A Dialogic Understanding of the Relationship between CSCL and Teaching Thinking Skills

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Abstract How to teach flexible thinking and learning skills, particularly creativity 12and the skill of "learning to learn," is a key concern for CSCL in the context of the 13emerging Networked Society. The currently dominant paradigms for supporting 14pedagogical design within CSCL, including socio-cultural theory, are limited in the 15support that they can offer to the project of teaching general thinking skills. This 16paper uses critical literature review, conceptual analysis, and evidence from case 17studies to argue for the value of a dialogic interpretative framework that links the 18goal of teaching thinking with the method of CSCL. The evidence reviewed suggests 19that dialogue is itself the primary thinking skill from which all others are derived. It 20is argued from this that dialogic theory offers a possible solution to the problem of 21 how to conceptualize general thinking skills for CSCL: this is that teaching dialogue 22as an end in itself promotes the learning of general thinking skills. Implications of the 23proposed framework for pedagogical design are brought out through case studies 24illustrating the use of CSCL to broaden and deepen dialogic spaces of reflection. 25

Keywords Creativity · Dialogic · Learning to learn · Theory · Thinking skills

Introduction

Within the Computer-Supported Collaborative Learning (CSCL) research commu-
nity there is considerable interest in teaching general thinking and learning skills.29Often this interest is explicitly linked to the claim that new skills are needed as a result
of a historical shift in work and life practices (e.g., Bereiter, 2002; Andriessen, Baker,
& Suthers, 2003). Castells surveys the many developments linked to the advent of30

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electronic networks and concludes that they amount to the emergence of a new 34form of global social organization, which he refers to as the "Networked Society." 35 He concludes that this historical transition "calls into question the entire education 36 system developed during the industrial era" and demands that we develop a new 37 pedagogy based around the idea of learning to learn (Castells, 2001, pp. 278). In this 38 paper I argue that although CSCL is the obvious pedagogic medium for the Net-39worked Society, some of the underlying assumptions behind CSCL pedagogies are 40still very much a product of the industrial age and need to be challenged. Dialogic 41 thinking, I argue, offers a particularly useful framework for education in suggesting 42 the direction of dialogue as an end in itself, that is, the direction of becoming more 43able to dwell in the contradictory, multiple, and creative space of dialogue. CSCL is 44 particularly suited to the induction of students into dialogue as an end in itself and, 45through this, to promote the skills of creativity and of learning to learn. 46

In the next three sections, I offer a brief account of the implications of dialogic 47 thinking, contrasting this with currently dominant paradigms in CSCL, and I outline 48 what is meant by the pedagogic aim of teaching thinking and how this relates to the 49 use of technology. I then advance the main argument of the paper through four 50 case–studies. 51

Unpacking Dialogic

The standard short definition of *dialogic* is that the meaning of an utterance is given 53by its location within a dialogue. It follows from this that to understand any 54utterance we have to look at the past utterances that it is responding to and the 55future utterances that it anticipates. Versions of this definition are widely repeated 56wherever the term dialogic is used in a technical sense, and seem to be accepted by 57researchers from a range of traditions. However, this simple claim has radical 58implications. Wertsch brings out the relationship between dialogic thinking and a 59critique of identity thinking when he writes, in a definition of dialogicality: "when a 60 speaker produces an utterance at least two voices can be heard simultaneously" 61(Wertsch, 1991, pp. 13). Bakhtin uses the term "inter-animation" or "inter-62illumination" to indicate that the meaning of an utterance is not reducible to the 63 intentions of the speaker or to the response of the addressee but emerges between 64 these two (Holquist, 1981, pp. 429–430). The way in which each generation of 65 scholars re-visits and re-interprets textual fragments from ancient Greece is used by 66 Bakhtin to illustrate his claim that there can be no final or fixed interpretation of an 67 utterance (Bakhtin, 1986, pp. 5, 170). 68

Wertsch combines Vygotsky's account of cognition as mediated by tools with 69 Bakhtin's account of thinking mediated by "social voices" (Wertsch, 1991, 1998). 70However, Vygotsky draws his model of mediation from Marx's account of the use of 71tools as mediated physical forces acting on objects in the world (Vygotsky, 1978, pp. 7254). As Bakhtin points out, relationships between things are very different from 73 relationships between voices (Bakhtin, 1986, pp. 138, 162). For each participant in a 74dialogue the voice of the other is an outside perspective that includes them within it. 75The boundary between subjects is not therefore a demarcation line, or an external 76 link between self and other, or a tool of any kind, but an inclusive "space" of dialogue 77 within which self and other mutually construct and re-construct each other. Any sign 78 taken to be a mediation between self and other, a word or a facial expression, must 79

