

Working with Dyslexic Learners

Authoring in a Multimedia Environment

Yota Dimitriadi

University of Reading, Flat 6, 4 Shinfield Road, Reading, RG2 7BW, UK
esr97pd@rdg.ac.uk

Keywords: pedagogical ICT facilitator, creativity, special needs

Abstract The fundamental principles of the teaching methodology followed for dyslexic learners evolve around the need for a multisensory approach, which would advocate repetition of the learning tasks in an enjoyable way. The introduction of multimedia technologies in the field of education has supported the merging of new tools (digital camera, scanner) and techniques (sounds, graphics, animation) in a meaningful whole. Dyslexic learners are now given the opportunity to express their ideas using these alternative media and participate actively in the educational process. This paper discusses the preliminary findings of a single case study of two English monolingual dyslexic children working together to create an open-ended multimedia project on a laptop computer. The project aimed to examine whether and if the multimedia environment could enhance the dyslexic learners' skills in compositional. Analysis of the data has indicated that the technological facilities gave the children the opportunity to enhance the style and content of their work for a variety of audiences and to develop the responsibilities connected to authorship.

1. INTRODUCTION

This paper discusses the preliminary findings of a single case study designed to explore whether a multimedia authoring program, which supports a variety of notations (text, sounds, images, video clips), could become a 'functional learning environment' (Newman 1997) for the development of literacy skills in learners with dyslexia. The term 'functional' relates to activities purposeful from the point of view of the

children (op. cit., 1997), and relevant to their experiences, interests and goals (Dewey 1938). Literacy is defined as 'a way of developing and communicating a child's thoughts, [extending] beyond simple manual encoding and decoding of text' (McFarlane 1997). Thus it is shifting the emphasis beyond the mechanics of spelling into an interest for content and style of information (Graves 1983) and respect towards the needs of an audience (Lachs 2000).

The focus of the project was twofold. Would the children's work be sporadic recordings of talk or whether there would be some of the linguistic features, connected to both structuralistic (spelling) and formalistic (fonts, layout) elements of writing, as identified in the National Curriculum. And whether the new technological environment would contribute to improving areas where the children underachieved.

2. BACKGROUND

Over the years the emphasis on dyslexia has shifted from the medical to the educational arena, concentrating mainly on poor reading and spelling performance. Recent research though, (Stackhouse and Wells 1997, Clayton 1999) has pointed to the idea that dyslexia probably has a neurological origin. This suggestion supports the notion that dyslexia is a syndrome, an umbrella term, for difficulties also connected with short-term memory, visual and auditory processing and recall. Apart from problems with literacy, dyslexia is connected to difficulties with mathematical and musical notation, sequencing and spatial awareness.

The introduction of computers in every day lives and activities has given dyslexic learners the possibility to approach information and scaffold their ideas in alternative ways. The notion of literacy has been redefined from a singular form noun and activity, involving mastering of writing, to a plural one, including the ability to express ideas in visual and auditory format. More specifically, the generic facilities of multimedia applications such as Talking Books, CD-ROMs, the Web allow the representation of information in a variety of symbolic systems. The on-screen product is a mixture of text, sounds, video clips, still or animated images and data can be organised in a non-linear sequence. Access to script for dyslexic learners whose decoding skills are not always fluent, is facilitated by alternative representations. Pictures and key words trigger users' attention and enable understanding of information.

The generic features of a multimedia program could allow literacy to be supported by oracy, and images to become an important operative medium of conveying a message. This interaction with various media can also

become a dynamic creative tool in the use of authoring packages that support the construction of such multimedia applications. The constraints that typing and spell checking the information imposes on dyslexic learners can be replaced by the input of speech and images, signalling a meaningful use of notations (letters, sounds, images) in a context defined by the users' preferences. Similarly, writing is transformed from a motor skill to a complex cultural activity while higher levels of language-forming acts, such as, analysing, synthesising and combining, can be developed to negotiate meaning. The process could be compared to piano playing where moving on from 'finger dexterity' and ability 'to strike the keys while reading music, [one is being] involved in the essence of music itself (Vygotsky 1978).

The generic facilities offered by a multimedia program could support the specialised teaching methodology followed for dyslexic learners. According to Hornsby and Shear (1993), Hickey (1977), and Miles (1990) teachers should encourage a multi-sensory approach for the development of skills. As dyslexic learners usually present qualitative and quantitative differences in their performance, the use of all the senses is advocated to support the stronger cognitive areas and assist the processing and retain of information (Pollock and Waller 1994).

