Computer-Supported Collaborative Learning DOI 10.1007/s11412-011-9134-8

Making rounds: The routine work of the teacher during collaborative learning with computers

Christian Greiffenhagen

Received: 6 March 2011 / Accepted: 5 October 2011 © International Society of the Learning Sciences, Inc.; Springer Science+Business Media, LLC 2011

Abstract This paper provides a detailed analysis of the work of the teacher during 10 collaborative-learning activities. Whilst the importance of the teacher for the success 11 of collaborative learning has frequently been recognized in the CSCL literature, there 12is nevertheless a curious absence of detailed studies that describe how the teacher 13 intervenes in pupils' collaborative-learning activities, which may be a reflection of the 14 ambivalent status of teachers within a field that has tried to transfer authority from 15teachers to pupils. Through a close analysis of different types of teacher interventions 16into pupils working in pairs with a storyboarding tool, this paper argues, firstly, that 17concerns of classroom management and pedagogy are typically intertwined and, 18 secondly, that although there may be tensions between the perspectives of teachers 19and pupils these do not take the form of antagonistic struggles. The paper concludes 20that it may be time to renew our interest in the work of teachers in the analysis of 21collaborative-learning activities. 22

KeywordsTeacher interventions · Teacher's role · Classroom management · Scaffolding ·23Collaborative learning · Cooperative learning · Ethnomethodology24

Introduction

This article deals with a familiar phenomenon of collaborative learning with 27 computers:¹ Once the teacher has set up a particular task (which is typically done by 28 talking to the whole class) and pupils have started to work on this task alone or in pairs, 29

School of Social Sciences, University of Manchester, Arthur Lewis Building, Manchester M13 9PL, UK e-mail: christian.greiffenhagen@manchester.ac.uk

1 3 2

4

5

6

9

25

26

¹There is a long-standing debate on the differences and similarities between 'collaborative', 'cooperative', or 'collective' learning (see, e.g., Pea 1996; Dillenbourg 1999; Koschmann 1999). I am using the term 'collaborative learning with computers' not to designate a particular pedagogical approach, but as a way to characterize situations in which the learning is organized through computer-mediated collaborative activities involving pairs or small groups of learners.

C. Greiffenhagen (🖂)

the teacher does not sit back and relax at her or his desk, but rather 'makes rounds' 30 (Mehan 1989, p. 10) through the classroom to monitor, evaluate, and control what pupils 31 are doing. Sorensen (2009, p. 155) provides a vivid description of this in the context of 32 pupils working within an online 3D virtual environment:² 33

The teacher [...] is rarely seated. He wanders around among children. He looks 34 restless. His head and upper body move in staccato rhythms. He looks around 36 uneasily. He bends down over a child, looks at his screen, and talks to him. After a 37 while he gets up and goes to another child, just because she was in his way, or so it 38appears. He squats down and talks to her. He gets up and looks around. He walks to 39another computer, stands behind a child, and looks at the screen for two minutes. He 40points at something on the screen and talks to the child. He straightens his back. His 41 eves quickly scan the room. [...] $\frac{42}{43}$

What interests Sorensen is the restlessness of the teacher in this situation, a restlessness 44 which for her is the result of the changing nature of the task: from a situation in which 45children are working on identical exercise books and going through the exercises in a 46sequential manner (thus giving the teacher an easy overview of what children have done 47and what they will do next) to a task which is more open-ended and has a less clear-cut 48sequential structure (thus making it much harder for the teacher to see what children have 49done and anticipate what they will do next). What interests me is less the restlessness than 50the organization of the work of teaching. My aim is to describe in greater detail what 51exactly a teacher does when he or she bends down to a child, looks at the screen, and talks 52to the child. In other words, I want to examine what, as one of the most practical matters in 53the world, teachers are *doing* during collaborative learning activities (not what they are 54supposed to do, but what they do do). 55

The analysis is based on video fragments from a project which examined the 56introduction of an educational technology into a secondary school in the UK. The software, 57called kar2ouche,³ is an electronic storyboarding tool, which allows pupils to construct their 58own visual representations of Macbeth in a series of frames and which has been designed to 59be used by teachers as one of the variety of activities to engage pupils with Shakespeare as 60 part of their English lessons. Both teachers involved in this study decided to have two 61 pupils working together at the computer, a common arrangement for the use of instructional 62technologies in schools. In a previous article, I focussed on the way in which the teacher set 63 up the storyboarding activity (Greiffenhagen 2008), whereas in this paper I investigate the 64 work of the teacher during the periods in which pupils were working with the storyboarding 65 software. 66

Teachers could be said to have an ambivalent status in theories and studies of 67 collaborative learning with computers (see, e.g., Koschmann 1996; Koschmann et al. 2002; 68 Stahl 2006, 2009). On the one hand, a lot of technological innovation in school classrooms 69 has been driven by the aim of transforming teaching and learning from 'teacher-led' whole-70class instruction to more 'pupil-centred' practices (see, e.g., Cuban 2001, p.14). This has 71been based on a new view of pupils who are no longer regarded as vessels to be filled with 72information imparted by the teacher, but instead as active constructors of knowledge. 73Consequently, there have been attempts to transfer authority from teachers to pupils during 74learning activities (see Koschmann et al. 2000 on the resulting tensions for the teacher's 75role in problem-based learning). 76

 $[\]frac{1}{2}$ In this situation the pupils are working on their own rather than in pairs.

³ http://www.kar2ouche.com/

Computer-Supported Collaborative Learning

Yet, on the other hand, it has always been recognized that teachers still play a crucial, albeit new, role during collaborative learning activities. Conceptions of the learning process rooted in notions such as 'scaffolding' and Vygotsky's 'zone of proximal development' (cf., Pea 2004) acknowledge that the teacher, although no longer the 'sage on the stage', nevertheless has to act as a 'coach', 'facilitator', or 'guide' for pupils. Johnson and Johnson (1994 [1975], p. 114) describe this role in powerful terms for their conception of cooperative learning:

The teacher's job begins in earnest when the cooperative learning groups start84working. Resist that urge to get a cup of coffee or to grade papers. Teachers observe86the interaction among group members to assess students' academic progress and87appropriate use of interpersonal and small-group skills.[...] Based on theirobservations, teachers can then intervene to improve students' academic learning or89on interpersonal and small-group skills.90

Across the literature we find a tension where teachers have been conceptualised in both 92 negative and positive terms: as authority figures that threaten to relieve pupils of selfdirected opportunities to learn and as important facilitators that guide and stimulate pupils' 94 learning activities. 95

The resulting tension could be one reason for the relative lack of empirical studies that 96 investigate the work of the teacher during collaborative learning activities, a lack that has 97 been noted in the literature. Gillies et al. (2008, p. 258), for example, state that "scant 98 mention has been made of the role that teachers play in implementing cooperative 99 pedagogy in their classrooms"; Urhahne et al. (2010, p. 237) complain that "research on 100information technology in education has given not enough attention to the role of the 101teacher, given the central part that the teacher plays in technology-enhanced classrooms"; 102 while Webb et al. (2009, p. 49) observe that: 103

Collaborative group work has great potential to promote student learning, and105increasing evidence exists about the kinds of interaction among students that are106necessary to achieve this potential. Less often studied is the role of the teacher in107promoting effective group collaboration.108

Of course, there are a variety of exceptions. There is an extensive literature that provides 110 practical advice and guidelines for teachers on how to implement collaborative and 111 cooperative learning activities, for example, how to structure such activities, how to group 112 pupils, how to deal with diversity among pupils, how to give feedback, or how to engender 113 a cooperative learning pedagogy in the classroom (see, e.g., Johnson and Johnson 1994 114 [1975]; Cohen (1994 [1986]); Gillies et al. 2008; Urhahne et al. 2010). 115

There are also studies that have coded teachers' and pupils' discourse into a variety of 116 categories to compare different learning situations and to assess the effects of teachers' 117 interventions on pupils' behaviour (e.g., Hertz-Lazarowitz and Shachar 1990; Chiu 2004; 118Dekker and Elshout-Mohr 2004; Gillies 2004; Ding et al. 2007; Webb et al. 2009). For 119example, Hertz-Lazarowitz and Shachar (1990, p. 83) identify four types of practices—"(1) 120teacher praises and encourages pupils in relation to task performance; (2) teacher interacts 121with pupils in an intimate-egalitarian orientation; (3) teacher stages herself as a central 122figure in the classroom; (4) teacher interacts with pupils in a rigid authoritarian 123orientation"-and found that teachers' verbal behaviour differed significantly between 124traditional whole class instruction and interactions in group work. Chiu (2004) measured 125the length of teachers' interventions and recorded whether pupils were on or off task prior 126and subsequent to the intervention. Chiu found that pupils "were more likely to be on-task 127

after speaking with the teacher than before doing so" and that "the beneficial effects of128teacher interventions persisted for at least 5 min, but they faded over time" (p. 391). Webb129et al. (2009) found that only 'probing' questions in contrast to other forms of interaction130(such as acknowledgement of correct answers or issuing reminders) resulted in pupils131"giving more detail about their problem-solving strategies, especially their producing132correct/complete explanations of how to solve the problem" (p. 64).133

When we look at qualitative studies that aim to provide detailed accounts of the 134processes of collaborative learning, we find that they predominantly focus on what pupils 135are doing, but rarely describe the practices of the teacher during such activities. For 136example, Barnes and Todd (1977), in one of the earliest qualitative studies of small groups 137(although without computers), investigated the differences between whole class and small 138group behaviour and discussion among pupils. They give an illuminating account of the 139interaction among pupils, but say very little about what the teacher did during such group 140work, almost suggesting that the teacher played no role and never interacted with the 141 groups. Heap (1989a, b), in one of the first video-based studies of collaborative writing 142with computers, provides a detailed description of the normative order at the computer, in 143particular, with respect to the different rights and responsibilities of pupils who acted as a 144'writer' or as a 'helper'. However, Heap does not say whether, or in what ways, the teacher 145interacted with pupils while they collaborated (only that pupils gave their final stories to the 146teacher for evaluation). Roschelle (1992), in a pioneering and often cited study, investigated 147 how pupils interacted with a computer software which graphically simulated the concepts 148of velocity and acceleration. On the basis of a detailed analysis of the interaction between 149two pupils, Roschelle provides a new conception of conceptual change to complement 150Piagetian and Vygotskian accounts. However, again, Roschelle is remarkably quiet about 151the role of the teacher (himself in this case) in engendering collaboration among pupils with 152the computer. Kelly et al. (2001) show how four groups of pupils differently interpreted the 153'same' task. The authors mention that one of them acted as the physics teacher in the class, 154but say very little of what the teacher did once the task had been set up. For example, after 155an extended analysis of a discussion among the pupils, the authors state that "[a]t the end of 156the seventh discussion, when the group was unable to come to a common solution, the 157teacher intervened" (p. 164), but provide no account of how the teacher knew that he 158should intervene (was he summoned by the pupils? had he been monitoring what the pupils 159were doing?). Finally, Karlsson (2010) provides an extended analysis of how two pupils 160collaboratively interpret an animation of the mouldering process and formulate their written 161report. The analysis is based on very rich multimodal transcripts, which shows how much 162studies of collaborative learning have moved on since the early studies of, for example, 163Heap or Roschelle. As in those earlier studies, the focus is entirely on the pupils. The 164teacher is only mentioned once, when Karlsson remarks that the teacher did not approve of 165the final written account produced by pupils (p.174). 166

