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The Use of Technology in Education: Seeking for a Pedagogy

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SUMMARY

Information and Communication Technology (ICT) has increasingly gained a place in educational practice. Today, apart from its supportive nature, ICT offers an alternative way of knowing and communicating enabling individuals to be fully engaged in many every day activities. It is becoming mainstream practice. This probably justifies governmental initiatives and funding to increase ICT literacy. Such initiatives, however, have their own problems. Preliminary findings from the paradigm of teacher training in ICT in the United Kingdom have shown that the demand on teachers' time, the infrastructure and resources available, the mode of delivery (face to face vs distance learning) and teachers' existing basic skills and confidence in using ICT play an important role in delivering successful training. In addition, the experience of training providers in delivering ICT training for educational purposes and applications becomes of supreme importance. Clearly, there is a need for the development of a pedagogy that allows the best use and utilisation of ICT in Education.

Lessons learnt from the application of the UK paradigm in teacher ICT training may be considered, evaluated and modified in the light of the particular educational, technological and cultural context of Greece in order (i) to avoid some of the pitfalls encountered in the UK training programmes and (ii) to get the best out of the training programmes undertaken in our country.

KEYWORDS: *Information and Communication Technology, Special Educational Needs, Inclusion, Teacher training*

INTRODUCTION

Technology has been proved to be a powerful tool for the education, inclusion and participation in every aspect of everyday life activities of many people with disabilities and special educational needs. The eminent scientist Stephen Hawkins who, for years, has been chair bound and without natural speech is a prime example. His computer-mediated speech enabled him to communicate his thinking and ideas and he has made the most important contributions to our understanding of the universe with his research and publications. Similarly, the actor Christopher Reeve, after the nearly fatal fall from his horse, has made remarkable recovery and maintained a quality of life with the use of technology. Considering such contributions of the technology to human life and learning, this paper aims:

- To explore the potential of the usage of Information and Communication Technologies (ICT) in enabling learning for pupils with Special Educational Needs (SEN);

- To discuss teacher training needs in mainstream technology in order to enable them to make informed decisions and confident use of ICT in the teaching and learning process.

The discussion which follows it is based on experience accumulated and results demonstrated from the paradigm followed in the UK.

THE POTENTIAL OF ICT FOR PUPILS WITH SEN

Some of the finest work with the Information and Communication Technologies has been done in special schools. Speech, pictures, symbols, words and animation combined in interactive ways enable individuals/learners to structure concepts to suit the level of their understanding and interests. Words that, for some learners, have waited as dead print on a page in busy classrooms to be explained by the teacher or helper can now be brought to life and spoken, illustrated or animated (Papatheodorou and Blamires, 2000). For instance, "Writing with Symbols 2000", developed by Widgit, is a talking package which can be used for and by children with severe learning difficulties. Children can select picture sympols to use in their writing to express themselves and convey messages (Kirkman,2000).

Children with dyslexia or specific learning difficulties have particularly benefitted by the use of technology. Macdonald (1996) reports that the use of voice text has made all the difference in the performance of her pupils with dyslexia. Wearing a headset with a microphone attached, pupils can just tell the computer what to do instead of typing it in. Davitt (2000) reports that a one-year pilot trial into voice-recognition software ended with positive reports from the 12 schools involved. Several said that they had seen dramatic improvements to students overall motivation and use of language as they trained the computer to turn their voice into text on screen

Macdonald (1996) also points out that the same technology, used for pupils with dyslexia, is of equal importance for pupils with such physical disabilities as weak muscle tone and poor motor co-ordination. For these pupils, touch monitors have also been a break-through for their inclusion in the learning process (Kirkman,2000). But, even mainstream technology, such as a personal computer, can make all the difference for pupils with physical disabilities in engaging them in rewarding activities. For instance, in artistic and creative tasks, children with poor motor contol and using traditional media such as a paintbrush, have often to fight a physical battle that usually is resulting in much frustration and unsatisfactory outcomes. McKeown (2001) reports that computer-based paint packages have helped many students to achieve startling results and produce high quality paintings and designs. It has also enabled them to experiment, improve their techniques and make decisions about composing their art work.

