

Multimodality: how students with special educational needs create multimedia stories

Abstract

This investigation into how students receiving special educational provision use an ICT multimedia environment to produce stories, took place within the special needs unit of a comprehensive, secondary school. The research aims were to investigate ways in which special education needs (SEN) students produce multimedia stories, analysing the role of the zone of proximal development (ZPD) with respect to literacy learning.

The research was framed by socio-cultural theory and a qualitative methodology underpinned the research activity, with consideration of interactions between students and computer, and between students and the researcher, taking the sociocultural environment into account. Research methods included interpretation, reflexivity, deconstruction, discourse and notions of multiplicity.

Students working within this software environment were encouraged to produce a number of high-quality presentations, and this contributed to an autonomous working style. However, whilst the role of the computer was important, so too were human agency, and other artefacts within the setting.

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Introduction

This paper aims to explore whether students using a multimedia authoring software (*TextEase 2000*) to assist them in story creation were able to produce new literacies (New London Group. 1996). It was anticipated that this software could be used to allow for the development and investigation of different literacy genres; the program allows for word processing, desktop publishing and multimedia authoring and was chosen because it is intuitive to use, offering the flexibility and power of Microsoft's *PowerPoint*, whilst making fewer cognitive demands on the user.

The paper centres around three boys, who will be referred to as K., A. and B. Each of the boys was deemed to be working at literacy levels 1-2 of the English National Curriculum, though K. and B. were in Year 7 and A. was in Year 8. As with many students with special educational needs (SEN), these learners all shared a low self-esteem and poor self-confidence, consequently requiring an extremely supportive learning environment. In part, this was met by the provision of appropriate technology, but it was also essential that their learning be 'scaffolded' by the teacher/researcher. The notion of scaffolding can be defined as a:

process that enables a child or novice to solve a problem, carry out a task, or achieve a goal that would be beyond his unassisted efforts. (Wood, Bruner, and Ross, 1976).

The context of literacy changes when approached through computers and, particularly, multimedia. Multiple literacies make new demands on readers and

writers and on those who are helping students to develop their literacy skills. Moreover, in line with Kress' (1997) arguments that we change language by using it, so we are actively involved in shaping the technologies we use.

Through a detailed analysis of their processes when creating stories with multimedia software, this paper considers interactions between the students and the computer, as well as between the students and the researcher, with a particular focus on the spoken word. It then concludes by considering notions such as advancing autonomy and verbalisation.

The Process

This study was underpinned by literature which viewed Special Educational Needs (SEN) through the lens of a sociocultural framework, but this was expanded by addressing how those ideas might be extended by the use of ICT tools within a framework of multi-literacies.

Vygotsky (1992) maintained that a child might be held back in their development by the way in which they are viewed socially and, consequently, the social experiences that are open to them. He emphasised that, rather than being less developed than other learners, they have merely followed a different developmental path. This, he believed, is as a result of 'retardation' being viewed as an entity, rather than a process, which, in turn, prevents us from looking at the *processes* of development.

There are many potential benefits to an education which is oriented towards the person-plus, empowering learners to capitalize upon resources in order to developing

their own 'plus' system. Perkins (1991) addresses the question 'How do thinking and learning happen?' He suggests several theories, which attempt to answer the question, but notes that there is always the difficulty of separating the person from the resources in trying to arrive at the answer. Consequently, he queries whether the question might be answered by assessing the person plus the resources.

Within the study I acted as both teacher and researcher and the study took place in a comprehensive, community school, in England, catering for mixed gender pupils aged eleven to eighteen years of age. Within this school the attainment of eleven year old pupils on entry is below average compared to most schools in England and attendance is lower than in most schools. Pupils with special educational needs are taught both within the main school and in the special needs unit, where teaching groups do not usually exceed five students. Generally, the students spend sixty per cent of their time in the resource base and forty per cent of their time in the main school, supported by classroom assistants. The majority of these students have specific language difficulties, dyspraxia and Asperger's syndrome, resulting in weak reading skills, poor written skills, spelling difficulties, grammatical problems and sequencing difficulties.