In sum, despite the acknowledged central role and responsibility of the teacher for 167implementing collaborative learning, there is an absence of the teacher in detailed accounts 168of collaborative learning using computers. The existing studies focus almost entirely on 169170interactions among pupils and thus, at least implicitly, suggest that the teacher does not play a crucial role in setting up, monitoring, and shaping such activities in classroom contexts. 171There are only a few notable exceptions. In an early study, Mercer and Fisher (1992) 172focussed on the interventions of a teacher in the computer-based activities of pupils, 173detailing the crucial role of the teacher in shaping and guiding these activities. Similarly, 174Roth (1995) investigated teacher-pupil (rather than pupil-pupil) interaction during 175collaborative learning with computers. More recently, Lindwall and Lymer (2008) have 176 Computer-Supported Collaborative Learning

analysed an extended interchange between two pupils and an instructor who was 177 summoned by the pupils when they were stuck and unsure how to proceed. The aim of 178 this paper is to further detail the mundane work of the teacher during collaborative learning 180 with computers. 180

Methodology

181

This study is in the tradition of what Macbeth (2003) has termed studies of 'naturally 182occurring discourse', which emerged in the 1970s under a variety of influences, including 183sociolinguistics (Cazden et al. 1972; Gumperz and Hymes 1972), context analysis 184 (McDermott et al. 1978), and, most pertinently for this paper, ethnomethodology (Garfinkel 1851967, 2002) and conversation analysis (Sacks 1992; Schegloff 2007). Using both audio-186and video-recordings (cf., Koschmann et al. 2007; Heath et al. 2010), such studies have 187 investigated a variety of taken-for-granted aspects of social interaction. Those aspects could 188 be said to be the 'dark matter' of social interaction (Schegloff 1996, p. 211; Lindwall and 189Lymer 2008) and although in a certain sense 'uninteresting', especially to participants, they 190are nevertheless essential to accomplishing practical affairs. The challenge of such studies is 191not to uncover hidden phenomena that only become observable through new methodolog-192ical tools or theoretical lenses, but to take interest in public organizations, and pay attention 193to the way in which unnoticed doings contribute to getting things done, something that 194Garfinkel has referred to as "getting the goldfish to become aware of the water" 195(cf., Watson 2009, p. 103). 196

Within the educational literature, studies of naturally occurring discourse could be seen 197as an alternative to the predominant normative orientation of studies of classroom life. That 198is to say, many studies of educational settings rest on a view of what classroom interaction 199should be (in terms of the types of interaction or power relations that are educationally 200desirable or effective) and then-more often than not-go on to find that the reality of 201classrooms falls short. In contrast, studies of naturally occurring discourse try to set aside 202 such normative expectations and instead aim to produce analytic descriptions of how 203classroom interaction is accomplished in orderly, collaborative ways, by teachers and 204205pupils.

Early studies influenced by ethnomethodology and conversation analysis focussed on 206traditional whole-class teaching (e.g., Payne 1976; McHoul 1978; Mehan 1979; Payne and 207Cuff 1982; Macbeth 1990, 1991, 1992). In recent years, researchers have extended this 208perspective to a variety of educational and instructional contexts, for example, problem-209based learning in medical education (Glenn et al. 1999), laboratory work in physics 210education (Ford 1999; Lindwall and Lymer 2008), the role of technology in architectural 211education (Lymer et al. 2009; Ivarsson 2010), online learning environments (Garcia and 212Jacobs 1999; Çakir et al. 2009), as well as postgraduate training in mathematics 213(Greiffenhagen and Sharrock forthcoming). 214

There are important respects in which the 'analytic mentality' (Schenkein 1978) of 215 ethnomethodolology and conversation analysis differs from the aims and methods of much 216 research in CSCL, in particular, (1) the emphasis on analytic description rather than 217 evaluation, (2) the focus on manifest rather than hidden aspects of interaction, (3) the 218 dissolution rather than integration of supposedly different levels of social organisation. 219

Firstly, the policy of 'ethnomethodological indifference' (Garfinkel and Sacks 1970, 220 p. 345; Lindwall and Lymer 2005) is, in a certain sense, against the whole point of CSCL. 221 Simplifying greatly, it could be argued that one of the strongest motivations of much work 222

in CSCL is the wish to improve current instructional practices through the design of new 223methods and innovative technologies (where that improvement can take a multitude of 224forms, from improving effectiveness to increasing the independence of pupils as learners). 225Consequently, there is an attendant emphasis on evaluation of both current and new 226practices. Ethnomethodology wants to step back and describe classroom practices without 227judging or evaluating them. Of course, there are various kinds of evaluations that are 228internal to the setting (e.g., teachers often evaluate pupils) and ethnomethodology takes an 229interest in explicating how such evaluations are accomplished. Ethnomethodology itself 230does not have its own (professional) standards for evaluating, for example, teachers. 231

Secondly, ethnomethodology and conversation analysis are concerned with the manifest 232character of social interaction. Garfinkel's notion of 'accountability' was a way to 233emphasize that people do things in such a way that other people recognise them as what 234they are. The aim of the researcher then is to investigate how people accomplish this (e.g., 235what resources and methods they employ). This is stark contrast to the perhaps more 236common approach in the social sciences that supposes that doings are really otherwise than 237they initially appear and that their real character is 'hidden' (and therefore needs to be 238'uncovered'). Macbeth (2003) expresses this focus on the public character of classrooms in 239his review of Hugh Mehan's (1979) Learning Lessons (LL): 240

LL was pointing to an orderliness of classroom lessons for which the participants242themselves were actively engaged in producing their teaching and learning, its243successes, failures, and relentless contingency, *in full and public view*, and moreover244and especially, in the interactional detail of what indeed they were saying and doing.245(p. 240; my emphasis)246

In what sense could classroom lessons be said to be "in full and public view"? After all, 248other teachers rarely get to observe their colleagues, parents almost never get see what 249happens in classrooms 'to' their children, and classrooms are therefore often regarded as the 250'private fiefdom' of teachers. However, "in full and public view" does not mean 'open to 251the public', but rather that any single action is done openly before an onlooking assembly 252of witnesses. That is to say, when a teacher asks a pupil a question, whether or not the pupil 253answers that question correctly will typically be evidenced by the teacher's reaction to 254everyone in the room. "In full and public view" then points to the fact that those elements 255relevant for the intelligibility of the current interaction are shown *in* the interaction (which 256is not to say that many aspects of what teachers and pupils do may not be visible in that 257way, for example, the teacher may have certain pedagogical aims in mind that he or she 258does not tell pupils). 259

Thirdly, ethnomethodology questions the widespread assumption that social organisation 260has to be described in terms of different levels (such as 'micro' and 'macro'), which have to 261be combined, integrated, or otherwise related by the researcher. Ethnomethodology does 262not deny the relevance of the sort of phenomena that are typically referred to by terms such 263as 'macro' or 'structures' (e.g., governmental policies or funding arrangements), but asks 264265for demonstration of their witnessable relevance in the organisation of the occasion at hand (cf., Sharrock and Watson 1988; Coulter 2001; Greiffenhagen and Sharrock 2008). 266Ethnomethodology does not disregard the fact that classroom activities are situated in 267schools, which are part of administrative districts, which are subject to policy arrangements, 268and so on. For ethnomethodology the challenge is to show whether and how these features 269270are present and displayed in the ongoing production of a classroom lesson. Methodologically, this places the researcher in the same position as the participants in the classroom 271272who have to figure out what is going on in the classroom from what is witnessable within

Computer-Supported Collaborative Learning

the classroom. Finally, ethnomethodology insists that supposedly 'macro' phenomena such 273as school management or educational policy decision making are just other topics that 274could be studied in the same way. 275

So what contributions can ethnomethodology and conversation analysis make to the 276design of educational technologies? A good inspiration is the various 'workplace studies' 277(e.g., Suchman 1987; Button 1993; Luff et al. 2000) that have focussed on the routine and 278 **O1** 'uninteresting' features of the practices surrounding a variety of technologies (from 279photocopiers to traffic control rooms). Whatever the aims and motivations behind the 280introduction of technologies into the workplace (which are often high-minded indeed), it is 281still the case that these will have to be incorporated into existing practices 'on the ground'. 282As Heath et al. (1995, p. 147) point out, the failure of various technological systems "derives 283not so much from their technological limitations, but more from their insensitivity to the 284organisations of work and communication in real world environments". A good understand-285ing of 'the ground' thus may be essential to the design of 'successful' technologies and make 286 it possible "to avoid some of the pitfalls which frequently arise in the introduction of 287'inappropriate' systems into real-world environments" (Heath and Luff 1992, p. 92). 288

The study

This paper is based on a three-month observational study of how a storyboarding software 290was integrated into English lessons. The lessons observed were part of the preparation for 291the Shakespeare element of their Key Stage 3 National Tests in English (SATs). During the 292time of the study, pupils spent the majority of their English lessons studying Macbeth 293through a variety of activities such as reading the play aloud, listening to audio-recordings, 294acting out particular scenes, and watching the play both on video and at the theatre. Having 295thus studied *Macbeth* for some weeks, working with the storyboarding tool became an 296additional activity for this class. 297

The storyboarding tool (see Fig. 1) was designed to enable pupils to construct a visual 298representation of Shakespeare's Macbeth. Storyboarding is, of course, a well-known 299



Fig. 1 Interface

technique for teaching Shakespeare (cf., Gibson 1998, p.210). The new idea was to 300 computerise this traditional technique in order to simplify the construction of frames, 301thereby making it more enjoyable for pupils (who would often have difficulty 302 understanding Shakespeare, as well as find Shakespeare generally unappealing). In sum, 303 the aim of the software was to facilitate creative learning, close engagement with the text, 304and also, at least implicitly, contribute to the preparation for the national exams. 305

We observed and video-recorded lessons from two English teachers of two different year 306 nine classes (thirteen or fourteen year-old pupils). Both lessons in traditional classrooms 307 and those in the computer suite were observed. Furthermore, we conducted several 308 interviews with teachers and pupils. After each lesson in the computer suite, all the 309 storyboards produced by the pupils were saved and collected. In total we observed nine 310 lessons with the first teacher (seven in the computer suite) and thirteen with the second 311(eight in the computer suite). Figure 2 shows the setup of the two video cameras in the 312computer suite. The first camera was always focussed on a particular pair of pupils. The 313 second camera was initially focused at the front (since the teacher was talking to the whole 314 class) and in subsequent lessons focussed on a second pair of pupils. 315

For the purpose of this paper, I looked at all of the lessons of one teacher, selecting 316 instances in which the teacher interacted with the pupils. Since the focus is on the work of 317the teacher, the transcripts focus predominantly on what was said and only highlight 318particularly noteworthy features of the participants bodily conduct and the visual 319arrangements of the items on the screen (since we can understand, for example, that the 320 teacher corrects a spelling mistake without close analysis of the teacher's body orientation 321 or the exact configurations of the items on the screen). Elsewhere I have explored, for 322 example, how pupils 'repair' items on the screen (Greiffenhagen and Watson 2009), how 323both teacher and pupils point to specific places on the screen (Birmingham et al. 2002), or 324 how pupils topicalise the placement of speech bubbles within a frame (Greiffenhagen 325forthcoming). 326

Analysis

🖉 Springer

As already pointed out, the aim of this paper is to investigate the role of the teacher after 328 she had set up the activity. Nevertheless, it is necessary to provide a brief summary of how the teacher introduced both the software and the task in the first lesson (for a detailed analysis see Greiffenhagen 2008). The storyboarding tool was introduced thus: 331

Fragment 1: [Feb 16; first computer lesson]

I T:	before a film is made (1.5) you always get a storyboard (.3) ((aside to a pupil)) you don't need
2	the text, the text's already on there (1.9) you always get a storyboard (.4) it's a <u>series</u> (.) of
3	pictures (.) that goes to make up the final film (.9) what we've got <u>here</u> (.4) is some whizzy
4	new software
5	[]
6	what th- >what this gives you the ability to <u>do: (</u> .7) is to make your own storyboards (.5)
7	°okay?

