Affective issues in learning technologies: emotional responses to technology and technology's role in supporting socio-emotional skills

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Abstract: :This paper focuses on some of the author's research studies over the past thirty years and places these in a wider context to reflect on research into affective issues in learning technologies over this period, and to consider whether and how the issues uncovered by research have changed as technologies have developed over time. Three issues are given particular attention: firstly the reasons for learners' use or lack of use of technologies for their learning; secondly adult learners' attitudes towards using technology for learning and thirdly how technology might support socio-emotional development and expression in children. The discussion of these issues is framed by two of the author's research projects. For the first two issues this is an early study of students' perceptions and attitudes towards using computers for tutorial learning in 1980. The factors that influenced the students' use of the computer tutorials are discussed (including access, assessment and anxiety about using computers) and also the extent to which some of these factors persist for many learners using (or not using) technologies today. The discussion of the third issue draws on a series of studies conducted in the 1990s to investigate whether educational technology could support children and young people's emotional expression and communication and development of socio-emotional skills. Finally the paper considers how these kinds of issues have been taken forward and how they are represented in contemporary research and suggests that trust is an important factor in using learning technologies.

1 Introduction

The term affect is a very broad one: Oates and Nundy (1996) describe it as a general term covering concepts such as emotion, mood, attitude and value and it is in this broad sense that it is used here. In the last ten years or so, interest in the relationship between learning technologies and affect has grown enormously and includes research on: attitudes towards and perceptions about the use of educational technologies; how learners feel when they are using such technologies for learning; the motivational power of using technologies and the barriers faced and how educational technology can support the expression and communication of emotions and the development of socio-emotional skills. This paper takes a historical perspective to discussing research into affect and learning technologies over the past thirty years. To do this it revisits two of the author's own past projects: one carried out in 1980, and one spanning a few years in the late 1990s, to relook at the affective findings from these projects, and consider whether these findings have remained relevant over time as the technological landscape has changed. The two case studies take place in very different contexts: one relates to adult distant learners and the second to children - but it is argued that there is nevertheless some common ground between the two.

Three issues are foregrounded in the paper and the discussion of each is framed by one or more of the author's research projects which are presented as case studies:

> 1. adult learners' reasons for using learning technologies or not - which arise from their perceptions, emotions about technology and their experiences.
>
> 2. adult learners' attitudes towards using technology for learning - this is about affective factors *concerning* technology: how learners feel about them, their perceptions and experiences of using technologies for learning.

The research related to these two issues is an early study of students' perceptions and attitudes towards using computers for tutorial learning in 1980. The factors that influenced the students' use of the computer tutorials included access, assessment and anxiety about using computers. More recent studies illustrate how some of these factors are still live issues for many students in making use of technology for their learning today.

> 3. the third issue is the role that technology may play in supporting children's negotiation of socio-emotional issues and their emotional expression - whether and how technologies can be harnessed to help people deal with their emotions, especially groups of people, usually children who could be thought of as emotionally vulnerable.

The discussion here draws on a very different kind of research on affect and technology, a series of studies conducted in the 1990s to investigate whether and how educational technology could support children and young people's

emotional expression and communication and development of socio-emotional skills.

The structure of the rest of the paper is as follows. Section 2 provides a very brief introduction to the issues of relevance to the first case study, *evaluating computer assisted learning tutorials at the Open University* which then follows as part of the same section. As the case study took place in 1980, much of the literature post dates the study, and so further discussion of the literature is in section 3, following case study 1, and includes discussion of issues arising from the case study. Section 4 then introduces the second case study: *using technology for supporting emotional development and communication* where a similar pattern applies, with most of the discussion of the issues, and some literature, following the case study in section 5. Section 6 provides further discussion and reflection and finally some conclusions.

2 Adults using learning technologies: the affective landscape

Using technologies for learning can provoke very different emotions for learners including excitement about the use and potential of the technology which can be motivating and fear and lack of confidence which can be a barrier. There is now considerable research focussing on the adoption of technologies for learning; teachers' and learners' perceptions and attitudes towards technology and how independent learners make use of technologies including the work of Kirkwood (2003); Kirkup and Kirkwood, (2005) and Kirkwood and Price (2005) in the context of the UK Open University; Gorard and Selwyn (2005) and Selwyn, Gorard and Furlong (2005) whose research focuses on adult participation in lifelong learning in the UK and draws on a much wider population. Literature on computer anxiety dates back to at least the 1980s, but has more recently been joined by studies about internet anxiety. Further discussion of the affective landscape of adults using learning technologies takes place in section 2 so that the discussion can consider the issues arising from the case study and other relevant studies that have taken place since then.

When case study 1 took place, there was little use of technologies for learning and therefore little research into their use. What is of interest about the study, however, is that firstly it revealed salient and persistent affective factors related to technology, at a time when cognitive aspects tended to be in the foreground and it will be argued that some of these same factors are still very relevant in the very different context we are in today.