K. had been placed in the SEN Unit because the local LEA had assessed him as having social communication difficulties and dyslexia. A. had been diagnosed as dyspraxic and his class teacher described him as having 'lots of problems with writing and particularly with spelling'. B. was diagnosed as having attention deficit and hyperactive disorder (ADHD) but teaching staff felt that his hyperactivity, for which he received medication, was his main problem, rather than his attention span.

Within the school context, there was a concentration on developing literacy skills, with a particular weighting given to spelling; all of the students were anxious in this regard. The researcher's ability to intervene was limited and the students were restricted by their inability to step outside the parameters of that which they had learned to be acceptable working practices. Therefore, although there was an attempt by the teacher/researcher to minimise the importance of spelling, the students still had difficulty in moving away from this concern. This highlights the importance of contextual aspects of learning, such as the policy context, the related underlying ethos of the school and the pedagogical framework within which the work is situated.

Teaching staff selected students they felt were most likely to benefit from spending their time in developing story making skills and this resulted in my working with three students from Years 7 and 8, withdrawing them from the classroom situation and working with them on a one to one basis. This took place over one academic year. Because I acted as both teacher and researcher, I was responsible for setting the agenda and this was assisted and enhanced by the use of data from video recordings. The research aimed to investigate the ways in which SEN students use an ICT multimedia environment to produce stories, analysing the role of the Zone of Proximal Development (ZPD) with respect to their literacy learning.

The research focus was on the process of learning, rather than the product. Through a detailed analysis of students' processes when creating stories with multimedia software, emergent themes led to categories of analysis, thus supporting final conclusions. There was consideration of interactions between the students and the computer, as well as between the students and the researcher, with a particular focus

on the spoken word. The sociocultural environment in which these communications took place was also taken into account.

The theory and the data were mutually informative throughout the research process and led to the construction of a highly detailed analytical framework. Additionally, the literature was constantly reviewed, with the inculcation of new perspectives. Data analysis from the first case study moved from emergent themes to major themes and, using transverse analysis, was then applied to the other two cases, before concluding with major trends and issues.

Much of this research centred on the notion of language, in varying forms, and so a hermeneutic methodology, whereby 'Society is seen as linguistically and meaningfully constituted' ((Delanty 1997. p.40) underpinned the study. The research methods included interpretation, reflexivity, deconstruction, discourse and notions of multiplicity, both in terms of the actual research activity and its data collection and analysis.

The project was divided into two phases, each comprising an approximate total teaching time of four hours, with lessons more or less divided into six lessons per phase. On completion of the research, all videotapes were transcribed but I then elected to focus the analysis on an initial, middle and final lesson with each student from each research phase. These lessons were selected for transcription and analysis because it made a development over a period of time visible. The transcripts were then entered into a table format, allowing me to more clearly see patterns arising from the data, such as turn-taking in conversation, and making a more in-depth

consideration of the major episodes within these lessons discernible. The visual representation provided by these tables allowed me to make analytical notes for speech events, each of which was numbered, and to add both images and comments, thus contributing to the development of categories of analysis. Initially, I tried to code the various categories that arose from the data but as they often overlapped, it was impossible to use any coding for analysis other than speech event numbering. Nonetheless, this immersion into the research data resulted in a reflexivity regarding that which had taken place, reconsidering the 'whys' and 'hows' both of interactions and activities.

Prior to the start of the research, I collected some samples of the students' work, both handwritten and computer generated. Throughout the research, I made field notes, evaluating the teaching sessions, which were later word-processed, and collected both hard and digital copies of the students' work.

The field notes were passed to the class teacher who then made her own comments before returning them to me. Hence, the entire process permitted ongoing evaluation and analysis, together with consideration of the relationship between ICT and the development of literacies, thus allowing for analysis of the model of teaching and learning, and consideration of the development of new forms of literacy, and pedagogical theories. The research concluded with semi-structured student interviews.