334

The teacher subsequently told pupils how to construct a frame (by inserting character, 335 pictures, and backgrounds and changing the size, position, and pose of the characters), how 336 to insert speech and thought bubbles (telling pupils that they should use the former for 337 Shakespeare's original dialogue and the latter for their interpretation of the characters' 338 thoughts), and how to use the caption box below the frame (instructing pupils to formulate 339

327

329330

332 **O2**

Computer-Supported Collaborative Learning



board

their reasons or choices for constructing the frame in that particular way). The whole task 340 was summarised at the beginning of the second lesson: 341 342

Fragment 2 [Mar 2; second computer lesson]

I T:	think about how you're going to break up this opening- >this opening part of this scene, how
2	you're going to break it up (1.4) °okay? (.) and start constructing <u>your</u> scenes (.6) this is the
3	work you're gonna save and work on for the next week (1.4) so by this time next week (1.3)
4	we're gonna have a fair interpretation of this scene from each of you (1.0) any questions? (1.3)
5	anybody not know what I want them to do? (.9) so you're gonna fill in- >put in your characters
6	(.4) put in your speech- >choose a bit of speech from the text (.3) and put in the thought
7	bubbles (.) and underneath say why you made the choices that you've made (1.2) °alright?

The task as laid out by the teacher engaged the pupils in a particular analysis of 345 Shakespeare's text and suggests a four-step sequence: picture construction (scene, 346 characters, and props), speech bubbles (for Shakespeare's text), thought bubbles (for their 347 interpretation of that text), and finally the caption box (for their account of the whole 348 frame). Pupils to a large extent followed this sequence, although-as we will see-they did 349not place equal emphasis on each of the four steps. 350

Ratifying

Perhaps the simplest form of interaction between teacher and pupils consists of the teacher 352ratifying the work that pupils were doing or had done. For example, in Fragment 3, the 353 teacher approaches behind two pupils, looks at the work on the screen, and then ratifies 354what they have done. 355

Fragment 3 [Mar 6; fourth computer lesson]

	T:	((approaches behind pupils and looks at the screen))	
2		(1.7)	and the second
3		°good	
4		(.)	
5	Jade:	((turns head towards teacher))	
6		(.5)	
7	Sally:	((also turns head towards teacher))	
8	T:	((nods)) <u>good</u>	6. 3.2001 Jade
9		(.4)	Jude
10		((points at screen))	
11		there's gotta be a punctuation here	the second secon
12		(2.2)	
13		(can't) (inaudible) (inaudible)	
14		((moves away))	
			11:40

358

In this episode the teacher does little more than tell pupils that what they have 359 done is satisfactory. Something that also has been described by Webb et al. 360 (2006, p. 95): 361

343

351

Computer-Supported Collaborative Learning

In some visits with small groups, teachers confirmed the accuracy of students'363answers or procedures (usually in response to a student request that a teacher check364the group's work) and provided no further help [...]. In these similarly brief visits,365teachers typically said little more than 'that's right'.366

What is perhaps remarkable is how unremarkable this interaction between teacher 368 and pupils is (by which I mean that both parties treat it as a familiar aspect of 369 classroom lessons). The teacher clearly has the right (and responsibility) to evaluate 370 pupils' work. In response to the teacher's initial utterance ("^ogood", line 3), both 371pupils turn around to look at the teacher (lines 5 and 7), thereby almost requiring the 372 teacher to produce another turn (which she does in line 8). Pupils can thus expect that 373 as part of her rounds the teacher will regularly stop and look at the work they have 374been doing. 375

What is noteworthy is that although the teacher accepts what the pupils are 376 doing 'in general', she nevertheless points to missing punctuation (line 11). This 377 might seem rather 'picky': the pupils are constructing a storyboarding of a scene 378 from Shakespeare's Macbeth-how important could some missing punctuation be? 379However, the teacher's comment points to an orientation to the fact that the current 380 storyboarding activity is part of an English lesson (i.e., not an IT or art lesson). Hence, 381correct punctuation is an important aspect of the activity, as is, of course, correct 382 spelling: 383

Fragment 4 [Mar 12; sixth computer lesson]

	T:	((appears behind the two pupils, looks at the screen))
2		(3.0)
3		yeah (.) that's good
4		(2.0)
5		the reeds not reefs (1.0) the <u>reed:s</u>
6	PI:	oh::: (.) _┌ huh huh
7	T:	reefs are made of coral and you run ships in them
8	PI:	((corrects the spelling mistake in the caption box))
9		(5.0)
10	T:	okay?
11		((walks away))

This fragment resembles the previous one: the teacher ratifies what the pupils are doing 387 (line 3), but points out a spelling mistake (line 5), which one of the pupils corrects (line 8). 388 Again, the whole episode is treated by both parties as unremarkable. 389

The emphasis on spelling and punctuation, apart from exhibiting the fact that the 390storyboard activity was part of an English lesson, can also be seen as reminding 391pupils-indirectly-that the current activity was not an end in itself, but part of the 392preparation for the national examinations (SATs) at the end of the year. As the other 393 teacher in the study once reminded the class: "In your SATs, you will lose marks if 394you are not spelling words correctly." Teachers recurrently sought to tie the activity to 395the pupils' performance on later standardised exams, which were a 'scenic feature' of 396 the activity (see below). 397

Reminding

Of course, not everything the pupils did was to the teacher's satisfaction. 399 Consequently, the teacher would frequently remind pupils of aspects of the task they 400

386

398

had not (yet) done. In the following fragment, the teacher approaches a pupil working 401 on her own: 402

Fragment 5 [Mar 2; second computer lesson]

	P:	((working on her own on second frame))
2	T:	((approaches behind her; looks at the screen))
3		(3.0)
4		((points to the screen)) thought bubbles?
5		((points at caption box [CB])) >and you've forgot about the choices you've made
6		(1.0)
7		((points at first frame in thumbnail bar)) can you show me this one?
8	P:	((continues working)) (6.0)
9	T:	((points again at first frame in thumbnail bar)) show me this one
10		(1.0)
П	P:	((changes to first frame, which also has an empty CB))
12	T:	>right (.3) you need to put them down here (.) okay? (.) your reasons (.6) why you've
13		chosen that background (1.7) and why you've chosen that pose (.7) okay?
14	P:	((nods))
15	T:	((walks away))

When looking at the frame the pupil is currently working on, the teacher points out 406 that the pupil has not inserted any thought bubbles (line 4), although the teacher had 407 previously told the class that thought bubbles were supposed to depict "what you 408 think that they are really thinking" [Feb 16; first computer lesson]. Furthermore, 409neither has the pupil written "the choices" (for constructing the picture in the way she 410 had) in the caption box (line 5). The teacher then asks the pupil to show her the 411 previous frame. The thought bubble and caption box have not been done in the 412 current frame, but the pupil may still be planning to get to them. However, the 413 caption box in the previous frame is also empty, which is more damaging, since it 414suggests that this is a habitually neglected part of the task. Consequently, the teacher 415repeats the reminder about the writing in the caption box (lines 12-13). What is 416 noteworthy is that the teacher does not directly reprimand the pupil for not fulfilling 417 an aspect of the task, but formulates her suggestion as something that the pupil 418 "forgot". 419

Part of the reason for 'making rounds' is to check whether pupils are completing 420all important aspects of the task and to remind them if they fail to do so. In other 421 words, pupils will not always, without prompting, tackle every aspect of the task 422automatically. There will always be aspects that pupils will treat as, at least 423 initially, too difficult, too boring, or too cumbersome and therefore try to avoid 424 (while for the teacher it may be precisely those aspects that are important). As the 425lessons progressed, it became clear that many pupils did not complete the caption 426 box aspect of the task. Consequently, the teacher would frequently remind both 427 specific pupils as well as the whole class to make sure that they wrote their 428 choices or reasons in the caption box.⁴ The next fragment is just one of many 429examples: 430

⁴ In a post-lesson interview the teacher remarked to me that the pupils are "so taken with the pictures which is great (.) but they're not getting their reasons in".

⁴⁰³

Computer-Supported Collaborative Learning

431

433

Fragment 6 [Mar 9; fifth computer lesson]

Т		((pupils working on thought bubbles in fifth frame))	THE MARCHE	
2		((caption box is still empty))		
3	Nick:	((typing in the thought bubble of Macbeth))		
4	T:	((approaches behind pupils))		
5	Nick:	((stops typing))		
6		((turns towards teacher))		
7		how do you spell outrageous?	Bob	16-44
8	T:	a g e o u s (.) o u t (.) r a g (.) e o u s	Nick	
9	Nick:	((corrects spelling)) (4.0)		
10		((looks at teacher))	berth	
11	T:	question mark?	21/2014 (
12	Nick:	yeah		-
13		((inserts question mark))		
14	T:	okay (.) and then <u>why:</u> you've chosen		N.
15		that ((points at construction window))		35
16		down there ((points at caption box))	and white	
17		((walks away))		

The teacher appears behind two pupils who are currently writing their 434 interpretation of Macbeth's speech in the thought bubble of Macbeth. Nick (on 435the right) is unsure how to spell 'outrageous' and asks the teacher for advice (line 436 7). Once Nick has corrected the spelling, he again turns to the teacher (line 10), 437 possibly to check whether he has spelled the word correctly or to see whether 438there is anything the teacher would like to comment on. In turn, the teacher 439points to some missing punctuation (line 11). After Nick has inserted a question 440 mark, the teacher reminds the pupils about the writing in the caption box (lines 441 14 - 16). 442

What is remarkable about the teacher's utterance is its placement. That is to say, 443 the teacher does not remind the pupils of an aspect of the task they forgot to do in a 444 completed frame (as the teacher did in Fragment 5, where she checked whether the 445caption box was empty in the previous frame). Rather, the teacher reminds the pupils 446 of something that they will have to do in the future. In the summary formulation of 447 the task, the teacher had suggested a four-step sequence for each frame-picture 448 construction, speech bubbles, thought bubbles, and caption box-which most pupils 449 followed. Since the pupils are currently working on the thought bubbles, it is not 450really that they have 'forgotten' to write in the caption box, since it is *next* thing they 451should do. It is more that the teacher expects that they might skip over that step and that 452she therefore emphasises that the next thing they should do is to work on the caption box 453(rather than, say, start a new frame). In this context, it is significant that this is already the 454 fifth computer lesson and the teacher will have gathered a lot of experience of 'typical' 455problems, in particular, pupils' unwillingness to complete the caption box aspect of the 456task. 457