According to the National Curriculum for English in Key Stage 2 (p.15) the process of writing involves: planning and drafting, composing, revising, proof-reading and presenting the ideas in a correct and clear final copy. "These processes cross over the oral/written divide" (Smith 1994). Multimedia authoring packages can bridge this gap and facilitate the creative process by harmonising the existence of oral speech, images and written text in the same environment. On the whole, these five stages can be then grouped into three broader areas:

- Exploring topic and creative media (Planning and Drafting)
- Composing the task (Composing; Presenting)
- Assessing and evaluating the product and the process (Reflecting; Proof-reading).

Looking at the development of the writing workshops organised by Graves (1983) and Calkins (1983) each of the five stages in compositional writing can be further analysed into the understanding and skills associated with their development.

The diagnostic assessments dyslexic learners undertake emphasise the difficulties they face in each of the writing stages. The language parts of the screening tests include spelling, reading, free-writing tasks and most dyslexic learners score very poorly in all three of them. Working in a multimedia authoring package can promote writing as a dialogic and multisensory process.

3. THE PROJECT

The project was organised in a single case study over a period of 12 weeks with two 50 minute-meetings per week. Two siblings, a boy (D, aged 8) and a girl (C, aged 10), of English monolingual background, helped with the empirical part of the project. The work took place at the children's home. It was hoped that this would give them more flexibility to concentrate on the project and not to see it as extra schoolwork.

The researcher took on the role of the teacher, introduced the program to the children and supported them in scaffolding their ideas, as conferencing with the children (Graves 1983) has been described as one of the most important elements in developing writing skills.

Assessment of their reading, spelling and mathematical skills (Table 1) indicated weaknesses and a discrepancy between their general abilities and their academic performance, which was further supported by their class teachers. Both children were confident in their alphabet skills and they knew the short and long vowel sounds. Their ability in recognising initial and final blends was also average. They indicated though poor concentration span, weaknesses in their organisational and spatial awareness skills, untidy handwriting, limited sight vocabulary, weaknesses in auditory processing and recall, together with a lack of knowledge of basic spelling rules of the English language.

Table 1. The children's educational profiling

C.		D.	
C.A.	10 yrs:0 mths	C.A.	8 yrs:2 mths
R.A.	7 yrs:0 mths	R.A.	6 yrs:0 mths
S.A.	8 yrs:0 mths	S.A.	7 yrs:0 mths
M.A.	1 0yrs:0 mths	M.A.	8 yrs:9 mths

C.A.: Chron/ical Age
R.A.: Reading Age
S.A.: Spelling Age
M.A.: Maths Age

'Hyperstudio' was selected as the multimedia-authoring program for the project. It has a user-friendly interface, a content-free setting where the user can combine text, graphics, animation, sound and video clips in a series of cards called 'stacks', a working template which resembles that of a children's drawing package, and big comprehensive icons on the toolbars. It was also considered more elaborate than generic programs such as *PowerPoint* and less complicated than other professional packages such as *Macromedia Director*. Visible and invisible 'buttons' can be set up as 'hot links' to enable transition through the cards. All the functions of the application are in drop-down menus; two of the most basic menus: 'Tools' and 'Colours' come in

separate toolbars. There is a spell checker and storyboard to assist the users in visually mapping the whole project.

4. DISCUSSION

The preliminary findings from the empirical data have been classified into the three broader areas identified above, and analysed against the stages identified by the National Curriculum for English and the difficulties that the children's profile had shown. The results so far have indicated that the children's work included all the elements and the responsibilities involved in authorship.

4.1 Exploring topic and creative media

4.1.1 Planning and drafting

- *Knowledge and understanding.* The children were introduced to the idea of multimedia by exploring two professional CD-ROMs and a multimedia project completed by other children during the first two sessions. The discussions on the format of the presented topics led to the formulation of a working definition of what multimedia is in order to create a framework for their own project.
- *Language and communication.* A notebook was used for the children to make notes, draft their ideas and keep a diary of each session. In these the children wrote down their spoken versions of text to rehearse it before they recorded it. They decided to incorporate sound and text on each card 'for people who cannot read or see'. Pictures were also important media 'so people from China can understand' what the passages were all about.
- *Skills and processes.* The program did not seem to have been conceptually difficult for the children as they learnt easily how to use advanced techniques such as creating their own animated graphics. But the multi-sensory construction of the program might have contributed to a better understanding of its features. The children's response to it was positive from the start. They were excited to use it as firstly they did not have much access at school and secondly because it reminded them of games and having fun. There did not seem to be any negative associations connected to the use of the computer as there were with using a pencil. Typing can be considered a laborious task; the children did not seem to mind.