Generating Multimedia Stories – a Teaching Intervention

The research study was divided into two phases, with the format of each phase remaining the same. In this way, the students were able to become familiar with the researcher, the software, the aims of the study and the working environment during the first phase, whilst the second phase allowed them to extend and develop their skills and expertise.

As the students were unfamiliar with the software, a training element was incorporated into the first phase of the study; the activities were based on work with which the students were already familiar so as to allow them fuller concentration on the processes involved. This meant that K. and B. produced their own versions of the Anglo-Saxon story of Beowulf, whilst A. produced his own version of Robert Browning's poem, The Pied Piper. The format, then, was broadly as follows:

- Lesson 1 overview of the software and developing a resource bank
- Lesson 2 making collages to be used in the story
- Lesson 3 learning to use a scanner
- Lesson 4 video recording acting and importing video clips into the software
- Lesson 5 adding components to the resource bank and starting the story
- Lesson 6 completing the story

The second phase of the project entailed the students making their own stories, based on the theme of 'finding things'. The story of 'Skellig', written by David Almond, was used both to introduce and initiate this activity, encouraging consideration of ideas and vocabulary. A story plan was provided, to help in mapping out ideas, and disposable cameras were distributed, to enable collection of pictures for the stories.

The students were required to develop their own resource banks prior to embarking on their story creations. In this regard, they were provided with a checklist to ensure that they had fully considered both vocabulary and the various multimedia components available to them, such as pictures, animations, sounds and video. The checklist also reminded the students to consider design aspects such as background colour/design, font colour, font size, font style, freehand drawing and speech; linking images to text, sound, speech and video. Thus, although the story creation itself was fairly open-ended, the actual activity was tightly structured; the students generated a portfolio of individual achievements.

The Findings

Themes that emerged from the data analysis included multimedia and multi-literacies, spelling and the role of the ZPD with respect to the literacy learning of SEN students.

(i) Multiliteracy and Multimedia

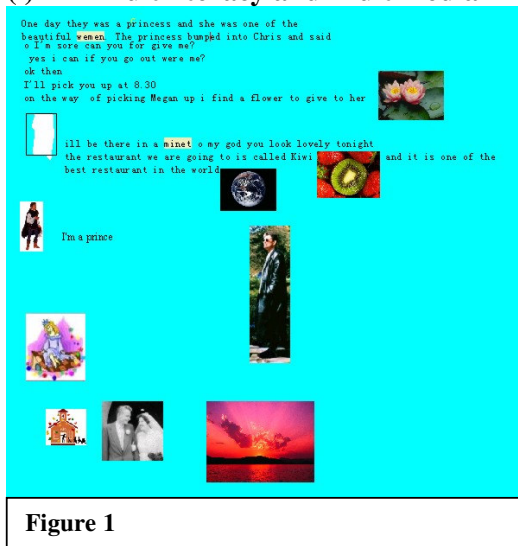


Figure 1

The stories were not viewed in purely written forms but, rather, through a lens which included all of the component parts (text, multimedia and sound). See, for example, figure 1, which is a completed multimedia story which utilises writing, sound and image.

A. focussed almost entirely on communicating with multimedia, using it as a narrative device, and developing an interactive story; however, both K. and B. found it more difficult to move away from the traditional writing-base with which they were

familiar. K.'s first story used writing to enclose the multimedia but he later considered it to be lacking in words. Consequently, his final story had writing as a central component but he used multimedia to create an interactive story. B.'s first story had words placed at the top of the screen, with images positioned further down but, in his second story, he focussed almost entirely on words, though he used background image, font-style and music to convey genre.

Clear design decisions were made, which capitalised on the students' areas of artistic and verbal strength and contributed to the development of an autonomous working style. This demonstrates that these students are both capable and literate, when regarded from the perspective of multiliteracies, and highlights the unhelpful way in which they are presently situated in relation to a restrictive, singular view of literacy that privileges writing (Luke 1998). Relieved of these restrictions, the students developed some ability to work independently, generating a newfound confidence.