Although pupils often did not write in the caption box, this does not mean that they were 458 not aware of this aspect of the task. This is visible in the next fragment (for a detailed 459 analysis see Birmingham et al. 2002): 460

EDIND 101 Rat S9 B4 Roof 02 F10/2011

Fragment 7 [Mar 5; third computer lesson] 462 I ((pupils are working on the third frame)) 2 Nick: ((is inserting characters)) 3 T: ((approaches behind them from the right)) 4 (2.0)starm'st is about it. ge with 5 T: can I see the first one °lads (.) 6 change it for this first one 7 Nick: do you just click on it? 8 T: veah 9 Nick: ((selects the first frame)) 10 (8.0) °hhh oka_ry:: 11 T: 12 ((turns to Nick)) >we need to °wrote Ben[.] 13 about >wrote about what- >why we thought they 14 thought that (.7) in the second °one (.) >frame (.) Nick: oh yeah 15 16 (1.0) Ben 17 T: you haven't (-) you haven't put that down there? Nick 18 Ben: no 19 T: °okay 20 (1.0)21 T: just put the second one up 22 Nick: ((clicks on the second frame)) I am alraid they have awaked, Tis not done. The attempt and not 23 (2.0)24 T: yeah (-) you need to put (.) >you need 25 some reasons down - here 26 Ben: yeah 27 T: as well (.) r don't you 28 Nick: yeah 29 T: okay 30 ((walks away))

The teacher approaches the pupils (who have just started to work on their third frame) and asks 463 them to change to the first frame (lines 5-6). The teacher then looks at that first frame for a long time, 464without saying anything (line 10), probably reading what the pupils have written in the thought 465bubble ("He better have done the deed or he can pay for the pizza.") and caption box ("We chose 466 Lady Macbeth's thoughts to be these because she is using hunger to descise [sic] her fear."). Just as 467 the teacher starts to speak again (line 11), Ben (sitting on the left) turns towards Nick (and the 468 teacher) and remarks that they still have to write "why we thought they thought that" in the second 469frame (lines 12-14). Nick agrees with Ben (line 15) and the teacher provides a reformulation of this 470omission (line 17), before asking to see that second frame (line 21). Once she has looked at the frame 471for a few seconds, she repeats Ben's formulation that they need "some reasons down here as well". 472

This fragment is noteworthy because it is one of the *pupils* who addresses their failure to complete the caption box requirement of the task. Note that this admission actually occurs in such a way that it could be seen to pre-empt the teacher's criticism: Ben starts to talk precisely at the moment at which the teacher has spent a long time looking at the first screen and starts to speak again. At this point the pupil can expect the teacher to ask them to move on to the next frame (she has ratified the first frame and is now likely to check the second frame). Since

Computer-Supported Collaborative Learning

they have not written in the caption box in the second frame, this would result in a negative479evaluation by the teacher (in contrast to the "okay" on their first frame). Ben's480acknowledgement of their omission thus pre-empts a potential criticism by the teacher.481

What this episode demonstrates is that although pupils often did not write in the caption box, it 482 was not that they were not aware of this aspect of the task. It was rather that the pupils, on occasion, 483 displayed a difference in orientation to that of the teacher in what they considered important or 484 interesting in the current activity. In other words, sometimes what pupils deemed interesting 485 diverged from the teacher's educational aims for the current task (this will be taken up below). 486

Making suggestions

487



The two pupils are working on their first frame. One of them (Sue) has copied a large 496 piece of text into Lady Macbeth's speech bubble. In fact, it is so much text that it does not 497 fit into the speech bubble. The other pupil (Bob) tries to solve this problem by resizing the 498 speech bubble, i.e., making it bigger (line 4). However, even the enlarged speech bubble 499 cannot display all the copied text. In response to this, Sue suggests to "just junk some" (line 5), i.e., to delete some of the text. 501

The teacher overhears this and suggest to the pupils to "break it [Lady Macbeth's 502monologue] down into smaller pieces" (line 8), i.e., to have the monologue "over a couple 503of scenes" (line 9). The teacher does not only propose this as a good solution to the 504technical problem (of too much text for a speech bubble), but also gives a rationale in terms 505of the task. The pupils are supposed to visualise a scene from a play, where a person who 506gives a long monologue would typically not stand still. Therefore the pupils should have 507the characters "moving around" (line 12), which is exactly what the pupils subsequently do 508(Fig. 3). 509

The teacher in this fragment does not remind the pupils of something that they have 510 forgotten to do. In her initial formulation of the task the teacher had not made any 511 specification about 'how much' of Shakespeare's text should be placed in a speech bubble. 512



Fig. 3 The frames at the end of the lesson

Computer-Supported Collaborative Learning

However, when the teacher is confronted with this potential solution, she does not accept it. 513 This way of visualising the scene is not how the teacher wants pupils to complete the task. 514 The teacher here elaborates on her original instruction, which points to the recursive nature 515 of tasks: once the pupils have begun to carry out the instructed actions, each of the original 516 instructions might be further expanded, clarified, corrected, etc. as needed (cf., 517 Greiffenhagen 2008). 518

Note that the teacher does not just say that what the pupils are doing is wrong. Rather, 519 she also makes a suggestion of what to do instead, i.e., how to correct what in the teacher's 520 eye is currently wrong with their work: they should break the text into smaller pieces (line 8), have it over a couple of scenes (line 9), and have the characters moving from frame to 522 frame (line 12). 523

It may be tempting to suggest that we have here a situation in which two different parties 524have two alternative, equivalent, suggestions, but that it is due to the teacher's authority or 525power that one of the alternatives is selected. However, this way of characterising the 526situation would miss what the teacher is trying to do. The teacher's suggestion is not just 527different, but also more complex, complicated, and challenging. It requires the pupils to do 528more than they are currently doing: rather than having one frame for Lady Macbeth's entire 529monologue, they will have to have at least two frames and think about how to depict Lady 530Macbeth in each of them. In other words, it is not so much that the teacher tells the pupils to 531do it her way, but that she challenges the pupils to come up with a more sophisticated 532solution to the one they have done so far. It is a suggestion that is supposed to stimulate 533more imaginative work from the pupils. 534

As mentioned above, pupils often did not write their 'reasons' in the caption box. If they 535 did, it often seemed that their main concern was to write 'anything' so that they could be 536 seen to at least formally comply with the requirement. One of the problems for the teacher 537 was thus to encourage pupils to spend more effort in finding formulations for the caption 538 box. In the next fragment, the teacher appears behind two pupils who have written a rather 539 minimal account of their frame in the caption box, namely: "Macbeth is guilty and he knows it. Lady Macbeth is reflecting on her poor past." (see Fig. 4). They are now in the 541

Fig. 4 The current frame [reconstructed]



544

hey Fi	will in	nsert into the next frame.
	agint	
		((pupils have inserted a blank fifth frame; construction window displays fourth frame))
	Bob:	((scrolling through text))
3	1:	((approaches behind them))
4		(3.0)
5		what do you mean by her <u>poor past</u> (.) what do you mean by that?
6	Bob:	((sniggers; continues scrolling))
7	Nick:	uhm:: (.) like (.) the way she was brought up
8		(.7)
9	T:	how do you know how she was brought up? you <u>don't</u>
10		(8.0) ((Bob continues scrolling through text))
11	T:	life before she married Macbeth is better
12	Nick:	okay
13		(1.5) ((Bob still scrolling through text))
14	T:	suggesting <u>what</u> ? what does it suggest?
15	Nick:	she married into _F uh::
16	T:	>okay (.) Bob (.) can you stop doing this for a second and answer this
17		question as well?
18	Bob:	okay ((stops scrolling))
19	T:	what are you suggesting by this? ((points at TB))
20		it's funny, it's amusing (.) okay? (.3) but what are you
21		suggesting about her- her past?
22		(.8)
23	Bob:	that it (.2) was (.2) a bad past
24	T:	or:: (.) that she's hard
25		(.3) Nick Bob
26	Bob:	yeah
27	T:	she's hard and she's dealt with death before=
28	Nick:	=yeah
29	T:	that's what you can put in there then (.) in fact that's what I'd suggest you put in there
30	Nick:	c'mon
31	т:	okay? get in there then (1.4) infact (instead of) poor past (you can put) awful or something
32		((leaves))
33	Nick:	((starts typing))
<u> </u>		

process of scrolling through the text of the play in order to find the part of the dialogue that 542 they will insert into the next frame. 543

The teacher starts by asking the pupils about the text they have written in the caption 546 box. Nick (who was the one who had written that text) tries to answer the teacher's 547 question: he explains that they were referring to "the way she was brought up" (line 7). This 548 is not accepted by the teacher who argues that they do not know how Lady Macbeth was 549 brought up (line 9). After a long pause, the teacher makes an alternative suggestion; they 550 could instead write: "[Lady Macbeth is reflecting on] the life before she married Macbeth" 551 (line 11).

The teacher then focuses on the thought bubble of Lady Macbeth (which 553 currently reads "He's being a bit over the top, back in my hitman days this was everyday stuff.") and asks the pupils what they are suggesting by this. The teacher clearly does not accept what the pupils have written in the thought bubble, but she does not directly tell them so. She characterizes what they have written as "funny" and "amusing" (line 20) and marks the content of the thought bubble as outside the

Computer-Supported Collaborative Learning

realm of the assignment. Nevertheless, she uses the content as a resource for 559 pursuing further reflection, asking the pupils what they are trying to express (line 21). Bob gives a candidate answer: they are trying to suggest that Lady Macbeth 561 had a "bad past" (line 23). To this the teacher offers an alternative: Lady Macbeth is 562 "hard" (line 24) and "has dealt with death before" (line 27). These suggestions get accepted by both pupils. 564

The teacher clearly is not satisfied with what the pupils have written in the caption 565box and the thought bubble. In contrast to the previous fragment, where the teacher 566gave the pupils a new problem which they were supposed to solve, in this fragment 567the teacher makes a relatively explicit suggestion as to what the pupils should write. 568In fact, the pupils subsequently write almost word-by-word what the teacher suggested 569("Macbeth is guilty and he knows it. Lady Macbeth is reflecting on her life before 570she married Macbeth. It shows that she is hard and tough and has dealt with death 571before."). What is interesting is that the teacher's suggestions preserve aspects of the 572pupils 'inappropriate' solutions. That is to say, the teacher does not completely 573dismiss the pupils' current solutions, but rather transforms or 'revoices' (cf., 574O'Connor and Michaels 1993) them. From "poor past" to "her life before she married 575Macbeth"; from "hitman days" to "she is hard and tough". Rather than dismissing what 576the pupils have done, the teacher marks it as partially inappropriate and makes a 577 suggestion how they can transform their text so it fits with the teacher's conception of the 578task and thereby into the context of an English lesson on *Macbeth*. Thus, again, we can 579see the teacher not being completely negative about what pupils have done (although this 580is marked as inappropriate), but as challenging them: what they are doing is funny and 581amusing, but they have to be more explicit in terms of their suggestions and to try to link 582it to the content of the play. 583

