction, and the role of epistemics and emotion in the unfolding organization of action. Her research covers various areas such as learning in interaction within peer groups, instructional work in encounters between students and teachers, and interaction in professional contexts.

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References


**Appendix**

Transcription conventions adapted from Jefferey (2004) and Mondada (2018).

| [ ] | Overlapping talk |
| = | Equal signs indicate no break or gap between the words or lines. |
| (0.8) (.) | Numbers in parentheses indicate silence. A dot in parentheses indicates a micropause less than 5/10 of a second. |
| \( ? \) | The punctuation marks indicate intonation. The period indicates falling intonation, the comma continuing intonation, the inverted question mark slightly rising intonation and the question mark indicates a rising intonation. |
| :: | Colons are used to indicate prolongation or stretching of the immediately prior sound. |
| word | Underlining indicates some form of stress or emphasis. The more the underlining the greater the emphasis. |
| \° \* | The degree signs indicate that the talk between them was quieter than its surrounding talk. |
| £ £ | The pound signs indicate that the talk between them is produced with a smiley voice. |
| < > | The up/down arrow marks a sharp rise/drop in pitch. |
| < > | Right/left carats indicate that the talk between them is slowed down. |
| h | Hearable outbreaths are shown with a ‘h’ |
| wo(h)rd | Laughter particles |
| { } | Double parentheses are used to mark transcriber’s descriptions of events. |
| . | Empty parentheses indicate that something is being said but no hearing can be achieved. |
| * * | Gestures and actions descriptions are delimited between two identical symbols (one symbol per participant) and are synchronized with corresponding stretches of talk. |
| \( -> \) | Gesture or action described continues after excerpt’s end. |
| *->* | Gesture or action described continues across subsequent lines until the same symbol is reached. |
| ANNA | Name in upper-case indicates teacher |
| Erik | Name in lower-case indicates student |
| erik | Participant doing the gesture is identified when (s)he is not the speaker. |