The role of ICT as catalyst and support for dialogue

Rupert Wegerif, Educational Dialogue Research Unit, The Open University, UK

r.b.wegerif@open.ac.uk

http://fels-staff.open.ac.uk/rupert-wegerif

http://www.dialoguebox.org

Abstract

There is evidence that EAL pupils benefit from opportunities to practice talking in small groups. In particular they benefit from being drawn into 'exploratory talk' which allows them to reason and learn together with others. ICT has a special role to play as a support for such learning and teaching dialogues. Computers do not judge and are endlessly patient and yet they can stimulate learners and serve as a focus for their talk. The quality of talk around computers can be improved by activities that prepare pupils for thinking together. Combining preparation for work together at the computer with the right kind of software can draw pupils into talking and learning together within the curriculum. I describe a series of research studies over the last ten years that provide evidence for the value of this approach to using ICT with a range of age groups, software and curriculum areas. This research on the role of computers as a support for oracy combined with what we have learnt about EAL teaching and learning suggests an answer to the question 'why ICT'? Understanding the educational role of ICT in turn suggests guidelines for practice.

1) What we know about EAL

Evaluation of the 'Talking Partners' project in Bradford show that EAL children can benefit greatly from structured opportunities for talk in small groups (Kotler, Wegerif and LeVoi, 2002). This project began with the belief that children learn another language best through engaging in real, motivating dialogues in that language and the realization that the average school day provides very few opportunities for such dialogues. The 'Talking

Partners' method is to offer extra support for oracy skills by providing trained adult 'talking partners' for young bi-lingual pupils.

The 'Talking Partners' project did not only address issues of language but also the relatively low educational achievement of certain ethnically defined groups. The aim was not simply to encourage children to talk in English, the project also sought to encourage them to reason and think together in a way that would help them gain access to the curriculum. The focus was on young bi-lingual learners in Bradford but the cause of low achievement in education is probably similar for other social groups – this is a mis-match between the language and expectations of the home and the language and expectations of the school. Angie Kotler, the director of the Talking Partners project, had been influenced by the work on oracy of Neil Mercer and colleagues. She believed with that through teaching oral competence she could equip children with the essential tools that they need to engage with and make sense of the education system and so to achieve more within it.

The idea of ways of talking as a kind of cognitive tool (Mercer, 2000) providing access to education fits well with the distinction often drawn in the EAL literature between conversational and academic language use (Cummins, 1994: 2000). It is possible to be apparently quite fluent in conversational language without having the skills required to make sense of the school curriculum.

The Talking Partners approach has been very influential and the Talking Partners team have been asked by the DfES to help prepare EAL materials to be piloted in January. However there are clearly ways in which it needs to develop if it is to fulfil the aim of providing access to education for those who are currently disenfranchised.

1. The structured talk activities provide foundations for reasoning but do not lead to the extended intellectual enquiry. More opportunities for full-blown reasoning are required.

2. Each group of three children is currently supported by one adult teaching assistant – there are simply not enough adults in classrooms for all the children who could benefit from this approach.
3. Currently the talking in small groups does not directly connect with learning within the curriculum. For oracy to become a drive-belt to achievement it is necessary to extend the focus on talk to whole class teaching and learning of the curriculum.

Each of these three needs can be addressed through a combination of the Thinking Together approach and the use of computer-supported activities. In the next section I will outline the Thinking Together approach before I go on, in the third section, to argue that computers have a distinctive role to play as catalyst and support for small group dialogues that lead to learning.

2) The Thinking Together Approach

Behind the Thinking Together approach lies the educational theory of the Russian psychologist Vygotsky, that an important way in which children learn to think individually is through first learning to reason with others in dialogues. Exploratory talk is educationally effective talk in which participants pool ideas, opinions and information, thinking together aloud to create meanings, knowledge and understanding. Achieving exploratory talk depends on the willingness of all participants to adhere to some basic rules, or 'ground rules'. In classroom situations, ground rules for talk can be created and agreed by the class. These ground rules are then applied by groups talking and solving problems together in different areas of the curriculum. Collaborative learning supported by computers is one context for the use of exploratory talk within the curriculum. Each classroom develops its own set of ground rules but these are variations of the main ground rules suggested by the developers of the approach. These are that:

- All relevant information is shared openly.
- Each group member should be actively encouraged to contribute to the discussion.
- Everyone should listen to others attentively.