3 Case study 1 Evaluating computer assisted learning tutorials at the Open University

The Open University context

The participants in this study were students at the UK Open University (UKOU) and so some context about the UKOU is provided before describing the study. The UKOU was set up in 1969 to provide distance education to

students who are geographically dispersed. One of its founding principles is Open Access: so applicants do not need prior qualifications to enrol on the university's entry courses and they study part time, thereby allowing students to study for a degree whilst maintaining full-time employment and/or childcare. Most students are mature students, and the UKOU is often viewed as providing a "second chance" to obtain a degree. Students work from home and are attached to a local regional centre which provides them with a tutor who marks their assignments and provides academic support. The vast majority of courses have tutorials where groups of students meet their tutor to discuss the course work and over time, more tutorial provision has been provided on-line. However in 1980 when the project described below took place, tutorials were face to face. Materials for UKOU courses were almost completely print based at this time, but the university also had broadcast programmes via the BBC and as exemplified in this study, the university had started experimenting with using different media and with the use of computers.

Arguably the UKOU context and that of other HE institutions in the UK are much closer to one another now than they have been in the past. The UKOU pioneered the use of technologies to support distance education - but the increase in using technologies for learning and especially the Web, and the desire for flexibility has led to most universities now using technology (Web technology in particular) both to support their teaching on campus but also to provide access and resources for off campus part-time students. Changes in the HE sector have also led to many students combining studying with working for financial reasons.

Evaluating the CICERO tutorials

One of the university's aims was to increase feedback for students, which at this time consisted of their tutors' comments on their assignments; computer marked assignments (on some courses) and tutorials - though attending regional tutorials might involve quite long journeys for some students and so attendance varied. As early as the 1970s, therefore, the UKOU was experimenting with using technologies to provide further support for students on their courses. The resources developed included a Computer Assisted Learning tutorial system: Cicero. One course where Cicero was used (and evaluated) was an interdisciplinary course: "Biological Bases of Behaviour". Four tutorials were developed, replacing computer-marked assignments, and aiming to provide diagnostic feedback and remedial help. These essentially consisted of multi-choice questions with a small amount of adaptivity, or alternatively students could use a postal version. Students who used the interactive system booked sessions to use the computer terminals that were housed at regional study centres.

An evaluation of Cicero was conducted in 1980 and aimed to find out why students used (or did not use) the tutorials and their expectations and beliefs about the educational benefits and practicalities of the Cicero tutorials. The students were surveyed before, during and after use. Questionnaires, investigating their intended use, reactions, expectations and

attitude were sent at various points in the course and also built into each interactive tutorial. For example at the beginning of their course students were asked:

- "What sort of benefits would you expect to get from using Cicero"
- "What types of disadvantages or annoyance do you expect to be associated with its use?"

Finally, to expand on the feedback that was received from students and to provide some context to the questionnaires, 53 students on the biology course were interviewed at a residential summer school.

The study revealed that 37 per cent of our respondents made some use of Cicero - compared with the 58 per cent who said they intended to - but the use declined for each tutorial (see Jones and O'Shea (1982) for full details). Students found the tutorial a useful experience and those using the interactive system also described it as fun - an element which emerged, unprompted in the interactive questionnaires (but not in the postal questionnaires) where students referred to the enjoyment of playing with the computers.

Why didn't students use the Cicero system?

Informal interviews with 53 students at the University's residential summer school were conducted to investigate the reasons for the lack of use and the decline in use over time and to inform the final end of year questionnaire. This process revealed that many students were scared of using the terminal and embarrassed about using it in front of others and a number were also able to tell us about what we called a "bad computer experience" that they had either experienced first hand or heard about from other students, including for example logging in difficulties. These turned out to be quite powerful. Our conclusion, surprising at the time, was that the perceived educational benefits had little to do with the amount of use. Students had a realistic view of the benefits but also of the problems - and one of the recommendations was "that the real breakthrough must be in providing home access".

The impact of technical difficulties - or perceived technical difficulties was confirmed in the final survey sent to students. Two further issues that emerged were the need for integration with the course and the importance of assessment: the optional nature of the exercise made it much less likely to be used, especially given that students needed to get to a regional centre in order to use the interactive version. During these very early days of experimenting with the possible use of computers for teaching and learning, the three issues of accessibility, (including the usability of the software itself), optionality and integration were closely and paradoxically related.

So to summarise, it seemed that students did not think there were sufficient benefits from using the system to make the not inconsiderable time and effort worthwhile. But students were also influenced in their decisions by

affective factors such as their own lack of confidence and embarrassment about trying to use the computer terminal in a public space - and the experiences that others reported to them. Finally, the tutorials were not compulsory nor strongly integrated into the course.

It would not have been possible to transform teaching to make using technology an integral part of it at a time when using computers for learning was just getting started and the vast majority of students had no experience at all of using computers. So although the importance computer based work being assessed and thus mandatory was clear from this and other studies, it was not possible to make any activities mandatory until they could be accessed by all students. This point was not reached until the early 1990s, when students were required to have access to computers for certain courses (Jones, Kirkup and Kirkwood 1992).

What was also clear from this study was the impact of students' perceptions, beliefs and attitudes on their willingness to engage with the process of learning to use the computer for their CAL tutorials. As we noted above, back in 1980, this process was a new journey for nearly all the students, a journey that many students were too apprehensive to embark upon. In the informal interviews, students were prepared to reveal more about their fears than they expressed in the questionnaires.

Our conception of the issues of access was a Chinese box with a number of barriers for students to get through: firstly access to the computer terminal; then to the program, then the quality of program and integration with the course. However whilst this model shows that accessibility and access have a number of components before a student can use the technology for learning - it does not point up the inter-relatedness of the different barriers - be they cognitive, technical or affective.