From the outset, the stories were viewed in multimodal terms, utilising the multimedia as a narrative device and developing interactivity between the story and the reader. Although the very nature of the discourse was likely to encourage a shift from school-derived literacy to the multimodal literacy upon which they had embarked, two of the three students nonetheless encountered some difficulty in moving away from the 'traditional' literacy with which they were familiar.

(ii) Spelling

As mentioned previously, all of the students were very anxious about spelling and, despite a serious application on his part, K.'s progress was sometimes slow because

this concern took up much of his time, attention and concentration. In many instances, the spellchecker was unable to understand what he was attempting to spell and so could not help him. However, whereas K. had initially relied upon human agency for spelling assistance, he gradually took advantage of the spellchecker and, finally, utilised the sound component in order to assess aurally whether his spelling was correct and to select required words. Thus, he extended the spelling help offered by the program by the process of aural cue, visual cue and dictionary use.

Nonetheless, K. continued to ask for help with spelling, even though he could usually have arrived at his own answers by using the software. However, he did use the speech function in order to ascertain whether words he selected from the word bank were, in fact, the ones he wanted. He also used the speech function to check the words once he had entered them onto the main screen. Perhaps his anxiety about spelling, and his general experience of how to manage this difficulty, has produced a dependency upon adult assistance. In this sense, as Vygotsky (1992) declared, K. may well have had insufficient experience of dealing with those aspects of learning which he found difficult. Although he regularly enlisted help with spelling, when he was asked how he could find out for himself if his spellings were correct, he did not answer verbally but responded by pulling up the spellchecker, indicating that he did actually know how to do this. Gradually, then, K. moved from a reliance upon the human agency for spelling assistance, to using the spellchecker to assess whether his spelling was correct and to select required words. Consequently, he slowly moved from the scaffold provided by the teacher/researcher, to the scaffold provided by the program, thus contributing to an independent working style.

Spelling was also of concern to both B. and A. but B. was better able to utilise the spellchecker as the dictionary did often recognise his attempts. Initially, B. relied upon the teacher/researcher for spelling assistance but gradually he started to use the spellchecker to check spellings, lessening his dependence on human agency for this support. Arguably, B. had stronger reading and writing skills than either K. or A. and it is therefore interesting to note that he relied less than they did on the auditory input. Nonetheless, despite B.'s use of the program's dictionary and attempting to spell words independently, he also continued to enlist the support of the teacher/researcher for spelling.

Like K., A. had shown that although he sometimes had difficulty in recognising problems visually, he was generally able to recognise them aurally and the software benefited him in this regard. A. opted to decrease the amount of text he used, thus minimising the problem. However, it was not apparent that he had deliberately employed this as a strategy to avoid spelling but, rather, that it was a by-product of the approach he chose.

(iii) The Role of the ZPD with respect to the literacy learning of SEN students

The software environment allowed the students to create high-quality presentations, which ordinarily they would have found difficult, and this, together with a higher than normal *volume* of work produced, meant that they were keen to exploit the multimedia. This was important because SEN students invariably produce limited amounts of work, which are poorly presented, thus contributing to a lowly perception, by both themselves and others, as successful learners. They made very clear design decisions and incorporated personal effects, thus enhancing a sense of ownership. In this way, the students started to produce their multimedia stories.

Because the program offered multiple representations, that is written, aural and pictorial, the students were able to capitalise on their areas of strength. For example, all of the students' verbal skills were stronger than their written skills. The program's feedback, by using the synthesised voice, helped the students to recognize their spelling mistakes and assisted them with reading, thus allowing them to overcome these difficulties and helping to foster an augmented sense of self-esteem. This resulted in higher levels of self-belief and a more risk-taking attitude.