- Each suggestion should be carefully considered.
- Group members are asked to provide reasons for ideas and opinions.
- Constructive challenges to ideas are accepted and a response is expected.
- Alternatives are discussed before a decision is taken.
- The group works together with the purpose of reaching agreement.
- The group, not the individual, takes responsibility for decisions made, for success achieved or for problems that may occur. (Dawes, Mercer and Wegerif, 2000)

Working closely with primary teachers, the UK research team produced a series of 'Talk Lessons' to teach these ground rules and to apply them within normal curriculum teaching and learning. The main focus is on developing children's use of language as a tool for reasoning and constructing knowledge. In the course of these lessons children in a class are led by a teacher to create their own ground rules for talk. Here is a sample of the rules for talk produced by a Year 5 class:

(Class 5 D) Rules for Talk

1. Everyone should have a chance to talk

2. Everyone's ideas should be listened to

3. Each member of the group should be asked

    - what do you think?

    - why do you think that?

4. Look and listen to the person talking

5. After discussion, the group should agree on a group idea

There have been several experimental implementations and evaluations of the Thinking Together approach in the UK. A government (ESRC) funded study called the Talk, Reasoning and Computers (TRAC) project ran from 1996 to 1998: Raising Achivement through Thinking and Language Skills, 1998 to 2000 (funded by Milton Keynes Local Education Authority), Thinking Together in Maths and Science at Key Stage 2, 2000 to 2002 (funded by The Nuffield Foundation), Thinking Together at Key Stage 1, 2002 to 2004 (funded by Esmee Fairbairn) and Thinking Together at Key Stage 3, 2002 to 2004 (funded by Milton Keynes Local Education Authority) and, most recently, Thinking Together with ICT in Primary Maths (funded by the Nuffield Foundation). These evaluations have shown that it can lead to

- marked changes in the way that groups of children talk together in the direction of greater reflection on learning and reasoning (Wegerif and Mercer, 2000)
- significant improvements in reasoning tests scores (Wegerif et al, 1999: Rojas-Drummond et al, 2000)
- learning gains in curriculum areas (Wegerif, 2004)

However the Thinking Together approach does not benefit all children equally. On the whole children who are doing least well in education benefit the most. Our simple hypothesis is that children from homes where 'Exploratory Talk' is practised and encouraged have less to learn from Thinking Together than children from homes where questioning, challenging and reasoning is less valued.

Another finding from observations and teacher interviews is that the use of the ground rules for talking together lead to a more inclusive atmosphere in the classroom. Where there is no explicit focus on talk EAL children can often be seen sitting in groups without speaking or becoming disruptive out of boredom. The ground rules for talk encourage children to draw others in and take responsibility for the group. An example of the impact of this can be found in a recent study in which we video-recorded a focal group of children working on some reasoning test problems before teaching them using the Thinking Together approach and then video-recorded them again on the same problems a few months later.

A case study: Nuresha, Vijay and Kyle *(all names have been changed)*

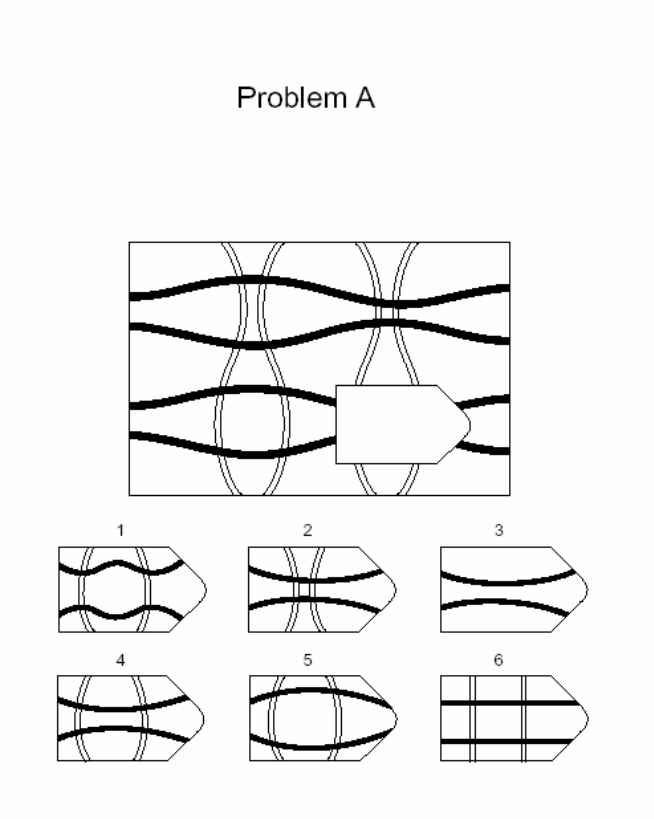
Nuresha was a child from a Bengali-speaking family in one of the target schools. Vijay had a similar background, though he was more fluent in English. Kyle was a native English speaker of local origin. When we made our initial video-recordings of the group working together on reasoning test problems, it was noticeable that Nuresha did not speak at all. On the recording she can be seen sitting well back from the table, while the other group members, Vijay and Kyle, work on the task. Sometimes she looks round the room, sometimes she plays with her ruler but she is completely disengaged from the group. The teacher introduces the group task and asks questions to check for understanding. She asks Nuresha several questions, such as:

Do you agree, Nuresha? What do you think? Can you see why it's not number 3?

In response Nuresha nods. When the teacher leaves the group Vijay takes over the pencil and answer sheet. Kyle says it is his 'go' and a little later asks Nuresha if she wants a go. Nuresha shakes her head. Neither of the other children speak directly to her again during the rest of the sequence. The subsequent exchange between Kyle and Vijay involves disagreement over who should answer each question. There is no explanation of opinions or collaboration to work out the patterns in the puzzles. This is a kind of interaction that we have found quite frequently in pairs and groups in classrooms which can be described as 'disputational' talk. Below as 'Pre-intervention talk' I give a sample of the children's talk before the implementation of the programme. The group are working on the Ravens' Test puzzles.

Figure 1: An example of a Raven's Reasoning Test Puzzle[1]

[1] This is a simulacrum rather than an actual Raven's problem to avoid copyright problems



Pre-intervention talk

Kyle : It's four not five *(referring to the number of the puzzle)*

Vijay: We're on number five now, bogey. Look, we done number four, dumb brain. It's this one, isn't it?.

Kyle : No.

Vijay: It's this one isn't it?

Kyle : No,

Vijay: Yes

Kyle : No

Vijay: It's number 1.

Kyle : No, It's my turn to cross it off *(Attempts to take the pencil from Vijay who keeps it and marks number 1 on the answer sheet)*

(Kyle raises a fist to Vijay and Vijay runs away from the table saying ‘don’t hit me’.)

In this extract, the boys disagree without attempting to explain, provide reasons for opinions or seek each others’ views. The competition between them is quite playful but is not productive from an educational point of view. Their main aim seems to be to assert or defend their individual ideas and there is no attempt to pursue the task collaboratively.

Soon after this extract was recorded, the implementation of the Thinking Together lessons began. The approach encourages children to listen with respect and ask one another relevant questions. The class creates and agrees to use a set of shared ground rules for talk when working in groups. The next recording we made of Nuresha was about half-way through the project in a whole class setting. In this session Nuresha is better engaged with the task and appears much more comfortable in the group. She speaks appropriately and confidently in response to a question from the teacher and takes part in class activities such as miming happiness to a partner.

In June 2004 we video-recorded Nuresha, Vijay and Kyle undertaking exactly the same problem-solving activity they had been engaged in the initial recording. This time the way that they worked together was quite different. The video shows all members of the group leaning forward to the table and frequently looking at each other as they pursue the task. Nuresha is involved throughout. They decide as a group that each should take turns at handling the task materials and ticking the answer sheet. The children remind one another of some the ground rules for talking that have been agreed in their class. Below I give a sample of the group talk. The children are working on the same Raven’s Test puzzle as in Extract 1.

Post-intervention talk

Kyle : Which one … *(to Nuresha)* You have to ask us which one we think. OK. You have to say “Kyle and Vijay, whose name, which one?”

Vijay: You have to say ‘I don’t want to do this’ or ‘Kyle , what do you think?’….say…

(And a little later)

Vijay: Next. Nuresha's getting the best ones, isn't she? You have to say 'what do you think, Vijay or Kyle '?

Nuresha: I think that *(number 2)*

Kyle : I think that *(number 4)*

Vijay: Nuresha, look.