When reviewing what pupils have done so far, the teacher frequently came across 584work that although not 'wrong' or 'incomplete' went against the pedagogic aims of 585the task. In such cases, the teacher typically did not just tell pupils *that* there is a 586problem with their work, but furthermore explained why there is a problem and 587 formulated a candidate solution for how to rectify it (thereby prompting them to produce 588further work). In doing so, the teacher frequently reoriented pupils to the 'point' of the 589task (i.e., to the aims of the current activity). This is, perhaps paradoxically, something 590that is a particular problem for activities that are seen as 'fun' by pupils, since pupils can 591lose the focus on what they should, educationally, be getting from the activity. 592Consequently, teachers have to, continuously, reorient pupils to what is educationally 593important. 594

Maintaining classroom control

Not everything the teacher does while making rounds is related to academic aspects 596of the lesson. Part of the reason for walking around has to do with classroom 597 management (cf., Macbeth 1990, 1991), i.e., with establishing and maintaining 598classroom discipline (which means, minimally, that pupils should be sitting on their 599seats, not talk too loudly, and at least appear to be working). The next fragment gives a 600 rather peculiar illustration of how the teacher can accomplish this: the pupils making 601 various jokes about their current frame (Fig. 5), which contains a piece of dung and which 602 leads one of them to characterize Chris (sitting on the computer to their left) as "a 603 donkey-faced mule". On hearing this, Chris starts to lean over, making several comments. 604 The teacher spots this and quietly appears behind Chris. 605

606



608

Nick and Ben are working on their frame, although currently they seem to be 'joking 609around'. Nick suggests that Chris (the pupil sitting to their left) could be a "donkey-faced 610 mule". Upon hearing this, Chris leans over, looks at the screen (line 9), and then continues 611 with the 'name calling', choosing Nick as his target (line 12). When Chris continues with 612this, even Pete (sitting on the far left) glances to the computer of Ben and Nick (see the 613 picture attached to line 18). While this is going on, the teacher slowly appears behind Chris, 614 placing her hands on the back of his chair. After standing there for a moment, the teacher 615utters the sound "BOO", which prompts Chris to turn around and solicits laughter from the 616 other pupils. Chris quickly turns his attention to his own computer and the teacher leaves. 617

Obviously, pupils are not 'on task' all the time, but by making rounds the teacher can 618 minimize 'off task' behaviour. In this episode, one pupil (Chris) is visibly not working on 619

Computer-Supported Collaborative Learning

Fig. 5 Current frame [reconstructed]



the task: he is not looking at his own screen but at the screen of other pupils; furthermore, 620 he is not helping them (which might be acceptable), but is rather engaged in some form of 621 banter. What is so lovely about the teacher's intervention is that she does not have to say 622 anything. The way the teacher creeps up behind Chris makes visible for everyone except 623 Chris that he is under surveillance and displays that there is something sanctionable about 624 his current behaviour. The teacher's surveillance is brought to his late attention through the 625 'BOO'. Although not a 'quiet reproach' (Macbeth 1990), it is a reproach that does not need 626 to be explicitly formulated. That is to say, the teacher's "BOO" (line 25) is hearable as a 627 reproach without the teacher having to say to Chris something like "stop what you're 628 doing" or "get back to your work". Instead, the teacher can rely on shared norms of the 629 classroom for Chris to do just that. Furthermore, it is not just Chris who hears the teacher in 630 this way, but also the other pupils who react to the teacher's "BOO" with collective 631 laughter, exhibiting that they can easily hear the teacher's utterance for what it is meant to 632me: a non-explicit reproach. 633

Although good-humoured, after all this is a minor offence, episodes such as this 634 are still vital for establishing classroom control: pupils are aware that the teacher 635 may approach them—or just look at what they are doing from the other side of the 636 room—and this potentiality helps to keep them from departing from 'acceptable' 637 classroom behaviour too often or too much. In that sense, it is not just the teacher 638 who monitors pupils, it is also pupils who monitor the teacher (pupils often quickly 639check whether the teacher is looking at them before engaging in 'off-task' activities). 640 In the current fragment, Chris is so engrossed in the exchange with Nick and Ben 641 that he does not notice that the teacher is approaching behind him. Indeed, the 642 teacher manages to lean on the back of his chair without Chris becoming aware of 643 her presence (in fact, for a few seconds the teacher mimics Chris's body movement, 644moving backward when Chris is moving backward). In that sense, the teacher's 645 "BOO" is a surprise and has a 'caught you (in the act)' character, since she has 646 given Chris an opportunity to see for himself that he needs to get back on task 647 (simply by approaching behind him). 648

In sum, pupils do not have to be seen to be 'on task' all the time, but neither can they be 649 seen to be 'not working' too often. Furthermore, teachers can and do expect that pupils will 650 watch and monitor for their approach and adjust their behaviour accordingly. 651

Making whole-class announcements

When reviewing the work of individual pupils, one question the teacher has to ask her- or 653 himself is whether the current problem (or solution) is specific to these pupils or whether it 654could be relevant to other pupils as well. In the case of the latter, the teacher may choose to 655make an announcement to the whole class. In the next fragment, the teacher tells the class 656 that if they want a character in the same size and pose as in a previous frame, they can drag 657 and drop the character from the thumbnail of that frame (in the thumbnail bar) into the 658 current frame (rather than inserting the character from the databank and then changing the 659 size and pose manually): 660

Fragment 11 [Mar 2; second computer lesson]

1	T:	I just found out folks (.) if you want to copy (.) just copy the pose into the next (.5) frame (.9)
2		you click on new frame at the top (.) so you got a blank one appearing at the top (.5) at the bar
3		across the top yeah? (.6) and then just click on the figure you want to copy (.) and <u>drag</u> it
4		out (.9) to the new frame (.) and it will just copy itself up there

What is interesting is that the teacher's announcement is presented as being touched-off (cf., Sacks 1992; Winter 1969, Lecture 1) by what the teacher has observed other pupils doing. In other words, she does not simply tell the class what to do, but says that she "just found out" (line 2). This is even more explicit in the next fragment, taken from the fourth computer lesson, in which the teacher instructs the class to make use of the scale feature of the software:

Fragment 12 [Mar 6; fourth computer lesson]

🖉 Springer

	T:	some of you now have started to play around with <u>scale</u> (.4) so you're having- (.) uh:m
2		(.) listen up (.2) thanks (.8) as I'm walking around (.4) some of you are playing around with
3		scale (.) so you're maiking (.4) at certain points in the text (.3) one character when they sort
4		of got something to say (.) much <u>bigger</u> ; (.) than the other (.7) some of you are looking at the
5		screen >(when) both have the same size (.) you're bringing one up much more to the
6		foreground putting one more into the background (.) and the effect of that is quite interesting
7		(.6) Pete and (.) I think Pete and Dave tried it first and now I've seen Chris has started doing
8		it as well (.3) uhm (1.2) <u>uh::</u> (.5) Jeff's doing it as well (inaudible) (.) it's quite effective >have
9		a go at that (.4) start moving the <u>scale</u> around a bit (.4) make one character bigger than the
10		other when they've got a lot to say (.6) or put one character right at the background (.) see
П		what effects you've got with that

In situations such as these, the teacher is sharing a solution found by particular pupils. 673 The reason for sharing is that it is likely that other, if not most, pupils will have encountered or will encounter the same problem; sharing the solution will thus save time and effort. The 675 teacher is, in effect, broadcasting a solution to the whole class, since it is difficult for these 676 to spread effectively without the help of the teacher. In this case, the teacher is producing 678 adds a new facet to the task. 679

The teacher's suggestion is again not presented as something that the teacher has thought of completely on her own, but as something that she has observed in the work of pupils. For the logic of making such a statement, it is irrelevant whether "as I'm walking around some of you are playing around with scale" is a 'correct' description of why the teacher is making this announcement, since the pupils are in the same position as the researcher and cannot

663 664

661

652

665 **O3**

```
666
667
```

```
668
```

669 670

Computer-Supported Collaborative Learning

'verify' whether what the teacher is saying is true. What is important is that the scale685function is not introduced as something simply requested by the teacher, but as something686observed by her, i.e., as something that was 'discovered' by pupils and not by the teacher.687This might be an effective device used by teachers in order to motivate others pupils to try688this out, since it allows the teacher to appear not as the 'director' (telling pupils what to do),689but more as a 'moderator' (communicating to the class what she has observed other pupils690doing).691

Of course, the teacher not only announced 'positive' examples, but also 'negative' ones, 692 in particular, the failure of many pupils to write in the caption box: 693

Fragment 13 [Mar 6; fourth computer lesson]

Ι	T:	when I'm going round I'm seeing (.) Sarah? (1.0) some <u>fantastic</u> (1.0) scenes (.) there's some
2		really nice ones (.) there's some great stuff coming on (.8) what I'm a <u>bit</u> concerned about is (.)
3		that a lot of you aren't putting anything in the explanation boxes at the bottom (.) telling me
4		why you've done what you're doing (.7) there are gonna be merits and stuff (.) going at the end
5		of this (.) alright? for the ones that are most effective >and what I'm going to be looking at (.8)
6		although the pictures are important >1'll be looking at the thought bubbles (.7) and what's
7		written in that bottom box (.) I want to be able to see (.4) what's made you make the decisions
8		that you've made (.) why you've made the choices that you've made (.7) so can you make
9		su:re (.4) that that grey box at the bottom of each scene has been filled in as you go along (.4)
10		why you've chosen (.) to portray the characters the way you have (.2) why they're thinking what
П		they're thinking \geq why they're standing the way they're standing (.3) why you've chosen that
12		background
13		
14		so whilst this is a great exercise (.4) your director's board (.) it is (.) I need to know why you're
15		making those choices (.3) cos that's what's going to get you through your SATs (1.0) you're not
16		going to have kar2ouche in your SATs unfortunately >it would be wonderful if you could (1.0)
17		what you are going to have to write down (.) is why you think characters are saying what
18		they're saying at a certain time (0.7) so get that- >those boxes filled in please

The teacher reprimands the pupils for not having put "anything in the explanation boxes 697 at the bottom" (line 3). As in the case of the scale functionality (Fragment 12), the 698 announcement is presented as being touched-off by what the teacher has observed ("when 699 I'm going round I'm seeing"). However, there are some important differences. Firstly, the 700 teacher does not launch directly into her criticism, but prefaces it with praise ("fantastic (.) 701scenes", "really nice ones", "great stuff"). This is a familiar feature of criticism, where one 702 first points out a positive feature, before launching into problems ("it's really nice, but..."). 703 In other words, the criticism is cushioned through the initial compliment. Note how the 704positive evaluation is formulated as only applying to some frames ("some fantastic scenes", 705"some really nice ones", "some great stuff"), whilst the negative evaluation is formulated as 706 applying to "a lot of you". In other words, a few positive instances are used to mitigate the 707 criticism of the majority of the pupils. Secondly, although in both fragments the teacher 708 instructs the pupils to do something (to use the scale function and to write their reasoning in 709 the caption box respectively), in the 'positive' case, the teacher had named individual pupils 710 that had touched off her announcement, but in the 'negative' case she does not do so, but 711 only speaks of "a lot of you" (line 4). In other words, she formulates her request as a 712generalised corrective that does not allow its recipients to determine which (if any) 713 individuals are the occasion for it and whether there really are "a lot of you". The teacher 714 indicates that it is not important who did not write in the caption box, as long as everybody 715

694

727

739

740

who hasn't done so corrects this. The teacher's formulation makes clear that every pupil 716 should check whether the criticism applies to her or him. 717

Finally, the teacher gives reasons for why pupils should be writing in the thought bubbles and 718 caption box. The teacher emphasises that in her evaluation of the task, "although the pictures are 719 important" (line 6), her emphasis will be on the thought bubbles and the caption box. This 720 emphasis on the written elements (thought bubbles and caption box) over the picture is further 721 accounted for by reference to the SATs (lines 15-18). The teacher thus informs pupils that the 722 thought bubble and caption box aspect of the current task is more directly related to the eventual 723 assessment than the composition of the picture. What is educationally noteworthy about the 724 current task is tied to what the pupils will eventually have to do in the written exam. The teacher 725thus again re-orients pupils to the 'point' of the task (since they are having too much 'fun'). 726

Linking this activity to the exams

This brings us to a final aspect of the work of the teacher during collaborative work, which 728 has to do with the 'double duty' these activities perform. On the one hand, most computer-729supported collaborative learning activities which are embedded in real classroom contexts 730 (rather than in experimental situations) are worthwhile 'stand alone' activity. On the other 731 hand, most of them are also embedded in a larger programme of work, often with the 732 explicit aim of preparing pupils for an exam. In our case, although the storyboarding 733 activity as clearly in itself a worthwhile way to engage pupils with *Macbeth*, it was also 734735 meant to prepare for their final examination.