Just as with 'traditional' teaching, the function of the scaffold within a software environment is to assist the student in achieving goals, or processes, which they would be unable to accomplish alone. Generally, the scaffold should provide the ability for fading, thus allowing the user to withdraw from the support offered when they are ready to act without help. The efficacy of the scaffold provided by the software is largely dependent upon the affordance that it offers to the students and it is difficult, if not impossible, to define these different affordances as either inherently positive, or negative, because those definitions would be dependent upon the individual user. However, this particular software environment offered several advantages to the students. Perhaps of paramount importance were the capacity for multi-sensory externalisation of the processes, and multiple representations. This was seen, for example, in the way in which, to varying degrees, all of the students tried to move from reliance upon icons for navigation, to the use of the directory structure.

It is important to note that in the traditional notion of scaffolding, the ultimate aim is to remove the scaffold, but when the scaffold is provided by the combination of computer and software it will, of necessity, remain permanently in situ.

Consequently, the learner can call upon it as and when needed, controlling where, when and how they enter into, and develop, their own zones of proximal development, rather than being dependent upon an 'other' to make this decision and provide this assistance for them. Thus the locus of control resides with the learner rather than the teacher. This has important implications for teachers because it is difficult, if not impossible, to address the ZPD for every student in a class: every student will have multiple zones of proximal development and each of these zones will be unique to the individual student, leaving the teacher incapable of effectively meeting the learning needs of students in a class setting. Whilst it is not suggested that computer use eliminates the need for teacher involvement, it is proposed that the ICT environment sometimes offers students the ability to 'self-assist'. However, developing the skills with which to self-assist came primarily from their interactions with the teacher/researcher and the importance of this human intervention should not be under-estimated.

The research findings suggest that the software environment allowed the students to produce a quantity of high-quality presentations, and contributed to the development of an autonomous working style. It also found that the provision of scaffolded support, particularly in relation to spelling, gradually shifted from the researcher to the computer. Largely, this shift was possible because of the multi-sensory support structure offered by the program, which allowed the students to externalise a variety of processes. However, it is important to note that whilst the role of the computer was important, so too were human agency and other artefacts within the setting.

Discussion

(i) Advancing Autonomy

Initially, it seems that human agency was an ‘easier’ resource for the students to use than the software, *TextEase 2000*, and, largely, the teacher/researcher provided the scaffolding, rather than the computer, with the important exception of when the speech function was utilised for this purpose. As the students’ verbal skills were stronger than their written skills, it might be that they found the auditory input – whether from the teacher/researcher or the speech function – easier to act upon and so it perhaps made sense for them to try to use this form of assistance to help with spelling, rather than the program’s spellchecker, which only provides assistance in written form.

External representations of learning meant that the students were initially able to deal with concrete, rather than abstract, notions. However, as their knowledge and skills developed, they were then increasingly able to cope with abstractions. This can be seen, for example, in the way in which, to varying degrees, all of the students tried to move from reliance upon icons for navigation, to the use of the directory structure.

In this sense, they were guided when they needed support but, at some point, became sufficiently ‘expert’ to work either with less support, or with no support. Thus, they were encouraged to deal with the abstract notions but only when they were sufficiently ready to do so. Consequently, the software encouraged learning by providing a non-threatening environment, with a ‘no fail’ factor attached to it. For this student group particularly, this was very important. Furthermore, because the software carried some of the cognitive load, such as spellings held in the resource bank, the students were better able to access their working memory. This was particularly important in view of the students’ concern with spelling.

Although the students all had trouble in grappling with abstract notions, when they were provided with a concrete experience, they were better able to attempt problem resolution. In this sense, the computer bridged the gap between the abstract and the concrete because the computer continued to offer support at varying levels, as required to meet their needs, thus extending the scaffold and allowing the students to move more easily from the concrete to the abstract. When the support of the teacher/researcher faded into the background, the students were still able to take control of their own learning through participation and shared responsibility with the computer. Therefore, they were not left totally to their own devices, as they would otherwise have been once the teacher/researcher faded. In addition, the students tended to discover the program's functions by a process of trial and error, which encouraged a more risk-taking attitude and contributed to a more independent working style.