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pre-suppose the prior opening of a space of dialogue (an opening of a difference 80 between voices) within which such a sign can be taken to mean something. 81

The principle that the meanings of things and signs are not stable or fixed but 82 arise only in the context of a difference between perspectives connects dialogic to 83 the theme of underlying difference best known through the work of Derrida, 84 particularly his seminal essay, "La différance." In this essay Derrida argues that 85 meaning is always a product of a prior invisible act of differentiating that includes 86 even the differing of space and the deferring of time (Derrida, 1968). Derrida 87 acknowledges that he is drawing out some of the implications in Heidegger's 88 account of meaning as arising out of "ontological difference," by which Heidegger 89 means the difference between Being and beings (Heidegger, 1969). One simple way 90 to understand Heidegger's distinction between beings and Being is through 91 Merleau-Ponty's more visual account of the difference between figure and ground, 92 the idea that all bounded "things" or "objects" or "signs" or "meanings" stand-out 93 from and are defined against an implicit background. For Merleau-Ponty, perhaps 94interpreting Heidegger, the source of meaning is to be found not in the figures or in 95their backgrounds but in the difference between the two because it is the boundary 96 around a figure that makes it exist as a thinkable thing. He goes further and writes 97 that figure and ground, the ultimate unit of meaning, are in a relationship of mutual 98 envelopment and reversibility that he calls a "chiasm." Merleau-Ponty applies this 99 analysis of perceptual meaning to how meaning arises in dialogues in which voices 100mutually envelop each other around an invisible gap or hinge which, he writes, is the 101 source of creative thought (Merleau-Ponty, 1964, pp. 194, 201; 1968, pp. 148, 153). 102

Derrida uses Mallarmé's account of his own poetry to draw attention away from 103the foreground signs, the black marks made by a pen, and towards the infinite 104potential for meaning of the white page beneath the signs (Derrida, 1972, pp. 308– 105309). This illustrates the general claim, shared by philosophical perspectives, which 106 assumes ontological difference rather than identity, that creativity (in the form of 107'imaginative analogy,' Carter, 2002) is not a "construction" that needs to be 108 explained, but a baseline. What needs to be explained is the loss of creativity in 109reified metaphors. Derrida's account of the practice of "deconstruction" can 110therefore be understood as a pedagogic practice that restores creativity through 111 questioning metaphors back to their origin in the "white page" that represents an 112infinite potential for meaning or "polysemicity." In a similar way Bakhtin 113emphasizes the intrinsic polyvocality and heteroglossia of the dialogic opening, 114and the natural creativity and fecundity of relations between living words (Bakhtin, 1151981, pp. 292–294). 116

Dialogic and the Paradigms of CSCL

Koschmann offers a history of paradigms in research on information technology and 118 associates CSCL with the socio-cultural research paradigm that is also often 119referred to as "neo-Vygotskian" (Koschmann, 1996). In later writing he includes 120"dialogic" as one of the paradigms of CSCL, but he does so through quoting Wertsch 121who, as described above, has been responsible for appropriating Bakhtin's dialogic to 122Vygotsky's more dialectically based social-historical framework (Koschmann, 2001). 123Although Wertsch's synthesis of Vygotsky and Bakhtin is interesting and has been 124fruitful, it is also misleading. The concept of dialogic was developed by Bakhtin to be 125

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an explicit contrast to dialectic (e.g., Bakhtin, 1986, pp. 162). Dialectic is a dynamic 126form of logic leading all apparent differences to be subsumed into identity in the 127form of a more complexly integrated synthesis-it is not dialogic as dialogic refers 128to the inter-animation of real voices where there can be no "overcoming" or 129"synthesis." For dialectic, difference is conceptualized as a contradiction stimulat-130ing the creative construction of some sort of synthetic representation, whereas for 131dialogic, meaning itself only arises when different perspectives are brought 132together in a way that allows them to "inter-animate" or "inter-illuminate" each 133other (Holquist, 1981). The dialectic assumption that new understanding is a 134synthetic construction stimulated by a contradiction is also found in other theories 135that Koschmann associates with CSCL, such as neo-Piagetian socio-cognitive 136conflict theory and Engestrom's version of Cultural Historical Activity Theory 137(Koschmann, 2001). Bakhtin argues that understanding is a direct insight that occurs 138in the context of the tension between different voices in a dialogue. For him the idea 139that we need to synthesize a shared single "text" out of different perspectives 140actually threatens the death of meaning because it threatens to close up the 'infinite 141 depth' of 'contextual meaning' that opens beneath dialogues across difference 142(Bakhtin, 1986 p 162). Koschmann is right to argue that dialogic offers a new and 143important paradigm for CSCL (Koschmann, 1999), but to make this the case 144Dialogic needs to be distinguished clearly from the competing voices of socio-145cultural theory and social-constructivism. 146