Nuresha: I think, that, that, that.

Kyle : No, because, look, because that goes round. It goes out. It goes out.

Vijay: Or that one.

Kyle : No, because it hasn't got squiggly lines.

Vijay: It has to be that.

Vijay: OK num' 4.

Nuresha: Num' 4

In this extract Nuresha is much more involved in the group's shared reasoning. She is encouraged by the other two children, who are listening to one another and accepting alternative view points better. Nuresha suggests an alternative which challenges Kyle and Vijay, prompting Kyle to provide reasons why her suggestion may not be the correct answer to the puzzle. When the group converge on an answer, Nuresha affirms her participation by repeating the answer aloud, echoing Vijay.

Nuresha speaks in total 26 times in this second recording. This is less than the others (Kyle 72 and Vijay 76) but is obviously significantly more than the pre-intervention session. She is involved in all the decisions that are made. She is asked one question in the pre-intervention test, but twenty-one in the corresponding post-intervention session. "What do you think?" is the commonest form of question, several times taking the form 'What do you think, Nuresha?'. All three children display a readiness to work together and an understanding of the importance of each individual contribution to the group answer.

3) The role of ICT

Originally the 'Talk Lessons' at the heart of the Thinking Together approach were developed by Lyn Dawes as a way of improving the quality of talk in groups working with a computer. Like other primary teachers she normally asked children to work in pairs or threes around computers hoping that this would help their communications skills. When teachers, such as Lyn, were shown video recordings of their children working together around computers they were often shocked by what went on. Lyn realised that the children needed to be prepared for working together effectively. When this was done the improvement in the quality of talk, thinking and learning was marked (Wegerif, 1996).

The Thinking Together Approach to using computers can be summarised in four points each of which assumes the crucial importance of teachers in framing and contextualising the computer-based learning experience:

- The class participates in an ongoing process of explicit teaching and learning of talk skills which promote thinking;
- Computers are used both to scaffold children's use of these skills and to bridge them in curriculum areas;
- Introductions and closing plenaries are used to stress aims for talk and for thinking as well as to review progress;
- Teacher intervention in group work, and their talk in introductions and closing plenaries are used to model exploratory talk.

(Wegerif and Dawes, 2004)

To illustrate this approach to using computers I will give three examples from recent research. The first of these concerns the use of specially designed software for prompting and directing conversations.

1. I*D*RF: A way of learning with computers

Several researchers (e.g Fisher, 1992; Cazden, 2001, p 124) have pointed out that the activity around much educational software often fits the IRF - Initiation (by a teacher)

Response (by a student) F (follow-up by a teacher) – educational exchange that has been referred to as 'the essential teaching exchange' (Edwards and Westgate, 1994). Thus, whether pupils are working with a piece of tutorial software or an 'edutainment' package, there is often an Initiation by the computer, a response by the user(s) and feedback or follow-up from the computer. However, if children in a pair or group respond to a prompt from the computer by 'sitting back' to discuss together their response the educational content of this interaction exchange can be transformed. This is what has been referred to as the I*D*RF educational exchange (Wegerif 1996).

An example of I*D*RF

Q3 On the computer screen

Rough surfaces cause

a) as much friction as a smooth surface?

b) more friction than a smooth surface?

c) less friction than a smooth surface?

Rachel: Which one do you think it is?

Cindy: 'c'

Rachel: I think 'b' (*Laughs*)

Cindy: I don't. Look 'changes more surfaces than a smooth surface' (Misreading the screen)

Rachel: Yeh I know, but if you rub

Cindy: (*inaudible*)

Rachel: Yeh I know but - wait, wait - listen, if you rub two smooth surfaces together right, will it be slippery or stable? (*Rubs hands together*)

Cindy: Stable - depends how tight you've got it.

Rachel: Cindy listen! If you've got oil on your hands and you rub them together will they be slippery or not? (*Rubs hands together*)

Cindy: Well you see (*She rubs her hands in a parody of Rachel but in a way that makes them miss each other*) 'cos they don't rub together they go ...

Rachel: Cindy! (*in mock exasperated tone*) If you've got ...

Cindy: Yeh, they will be slippery! (*laughs*)

Rachel: Yeh, exactly. So if you've got two rough surfaces and you rub them together it will not be as slippery will it?

Cindy: No

Rachel: So that proves my point doesn't it?