Video-conferencing can also help sick and injured children to link up with their school and others. Children who are in isolation wards can take part in lessons and activities, relieving some of the loneliness and boredom (McKewon,2001). Equally, children can benefit from multi-sensory environments created in schools. That is education through the senses (Kenny, 2001a).

Technology and especially the use of a personal computer has been proved to be a vital link in the learning of children with autism. People with autism thrive on routine and like the predictability of a windows-based computer programme where the learning is done frame by frame. It allows them to think at one stage at a time, which means that the packages used are well suited to the ways children with autism make sense of things. Technology can help children with

autism to develop language, communication and creative skills through the use of computers that teach letters, words and colours (Harris,undated).

Furthermore, if one considers the requirement for children with special educational needs to have access to the same curriculum as their peers (DfEE,1994), then they should be using the same software working, however, at their own pace. In this way, they do not feel marked out because they are using different resources from their friends (Kirkman, 2000). Certainly, technology has been proved a powerful tool for the social inclusion of children with special needs in the mainsream schools (Abbott, 1999).

Research findings regarding the outcomes of ICT integration into teaching

Overall, wherever ICT has been used resulted in positive outcomes. Selinger and her colleagues (2000) reviewing and making a critique of over 200 research studies have found that the integration of ICT into teaching revealed a number of benefits, that is:

- *Access.* ICT enables pupils with reading difficulties to find different ways in to curriculum, and raises the status of visual and aural literacies to the level of literacy acquisition through text.
- *Visualisation* makes the invisible visible. Dynamic images and animation aids understanding of abstract concepts and enables visualisation of processes otherwise either too small or too fast.
- *Differentation* gives enrichment and extension for able pupils, provides support and motivation for weaker pupils, allows independent learning at an individual pace, allows easy repetition and more teacher/pupil interaction, and better pupil contact.
- *Motivation and variety* generates enthusiasm, interest and involvement, keeps attention and enjoyment, and is a new way to present difficult ideas.

In addition, thinking skills and problem solving strategies are enhanced when using ICT. Pupils' sense of competence is enhanced by challenging tasks and a responsive environment. Using the Internet has far-reaching effects. As well as facilitating communication, it develops skills of searching, interpreting and organising information often defined as "network literacy".

A PEDAGOGY FOR INFORMATION AND COMMUNICATION TECHNOLOGIES

It is of importance, however, to note that for technology to become an enabling tool for learners it is not enough to just have access to it. For technology to become an enabling tool it must facilitate the active engagement of all learners. According to Blamires (1999) inclusion equals access plus engagement. For this, the role of the teacher is important in the process. Selinger et al (2000) point out that ICT have also affected teachers' views of the learning process, with the technology playing a vital role in opening the minds of the teachers to new ideas about children, learning and their role in education. The teachers role has changed from whole class teaching to small group instruction; from a didactic approach to coaching with individuals or pairs; from working with and questioning the more able to working with all abilities and understanding their difficulties.

Consequently, an appropriate pedagogy for the use of technology in the learning process becomes supremely important. This view has implications for the training of teachers who use technology in the teaching and learning process. Following, the British paradigm of teacher training will be briefly outlined and the main issues surrounding this training will be discussed in the light of the experience accumulated from the relevant training.

TEACHER TRAINING IN ICT
ICT training: The British paradigm
In 1998, the most ambitious ICT training programme, funded by the Lottery New Opportunities Fund (NOF), was announced aiming to train Britain's 500.000 teachers and librarians in computer skills by 2003. (This is, allegedly, the biggest training exercise since the civilian population was taught how to use gas masks in 1939). Each teacher, admitted to an ICT training course, was entitled an amount of £ 500.00 of the £ 230m allocated by NOF for teacher training.