4 Adults using learning technologies: the affective landscape revisited

Has what drives students' use or non use of technology changed over time? One recent study, (Kirkwood 2008) is relevant for understanding changes over time as he investigated the incentives and barriers for students using technology for learning in the same UKOU context. He comments that:

> *"The findings suggest that it is not technologies per se, but a combination of various contextual factors that determine students' use of Web resources for learning. Of the academic factors that emerged from the interviews, assessment requirements and pedagogic approach were particularly important"*
>
> (Kirkwood, 2008, p372)

Kirkwood's detailed interview study aimed to contextualize students' learning in relation to any relevant experiences and revealed that familiarity and competence in using ICT was as an incentive for students' use of Web resources, whilst problems with software and university systems were a

barrier. As with the Cicero study, students reported assessment to be an influential factor in whether they used technology. Indeed, almost all the participants were strongly influenced by assessment - and those with limited time made strategic use of the assignments to manage their study time.

Focussing on assessment, Kirkwood and Price (2008) note that the relationship between students' academic success and their attentiveness to assessment requirements was established in the 1960s and 1970s and that not only is assessment a crucial factor in the take up of learning technologies but also influences what parts of a course get studied and how those parts are studied. Confidence and skills remained an issue for some of these students nearly thirty years after case study 1 - as did access to particular pieces of software with Kirkwood citing technical difficulties that are often a disincentive to the use of specialist online software or password-protected facilities.

In another UKOU study, Kirkwood and Price (2005) draw on surveys over the years 1996-2002, with 80,000 respondents overall, to consider the *quality* of student access to computers and the internet. Figures for UKOU student computers access in 1980, when case study 1 took place, are not readily available, but it was 33% by 1986 (Kirkwood, 1988). By 2002, the end of the period reviewed by Kirkwood and Price, student access was 89% with internet access at 82%. However, the quality of access varied; for example some students shared access, and there was variability in the speed and quality of students' internet access. Kirkwood and Price therefore urged course designers to be realistic about the amount of time learners could spend working online and to allow space and time for them to work off-line.

So in contrast to 1980, although personal access could be assumed, it was not completely unproblematic - and some students still lacked confidence and skills in using computers. The next section focuses on changes in computer anxiety between then and now.

Computer anxiety

Case study 1 took place in 1980 and as noted, anxiety about using computers was a significant issue By the mid to late 1980s there was a reasonable amount of literature on computer anxiety developing. Some of this related to concerns about the impact of such anxiety on a workforce increasingly expected to use computers and focused on computer anxiety in the context of workplace computerisation (e.g. Zuboff, 1988) although some studies focused on college students (e.g. Raub, 1981). Although computer anxiety was discussed and researched, the concept of anxiety, let alone computer anxiety, was still not clearly defined (Torkzadeh and Agulo, 1992) and the literature was very diverse in its concerns and in the kinds of studies conducted.

Maurer's (1994) literature review explains that the only certainty around computer anxiety correlates was the relationship between experience and anxiety (the more experience people had the less anxiety they felt). A

number of measures (usually rating scales) had been developed, and there was research on the best training to reduce anxiety, but this too was rather inconclusive. Although nearly all the studies cited by Torkzadeh and Agulo (op. cit.) concerned computerisation in the workplace, their descriptions of computer anxiety match the experiences of some of the students in the Cicero study very well: *"Users are afraid they will break the computer…."* and *"They feel awkward and fear looking stupid." (p. 106)*

By the 1990s a clearer definition of computer anxiety had been developed. Chua, Chen and Wong (1999) described computer anxiety as a complex psychological construct, which is connected to computer avoidance. "*Computer anxiety is, therefore, a kind of state anxiety, which can be changed and measured along multiple dimensions*" (p611). They also report on a meta-analysis of computer anxiety and its relationships with gender, age and computer experience based on studies between 1990 and 1996. Whilst the literature suggested that the relationship with gender and age was not straightforward, the relationship between anxiety and experience appeared to be reliable and this was confirmed in their meta analysis which showed *that computer anxiety is inversely related to computer experience.* In line with previous researchers, Chua et. al discussed the possibilities of reducing anxiety through programmes and exposure, as it is a changeable state - and indeed cited evidence of successful training programmes.

As noted, some of the literature at this point was about workplace use of computers, and when it did focus on educational use, as with many studies, it tended to study college undergraduates, so focussing on a population of young people in full time education - a different population to the students in the Cicero study. One study, by Popovitch, Gullekson, Morris and Morse (2008) researched the change in attitudes towards computers between 1986 and 2006. They found that whilst attitudes have changed with vastly increased usage over this period, the amount of time spent using a computer was still positively related to computer attitudes, and attitudes towards computers and anxiety remained negatively related.