Teaching Thinking, Dialogue and Technology

"Thinking skills" and related terms such as "learning to learn," are used to indicate a 148desire to teach processes of thinking and learning that can be applied in a wide 149range of real-life contexts. The list of thinking skills in the English National 150Curriculum is similar to many such lists in that is includes information-processing, 151reasoning, enquiry, creative thinking and evaluation. While some approaches to 152teaching thinking treat such skills as separate, other approaches treat them all as 153aspects of high-quality thinking or "higher order thinking." In practice, thinking 154skills programs do not all focus on the narrowly cognitive, but promote a variety of 155apparently quite different kinds of things including, strategies, habits, attitudes, 156emotions, motivations, aspects of character or self-identity, and also engagement in 157dialogue and in a community of enquiry. These "thinking skills" are not united by 158any single psychological theory. It is probable that the only unity they have is that 159they are all those sorts of things that practitioners believe can and should be taught 160or encouraged in order to improve the perceived quality and/or the effectiveness of 161their students' thinking Wegerif, 2003). 162

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Resnick chaired a major US government inquiry into the nature and value of 163 teaching thinking skills, which came up with a widely quoted account of the nature 164 of "Higher-Order Thinking Skills" (Resnick, 1987). According to Resnick, higherorder thinking: 166

- is non algorithmic. That is, the path of action is not fully specified in advance. 167
- tends to be *complex*. The total path is not "visible" (mentally speaking) from any 168 single vantage point.
- often yields *multiple solutions*, each with costs and benefits, rather that unique 170 solutions. 171

- involves nuanced judgement and interpretation.
- involves the application of *multiple criteria*, which sometimes conflict with one another. 173
- often involves *uncertainty*. Not everything that bears on the task at hand is 174 known. 175
- involves *self-regulation* of the thinking process. We do not recognize higherorder thinking in an individual when someone else "calls the plays" at every step. 177
- involves imposing meaning, finding structure in apparent disorder.
- is *effortful*. There is considerable mental work involved in the kinds of 179 elaborations and judgements required. (Resnick, 1987) 180

Resnick describes these attributes as if they were the characteristics of a certain 182type of "thought"-higher order thought-but they are almost all (self-regulation 183being a possible exception) aspects of situated dialogues (where dialogue is assumed 184to be not just conversation but also shared enquiry, following [Bakhtin, 1986, pp. 185 114, pp. 168]). The term "higher order thinking skills" is normally used to contrast 186these with "lower order thinking skills" described in Bloom's taxonomy as skills 187 such as "comprehension" and "memorization" (Bloom, 1956). Some educationalists 188 think that the lower order skills should be taught first as a basis for the higher skills. 189This is not the point of view taken by Lipman, founder of the successful Philosophy 190for Children method of teaching thinking. He points out that, just because wholes 191are capable of being analyzed into parts, it does not follow that the assemblage of 192parts must precede the construction of wholes. His philosophy method inducts 193children directly into that kind of dialogue which he considers to be the highest 194possible form of thinking in the belief that all the necessary individual skills will 195follow from this (Lipman, 2003). 196

CSCL implies a focus on social rather than individual learning. As Koschmann 197and Stahl bring out, this focus on the social distinguishes CSCL from both the 198behaviorist and the cognitivist/constructivist traditions that underlie previous 199approaches to the relationship between information and communication technology 200(ICT) and teaching thinking (Koschmann, 1996; Stahl, 2006). Many writers in the 201CSCL tradition refer to the ideas of educational psychologist Vygotsky to provide 202 intellectual authority for a turn towards the social dimension of learning. Vygotsky 203is often presented as providing a psychological version of Marx's claim that 204individual thought is a product of the social and historical context (e.g., Edwards, 2051996, pp. 43). In particular, Vygotsky claims that language is a tool-system that 206 mediates thought and the development of thought. If language can play the role of a 207cognitive technology mediating and supporting thought, then this implies that so too 208can other technologies of communication. The approach of locating thinking skills 209in types of dialogue—argumentation for example—supported by technology could 210be seen, from this perspective, as an attempt to include a better understanding of 211how general thinking skills can be taught (Ravenscroft & Pilkington, 2000; 212