Cindy: mmm

Rachel: Yes, do you agree? Good. (*She clicks on answer 'b'*)

Commentary

Here Rachel appears to know the answer and persuades Cindy. She does so with reasons and an analogy of the effect of adding oil to ones hands when rubbing them. Rachel's response to an initial disagreement is to give reasons and attempt to persuade her partner. Although this could appear to be rather one-sided, Cindy is genuinely persuaded and in other interactions Cindy was the one persuading Rachel, so their relationship overall was more balanced than this episode implies.

The interface here is 'tutorial' in design; yet it has the potential to support a productive teaching and learning interaction through the the I***D***RF (Initiation, **Discussion**, Response, Feedback) structure of the talk, where instead of responding immediately to the computer prompt the children sit back from the computer and discuss their possible response amongst themselves. The computer-based educational activity does not, therefore, reside in a piece of software; rather, the software supports an educational activity, that is constructed through the interaction of the pupils, teachers and the technology. Note that feedback from the computer is also integrated within the children's discussions, with such feedback affording valuable opportunities for the students to have their responses either confirmed or disconfirmed.

Computer-supported I*D*RF educational exchanges enable directive teaching and active learning to cohere within a single activity. Software prompts, information and questions can provide directive teaching while opportunities to engage in learning dialogues enable children to actively construct new understandings and generate their own questions. It is thus the purposeful integration of discussion (the '*D*') within the 'IRF' sequence that is critical. The 'IRF' part of I*D*RF refers only to the student - computer interaction. If we look at the IRF exchange alone, the computer appears to direct the learning and the student appears to be relatively passive. The computer gives some information and then asks a question about it with a multiple choice answer. On the other hand the '*D*' part of I*D*RF refers only to the spoken pupil-pupil discussion. Here pupils may come up with ideas and support them with reasons before testing them out on the computer. Discussion of this kind provides an opportunity for the joint construction of meaning by pupils. The I*D*RF exchange structure as a whole therefore unites directed teaching with active learning in a way that draws children to construct pre-defined curriculum knowledge for themselves. I*D*RF goes beyond the opposition of transmission teaching versus discovery learning in a combination that Mercer has described as 'the guided construction of knowledge' (Mercer, 1995).

2. Strategy games against the computer

Competitive strategy games can motivate reasoning. However, unless the children are inducted into effective ways of working and talking together, competitive games *between children* usually prove destructive of the collaborative ground rules that are important for effective shared thinking. We have evidence of this extracted from over fifty hours of video data of children, in a range of schools, working together around different pieces of software (Wegerif, 1997).

For example, Mercer (1995, p 100) described children working with co-ordinates software produced by SMILE Mathematics (http://smilemathematics.co.uk/) to locate a 'hidden elephant' in the grid-map of New York city. The software provides a grid representing New York City. An elephant is 'lost' in the city and the aim is to locate it by keying in co-ordinates. After each guess, the programme provides information about how near the guess is to the actual position of the elephant.

Find the Elephant

Lester: I know where it is. (Sean takes his turn and fails to find the elephant)

Lester: I told you it weren't over there. (He then takes his turn also without success)

Sean: Eh, heh heh heh (laughing gleefully).

Lester: Which one just went on? I don't know. (Says something unintelligible).

Sean: 1, 2, 3, 4, 5, 6. (Counting squares on the screen).

Lester: I know where it is.

Sean: I got the nearest.

The two boys - Sean and Lester - treated the programme as a competitive game (Mercer, 1995, p 102). They took turns to make random guesses not really based on the information the computer offered. They laughed or made derisory comments when their partner made an incorrect guess. They were motivated enough to keep trying until by chance a correct guess was made: at which point either could say with satisfaction 'I won!' - while the other might insist that the game 'wasn't fair'. It was clear that they were not thinking together to work out a winning strategy.

Eight years later we were able to observe children using very similar co-ordinates software as part of a collaborative project with SMILE mathematics. This time the children's class had worked through the Talk lessons and the interaction between the children at the computer was quite different. They are working on a 20 by 20 grid with negative as well as positive co-ordinate squares. As we join them they have been told by the computer that the hidden animal (a Rhino this time) is 12 squares away.

Thinking together to find the Rhino

Andy: 1,2,3,4,5, … 12 … (pointing to screen)

Baz: What, oh – 2, -5

Andy: Maybe then cos look …. Cos when you went 12 you went that way but if you go that way it's 2 way and it makes 12, look see it goes 1,2,3,4,… So I think it's that one, do you?