4.2 Composing the task

4.2.1 Composing

- *Knowledge and understanding.* The children explored the features of the program to produce their desired effects. When they were not able to create what they had in mind, they negotiated alternative ways of presenting the message; they never gave up.
- *Language and communication.* The whole project is in dialectic form. The children communicate to an audience: they give instructions of what to do in the card; they give factual information to the user about each sport; they take on the role of the sports commentator and describe highlights of games.
- *Skills and processes.* The children seemed to enjoy the sessions, which sometimes lasted for more than an hour. They were motivated to discuss spelling patterns introduced during the sessions and revisit their cards to improve content and layout. So their sight vocabulary also increased. They became more comfortable with navigating through the program and reading the menus. They also learnt technical terms such as 'animation', and appropriate vocabulary such as 'instruments' and 'setting'.

4.3 Presenting

- *Knowledge and understanding.* The children talked about the main idea of the project and realised that their emphasis had been on sports rather than on dinosaurs. They identified elements they should have included if they wanted to talk about dinosaurs (names and information about different species). The allusions to computer games described by the children could have instigated the creation of an action story. Instead they decided to present a virtual picture of life where real life sports take place in 'realistic' settings with 'realistic' rules. The photographs of the players scanned in and used in the 'Football' card, a comment on "too many clouds in the sky pattern", may indicate their need for 'reality' in their designs.
- *Language and communication.* A month after the project the children seemed to have maintained ownership of the work. They were still able to discuss the content of the project, justify their choices, revise the spelling patterns presented during the sessions and map out the structure and the content of each card.
- *Skills and processes.* The final product follows the classical structure of a book, with a title page-card followed by a content page-card. It has a

horizontal structure with things appearing at the click of buttons, rather than interrelating with other cards. The children indicated preference in developing the content of each card as much as they could before moving on to the next one. With more time, it would be interesting to see if more elaborate interconnections would have been created.

4.4 Assessing and evaluating the product and the process

4.4.1 Revising and proof reading

- *Knowledge and understanding.* Although an initial look at the product indicated that the children's preferred media were the drawing tools and the speech recorder, a closer examination of it alongside the transcripts which decode the process, indicate that written language was evident in almost all their cards. The templates they developed for their cards show consistency in the choice of media: text.; the 'Back' button, leading to the 'Contents' card, is always at the top right corner of the card and the font size, type and colour are the result of long discussions and trials. When sound was selected as the presentational mode of the information, the children prepared the passage in their notebook and rehearsed it before the actual recording. The researcher then discussed spelling points in the children's texts. When the children felt motivated to construct their thoughts in written format the researcher did not interrupt their flow of ideas and discussed spelling, syntactic or grammatical points later. This gave another opportunity to revise the form and the content of the passages. The immediate feedback (an application could be visualised immediately) and the visual structure of some of the program features ('Tools', 'Colours') gave the users autonomy and confidence in the process.
- *Language and communication.* The children were in charge of checking whether the links between cards worked and whether they were set up as they wanted them. The children mentioned the spell checker as an advantage, even though they never used it, preferring to ask the teacher-researcher. Feeling more relaxed about correcting the script, C, who had been described by her teacher as a girl who dislikes writing, composed a passage on football on her own in less than five minutes. Equally important, she agreed to go back and improve both the layout as well as the spelling and punctuation in various other sessions. The children worked together on most of the ideas but not to the extent that it was expected. The girl being older tended to overpower the process. She wanted to do most of the writings and the drawings, even though she had

more problems in spelling and writing than her brother. The boy went along, letting his sister lead the process. At some points though he performed probably in order to be in the centre of attention. He always carried an object with him so he could have the opportunity to talk about it or made noises and gestures. At those points, C was asked to talk the boy through the processes he missed by being far from the screen. D was willing to ask C questions about the project.

- *Skills and processes.* Repetition of techniques became meaningful as the children moved back and forth in the cards trying out sounds and animated graphics. At the same time they saw the information written there and read the labels of the buttons. Drill and practice of the constructed tasks was initiated by the children themselves, sometimes to the objection of the researcher who insisted on moving on with the project rather than trying out all the links they had made. Luckily the children did not always agree. The initial screening of the children's literacy skills indicated reluctance to reading and writing tasks. Both children developed initiatives in reading out the information they composed. C, described by her teacher as a reluctant reader, took ownership of her passage, reading it so often that she learnt it by heart.

As the sessions developed the children had to read the menu options and decide whether they were relevant (defining size of the card, saving the stack, moving back and forth). Each time they added a button on one of their cards. A series of questions concerning the things to do, places to go and the transition to the other card, came in menu boxes and the children had to make their choices before proceeding. Though at first it was difficult for them to read all the words on the tool bar they began to access the information more easily, and they developed a functional sight vocabulary which was tested at the end of the project with the use of out-of-context cards.