Increasingly, as connectivity has become widespread, use of computers has involved use of the internet, and some literature, concerned with internet anxiety has developed. Joiner et. al.'s 2007 study focuses specifically on internet anxiety and identification and the relationships between them, drawing on Cooper and Weaver's (2003) model of computer use in which computer anxiety is an important factor. Joiner et. al used Brosnan's definition of computer anxiety: "*an irrational anticipation of fear evoked by the thought of using (or actually using) computers, the effects of which result in avoiding, or minimising, computer usage*" (Brosnan, 1998, p. 17). They note the debate about whether computer anxiety and internet anxiety are the same thing. The consensus in the literature appears to be (see also e.g. Chou (2003) and Presno (1998)) that although there is some overlap between the two, some Internet anxiety has some unique constructs that are related to connectivity e.g. search anxiety, delay anxiety and general fear of Internet failure (Presno, 1998). Joiner et. al's study shows that two psychological factors, Internet anxiety and Internet identification are both

related to the use of the Internet.

So anxiety continues to be an issue. Kirkwood's 2008 study and Kirkwood and Price's 2005 study suggests that other factors identified in the Cicero study still persist: technical difficulties (real or perceived); the need for integration with the course and the importance of assessment. Almost ubiquitous access to computers at home or even on the move has addressed the access problem at one level - but does not mean that the learner will necessarily be able to easily access what she wants to once she is using the computer, nor does it guarantee confidence.

So learners' perceptions of technology and attitudes towards it are clearly important factors in affecting whether they are likely to make use of such offerings. However, until relatively recently, the role of affect in learning with technology - and in educational research more generally - received little attention. One legacy of the early CICERO study was the importance of paying attention to this area, as well as to cognitive factors - and this was echoed in the approaches taken to later evaluations of technology based learning such as the CIAO! evaluation framework (Jones, Scanlon, Tosunoglu and Butcher et. al., 1996) which included an emphasis on such affective factors. In recent years, however, there has been an increasing recognition of the importance of such factors in using technologies to support learning.

The second half of this paper focuses on a different relationship between affect and technology - an investigation of the extent to which technology itself can support affect: can it help children who have had difficult emotional experiences to express their feelings? For example, can it help children with emotional and behavioural difficulties (EBD) to develop better socio-emotional skills?

5 Case study 2 Using technology for supporting emotional development and communication.

This case study is about using a software tool, Bubble Dialogue[1], for communication in different contexts. The participants were mainly children, not adults, and they were using computers for creating a narrative in a cartoon-like environment, not studying a course. At the time there was little work on using computers to assess and help develop children's emotional and social understanding and articulation. Unlike many of the students using Cicero, the participants here were confident in using computers and motivated by the idea of using them. It was thought that this positive attitude that many children have could be capitalised on and that the Bubble Dialogue role-play environment could benefit children with troubled backgrounds (e.g. some had experienced disruptions in their care and others had been abused) in two main ways. Firstly, the children might be willing to express some of their feelings and secondly their use of the software could reveal their socio-communicative skills and provide an environment in which these could be reflected on and developed. A number of studies were carried out with different groups of participants where social communication was a particular issue, and communication skills were often poor including:

1. children who had suffered family disruptions (and where some were in care); where their parents or social workers thought that using Bubble Dialogue could help them to explore and communicate about difficult issues.
2. children with emotional and behavioural difficulties (EBD)[2]

The Bubble Dialogue sessions focused on negotiating social interactions which some children, including those with EBD can often find particularly difficult (see, e.g. Dodge and Frame, 1982). The two main approaches to understanding children's social interactions in the psychological literature at the time, were a structural-developmental approach, as exemplified by Selman's work, (Selman, 1980, and Selman 2003) and an information processing model (Dodge et al., 1986).

Dodge's work and related work (Dodge and Frame, 1982; Dodge et al, 1986; Quiggle et. al 1992) provided evidence that rejected and aggressive children may perceive ambiguous stimuli differently from other children and be less skilled at interpreting others' intentions and interests in such situations, e.g. they were more likely to attribute hostile intent to peers in neutral situations (Steinberg and Dodge 1983).

However, both the earlier work by Selman and colleagues and the approach taken by Dodge had been criticised as 'deficit' models where their approaches are compared with universal standards. Demorest (1992) therefore argued for an approach that takes account of children's personal beliefs. She suggested that understanding children's persistently held beliefs formed from similar situations in the past may be essential for understanding their persistent and often problematic styles of relating. A tool such as Bubble Dialogue, described below, can allow us to firstly obtain children's perspectives of situations and secondly, when investigating social difficulties it can allow us to focus on situations that are pertinent for the child. The next section describes the Bubble Dialogue software and how it is used.

When using the software, participants (usually two) adopt the roles of characters in a particular 'story' that they develop from an initial 'scenario' which may have already been outlined or they may develop it. They take turns to develop a narrative through dialogue that they assign to their character and which is presented on screen as speech and thought 'bubbles'. This facility for depicting characters' thoughts, as well as speech, is a key feature of the application and allows the exploration of a number of issues. These include the extent to which a participant can understand another's perspective and how participants negotiate social conflicts and communicate about them. It also allows participants to reflect upon and explore different approaches in these interactions and makes it a rich and powerful environment for exploring children's perspectives - as it shows what thoughts children ascribe to the characters. Once a dialogue has been created, the participants can move into "Review" mode, which enables them to move backwards and forwards through the script, adding any comments, explanations or modifications to the original dialogue

The aims of the Bubble Dialogue studies varied with each group, according to participants' needs and the context, but all concerned communication skills and negotiating social interactions. One set of studies (Jones and Price, 2001) mainly focused on four 'standard' scenarios which presented examples of interpersonal conflict which the children all worked with to explore how the children dealt with these conflict scenarios. The participants were 10 children with EBD (aged 9-12) and 10 primary (mainstream) pupils (10-11 years). There is evidence that children with EBD have difficulties in negotiating social situations and managing interpersonal relationships (Crick and Dodge, 1994) and so this study investigated the strategies that the children adopted in the Bubble Dialogue narratives and compared these with those of the mainstream pupils.