Q2 Andreissen et al., 2002). However, while some kinds of thinking (formal reasoning, 213 for example) can be described in terms of the application of tools, the use of tools 214 does not adequately address the non-algorithmic and unpredictable nature of 215 creative 'higher order' thought described by Resnick. 216

Dialogic has emerged as a voice in educational research within the umbrella of 217 the socio-cultural tradition. As shown in the previous section of this paper, however, 218 unpacking the full implications of dialogic lead to a challenge to key assumptions in 219 the socio-cultural tradition and therefore require that dialogic be treated as a 220

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separate paradigm in its own right. The ontological interpretation of dialogic that I 221have outlined above suggests that dialogues are not only situated, they are also, in a 222sense, universal. This is because any account of the situation of an empirical 223dialogue in terms of its horizon of history or culture, for example, must be an 224 interpretation within a dialogue. The opening of dialogue therefore precedes 225situation and can be conceptualized as an opening of infinite possibility or 226potentiality. This is not, of course, a version of the overarching universality of 227 abstract cognitive structures, but more an underlying content-free universality 228represented metaphorically by Mallarme's metaphor of the white page as an implicit 229whole of potential meaning out of which actual meanings are all carved. This 230dialogic paradigm suggests a new approach to teaching general thinking and 231learning skills in which dialogue is itself understood as the primary thinking skill 232upon which other skills are derivative. A dialogic vision for teaching thinking is 233 developed further in the first case study below, and its implications for the design of 234CSCL are then exemplified in the three short case studies that follow. 235

Case Study 1: Dialogue as a Direction for Education

Over a decade ago, a research study found that the educational quality of 237collaborative learning around computers in primary classrooms in the UK was 238disappointing. In response to this finding an intervention was devised promoting 239"Exploratory Talk" for use around computers. Exploratory Talk is a type of talk in 240which questions are asked, alternatives explored, and reasons given. A method was 241devised to assess the effectiveness of the way groups were talking together using 242Raven's Standard Progressive Matrices Wegerif, 1996). These tests are designed to 243assess individual "non-verbal" reasoning ability in a "culture-free" manner, and 244consist of a grid of abstract designs (see Fig. 1). RSPM test scores correlate well with 245246

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later academic achievement and are considered by those in the field of psycho-



metrics to be the single best indicator of "g" or general intelligence (Raven, Raven 247& Court, 1995). However, the method used to assess group talk undermined the 248individualist tradition of assessing general reasoning skill through the simple 249expedient of giving the test to groups of three students, each group having only 250one answer sheet and only one pencil between them with which to fill in the answer 251sheet. Video recordings of groups working together around these tests provided 252qualitative data on group thinking processes; interpretation of this data was then 253compared to quantitative measures of success at solving the problems in the test. 254Comparable Raven's reasoning tests were also given to the same students working 255as individuals in order to explore the relationship between group thinking and 256individual thinking. This method was used as a pre- and post-test (with controls) 257to assess the effectiveness of the intervention program in improving the quality of 258talk at computers in three studies in the UK and in two in Mexico. The headline 259findings from these studies were that: 260

- a) the intervention program coaching exploratory talk statistically improved the 261 ability of groups to solve reasoning tests; 262
- b) this increase in scores correlated with qualitative changes in the talk of groups, 263 particularly an increase in indicators of explicit reasoning such as logical 264 connectors; 265
- c) individual scores on comparable reasoning tests also improved significantly as a 266 result of engagement in group reasoning (Wegerif, Perez Linares, Rojas 267 Drummond, Mercer, & Velez, 2005a).

In one project this assessment method was implemented as part of a larger study 270 designed to improve the quality of talking, thinking, and learning in CSCL activities 271 in mathematics and science over one year at upper-primary level (students aged 9 272 and 10 years). Similar changes in the quality of talk at the computer were observed 273 within these curriculum activities and these were similarly correlated with improved 274 scores on standard tests of content knowledge over a year in relation to a control 275 group (Wegerif, 2004). 276

These headlines were reported within a neo-Vygotskian interpretative framework as evidence for the claims that reasoning can be embodied in a type of 278 interaction, that language can be used as a "tool for thinking" supporting the 279 "shared construction of knowledge" and that individual reasoning can be improved through the "internalization" of improved group reasoning. 281