Perkins (1993) claims that although the executive function in learning can be distributed, at some point autonomy must be returned to the learner. This echoes the views of Wood (1988) who claims that, ideally, the students should be able to move away from the learning scaffold which has been provided for them. Although it may well be that, in order to work independently, it is necessary, where possible, for the students to move away from the scaffold provided by human agency, it is important to realise that, at an appropriate point, this can be substituted with the scaffold provided by the computer.

In multimodal writing there is not only no need for the students to move away from the scaffold provided by the computer but, to do so, might even detract from the end

product because the inherent scaffold provided by both the computer and the software are an integral part of the task. For example, because the software carried some of the cognitive load, the students were better able to access their working memory and so to overcome difficulties with spelling and reading by using the synthesised voice, thus allowing them to focus on the creation of their stories.

Additionally, in considering the role of the zone of proximal development (ZPD) with respect to the literacy learning of SEN students, the research found that as the students developed some expertise with the software, the provision of scaffolded support, particularly in relation to spelling, shifted from the teacher/researcher to the computer. However, this was a gradual process because the students initially found the teacher/researcher the easiest resource to use and they therefore had to change their habit of 'learned helplessness' in order to move from this support to that offered by the ICT environment.

Also, as Christie (1990) stated, working with new technology demands a greater degree of conscious reflection on its ways of working and this process was new to the students. However, in a large measure, this shift was possible because of the multi-sensory support structure which the program offered, and the ability for students to externalise a variety of processes. This relates to Perkins' (1993) argument that resources 'outside' of the person contribute to cognition. Further, the four facets of Perkins' access framework (1 – needed knowledge; 2 – accessible representation; 3 – efficient retrieval paths; 4 – constructive arenas), which he described as 'an art', played an important part in the work which the students undertook. Perkins argued that traditional teaching does little to teach students this 'art' but within the ICT

environment provided by TextEase, these facets were met as an integral part of the activities.

To a large extent, the inherent scaffold provided by the computer and software supplied this support. Consequently, working with the ICT amplified the students' cognitive powers (Salomon 1991). To move away from this scaffold might detract from the end product, because it is an integral part of the environment, but schools generally expect students to function in a person-solo manner (Perkins 1993) even though active thinkers generally use the person-plus. Indeed, the person-solo approach is simply not relevant to the acquisition of multimodal literacy, where the activity cannot be performed without a computer and where the aim is to communicate to diverse audiences, rather than, specifically, to improve spelling or reading skills. In this sense, perhaps it is time to re-cast the notion of scaffolding.

Using the computer as a mediating tool enabled the students to gain experience of using language for information-giving purposes, modelled and scaffolded by the teacher/researcher, consequently augmenting their thinking and learning. These aspects encouraged the development of an intellectual partnership between the learner and the computer, thus distributing the cognitive load. This distribution allowed the students to progress more easily and rapidly than is the case when they work unaided and this resulted in an enhanced confidence and willingness to further engage with the task, thus contributing to a more general learning development. However, it is important to note that the computer was only one facet of this learning environment and whilst it played an important role, the distribution of cognition was not restricted

purely to the computer but was also carried by human agency (largely, but not solely, the teacher/researcher) and other artefacts within the setting.

Perhaps none of us ever truly reaches absolute autonomy but, rather, are somewhere along a spectrum of autonomy, being more advanced in some areas than in others. That being the case, then what is important is not so much that we always act autonomously, but that we are *willing* to do so whenever possible. However, initially, all of the students relied on the teacher/researcher to structure tasks for them, seeming to have learned to expect dependence, rather than independence - this was 'normal' for them. When Vygotsky (1992) discussed the notion of SEN students having a different developmental path from other students, he talked about it in terms of cognitive development; however, it could be argued that schooling has inculcated these students into taking a different developmental path in so much as they have learned dependence. Consequently, Vygotsky's declaration that a child's development might be restricted by the way in which they are viewed socially, seems to explain the position in which these students found themselves. This highlighted the need to develop increased autonomy, which was actively encouraged within the research environment.