These studies showed that using Bubble Dialogue with children who have been in care and children with EBD can facilitate communication between children and between children and relevant adults in a number of ways (Jones and Selby, 1997 and Jones and Price, op. cit.) including enabling the adults (carers, parents or teachers) to:

- gain some insight into a child's perspective of a particular social situation;
- ascertain children's knowledge of different social strategies (whether or not they employ such strategies in real life);
- ascertain children's understanding of another's perspective

More generally, Bubble Dialogue can provide a platform for practicing role play, for participants to reflect on their actions as played out by their characters and to express emotions that might otherwise be difficult to own. In the remainder of this section examples are given of participants' Bubble Dialogue use to illustrate these findings. Figure 1 below shows the prologue screen from the Accidental Kick scenario and Table 1 also shows the opening dialogue.
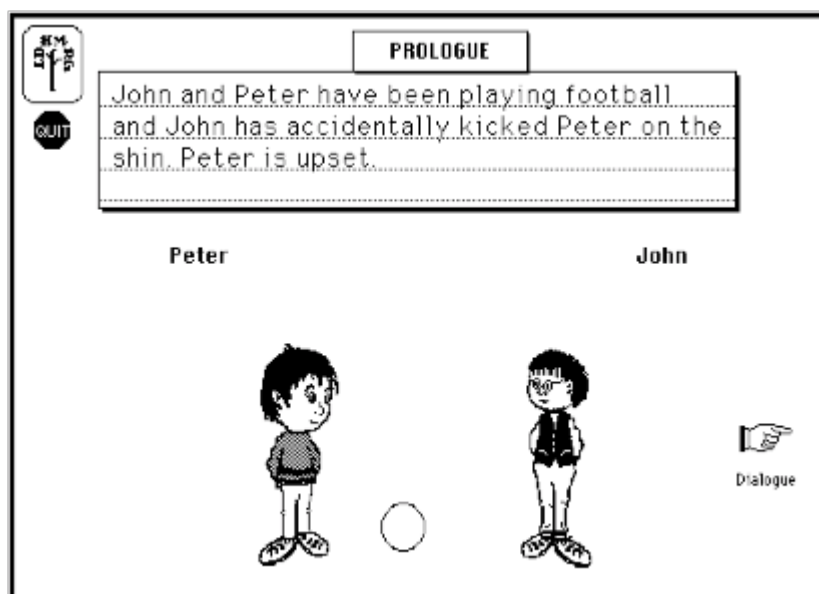

Figure 1: Screen image of the Accidental Kick prologue

Characters:	John and Peter
Prologue:	John and Peter have been playing football and John has accidentally kicked Peter on the shin. Peter is upset
Opener: (Opening speech)	John says: "whoops! Are you OK?"

Table 1: The accidental kick scenario

Figure 2 below shows the initial dialogue that was entered by one child, Harry, who is playing the role of Peter, in the Accidental Kick scenario.
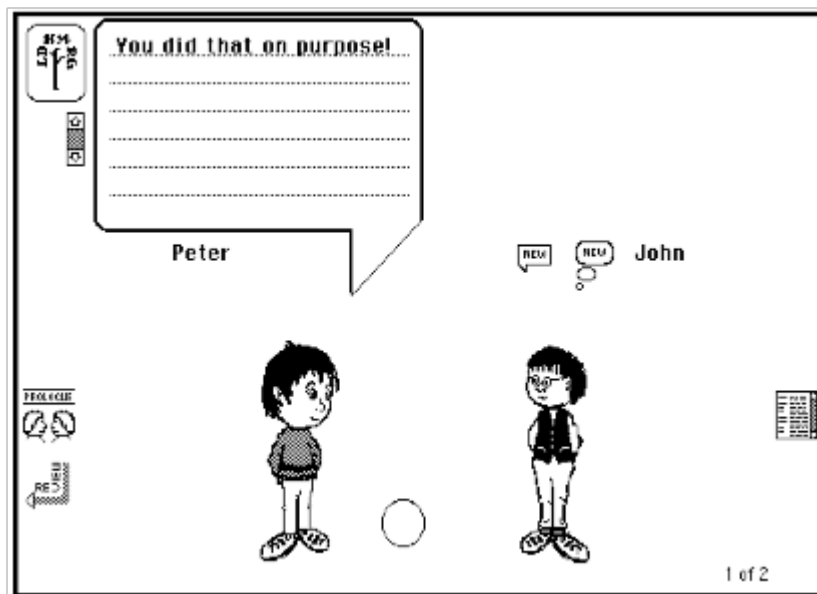