The children did not look at other resources even though two children's booklets were provided, one on dinosaurs and one on sports. The researcher did not expect the children to use them because their reading accuracy age was quite low, even though the books were for young children, and also because the whole project was perceived as an after school activity that did not necessitate any extra preparation. Both children were happy to explore the facilities offered by the program during the sessions.

5. CONCLUSION

The study focused on structure, form and content as integral parts of authorship and tried to see how the children explored these elements. It also

wanted to investigate whether the new technological environment provided an enjoyable setting for the development of areas where the children underachieved, but also an alternative platform for them to negotiate their ideas and for others to evaluate their potential in the authoring process.

Empirical work in this field is important to support children with learning differences by introducing alternative ways of using their creative skills. The package, even though it realises the basic methodological principles advocated for the education of dyslexic learners, does not stick to the 'basics', in the sense that it does not necessitate the teaching of phonemes as a prerequisite in the constructive process.

The preliminary findings have indicated that the children's work included all the elements and the responsibilities involved in authorship. They took ownership of the product, and they negotiated meaning. The effect of mastery in the use of the tool led on from a sensory-motor activity to a conscious and structured task where respect towards varied needs of different types of audience became part of the context. One of the children's responses to those needs was to create a guessing 'Game' card as the people who were going to use the project 'must have fun'.

As indicated by their teachers and samples of their schoolwork, the children demonstrated an active role in the process quite different to their previous authoring attempts with more traditional media. They were willing to revisit their work and redraft it, discuss the choice of language, the style and content of their presentations.

The discourse recorded on the videotapes, the product itself, as well as a post-project assessment have also pointed out that the learners showed improvement in sporadic spelling patterns identified during the project. They were also able to identify and read fluently words that were introduced during the project and passages they themselves composed.

In summary, by focusing upon the needs of two individual children, this work does not claim to be generally applicable but the findings may provide the basis for further experimentation into the children's own perceptions of literacy through the medium of multimedia technology.

ACKNOWLEDGEMENTS

The author would like to acknowledge the support of the Foundation of National Scholarships (IKY) and of the British Computer Society. Thanks also to Sue Flohr from the British Dyslexia Association, to the children who participated in the project and to their families.

REFERENCES

- Calkins, L. McCormick (1983) *Lessons from a Child*.
- Clayton, J. (1999) Lost for Words. *New Scientist*, 24th April, No 2183, pp. 26-30.
- Dewey, J (1938) Experience and Education. Collier Books, New York. In: Newman, D. (1997) Functional Environments for Microcomputers in Education. In *Mind, Culture and Activity. Seminal Papers from the Laboratory of Comparative Human Condition*, M. Cole, Y. Engstrom and O. Vasquez (eds.), Cambridge University Press, Cambridge.
- Graves, D. (1983) *Writing*.
- Hornsby, B. and Shear, F. (1993) *Alpha to Omega. The A-Z of Teaching Reading, Writing and Spelling*. 4th Edition, Heinemann Educational, Oxford.
- Lachs, V. (2000) *Making Multimedia in the Classroom: A teacher's guide*. Routledge, London.
- McFarlane, A. (ed.) (1997) *Information Technology & Authentic Learning*. Routledge, London.
- Miles, E. (1990) Principles of Teaching Students with SpLD. In: *Meeting Points in Dyslexia*, G. Hale, M. Hales, T. Miles and A. Summerfield (eds.), BDA, Reading.
- Newman, D. (1997) Functional Environments for Microcomputers in Education. In *Mind, Culture and Activity Seminal Papers from the Laboratory of Comparative Human Condition*, M. Cole, Y. Engstrom and O. Vasques (eds.), Cambridge University Press, Cambridge.
- Pollock, J. and Waller, E. (1994) *Day-to-Day Dyslexia in the Classroom*. Routledge, London.
- Stackhouse, J. and Wells, B. (1997) *Children's Speech and Literacy Difficulties. A Psycholinguistic Framework*. Whurr Publishers Ltd., London.
- Vygotsky, L. S. (1978) *Mind in Society. The Development of Higher Psychological Processes*. Harvard University Press, Cambridge, Mass.

BIOGRAPHY

Yota Dimitriadi is a specialist teacher and assessor for dyslexic learners. She works for the British Dyslexia Association providing advice at the National Helpline. She is also involved with the New Opportunities Fund teacher training programme on ICT and SEN (Special Educational Needs) at the Institute of Education, University of London.