To begin with, both K. and B. had been passive and receptive, relying on the teacher/researcher to scaffold their memory recall and resisting autonomy. B. continued to enlist help with memory recall, story structure and computing processes, but he made very clear design decisions and, in this sense, took ownership of his work. However, he, too, appeared to be surprised when asked to take responsibility

for this work. Although A. was much keener to act independently, he also relied upon the teacher/researcher for memory recall and preferred to cede handwriting.

Vygotsky (1992) discussed compensatory techniques, whereby children learn to use a 'weakness' as 'strength'. These students have all learned that their literacy skills are perceived to be 'weak' but they have capitalised on it by enticing others to act as scribes, and take responsibility for them, thus avoiding overcoming their difficulties. However, as they had not learned that multimedia literacy was an area of weakness for them, they did not try to avoid this style of 'writing' and so were actively overcoming their difficulties both in terms of literacy and general development of their learning. Nonetheless, encouraging an independent working style meant that the students had to change their existing practices and they needed support in doing this.

Initially, the students relied on the teacher/researcher for support but as they became more skilled in utilising the software environment, so the scaffold shifted to the computer. The software environment offered the students the positive affordances of speech, sound, a multi-sensory support structure and the ability to externalise various processes. This distribution of cognition, and development of abstraction skills, meant that they were able to cope with abstractions at their own pace, at which point the software scaffold would then fade. For example, initially the students were able to navigate by the use of icons and the drag and drop function; later, they were able to deal with the more abstract notion of the directory structure. However, in order to take advantage of these positive affordances, the students needed some basic computing skills, such as an ability to use the keyboard and mouse effectively and some understanding of terminology such as 'windows', 'files', 'menu' as, otherwise,

the environment presented some negative affordances. This, then, suggests that some explicit teaching of these skills might prove beneficial.

These students were aware that their literacy skills were perceived to be 'weak' and they tried to turn this to their advantage by appealing to others to act as scribes, structure their working habits and generally take responsibility for them. This is likely to result in what Vygotsky (1978) termed a 'poverty of experience', whereby the students are unused to problem solving. In turn, educators may well misinterpret the behaviour as inability on the student's part to transfer skills or knowledge, thus perpetuating this perception of the student as 'unable', and thereby continuing with teaching methods which are unlikely to further develop the student's independence. This relates to Freire's belief (1988) that oppressed people feel incapable of true autonomy because they share the negative images held about them by their oppressors. Arguably, then, SEN students have been forced into this attitude of dependency by 'school's' notions of literacy and 'school's' views of 'special educational needs'. Consequently, it is time for these issues to be reconceptualised.

Autonomy was actively encouraged throughout the study and a collaborative approach was taken, where reciprocal teaching and learning developed organically, with a consequent move towards shared and genuine problem solving. Participation was not only encouraged, but *expected*, resulting in mutual inter-dependency. Paradoxically, the more the learning practices and activities were shared, the more individual growth and development were enhanced. Nonetheless, encouraging an independent working style meant that the students had to change their existing practices and they needed support in doing this. Where students have developed an

attitude of dependence, it will be necessary to support them in changing their existing learning practices but it is also likely that teachers will need support in changing their teaching practices. However, because this style of teaching does not sit comfortably within the knowledge transmission focus of the curriculum, effecting these changes may prove difficult. There is a need for changes in teaching strategies, management, curriculum content and organisation, together with a focus on a whole school methodology, but so long as the acquisition of 'knowledge' remains the *raison d'être* of education, SEN students will continue to 'fail' because they will not develop the pre-requisite skills for learning. In this regard, their educational provision is not only unhelpful, but also counter-productive. Further, so long as teachers are obligated to prioritise a knowledge transmission model of education, then they will be unlikely to develop pedagogical practices appropriate to teaching with ICT.