Figure 2: The initial dialogue

Although the prologue tells us that the kick was accidental, in the opening speech, Peter accuses John of kicking him on purpose. Harry then decides to take up the option of giving Peter a thought bubble, and this is shown in figure 3 below.
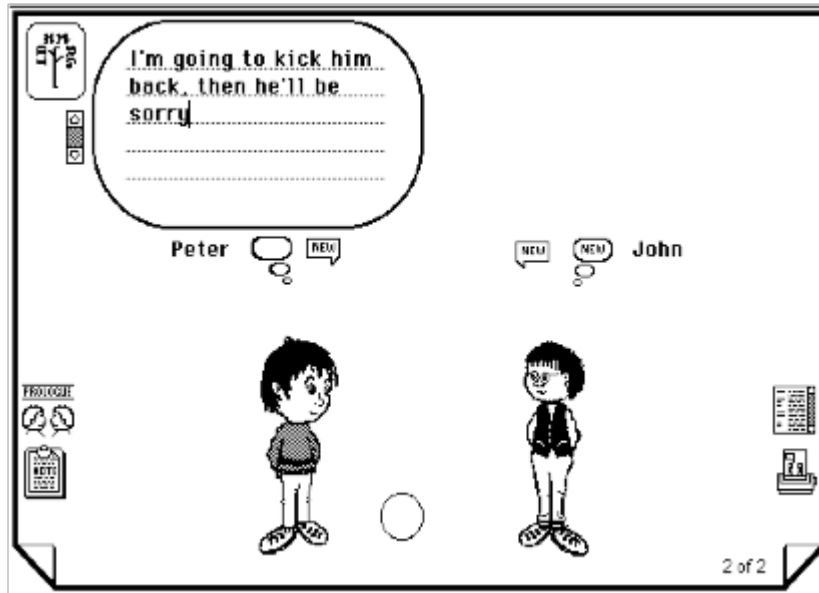
Figure 3: Use of the thought bubble in the accidental kick scenario

As shown in figure 3 above, Harry (in the EBD group, who is role playing Peter) uses the speech bubble to express his character's feelings. In this scenario eight out of the ten EBD children expressed the view that they had been kicked on purpose, and were angry about it. Both the children's use of the thought bubble and the review mode, helped to provide insights about the children. The EBD group frequently used the review mode to relate their Bubble Dialogue narrative to their real life interactions. For example, Aaron, who used his speech bubbles to 'hit' the bully, explained: "I wouldn't hit a teacher. Mainly I would hit someone who was picking on my family". So this mode can provide helpful information about how the children view issues in real life. The children's teacher also found using Bubble Dialogue helpful for discussing classroom incidents and the children's reactions to them whereas previously children had been very uncommunicative about such issues. It seemed that it provided a "safe enough" space for children to communicate about difficult social situations and their feelings in negotiating such situations.

The examples above are from the "standard" scenarios: however, Bubble Dialogue also allows the creation of personalised scenarios. So for example, where professionals working with children are aware of children struggling to cope with particular types of situations, or to deal with particular emotional issues, relevant scenarios can be created. Some Bubble Dialogue case studies therefore also used personal scenarios. The remainder of this section illustrates how using personalized scenarios with one child helped his mother to gain insight into his perspective of a particular event and helped him to express and communicate his emotions.

An example of using personalised scenarios: Peter

Peter (9) and his brother Joe (12) were adopted together after a very traumatic early childhood. They were taken into care following severe neglect and were fostered but were abused by their foster father and were

eventually adopted. Peter had been with his adopted family for two and a half years and had many problems including limited speech. He was taking a long time to build up trust in his new family and to feel secure and his mother was concerned about his inability or unwillingness to express his feelings and to work through his past experiences. Ten scenarios were developed in conjunction with Peter's mother including "Home Time":

Characters:	Peter and his mum
Prologue:	After school Peter found no-one had come to pick him up. He had to go to the school secretary and she phoned his mother. When his mother collected him later he was very upset
Opener: (Opening speech)	Peter says "Mum, there was no-one there to pick me up - how could you leave me there by myself?"

Table 2: Opening dialogue from the Home Time scenario

This scenario echoed a real incident when there was a misunderstanding about who was picking Peter up and no-one came. He was extremely upset by the incident and his mother thought it would be useful to mirror this in Bubble Dialogue to give him the chance to talk about his insecurity and his feelings in this situation. At the time of the event, although he was very upset, Peter had not been able to talk much about it. In the Bubble Dialogue scenario however he was able to express his feelings. He began by expressing his fears about the situation through the thought mechanism:

Peter thinks: But she did not come. I thought a robber would catch me and throw me in the road.

Later he also expresses his anger with his mum for not being there:

Peter thinks: I felt sad. I felt angry. I was angry with you Mum because you had left me and I didn't know where you were .

Interestingly, Peter's emotions are expressed through his characters' thoughts. After the opening speech, his character expresses thoughts only - although in other scenarios he uses speech too. He concludes the scenario with a further thought:

Peter thinks: I like it when my mum collects me. I don't like it when no-one comes.

This scenario raised some important issues and following it, Peter and his

mother were able to discuss childcare: Peter had two child minders picking him up on different days which he said that he found unsettling and as a consequence different arrangements were made that he felt happier about. In other scenarios he was also able to raise issues which he did not do in real life, such as to refer to his previous foster carers, talk about a burglary which had really worried him and to express his fear of strangers and adults. This suggests that this felt like a safe environment for Peter where he could express himself, and his anxieties. Both Peter and his mother said that they enjoyed using Bubble Dialogue together. His mother found it a good opportunity to concentrate on one child and to build up a bond. They used his own name in the scenarios and Peter commented that he particularly liked this as it made him feel special. He made good use of the speech/thought distinction as almost all his expressions of feelings were through thoughts. His mother thought that Peter was more prepared to reflect before responding when using Bubble Dialogue than he did in real life and was more expressive. She also thought that the sessions revealed his problems in working out what other people were feeling and that he could not anticipate the effect his responses would have on another person.