It must be noted here that this training was not just about basic skills. Right from the start the Teacher Training Agency (TTA) demanded subject-based skills that teachers could use to enhance their teaching (Revell, 2001). The TTA had also provided a model which identified the main areas where ICT can have a positive impact on learning, that is, (DfEE/TTA, 1998):

- **Information** where large amounts of information can be accessed from discrete encyclopaedias on CD ROM to vast networks of interconnecting information such as the World Wide Web.
- **Provisionality** where, for example, the Delete key and the Undo button mean that learners can be more experimental, and documents can be saved at different stages of development so that new possibilities can be explored with little risk of loss and with ease.
- **Speed** where the laborious aspects of work can be eliminated such as letter formation and the duplication or movement of text, images and sound.
- **Accuracy** where editing is easier than traditional technology. Proofing tools such as spell checkers and auto correct can improve accuracy in work by taking over secretarial aspects of composition;
- **Presentation** where ideas can be presented in a wide range of formats, including sound, video, music, pictures and graphics.
- **Communication** where technology can aid the process of communication, e.g. work can be published to a wide audience electronically.

Technology may utilise any or all of them. This, however, means that training has to go beyond the basic skills and incorporate pedagogical principles applicable to the use of ICT.

More than 100 training providers from the industry and academia have developed training courses available to teachers. The author of this paper has been involved in the development of the ICT for SEN training programme at the Canterbury Christ Church University College (CCCUC) in England. The programme was specifically developed for the training of professionals working with children with Complex and Severe Learning Difficulties, Special Educational Needs Co-ordinators (SENCos) working in mainstream schools, special schools and Pupil Referral Units (PRUs) and advisory teachers working in Local Educational Authorities (LEAs) and Special Educational Needs (SEN) support services

Preliminary findings of the training programmes
Initial feedback from training undertaken by different training providers has been unanimously positive (Revell, 2000). However, this view was not reflected in the Interim Report that was published by the Office for Standards in Education (OFSTED) in April 2000 (Kenny, 2001b). The OFSTED acknowledged that some advances have been made and that teacher confidence in using ICT has been improved. However, teachers only rarely used pedagogic expertise to make most effective use of ICT in their lessons. Subject applications were referred to,

but matters of pedagogy were generally not sufficiently explored. Both training providers and the OFSTED have acknowledged a number of issues and difficulties that have emerged during the initial stages of training. These are outlined below.

Demands on teachers' time

Time has been found to be a vital ingredient for success (Davitt,2000; Revell, 2000). The NOF funding was for training only and no supply cover was attached. As a result teachers had to be trained outside school hours either on a distance learning basis at home, or after school, in twilight sessions. Capita's Learning Network training programme expected teachers to devote two to three hours a week to the training over three five-week blocks. It was expected that this time would have been spent in the classroom with children, but in most of the cases teachers had been working on the training materials on their own time. The same programme had in place a conferencing system and encouraged sharing ideas and problems by email. Teachers also received a CD-ROM to take them through a variety of tasks and were monitored by a mentoring team. Teachers acknowledged that the material was good, but the work pressure left them working the materials in their own time. The problem was to find the time required for the training (Revell,2000).

Infrastructure and resources

Much of the training was built on the notion that teachers would have access to ICT. This, however, was not the case. For some primary schools, one computer in the library had be seen as meeting the government's target for every school to be connected to the Internet by 2002. The TTA estimates that more than 200.000 teachers have signed up for the training, possibly before their schools were ready to benefit from it. The availability of appropriate resources is an important factor for the success of the programme. There is no point to the training until the school has adequate hardware and software. To highlight the importance of available resources, Johnston (2001) quotes Molyneux, from the National ICT Research Centre in the UK, saying that "if content is the king, then infrastructure is god".