These neo-Vygotskian claims were supported with detailed analyses focusing on 282 the change in talk around problems that groups failed to solve in the pre-test and 283succeeded in solving in the post-test: in other words, the great strength of this 284experimental design is that it allowed for a direct comparison between successful 285group thinking and unsuccessful group thinking. These detailed analyses, conducted 286 both in the UK and in Mexico, did support the Vygotskian claim that language was 287being used as a tool for thinking, but two other aspects also emerged that implied 288the need for a more genuinely dialogic interpretative framework. The first of these is 289that change in language use was accompanied by a shift in intersubjective 290orientation. Unsuccessful group talk failed in mainly two ways: through each 291individual identifying with their own self-image in the dialogue and so trying to 292impose what they saw as their position on the others, or through individuals 293identifying with a sense of group identity and uncritically agreeing with each other 294in order to avoid any disruption to what was felt as group solidarity. In successful 295

group talk the most obvious difference was that individuals were able to change 296 their minds, to question their own positions, and to ask for help when they did not 297 know the answer. This shift in attitude can be seen in all the published extracts of 298 transcripts from this method. An example is given below in Transcript Extract 1. 299

Raven's Standard Progressive Matrices non-verbal reasoning test problems are300presented in the form of a matrix with one piece missing. To solve the problem the301missing piece has to be selected from the range of alternatives given below the302matrix. The full transcript of one group of nine year old children (whom we called303Tara, Perry, and Keira), working on a version of the problem shown in Fig. 1 in a304pre-test and again in a post-test, is published in Wegerif and Dawes (2004, pp. 37–30539), so only three short extracts are reproduced here.306

Transcript Extract 1: Pre-Test Initiation and Challenge

Tara:	Square and diamond, it's 2.	308
Perry:	No it's not.	309
Tara:	It is 2.	310
Perry:	No it's not.	311
Tara:	It is.	312

In the pre-test Tara, a girl, initiates with a suggestion, Perry, a boy, rejects it, 314 and they move into a dispute. This disputatious approach continues and eventually 315 Perry imposes his own solution, number 6, against the opposition of two girls, 316 Tara and Keira, by grabbing the pencil and writing down his answer in the space 317 provided. 318

Franscript Extract	2: Post-T	est Initiation	and Challeng	e 319)
1			2	,	

Tara:	That has got to be a diamond, a square with a diamond with a circle in	320
	that one, number 6, do you agree?	321
Perry:	No, what do you mean?	322
Tara:	OK, no it's got to be square.	323

In the post-test, three months later, the same group responded to the same 325problem quite differently. When Tara suggests number six she does so with a 326 question asking if the others agree. Perry then asks her politely to clarify her reasons 327 and, in the act of reflecting on her claim, Tara changes her mind. The talk continues 328for some time exploring different alternatives. The video also shows long pauses 329with the group all leaning forward towards the problem sheet with concentrated 330 expressions. Eventually Tara sees the correct answer and tries to communicate this 331to the others. 332

Transcript Extract 3: Post-Test, Sharing the Solution333

Tara:Look, that's got a triangle, that's got a square. Look. that's got a square334with a diamond with a circle in, that's got a square with a diamond in335and that's got a square with a circle in so that's got to be a square.336

Perry: I don't understand this at all.

- Tara:Because, look, on that they've taken the circle out yes? So on that you are338going to take the circle out because they have taken the circle out of339that one.340
- Perry: On this they have taken the circle out and on this they have taken the 341 diamond out and on this they have put them both in, so it should be a 342 blank square because look it goes circle square. 343

Commentary based on the video evidence After Tara tries to explain her vision, Perry admits that he does not understand her in a way that invites her help. Tara then tries again using the phrase "taking the circle out." Perry suddenly seems to see the answer. His eyes light up and he shows signs of pleasure and excitement. He then repeats Tara's words "taking the circle out" with energy and animation to express his new understanding. 345