In the last fragment we had seen the teacher explaining to pupils the need to write in the 736 caption box by reminding them that they would not have the software as part of their 737 exams. A similar announcement is made two lessons later: 738

Fragment 14 [Mar 12; sixth computer lesson]

Ι	T:	UHHH (.4) <u>Year</u> (.) <u>Nine</u> (.) as I walk around (.5) I <u>find</u> that you haven't all written in your
2		reasons underneath the screens (.) why (.4) you've made the choices you've made (.8) UHH: (.)
3		thank you (0.4) LISTEN (1.6) uh: (.) thank you (1.0) ((class quiet now)) I was under the
4		impression that you <u>had</u> all done this (0.5) when I asked on (.8) Friday (.) I was <u>su:re</u> that you
5		had all done this (.6) then I find that you haven't all done this >this is very, very important (.) in
6		the SATs exam (.3) that's what you are going to be tested on (1.0) so if you've got any frames
7	4	there that you have not written there underneath the reasons for your choices (.5) in that
8		particular frame get them written in <u>now (.)</u> and I'm going to come around to spot check

In this fragment, the teacher again touches off her announcement by stating that it concerns something that she has observed (line 1). She then provides another formulation of why the writing in the caption box is treated as so important, since it is this aspect of the task that they will be tested on (line 6). 743

This fragment nicely exhibits that although the storyboard activity was in a certain sense 746 a self-contained activity, it was also part of a larger project, the preparation for SATs. Lynch 747 (1997 [1979]), in a study of pre-trial discussion among lawyers, argued that although the 748 judge may not be present during these discussions, the participants still orient to the judge, 749e.g., by projecting what a judge might do. In other words, the judge is a 'scenic feature' of 750these discussions. Similarly, Sharrock and Anderson (1994) show how 'the user' is a scenic 751feature of engineering design projects, while Zemel et al. (2008, p. 83) demonstrate how a 752non-present actor can be still be relevant for the ongoing interaction. In our case, we might 753say that the exams (SATs) were a scenic feature of the storyboarding activity. 754

Computer-Supported Collaborative Learning

The term 'scenic feature' does not imply that the exams were the explicit focus all the 755 time. For example, the SATs were not mentioned during the very long introduction of the 756 task. However, the SATs could be invoked at any point, for example, in explaining why 757 correct spelling is important and why the teacher placed such great emphasis on the writing 758in the caption box. A perspicuous example can be found in our final fragment, in which the 759pupil asks the teacher whether Macbeth and Lady Macbeth can "live on a farm" (this 760 fragment occurs about a minute after Fragment 10). 761 762

Fragment 15 [Mar 5; third computer lesson]



The two pupils are considering what to write in the thought bubble of Lady Macbeth. 763 One of the pupils (Nick) suggests that they should write that they live on a farm (line 6). 766 The other pupil proceeds to type in Macbeth's thought bubble (line 9). Nick subsequently 767 repeats his suggestion, which Ben does not accept (line 11). In response, Nick calls out to 768 the teacher (line 13) and asks: "can they live on a farm?" (line 10–15). Nick's question is 769 hearably 'unusual': when the teacher repeats the question (line 17), pupils sitting close to 770 Ben and Nick start to look over and laugh (line 18); even Nick smiles (still attached to line 771 20). However, the teacher does not immediately dismiss the pupil's question. Once Nick 772 has produced an account of why he wants them to live on a farm, the teacher prompts Nick 773 to give a further elaboration (line 21). When he has done so, the teacher provides a re-774 formulation of what the pupil is trying to express. The teacher characterises the suggestions as 775 "humorous" and then uses the exams as a reason why it is unacceptable. As in some of the 776 previous fragments (e.g., Fragment 9), the teacher preserves an aspect of the pupils' suggestion 777 while simultaneously transforming it (cf., Sacks 1992, Winter 1969, Lecture 9, p. 138). 778

Although the teacher's suggestion is eventually accepted by the pupil, I would suggest 779 that this episode and the fact that pupils often did not write in the caption box demonstrates 780that the orientations of the two parties are in several important respects different. The 781 teacher, while appreciative of the fact that pupils were enjoying the storyboarding activity, 782 also wanted them to prepare for the exams. In contrast, the pupils occasionally seemed to be 783 carried away with the purely pictorial aspects of the storyboarding activity (remember the 784teacher's remark in a post-lesson interview: the pupils are "so taken with the pictures which 785is great (.) but they're not getting their reasons in"). Given their focus on the pictures, the 786 writing in the caption box seemed for pupils to be a 'dirty work designation' (Hughes 1971; 787 Emerson and Pollner 1976; Button and Sharrock 1996, p. 382), i.e., constitutes work that 788 they did not do for themselves, but only for others (the teacher). 789

The pupils needed little encouragement to produce the visual representation of the play. 790 However, the teacher frequently had to remind them that the current activity—while 791 certainly interesting and worthwhile—was also part of the preparation for their exams. Just 792 as the teacher's suggestions were meant to keep pupils 'on task', these remarks were meant 793 to remind pupils to what was important if they wanted to do well in their exams. 794

Discussion

795

While it is clearly important how a teacher introduces a particular task (cf., Greiffenhagen 796 2008), it is perhaps even more significant how the teacher subsequently follows the 797 trajectory of that task, especially in situations in which pupils work on a task over several 798 lessons. By 'making rounds' the teacher is able to monitor and assess how the pupils are 799 working on the task and can then choose to ratify work that is proceeding along the right 800 lines (e.g., Fragment 3), remind pupils of aspects of the task that they have neglected (e.g., 801 Fragment 5), as well as make expansions, clarifications, and corrections in light of what the 802 pupils are doing (e.g., Fragment 8). These interventions and announcements allow the 803 teacher to deal with the recursive nature of tasks, which in a sense are given shape 804 (reflexively and always revisable) through the workings of the pupils. The teacher does this 805 both by talking to pupils individually as well as making announcements to the whole class 806 (which are, interestingly, often formulated as being touched-off by what the teacher has 807 observed other pupils to have done, e.g., Fragment 12). By walking around the classroom 808 the teacher is also able to maintain order, making sure that pupils to a large extent display 809 810 an appearance of working (Fragment 10).

Computer-Supported Collaborative Learning

When the teacher approaches pupils and looks at their work, pupils expect a reaction 811 from the teacher. Teacher's interactions with pupils can be very brief, as in offering a 812 passing remark or pointing out a spelling mistake (Fragment 6), or can be more prolonged 813 and deal with more complicated matters, for example, when the teacher is not satisfied with 814 what pupils have written in the thought bubbles and caption, but then uses that content as a 815 resource to pursue further reflection (Fragment 9). On the whole, the teacher does not have 816 much time for these engagements, since he or she cannot linger too long with a particular 817 pair of pupils before other pupils begin to call for her or his attention (in Fragment 15, for 818 example, you can see a girl in the back of the three stills who has her hand up throughout 819 the exchange between Nick and the teacher). By paying close attention to what the teacher 820 does, the aim has been to make visible those routine aspects of teaching, which are 821 nevertheless essential for the accomplishment of successful lessons. 822

The emphasis in this paper has been on the perspective of the teacher and has only in passing discussed how the various comments were subsequently taken up by pupils (e.g., by looking at the storyboard at the end of the lesson as in Fragments 8 and 9). Although it would be interesting to explore this in greater detail, the conceptual and methodological challenges should not be underestimated: Would we only examine those occasions in which pupils explicitly discuss the teacher's instructions? Or can pupils take up the teacher's instruction without any discussion?

The introduction raised the absence of detailed studies of the work of the teacher during 830 collaborative activities and argued that this might be a reflection of the ambivalent status of 831 teachers in theories and studies of collaborative learning. On the one hand, collaborative 832 learning is seen as an alternative to traditional teacher-led instruction with the consequence 833 that the teacher drops from view in pupils' activities. On the other hand, it has always been 834 recognized that the teacher plays a crucial role in facilitating pupils' collaborative activities 835 (e.g., Dillenbourg 2008, p. 131).

What the teacher did in these fragments could variously be characterized as fruitful, 837 stifling, encouraging, dismissive, too specific, not specific enough, etc. In particular, it may be 838 tempting to distinguish between interventions that deal (only) with classroom management 839 and those that engage in pedagogical interaction (the 'real' work of the teacher). What a close 840 analysis of different types of teacher interventions shows is that it is rarely one or the other 841 and that teachers are typically doing both at the same time (to varying degrees). When the 842 teacher creeps up behind a pupil who is currently joking with other pupils and then surprises 843 that pupil (Fragment 10), there is certainly little 'teaching' going on. However, when the 844 teacher is correcting a spelling mistake (Fragment 4) or reminds pupils to work on their 845 thought bubbles and caption box (Fragment 5), this is more difficult to characterize. Is the 846 teacher only reinforcing the normative social order by maintaining her authority? Or is the 847 teacher orienting pupils to the general educational aims of the activity (which had not just to 848 do with constructing 'pretty pictures', but also with preparing them for subsequent writing 849 assessments)? I think a strong distinction between 'management' and 'instruction' is difficult 850 to maintain, since the two are in various ways intertwined. 851

Furthermore, although there are certainly tensions between the perspective of the teacher 852 and those of pupils (as in which aspects of the task to spend most effort on), it would be 853 wrong to characterize our episodes as antagonistic struggles, in which the teacher is trying 854 to enforce authorized knowledge while the pupils are trying to discover things on their own. 855 I think it would be difficult, for example, to distinguish instances in which the teacher 856 interacts with pupils "in an intimate-egalitarian orientation" and those that are of "rigid 857 authoritarian orientation" (categories 2 and 4 in Hertz-Lazarowitz and Shachar's [1990] 858 classification). For example, when the teacher suggests to pupils to "break it down" 859 (Fragment 8), is that an instance in which the teacher tries to interact with pupils as a 'team
member' or is the teacher giving instruction in an authoritarian fashion? Similarly, when the
teacher does not accept what the pupils have written in the caption box (Fragment 9), she
clearly draws on her authority, as she builds on and develops their work.