It is, therefore, of major importance that new technology offers the opportunity to change the dynamics of classrooms. It changes the focus of attention, so that all eyes are no longer on the teacher and it offers the possibility of one-to-one interaction between child and screen, and a culture which is freer and less intense, in which the teacher can much more easily adopt the role of facilitator of learning. In this culture teachers' supervisory responsibilities are reduced because children take more responsibility for their own learning, and it becomes possible for teachers to engage in one-to-one discussion with individual children to take their thinking forward. (Somekh 1999. p.26).

(ii) Verbalisation

As previously mentioned, the students were supported in their endeavours by the scaffold provided by both human agency and the software itself. In addition, it became apparent that speech, in diverse forms, was of vital importance to all three students.

Indeed, speech, whether that of the teacher/researcher, or the egocentric speech of the students, or the auditory feedback provided by the program, proved to be of central importance. Furthermore, the acquisition of a 'technological discourse' enabled more meaningful discussions, debates and dialogues and contributed to both personal development and a sense of ownership. In large part, this was accomplished by the students' ventriloquation of the teacher/researcher's language, within what had become, albeit small, a community of learners. This, then, allowed for the development of social and instructional exchanges, which, as Wertsch (1991) points out, is of the utmost importance. Further, Brown and Palincsar (1985) claimed that these learners often have insufficient exposure to the use of language for information-giving purposes and that communication skills improve when modelling and scaffolding explicate the processes. The use of the computer as a mediating tool allowed for this explication and interaction and thus enhanced the students' thinking and learning, so that an intellectual partnership developed, where learning was distributed between the learner, the computer and other features of the learning environment.

All of the students' verbal skills were stronger than their written skills and it became apparent that speech, in all forms, was of central importance to both their personal and learning development. Also, the ability to include the spoken word within their creations contributed to a sense of ownership. As a result of the students ventriloquating the teacher/researcher's language, regulatory processes were made explicit (Brown 1985) and a 'technological discourse' developed, which improved the quality of discussions and dialogues, and encouraged both social and instructional exchanges, thus offering opportunities for the students to improve upon their

vocabulary acquisition and speaking skills and transforming speech from a means of communication to a means of thinking (Vygotsky, 1992). Indeed, Wertsch (1991) extended Bakhtin's argument in this regard, saying that 'when a speaker produces an utterance, at least two voices can be heard simultaneously.' Additionally, this meant that a small community of learners developed and, as Wertsch (1997) claimed, in order to consider the part which speech plays in learning development, it is also necessary to consider the sociocultural environment in which the communications took place. For these students, who, because of their special educational needs are very often on the outside of learning communities, this was crucial because it provided a sense of belonging and inclusion. These feelings are essential to self-esteem, which is generally low for these learners. Further, increased self-esteem → increased confidence → more risk-taking behaviour → increased experimentation → increased involvement → meeting learning challenges → improved performance, resulting in a learning circle.

Although these students had previously learned to see themselves as 'educational failures', they had not previously undertaken any multimedia work and so had never learned failure in this regard, nor had they learned failure when using computers. They all perceived the activity to be high status and, over the period of the project, were perceived by both themselves and others as 'expert'. For students who have previously only encountered educational failure this boost to their self-esteem was of paramount importance.

Conclusion

In conclusion, this study aimed to explore whether, using the notion of person-plus, students were able to develop a multiplicity of new literacies and it seems evident that

this has been the case. Central to this development was that the students came into contact with, and, to some extent, created, both their surroundings and themselves through the actions in which they engaged (Wertsch 1997). Traditional literacy activities are often de-contextualised but this study has shown that, given a choice, students select methods and resources which provide a context of personal relevance and importance. Further, the ability to create interactive environments necessitates a consideration of abstract concepts such as time, space and reader intervention. The students were motivated to engage with the writing process, even though this multimodal literacy made heavy demands on their skills, and required that they were actively engaged with the task. However, school's resistance to change can be seen in its resistance to divergent literacies and implementing the changes necessary to support the development of divergent literacies within schools requires a less prescriptive curriculum and a means of assessment which allows teachers to credit students for their accomplishments in this regard.

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