Discussion of Case Study

The shift in the way this group worked together was fairly typical of the changes 353from the pre-test to the post-test found in the data in both the UK and the Mexican 354studies. Although this was an off-computer paper exercise, it was a part of a larger 355project to improve the collaborative learning around computers. The characteristics 356of the talk of successful groups working on paper were also found in successful 357 groups working at CSCL activities within curriculum areas, making this study of 358 group cognition relevant to the concerns of CSCL (Wegerif, 2004; see also Stahl, 359 2006). It is not wrong to claim that language is being used here as a tool to think 360 with and that this helps the children to construct a solution together. However, this 361 neo-Vygotskian perspective is only part of the story. The key factor in the success of 362 the post-test talk is that both Perry and Tara became able to listen to each other, 363 change their minds, and ask for advice. This implies a shift in their center of 364 identification from an initial identification with an embodied self-image, which 365 needed to be asserted and defended, to identification with the shared space of 366 dialogue from which self-positions could all be questioned and changed. The other 367 thing that is interesting, from a dialogic perspective, is that "language as a tool" does 368 not directly solve the problem. This is solved in an act of insight, a way of seeing the 369 puzzle, which Tara then struggles to communicate to the others in words. Perry does 370 not understand her at first and then does, not through repeating her words, but by 371 using them as a stimulus to re-orient himself to the puzzle and to see it in a new way. 372It is only then that he understands and repeats her verbal formula. The ground rules 373 of Exploratory Talk that were taught in the intervention do help the children to 374solve the problem—this is shown by the statistics—but they only help indirectly. An 375interpretation from the dialogic framework outlined above is that ground rules, such 376 as listening with respect and asking open questions, help to open and maintain a 377 space of shared reflection within which there occurs a creative emergence of 378 multiple ways of seeing the problem, one of which is then taken up and developed as 379the solution. 380

The findings of this case study suggest three main conclusions: that it is possible 381 to suspend identification with self-image or group image and to identify to a greater 382

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or lesser extent with the space of dialogue; that moving towards an ability to feel at home in dialogue in this way is a direction that can be promoted through education; and that the space of dialogue is a space of possibility such that an increased identification with the space of dialogue leads to increased capacity for creative thinking and problem solving.

The claim that education can promote a direction of increased identification with 388 the space of dialogue is a contradictory claim if one considers that the space of 389dialogue is defined above through its non-identity, being precisely that "no-mans 390land" where multiple voices co-exist simultaneously. However, if this is an 391oxymoron, it is a useful oxymoron in pointing to the development of a kind of 392identity that is more open to other perspectives and more at home in multiplicity. 393 While complete identification with the infinite meaning potential that underlies the 394opening of a dialogue would imply a loss of self-identity, the reality of becoming a 395creative thinker involves a dynamic combination of losing oneself and finding 396oneself again, which can perhaps be summed up in the idea of developing a more 397dialogic identity. 398

This case study also illustrates and exemplifies the claim that a dialogic 399perspective builds upon a neo-Vygotskian account of thinking as tool use, but 400locates this within a larger perspective from which it is interpreted differently. In 401this example we see the phrase "taking the circle out" being co-constructed as a 402useful tool for consolidating and sharing an insight. However, it is only in the 403context of dialogic relationships in which things can be seen from multiple 404perspectives at once and sign-tools such as this have any meaning. Not only do 405tools of this kind pre-suppose a dialogic relationship but they also remain within it. 406For instance, the phrase "taking the circle out" has to be re-animated and lived by 407Perry as a way of re-seeing the Raven's puzzle from the perspective first achieved 408by Tara. Whereas what is constructed is always a representation of some kind, 409understanding is always a lived event. When Perry later did better on individual 410 Raven's tests than he had before his engagement in group thinking, a dialogic 411 perspective would suggest that he had not "internalized" explicit tools such as 412"taking the circle out" but had internalized, or appropriated, the creative dialogic 413space within which such tools emerge when they are needed to solve a problem: 414 this is the space of possibilities opened up by dialogue enabling a problem to be 415seen from multiple perspectives at once. 416

Designing for Expanding Dialogue: The Forum

In the CSCL strand of the program of projects described above, a variety of 418 software activities were developed or selected to be used in combination with the 419promotion of exploratory talk. One design that proved effective in both citizenship 420and science was that of the forum of competing voices. In the area of education for 421 citizenship, a branching narrative was developed in which the heroine, Kate, has to 422make decisions about how to respond when her friend, Robert, admits that he stole 423some chocolates. This story ends with a forum in which all the characters in the story 424 present their account of whether or not Kate "did the right thing" and the children 425have to use these voices as a resource for making their own decision. When used 426 after preparation in the ground rules of exploratory talk, this forum worked well in 427 stimulating wide ranging debate about the issue of stealing. In these debates the 428 primary age children were happy to challenge the opinions of adults in the story, 429 such as the shopkeeper, the policeman who was called in, and the head teacher, in 430 order to articulate their own perspective. The strength of this design is that it inducts 431 learners into dialogue in a specific domain in a way that is focused but not bounded. 432 There were many examples of both what Bakhtin would call intertextuality and also 433 ventriloquation as the learners called upon their experience and practiced voices 434 drawn from a range of contexts. 435