A very different reason for the absence of the teacher in studies of collaborative learning may perhaps be a consequence of the amazing success of computers in focussing pupils'—and researchers'—attention. That is to say, partly as a result of their novelty, but also as an expression of how computers are more 'fun' and engaging, and are so in a culture that highly values recreation, pupils often become easily engrossed in these activities. Both educationalists and teachers have been excited about this aspect of instructional technologies. As Roschelle and Teasley (1995) argued such technologies create a 'joint problem space': 870

We see the 'computer-supported' contribution to collaborative learning as contributing a872resource that mediates collaboration. In ordinary circumstances, one cannot imagine two87315 year olds sitting down for 45 min to construct a rich shared understanding of velocity874and acceleration. But in the context of the support provided by the Envisioning Machine875activity, our students were successful in doing just that. (p. 95)876

This was also the case in our study. Both teachers remarked that the technology helped 878 pupils to engage with Shakespeare's often difficult text in ways that would otherwise have 879 been difficult. One teacher said (in a post-lesson interview): "The students loved it and what 880 I found was that the kids remained focussed". The other remarked: "I think for the lower 881 end it's brilliant. Tom has jumped a National Curriculum grade at least. Just by the fact that 882 it's visual for them and they find it easy to do, they don't realise that they're actually 883 learning something, which is brilliant." However, the way that technologies focus pupils' 884 attention is not without hazards, since it may also become a distraction from and competitor 885 to any educational aims the teacher may have in mind. In our case, some pupils became 886 preoccupied with the pictorial aspects of the task, neglecting the fact that this was an 887 English lesson (rather than an art class). One of the important aspects of the teacher's work 888 is to constantly remind pupils of the important aspects of their task. 889

This brings us to a final point: while there is a relative absence of studies that take interest in 890 the teacher's work and professional judgement, almost no study mentions how the computer-891 supported collaborative learning activity relates to the *exams* that pupils will have to eventually 892 take. While the problems of 'teaching to the test' are widely acknowledged, it is nevertheless 893 the case that both teachers and pupils have to bear in mind that exams are an important aspect 894 of classroom life. This study is a good example: The computer lessons with the storyboarding 895 tool were nothing like 'drill and practice' as a direct preparation for the exams. Nevertheless, 896 the exams were a 'scenic feature' of what the pupils were doing, allowing the teacher to 897 emphasize both the importance of correct spelling as well as the continuing emphasis on the 898 writing in the thought bubbles and the caption box. In order to create instructional 899 technologies that will have a lasting impact, it is important to take account of this. As 900 Dillenbourg and Jermann (2010, p. 535) rightly observe: 901

Teachers are not free to teach what they want; they have some degree of freedom in
primary school, almost no freedom in secondary schools and a bit more at university903
904level. Our community has been quite creative in designing activities that address skills905
905that are not in the curriculum or only in the 'meta'-section with transversal skills. An
extra-curriculum investment from teachers and students is acceptable for a short duration
(the time of an experiment), but such an environment will not be used over long term if it
is [not] justified by the importance of its learning objectives within the curriculum.903
903

Computer-Supported Collaborative Learning

In that sense, it is not just the teacher who is absent from studies of computer-supported 910 collaborative learning, but also the role that examinations play in collaborative learning 912 activities (where examinations are not simply an 'external' factor but something that is 913 visible and oriented to in classroom interaction). 914

In sum, although most champions of technology have aimed for fundamental changes of 915 classroom practice, when we look at actual cases of the adoption of various technologies, 916 we find that teachers have selected those that fit with their existing practices (Cuban 2001). 917 It thus may be more realistic—although (at least at first sight) less appealing—to consider 918 how technologies can lead to incremental rather than revolutionary changes in classroom 919practices. So it may be time to renew our interest in the work of teachers in the analysis of 920 collaborative learning activities. As Hammer (2002), in a critical review of Colella's (2002) 921 study of a learning environment based on programmable badges, put it: 922

'How can technology help teachers teach?' That question sounds 'teacher-centred' 923 ('bad') rather than 'student-centred' ('good'), but with respect to the development of 925educational technology this is a false dichotomy. Colella is writing within a 926 community that has a long history of developing wonderful technological tools, 927 working toward the sort of engagement, participation, and learning evident in this 928 chapter. But students do not generally engage, participate, and learn in these ways-929 and they did not here—without facilitation, support, and guidance by talented 930 teachers. (p. 402) 831

Rather than only asking how technologies can help pupils to learn, we should perhaps 933 also ask how technologies can help teachers to help pupils to learn. 934

Acknowledgements I am most indebted to the two teachers and their pupils who helped me with this935project by allowing me to spend an extensive period of time in their classrooms. Without their generosity this936study could not have been conducted. I would also like to thank Jacqueline Eke, Tim Koschmann, Oskar937Lindwall, and Douglas Macbeth for very helpful comments and criticisms on earlier versions of this paper.938Part of this research was supported through a British Academy Postdoctoral Fellowship and a Simon939Research Fellowship (funded through an endowment made to the University of Manchester).940

References

Barnes, D., & Todd, F. (1977). Communication and learning in small groups. London: Routledge & Kegan 943 Paul. 944

- Birmingham, P., Davies, C., & Greiffenhagen, C. (2002). Turn to face the Bard: Making sense of three-way interactions between teacher, pupils and technology in the classroom. *Education, Communication & 946 Information, 2*(2–3), 139–161.
- Button, G. (Ed.). (1993). Technology in working order: Studies of work, interaction, and technology. 948 London: Routledge. 949
- Button, G., & Sharrock, W. W. (1996). Project work: The organisation of collaborative design and development in software engineering. *Computer Supported Cooperative Work (CSCW)*, 5(4), 369–386.
 Cakir, M. P., Zemel, A., & Stahl, G. (2009). The joint organization of interaction within a multimodal CSCL 953
- Çakir, M. P., Zemel, A., & Stahl, G. (2009). The joint organization of interaction within a multimodal CSCL 953
 medium. International Journal of Computer-Supported Collaborative Learning, 4(2), 115–149. 954
- Cazden, C., John, V., & Hymes, D. (Eds.). (1972). Functions of language in the classroom. New York: 955 Teachers College Press. 956
- Chiu, M. M. (2004). Adapting teacher interventions to student needs during cooperative learning: How to improve student problem solving and time on-task. *American Educational Research Journal*, 41(2), 958 365–399.
- Cohen, E. C. (1994 [1986]). Designing groupwork: Strategies for the heterogeneous classroom (2nd Ed.). 960 New York: Teachers College Press. 961

941

EDJhil @RartS9B4Rog OF10/2011

968

969 970

971 972

973

974 975

 $\begin{array}{c} 976\\977\end{array}$

978

979 980

981

982 983

984

985

986

987 988

989

 $990 \\ 991$

992

993 994

995

996 997

998

1001

 $1002 \\ 1003$

1004

1005

 $1006 \\ 1007$

1008

 $\begin{array}{c} 1009 \\ 1010 \end{array}$

1011

1012

 $1013 \\ 1014$

 $1015 \\ 1016$

1017

1018

- Colella, V. (2002). Participatory simulations: Building collaborative understanding through immersive 962 dynamic modelling. In T. Koschmann, R. Hall, & N. Miyake (Eds.), CSCL2: Carrying forward the 963 conversation (pp. 357–391). Mahwah: Lawrence Erlbaum. 964
- Coulter, J. (2001). Human practices and the observability of the 'macro-social'. In T. R. Schatzki, K. Knorr Cetina, & E. von Savigny (Eds.), *The practice turn in contemporary theory* (pp. 29–41). London:
 966
 Routledge.

Cuban, L. (2001). Oversold and underused: Computers in the classroom. Cambridge: Harvard University Press.

Dekker, R., & Elshout-Mohr, M. (2004). Teacher interventions aimed at mathematical level raising during collaborative learning. *Educational Studies in Mathematics*, 56(1), 39–65.

- Dillenbourg, P. (1999). Introduction: What do you mean by 'collaborative learning'? In P. Dillenbourg (Ed.), *Collaborative learning: Cognitive and computational approaches* (pp. 1–19). Amsterdam: Pergamon.
- Dillenbourg, P. (2008). Integrating technologies into educational ecosystems. *Distance Education, 29*(2), 127–140.
- Dillenbourg, P., & Jermann, P. (2010). Technology for classroom orchestration. In M. S. Khine & I. M. Saleh (Eds.), New science of learning: Cognition, computers and collaboration in education (pp. 525–552). New York: Springer.
- Ding, M., Li, X., Piccolo, D., & Kulm, G. (2007). Teacher interventions in cooperative-learning mathematics classes. *Journal of Educational Research*, 100(3), 162–175.
- Emerson, R. M., & Pollner, M. (1976). Dirty work designations: Their features and consequences in a psychiatric setting. Social Problems, 23(3), 243–254.
- Ford, C. E. (1999). Collaborative construction of task activity: Coordinating multiple resources in a high school physics lab. *Research on Language and Social Interaction*, 32(4), 369–408.
- Garcia, A. C., & Jacobs, J. B. (1999). The eyes of the beholder: Understanding the turn-taking system in quasi-synchronous computer-mediated communication. *Research on Language and Social Interaction*, 32(4), 337–367.

Garfinkel, H. (1967). Studies in ethnomethodology. Englewood Cliffs: Prentice-Hall.

- Garfinkel, H. (2002). *Ethnomethodology's program: Working out Durkheim's aphorism*. Lanham: Rowman & Littlefield.
- Garfinkel, H., & Sacks, H. (1970). On formal structures of practical action. In J. C. McKinney & E. A. Tiryakian (Eds.), *Theoretical sociology: Perspectives and developments* (pp. 338–366). New York: Appleton.

Gibson, R. (1998). Teaching Shakespeare. Cambridge: Cambridge University Press.

- Gillies, R. M. (2004). The effects of communication training on teachers' and students' verbal behaviours during cooperative learning. *International Journal of Educational Research*, *41*(3), 257–279.
- Gillies, R. M., Ashman, A. F., & Terwel, J. (Eds.). (2008). The teacher's role in implementing cooperative learning in the classroom. New York: Springer.
- Glenn, P. J., Koschmann, T., & Conlee, M. (1999). Theory presentation and assessment in a problem-based learning group. *Discourse Processes*, 27(2), 119–133.

Goodwin, C. (1994). Professional vision. American Anthropologist, 96(3), 606-633.

- Greiffenhagen, C. (2008). Unpacking tasks: The fusion of new technology with instructional work. Computer Supported Cooperative Work (CSCW), 17(1), 35–62.
- Greiffenhagen, C. (forthcoming). Visual grammar in practice: Negotiating the arrangement of speech bubbles in storyboards. Forthcoming in *Semiotica*.

Greiffenhagen, C., & Sharrock, W. (2008). Where do the limits of experience lie? Abandoning the dualism of objectivity and subjectivity. *History of the Human Sciences*, 21(3), 70–93.