Baz: Yeh, OK, let's try it: -1, -3

Andy: No, it can't be actually, no ..

Baz: -2, -4 it might be

Andy: Yeh, it's got to be that, if it is not I will be surprised.

This recording came from a typical group of three boys. It is noticeable that, unlike Sean and Lester, they are discussing and agreeing pairs of co-ordinates before one of them typed this into the keyboard. They give reasons for their ideas and question each other, and as a result they are developing their mathematical reasoning and their use of co-ordinates.

Our current research with SMILE suggests strongly that once children have been inducted into the *Thinking Together Approach* playing strategy games *against the computer*, where a small group of children work together to try to beat the machine proves to be a highly motivating context for shared reasoning and problem solving. It re-inforces the use of exploratory talk because, as one young girl put it: 'talking about our moves really helps us win against the computer'. Again this role for the computer takes advantage of its dual nature. As agent-like it is able to take the role of a partner in a competitive game in which it is perceived as trying to win. However, the fact that it is a machine means that the children can unite together to try to defeat it in a competition that supports social cohesion and motivates collaboration.

3. 'Slow-throwness': the case of Bubble Dialogue

So far we have looked at the use of the computer's potential as a support for face to face dialogue. Another way in which computers can support dialogues, however, is through offering a flexible way of externalising shared ideas. Talk in face-to-face dialogues exists only momentarily and only for those immediately present. Technologies that support drawing and writing can thus be thought of as a way of extending and deepening dialogues, by turning transitory talk and thoughts into external objects that are available

to learners for discussion and shared reflection. (Olson, 1996). Computer documents can offer a kind of half-way stage between the ephemerality of talk and the permanence of written texts. This is part of what Harry McMahon, one of the originators of Bubble Dialogue software, refers to as 'slow-throwness' (McMahon and O'Neill, 1993). By this term he refers to the way that Bubble Dialogue can externalise the thoughts and feelings of the participants and also support shared reflection, shared construction and the possibility of a shared re-construction. The Bubble Dialogue software is designed to support dialogues by converting them into a more enduring and yet flexible medium. Although it does not take advantage of the computer's capacity for simulated agency in the way that tutorial software and computer games do, it nonetheless makes use of the same ambivalent or intermediate status of computers between subjects and objects in that it allows users to create characters for themselves that can then be made to speak on their behalf. Arguably the extent to which children perceive their characters as speaking on their behalf is related to the degree to which they identify with that character, and so early studies of the use of Bubble Dialogue looked for and found evidence of such identification (Jones, 1996)

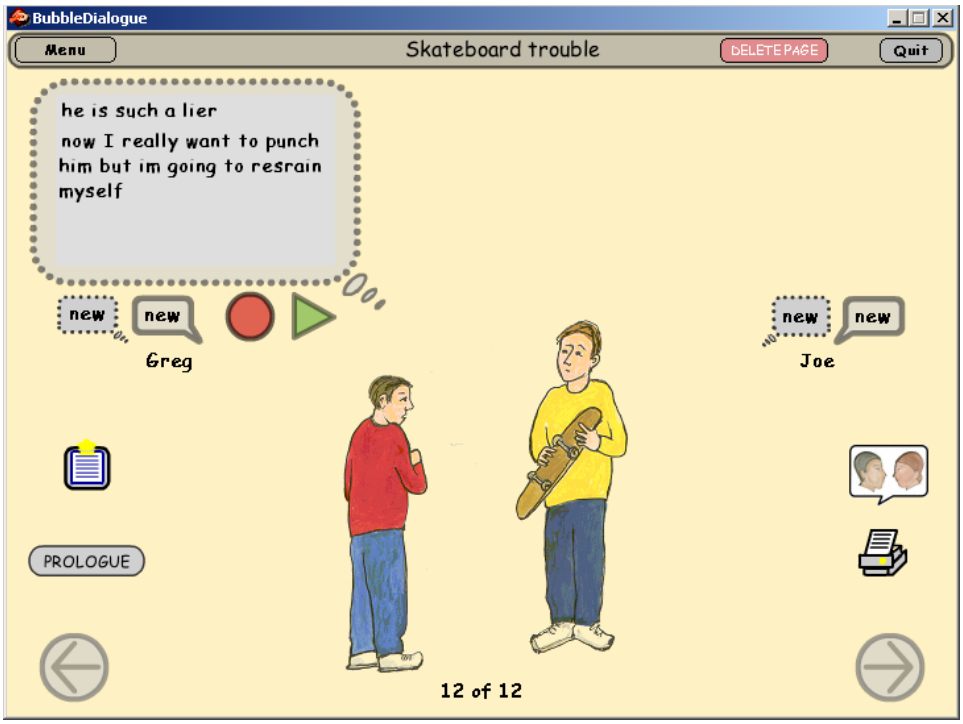
At the heart of Bubble Dialogue is the simple idea of combining pictures with speech and thought bubbles. The pictures are easy to load into the software and can represent dialogues in any situation. In addition to the bubbles there is a facility to review the dialogue created so far and to change it and also, of course, the option to print it out. In the latest variant there is also an option to record speech so that children do not need to type but can talk instead.