In education for creativity there is a stress on the importance of teaching 436 everything not as fact but as "possibility" (e.g., Craft, 2005). One way of doing this is 437 for teachers never to claim something "is" the case but always that it "might be" so, 438thereby suggesting to the students that it might also be otherwise and shifting the 439focus from the idea of true knowledge to the process of dialogue and enquiry. The 440 forum design described above is particularly suited to the interactive potential of 441 computers. It does not need to be limited to artificially constructed debates of the 442 kind described, but, in combination with use of the World Wide Web, it can be used 443 to induct learners into real debates between different perspectives on any and every 444 issue. Web-quests, for example, can be structured not as a "finding out the truth" 445type of exercise but more as "an exploring the space of debate" type of exercise. 446

Designing for Deepening Dialogue: Bubble Dialogue

Talk in face-to-face dialogues exists only momentarily and only for those448immediately present. Technologies that support drawing and writing can thus be449



Fig. 2 Bubble Dialogue

thought of as a way of deepening dialogues, by turning transitory talk and thoughts 450into external objects that are available to learners for discussion and shared 451reflection (Ong, 1982). Computer documents can offer a kind of half-way stage 452between the evanescence of talk and the permanence of written texts. This is part of 453what McMahon, one of the originators of Bubble Dialogue software, refers to as 454"slow-throwness" (McMahon & O'Neill, 1993). By this term he refers to the way 455that Bubble Dialogue can externalize the thoughts and feelings of the participants 456and also support reflection and the possibility of returning and retrospectively 457changing dialogues. An example of such dialogue is provided in the Bubble 458Dialogue reproduced in Figure 2 and extract 4 below. This dialogue was created by 459Charlene and Rory, both aged 10 years and both excluded from their previous 460schools because of behavioral difficulties. They are discussing a Bubble Dialogue 461scenario about a personal conflict involving characters called Joe and Greg. In the 462story Greg was using his new skateboard in the playground when Joe, a bigger boy, 463grabbed it from him. 464

In the first exchanges both characters "square up" for a physical fight. However, 465 the next set of think bubbles that Charlene and Rory produced (see Transcript 466 Extract 4) indicate that while both parties are prepared to fight over the skateboard, 467 "asking nicely" or apologizing would diffuse the situation. 468

Q3 Transcript Extract 4 (Bubble Dialogue): I'm Not Scared

Joe think:	s: he just has to ask nicely.	470
Joe:	I'll kick your head in you fat brat head	471
Greg:	yeah come on then, I'm not scared of you if im a big fat brat head what	472
	does that make you, you peebrain	473
Greg thin	ks: im not scared of him all hes got to do is give me my skateboard back	474

and apologise to me, if he doesn't im going to break his big fat ugly bogied up nose 475

Charlene and Rory's story goes on to have Joe give Greg the skateboard back.477When Greg insists on an apology, Joe denies having taken the board and says that478Greg should say sorry for threatening to punch his lights out when he was only479playing. Eventually they both manage to apologize in a guarded way and agree to be480friends.481

Transcript extract 3 shows that, as well as their obvious enjoyment in the use of 482insulting language, they were also able to explore the distinction between what their 483proxy characters were saying and what they were thinking. This implies a reflective 484 exploration of their motives. Although the characters were acting tough they did not 485actually want to fight and through using the Bubble Dialogue program they 486rehearsed a way to talk themselves out of the fight that had at first seemed to be 487 inevitable. The features of Bubble Dialogue allowed them to externalize their own 488image and reflect on it, to consider the difference between what they say and what 489they really think in order to explore the consequences of their speech in a context 490where they can go back and change what they say until they get the outcome that 491they want. All these features deepen the space of reflection involved in a dialogue in 492a way that increases the degrees of creative freedom because it is only through 493becoming more aware of who one is through a dialogue that one is able to change 494(Bohm, 1996). 495

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Scaffolded Induction Into Online Dialogue: InterLoc