- Greiffenhagen, C., & Sharrock, W. (forthcoming). Does mathematics look certain in the front, but fallible in the back? Forthcoming in *Social Studies of Science*.
- Greiffenhagen, C., & Watson, R. (2009). Visual repairables: Analysing the work of repair in humancomputer interaction. *Visual Communication*, 8(1), 65–90.
- Gumperz, J., & Hymes, D. (Eds.). (1972). Directions in sociolinguistics: The ethnography of communication. New York: Hold, Rinehart & Winston.
- Hammer, D. (2002). Powerful technology and powerful instruction. In T. Koschmann, R. Hall, & N. Miyake (Eds.), CSCL2: Carrying forward the conversation (pp. 399–403). Mahwah: Lawrence Erlbaum.
- Heap, J. L. (1989a). Collaborative practices during word processing in a first grade classroom. In C. Emihovich (Ed.), *Locating learning: Ethnographic perspectives on classroom research* (pp. 263–288). Norwood: Ablex.
- Heap, J. L. (1989b). Sociality and cognition in collaborative computer writing. In D. Bloome (Ed.), *Classroom and literacy* (pp. 135–157). Norwood: Ablex.
- Heath, C., & Luff, P. (1992). Collaboration and control: Crisis management and multimedia 1019 technology in London underground line control rooms. *Computer Supported Cooperative Work* 1020 (*CSCW*), 1(1–2), 69–94.

1026

1027

1028

1029

 $\begin{array}{c} 1030 \\ 1031 \end{array}$

1032

1033

1034

1038

 $1039 \\ 1040$

 $1041 \\ 1042$

 $1043 \\ 1044$

1045

1046

 $1047 \\ 1048$

 $\begin{array}{c} 1049 \\ 1050 \end{array}$

1051

1052

 $1053 \\ 1054$

1055

 $\begin{array}{c} 1056 \\ 1057 \end{array}$

1058

1059

 $1060 \\ 1061$

1062

1063

1067

1068

1069

 $\begin{array}{c} 1070 \\ 1071 \end{array}$

1072

 $1073 \\ 1074$

 $1075 \\ 1076$

1077

1078

Computer-Supported Collaborative Learning

- Heath, C., Jirotka, M., Luff, P., & Hindmarsh, J. (1995). Unpacking collaboration: The interactional organisation of trading in a city dealing room. *Computer Supported Cooperative Work (CSCW)*, 3(2), 147–165.
 Heath, C., Hindmarsh, J., & Luff, P. (2010). Video in qualitative research: Analysing social interaction in 1025
- Heath, C., Hindmarsh, J., & Luff, P. (2010). Video in qualitative research: Analysing social interaction in everyday life. London: Sage.
- Hertz-Lazarowitz, R., & Shachar, H. (1990). Teachers' verbal behaviour in cooperative and whole-class instruction. In S. Sharan (Ed.), *Cooperative learning: Theory and research* (pp. 77–94). New York: Praeger.
- Hughes, E. C. (1971). The sociological eye: Selected papers. Chicago: Aldine.
- Ivarsson, J. (2010). Developing the construction sight: Architectural education and technological change. Visual Communication, 9(2), 171–191.
- Johnson, D. W., & R. T. Johnson (1994 [1975]). *Learning together and alone: Cooperative, competitive, and individualistic learning* (4th Ed.). Boston: Allyn and Bacon.
- Karlsson, G. (2010). Animation and grammar in science education: Learners' construal of animated educational software. International Journal of Computer-Supported Collaborative Learning, 5(2), 167–189.
- Kelly, G., Crawford, T., & Green, J. L. (2001). Common task and uncommon knowledge: Dissenting voices in the discursive construction of physics across small laboratory groups. *Linguistics and Education*, 12 (2), 135–174.
- Koschmann, T. (Ed.). (1996). CSCL: Theory and practice of an emerging paradigm. Hillsdale: Lawrence Erlbaum.
- Koschmann, T. (1999). Computer support for collaboration and learning. *Journal of the Learning Sciences*, 8 (3&4), 495–497.
- Koschmann, T., Glenn, P. J., & Conlee, M. (2000). When is a problem-based tutorial not a tutorial? Analyzing the tutor's role in the emergence of a learning issue. In D. Evensen & C. Hmelo (Eds.), *Problem-based learning: A research perspective on learning interaction* (pp. 53–74). Mahwah: Lawrence Erlbaum.
- Koschmann, T., Hall, R., & Miyake, N. (Eds.). (2002). CSCL 2: Carrying forward the conversation. Hillsdale: Lawrence Erlbaum.
- Koschmann, T., Stahl, G., & Zemel, A. (2007). The video analyst's manifesto (or the implications of Garfinkel's policies for studying instructional practice in design-based research). In R. Goldman, R. Pea, B. Barron, & S. J. Derry (Eds.), *Video research in the learning sciences* (pp. 133–143). Mahwah: Lawrence Erlbaum.
- Lindwall, O., & Lymer, G. (2005). Vulgar competence, ethnomethodological indifference and curricular design. *Proceedings of CSCL 2005* (Taipei, Taiwan, May 30–June 4, 2005), pp. 388–397.
- Lindwall, O., & Lymer, G. (2008). The dark matter of lab work: Illuminating the negation of disciplined perception in mechanics. *Journal of the Learning Sciences*, 17(2), 180–224.
- Luff, P., Hindmarsh, J., & Heath, C. (Eds.). (2000). Workplace studies: Recovering work practice and informing system design. Cambridge: Cambridge University Press.
- Lymer, G., Ivarsson, J., & Lindwall, O. (2009). Contrasting the use of tools for presentation and critique: Some cases from architectural education. *International Journal of Computer-Supported Collaborative Learning*, 4(4), 423–444.
- Lynch, M. (1997 [1979]). Preliminary notes on judges' work: The judge as a constituent of courtroom 'hearings'. In M. Travers & J. F. Manzo (Eds.), *Law in action: Ethnomethodological and conversation analytic approaches to Law* (pp. 99–130). Aldershot: Dartmouth.
- Macbeth, D. H. (1990). Classroom order as practical action: The making and un-making of a quiet reproach. British Journal of Sociology of Education, 11(2), 189–214.
- Macbeth, D. H. (1991). Teacher authority as practical action. Linguistics and Education, 3(4), 281-313.
- Macbeth, D. H. (1992). Classroom 'floors': Material organizations as a course of affairs. *Qualitative Sociology*, 15(2), 123–150.
- Macbeth, D. H. (2003). Hugh Mehan's *Learning Lessons* reconsidered: On the differences between the naturalistic and critical analysis of classroom discourse. *American Educational Research Journal*, 40(1), 239–280.
- McDermott, R. P., Gospodinoff, K., & Aron, J. (1978). Criteria for an ethnographically adequate description of concerted activities and their contexts. *Semiotica*, 24(3/4), 245–275.
- McHoul, A. W. (1978). The organization of turns at formal talk in the classroom. *Language in Society*, 7(1), 183–213.
- Mehan, H. (1979). Learning lessons: Social organization in the classroom. Cambridge: Harvard University Press. 1079

Mehan, H. (1989). Microcomputers in classrooms: Educational technology or social practice? Anthropology and Education Quarterly, 20(1), 4–22. 1080

EDIND ORANS 9124 Rost O2410/2011

e. eterremagen	
Mercer N & Fisher F (1907) How do teachers help children to learn? an analysis of teachers'	10
interventions in computer-based activities <i>Learning and Instruction</i> 2(4) 339–355	10
O'Connor, M. C., & Michaels, S. (1993). Aligning academic task and participation status through revoicing:	10
Analysis of a classroom discourse strategy. Anthropology and Education Quarterly, 24(4), 318-335.	10
Payne, G. C. F. (1976). Making a lesson happen: An ethnomethodological analysis. In M. Hammersley & P.	10
Woods (Eds.), The process of schooling: A sociological reader (pp. 33-40). London: Routledge.	10
Payne, G. C. F., & Cuff, E. C. (Eds.). (1982). Doing teaching: The practical management of classrooms.	10
London: Batsford.	10
Pea, R. D. (1996). Seeing what we build together: Distributed multimedia learning environments for	10
transformative communications. In I. Koschmann (Ed.), CSCL: Theory and practice of an emerging	10
paraaigm (pp. 1/1–180). Hillsdale: Lawrence Eribaum.	10
learning education and human activity. <i>Journal of the Learning Sciences</i> 13(3) 423-451	10
Roschelle I (1992) Learning by collaborating: Convergent concentual change Journal of the Learning	10
Sciences, 2(3), 235–276.	10
Roschelle, J., & Teasley, S. D. (1995). The construction of shared knowledge in collaborative problem	10
solving. In C. O'Malley (Ed.), Computer supported collaborative learning (pp. 69-97). Berlin: Springer.	10
Roth, WM. (1995). Affordances of computers in teacher-student interaction: The case of Interactive	10
Physics. Journal of Research in Science Teaching, 32(4), 329–347.	11
acks, H. (1992). In G. Jefferson (Ed.), Lectures on conversation. Oxford: Blackwell.	11
chegloff, E. A. (1996). Confirming allusions: Toward an empirical account of action. American Journal of	11
Sociology, 102(1), 161–216.	11
chegloff, E. A. (2007). Sequence organization in interaction. Cambridge: Cambridge University Press.	11
chenkein, J. (1978). Sketch of an analytic mentality for the study of conversational interaction. In J. Schenkein (Ed.) Studies in the organization of conversional interaction (np. 1.6). New York:	11
Schenkelli (Ed.), Suales in the organization of conversational interaction (pp. 1–6). New Tork:	11
harrock W W & Anderson R I (1994) The user as a scenic feature of the design space. Design Studies	11
<i>15</i> (1), 5–18.	11
harrock, W. W., & Watson, D. R. (1988). Autonomy among social theories: The incarnation of social	11
structures. In N. G. Fielding (Ed.), Actions and structure: Research methods and social theory (pp. 56-	11
77). London: Sage.	11
orensen, E. (2009). The materiality of learning: Technology and knowledge in educational practice.	11
Cambridge: Cambridge University Press.	11
tahl, G. (2006). Group cognition: Computer support for collaborative knowledge building. Cambridge:	11
MIT Press.	11
uchman I A (1987) Plans and situated actions. The problem of human-machine communication	11
Cambridge: Cambridge University Press.	11
Jrhahne, D., Schanze, S., Bell, T., Mansfield, A., & Holmes, J. (2010). Role of the teacher in computer-	11
supported collaborative inquiry learning. International Journal of Science Education, 32(2), 221-243.	11
Vatson, R. (2009). Analysing practical and professional texts: A naturalistic approach. Farnham: Ashgate.	11
Vebb, N. M., Nemer, K. M., & Ing, M. (2006). Small-group reflections: Parallels between teacher discourse	11
and student behaviour in peer-directed groups. Journal of the Learning Sciences, 15(1), 63-119.	11
ebb, N. M., Franke, M. L., De, T., Chan, A. G., Freund, D., Shein, P., et al. (2009). 'Explain to your	11
partner: Leacners' instructional practices and students' dialogue in small groups. <i>Cambridge Journal of</i>	11
Education, 59(1), 49-10. amal A. Koschmann T. LaBaran C. & Faltovich D. (2008). (What are we missing?) Usability's	11
indexical ground Computer Supported Cooperative Work (CSCW) 17(1) 63-85	11
indexical ground. Computer supported Cooperative work (CSCW), 17(1), 05-65.	11
	11