Other case studies of adopted and fostered children (Selby and Jones 1996) suggest that the success of Bubble Dialogue in this context is likely to depend on how expressive the child is through other means; the types of topic addressed, and perhaps who the adult is (e.g. children sometimes chose to talk to the researcher rather than the parent). Some children opted to reveal more with adults they did not know well.

Arguably the Bubble Dialogue software from the 1990s (see illustrations) now looks dated - it is not dynamic - it is not interactive in the way we understand it now or in a way that children might expect from games. Even so, a newer version that was used in the same EBD school in 2001 was well received by the children (Wegerif, Littleton and Jones, 2005) see figure 4 below. The powerful aspects of Bubble Dialogue are: the cartoon like graphics; role play; identification; the thought/speech distinction and the layers of mediation. Through using Bubble Dialogue, children can express difficult emotions without having to 'own' them by ascribing them to the characters that they role play. Conventional role play and expression through use of 'characters' is commonplace in therapeutic sessions with children (e.g. Wilson, Kendrick and Ryan, 1992). Here, however, there is a *double* layer of mediation. Rather than talking directly to a parent, teacher or counsellor, where many children are not very communicative, and which they may find very uncomfortable, the child is interacting *through* the computer. There is a further layer of mediation in that the child is a character: they are not acting as themselves in this context and so it feels safer to disclose their feelings. Results from our earlier studies strongly suggest however that children do identify with the characters - both by referring to the characters in personal terms (I, my etc) and also when discussing the actions of the character in the story.
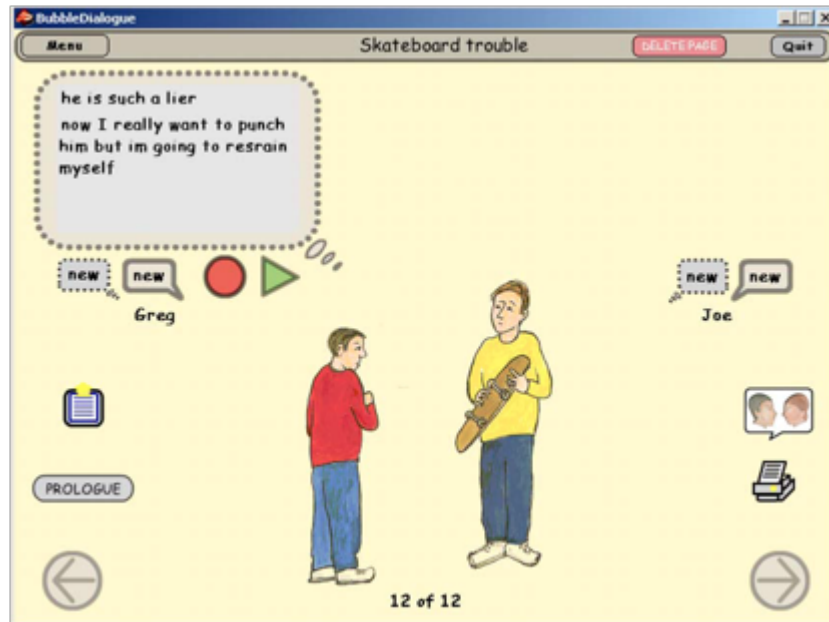
Figure 4 (from Wegerif, Littleton and Jones, 2003)

6 Related work

A number of projects have involved software to support children's story telling. Some of this research has focused on developing tools for narrative support and for creativity, whilst other research has built on the Bubble Dialogue work to support social communication skills to use the Bubble Dialogue software with children with autism. One project that developed software to support collaborative storytelling was the KidStory project (1998-2001): a European Union funded collaboration between a number of countries (Stanton and Neale, 2003; Stanton, D., Neale, H. and Bayon, V., 2002). Here much of the focus was on the development of the tools to support the storytelling and in particular on interfaces and tools to support collaboration.

Hartley (2010) in reviewing 25 years of CAL discusses the Networked Interactive Media in Schools (NIMS) project which took place between 1998 and 2000, a little after the Bubble Dialogue work. This involved much younger children, (aged 5-6) but also focused around building narratives with a cartoon style representation. The children worked in a classroom with a large touch screen, several PCs (arranged octagonally) with touch-sensitive displays, a colour printer and a digital camera. The teacher sat alongside the children. This configuration had been very carefully designed to support the young children learning through collaboration and story building. The software, T'riffic Tales, included settings, props and characters. The developing narrative was represented as comic strip frames each with a picture and a piece of narrative - so the representation was not unlike that in Bubble Dialogue, but here stories were developed using drag-and-drop techniques. Children worked together; either at the large touch screen or at their own computer editing the same story as other children. Another similarity with Bubble Dialogue was the inclusion of a focus on social and affective factors (Cooper and Brna, 2001). Whereas Bubble Dialogue was intended to support children's social interaction and emotional

communication through role play, here, the design of the software and the spatial lay-out of the classroom fostered high motivation and engagement (Cooper and Brna, 2002). T'riffic Tales also supported children's motivation and self esteem more directly through the use of a pedagogical agent designed within a strongly empathic framework.