What Harry MacMahon called the 'slow-throwness' of Bubble Dialogue makes it particularly effective for exploring issues of values and social relationships. To give one example of this, Bubble Dialogue is in use in a special school for children with emotional and behavioural difficulties. Such children can find it particularly difficult to articulate their own thoughts and feelings and to appreciate others' thoughts and feelings. Previous studies at the Open University showed that Bubble Dialogue could be helpful here by making the characters' thoughts (as well as their speech) objects for reflection and discussion (Jones and Price, 2001). Teachers at the school believe that collaborative use of the software has great potential value. An example of such dialogue is provided in the

Bubble Dialogues reproduced in Figure 2 and extract 4 below. This was created by Charlene and Rory, both aged 10 years, and both excluded from their previous schools because of behavioural difficulties. They are discussing a Bubble Dialogue scenario about a personal conflict involving characters called Joe and Greg. In the story Greg was using his new skateboard in the playground when Joe, a bigger boy, grabbed it from him.

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

Figure 2: Greg and Joe.



Extract from a Bubble Dialogue

Joe thinks: he just have to ask nicely

Joe says: I'll kick your head in you fat brat head

Greg says: yeah come on then, I'm not scared of you if im a big fat brat head what does that make you, you peebrain

Greg thinks: im not scared of him all hes got to do is give me my skateboard back and apologise to me, if he doesn't im going to break his big fat ugly bogied up nose

Charlene and Rory's story goes on to have Joe give Greg the skateboard back. When Greg insists on an apology Joe denies having taken the board and says that Greg should say sorry for threatening to punch his lights out when he was only playing. Eventually they both manage to apologise in a guarded way and agree to be friends. Their thoughts remain angry but their words are conciliatory.

The expert teachers of children with emotional and behavioural difficulties are convinced that these kinds of conversations can equip children like Charlene and Rory with inner resources to draw on in real life situations. Through using the Bubble Dialogue programme they rehearsed a way to talk themselves out of a fight that at first seemed inevitable.

It is very easy to load pictures into Bubble Dialogue. This software is available free to download on www.dialoguebox.org. Some of its features, such as the option to generate and print a complete dialogue, support literacy as well as oracy.

Summary and conclusion

The Talking Partners project in Bradford suggests that children learning English as an additional language require structured opportunities for talk in small groups. The aim of EAL teaching is not simply conversational competence but also academic competence. There are good reasons for believing that the use of 'Exploratory Talk', characterised by questions, the use of reasons and shared reflection, can provide access to education for those groups who are currently not achieving as well as might be expected. The Thinking Together approach promotes the use of Exploratory Talk in the classroom as a medium for teaching and learning. There is some evidence that this approach is helpful to EAL children particularly through the creation of a climate of inclusion. The use of ICT, especially stand-alone computers is a core part of the Thinking Together approach as this has been applied in a number of research projects. Educational software has been used to stimulate, support and frame learning dialogues within areas of the curriculum. Because

computers are machines, without expectations and with infinite patience, they can provide a safe context for children to try out ideas. However computers can also be made to act as if they were interactive partners in games and conversations and this enables them to focus and direct children's learning dialogues. The combination of preparing children to talk effectively together and computer software can provide access to education for those groups who are currently achieving below expectations. This use of computers as catalysts and support for learning conversation may be particularly appropriate and effective for EAL children.

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