Synchronous messaging has become popular as a means of communication and seems 497 to produce more motivation as a medium for CSCL at a distance than asynchronous 498communication. However, as a medium, synchronous messaging does not support 499shared inquiry as well as it supports social conversation because messages disappear 500too fast for deep reflection. InterLoc is a software tool designed to turn synchronous 501"chat" into learning dialogue through two means: first by providing an interface that 502allows participants to return to previous messages and contribute to developing 503threads of argument, and second through constraining users to a limited set of 504openers and preferred follow-on openers that define what the developers, 505Ravenscroft and McAlister, refer to as a "dialogue game" (Ravenscroft & 506McAlister, in press). The current language game used is called "Critical Discussion 507and Reasoning" and includes questions such as "Why do you think that?" and 508challenges such as "I disagree because..." Other language games focusing more on 509creativity and on empathy have been designed by the research team and are also 510being tested (Wegerif, Ravenscroft, & McAlister, 2005b). Trials of this system 511suggest that it does deepen the quality of dialogue and allow for the broader 512exploration of issues. It might be thought that the prescribed openers would 513frustrate users, and the reaction is often one of frustration initially, but most users 514get highly engaged in debates and report that they like the system partly because it 515provides a kind of alibi that they can hide behind. Putting forward ideas and 516questioning those of others can be socially difficult, especially when those others are 517unknown and located at a distance. A shared acceptance of the rules of the language 518game that is built into the software allows users to challenge each other and explore 519issues more freely than they would do otherwise. The debates that occur using this 520system are not reducible to abstract structures of explicit reasoning, or to simple 521notions of constructing shared knowledge. They consist more in a divergent 522exploration of a field of potential perspectives on a topic. Through using this tool, 523participants report that they are stimulated to think more deeply (Wegerif et al., 5242005b). 525

Conclusions

The teaching and learning of general thinking skills, especially creativity and 527 learning to learn, is hard to understand through a neo-Vygotskian perspective, 528 which focuses on the use of tools for the social construction of knowledge. 529Understanding is an event within a dialogue between perspectives and is not 530reducible to a constructed representation. A focus on tools and construction cannot 531explain creative insights and is hard to convert into a pedagogy for teaching general 532thinking skills since tools are always specific to tasks. Teaching thinking is much 533easier to understand through a dialogic perspective that focuses on the opening, 534deepening, and broadening of reflective spaces. What is missing from the neo-535Vygotskian account is the importance of the implicit space of possibilities opened up 536by dialogue that allows for creative emergence and is the irreducible context for the 537 interpretations of signs and representations. This dialogic interpretative framework 538implies the need for a pedagogy of teaching dialogic, or the ability to sustain more 539

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than one perspective simultaneously, as an end in itself and as the primary thinking 540 skill from which all other thinking skills are derived. 541

This pedagogy can be described in terms of moving learners into the space of a 542dialogue. Tools, including language and computer environments, can be used for 543opening up and maintaining dialogic spaces and for deepening and broadening 544dialogic spaces. In many cases, the pedagogic practices that follow from this dialogic 545interpretative framework are already happening. This includes the promotion of 546communities of enquiry and dialogue skills, the use of forums of alternative voices 547to induct students into debate, engagement in real dialogues across cultural and 548geographic differences using the Internet, and scaffolding induction into such 549dialogues using synchronous and asynchronous environments, amongst others. The 550purpose of the dialogic framework for CSCL is therefore not necessarily suggesting 551new pedagogical strategies, but rather in providing an interpretative framework that 552can be applied retrospectively to effective pedagogical practices that have emerged 553at least partly through the intuition of practitioners in a way that reveals what is of 554real value in these practices and so can serve as a basis for future design. 555

The dialogic framework proposed in this paper responds to the educational needs 556of our cultural and historical situation as articulated by Castells (2001, pp. 278). The 557Internet is, amongst other things, an expanding cacophony of competing voices. 558Teaching general thinking and learning skills, in the context of the shift to a global 559"Networked Society," is at least partly about teaching students how to use the 560Internet for thinking and learning. While being able to participate in the construction 561of shared knowledge is clearly an important aim of education, the dialogic 562perspective argued for in this paper implies that it is even more important, as both 563a preliminary requirement for construction and as the context of construction, that 564students in the networked society learn how to listen to other voices and how to 565suspend assumptions and dissolve previous constructions in order to enter into 566dialogue and to be open to the creative emergence of something genuinely new. 567

In sum, this paper argues that the metaphorical image of actively constructing 568representations with cognitive tools needs to be balanced and augmented by the 569metaphorical image of stepping back from identity commitments in order to actively 570listen to others and thereby to deepen and expand creative dialogic spaces of 571reflection. Questioning the dominant metaphor of knowledge construction, this 572dialogic perspective argues that the emergence of creative new insights presupposes 573a capacity for suspending assumptions and dissolving previous constructions in order 574to be able to enter more deeply into the space of dialogue. 575

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