Rajendran and Mitchell (2000) used Bubble Dialogue to work with individuals with Asperger's syndrome, and suggest that this use of computers may be able to elicit more 'normal' social interactions in these individuals. They note that one benefit of such tools for this group is that it slows down communication - allowing time to reflect and think. This argument has also been made for asynchronous computer mediated communication. Rajendran and Mitchell suggest that various forms of computer-mediated communication may allow individuals with Asperger's syndrome to overcome some of their social problems.

What would Bubble Dialogue look like today? Two projects funded by the UK ESRC/EPSRC TEL programme (http://www.tlrp.org/tel/the-tel-programme /about-tel) take forward some aspects of Bubble Dialogue and also the work with individuals with Asperger's syndrome described above.

ECHOES II is developing an "adventurous technology- enhanced learning environment" for both typically developing children and children with Asperger's Syndrome (ages 5-7) to explore and improve social interaction and collaboration skills in the context of virtual environments. In the same way that Bubble Dialogue did in the 1990s (albeit on a much smaller scale) the environment will also " *serve as a tool for researchers, teachers, parents, and practitioners to investigate problems that children may encounter in specific social contexts and the ways in which those problems may be addressed. The proposed technology-enhanced learning environment will combine existing technologies in new ways. With the active participation of user groups, we will combine interactive multitouch screens, gesture and gaze tracking, and intelligent agent-based context-sensitive interfaces to create a novel interactive multi-modal environment that can be adapted to the needs of specific individuals, and that can provide new ways of investigating and supporting the development of social skills in children* " (see http://echoes2.org/).

A second TEL project is working with a similar group of young people to one of the groups of Bubble Dialogue participants. The Inter-life project (http://www.inter-life.org/blog/?p=141) is about enabling young people to acquire and develop skills to enhance life transitions and is focusing on informal transition activities with two main groups of young people: 'Gifted and Talented', and Looked After and Accommodated (LAAC) as well as working with their friends, teachers, parents and others. The project is working within the Second life online virtual world where participants navigate and interact via their customised avatar - a digital representation of themselves. Inter-life is investigating identity development and posing the following research questions:

- *How can transitional change including goal-setting, 'identity change', risk and conflict be handled in the virtual world?*

- *How do personal identities develop during transitions in the virtual world, and how does this map onto real world activity?*

The first question deals with one of the themes that the Bubble Dialogue studies focused on, handling conflict. As with Bubble Dialogue, the interaction is mediated, but here the mediation is via a virtual world. It was argued that children often find that the double mediation of Bubble Dialogue offers a safe place to reveal their feelings. In the much more complex space of Virtual Worlds, questions of identity development and practice, as the project notes, are important.

7 Reflections and conclusions

Whether learners are using tutorial CAL, role playing using computers or in virtual worlds, they are taking risks and need to feel secure enough to do this without fear of feeling stupid or being judged. They need to feel safe enough to participate in these different spaces. Some of the young people using Bubble Dialogue clearly did not feel safe enough to communicate and express their feelings within conventional interpersonal settings. The double layer of mediation, as described earlier, provides distance that may facilitate such communication and expression. Cooper and Brna (2001, op. cit.) in the context of their software, T'riffic Tales, discussed earlier, also note the challenge for teachers of helping children to feel secure enough to engage in the creativity needed for story writing and learning more generally. It is suggested that for learning technologies to be successful, trust is crucial.

Social and affective factors are as important, if not more important now, in influencing whether learners choose to use technology to support their learning as they were thirty years ago when the first case study was conducted. Reviewing some of the work on attractions and disincentives for using learning technologies highlights the importance of a number of factors in influencing learners' use, which include academic factors such as pedagogic approach, integration and assessment. Affective factors such as anxiety or even fear about using technology, insufficient competence and familiarity in using technologies for learning can also be strong disincentives. Unfortunately technical difficulties have not disappeared, and are likely to pose much greater barriers for learners who do not feel confident and competent.

It is argued that a common factor between research on the affective factors concerning students' use of technologies for learning and research into how technologies might be harnessed to support social communication and the expression of emotions is trust. Learners using technologies to support their studies need to be able to trust in their competence, in the technology working, in the support they will receive if they need it - and ultimately be sufficiently confident that the benefits they gain are worth their efforts. It was suggested that the Bubble Dialogue environment mediates participants' interactions both through the technology and the role playing - thus here it

is distancing that allows participants to feel sufficiently safe, and trusting enough, to express their emotions: a process that is likely to feel quite risky. Research on how children can be supported to communicate and develop social skills in a virtual world environment will be important in developing our understanding of whether this much more immersive environment will also provide sufficient distancing and of other issues that are important in this particular environment.

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9 Footnotes

[1] Bubble Dialogue was developed by the Hypermedia Research and Language group, University of Coleraine

[2] The formal definition of emotional and behavioural difficulties in the UK refers to "children who …[present]… present inappropriate, aggressive, bizarre or withdrawn behaviour" and who "have developed a range of strategies for dealing with day-to-day experiences that are inappropriate and impede normal personal and social development and make it difficult for them to learn" (DES, 1989).