Good quality of resources is equally important. Krechowieska (2001) points out that comparable and high quality equipment that behave in a predictable way and give access to the same information are important at least at the initial stages of training until teachers will have the confidence to use ICT in their teaching. Reeves, cited in Revell (2000), has also claimed that good quality training equipment that do the job properly are essential.

Mode of delivery (face-to-face vs distance learning) and lack of confidence

Most training programmes offer a mix of face-to-face and distance learning. For many teachers, who do not have the confidence to use ICT, face to face teaching is the preferred mode. Freedman (2001a) quotes a Head teacher saying that she has signed with a training provider that had, at the heart of its training programme face-to-face teaching. Barker (2000) also quotes an ICT co-ordinator, admitting that the face-to-face interaction with teachers was vital to the training. If teachers are not confident enough to use computers in the first place then it is not going to be effective to use one of the Web-based training packages on offer.

Of course, no one type of training suits all circumstances. For example, a face-to-face lecture-style training best suits the idea of providing information rather than teaching skills. Small groups involved in discussion of pedagogical issues or learning and applying software skills helped by a tutor is a better means of helping teachers to gain specific skills and understanding (Freedman,2001b).

Teachers' existing basic skills and competencies

McLean (2000) proposes three tiers of ICT training. The bottom level addresses basic skills in using the technology. Basic skills are not an end in themselves, however, a basic competence and confidence is essential for more interesting activities. Goldsbury (2000) points out that "We learn to crawl before we walk, yet alone run-and developing IT skills should not be different" (p.11). McLean (2000) points out that different people need different degrees of basic training. The key is to reach the point when one knows what s/he does not need to know. Although, TTA was quick to make clear that this training was not about basic skills, it has been found by trainers that they had to allow in their training programmes for basic skills training. In some cases, however, Local Educational Authorities have been diverted into generic skills support rather than subject-specific training (Kenny, 2001b). For this, an ICT Skills Audit developed by NOF trainers and others that has been a useful tool and enabled schools to identify their own training needs (www.ictineducation.org/downloads.htm; www.ngfl.ac.uk/auditpdf.html;).

It is also important for teachers to start their NOF training considering the purpose of their activity such as meeting expected learning outcomes and/or raising standards (Barker,2000) or/and enhancing students ability to reason with ICT (Freedman,2000c). Abbott (2001) says that there is a real danger to plough ahead with ICT without thinking why we use it. For this, Kenny (2000a) quotes the Head at the initial teacher training at the TTA, saying that training has to be tailored to schools and teachers. It has been acknowledged that where training has been going well and felt to be good there had been a clear identification of training needs before the training started. The identification has been used to choose the starting point and a route through the training of each participant teacher (Kenny, 2000b).

McLean (2002) argues that confidence in using a few basic skills and appropriate levels of access, can enable teachers to use ICT in order to find, produce and print resources for use in their teaching. ICT can help teachers to plan and prepare their teaching and deal with administrative tasks. Work with pupils can come later. For Sulke, in Kenny (2000a), the focus of the training is still on using ICT in the classroom, deciding when and when not and how to use it.

The next tier of training is how to use ICT in teaching, that is how to meet teaching objectives and the pedagogy associated with its use. McLean argues that good teaching with ICT requires all the traditional skills of teaching, such as classroom management, intervention and giving feedback, as well as new ones, such as assessing work produced using ICT. Even though, some solutions at the lower end of the market or mainstream ICT technologies used imaginatively can enable teachers to produce lesson plans with a high degree of pupil interaction with more control being passed over to children. This, according to McLean (2000), paves the way for the pupils' autonomous use of ICT.

The NOF training is just about this second tier of ICT training. For this, Barker (2000) quoting also a Head teacher, argues that schools should choose a trainer with experience in curriculum areas rather than in traditional "technological" areas- to focus on the classroom and not on the machine. Moluneux, quoted by Johnston (2001) argues that technology has to be taken from the laboratory and put in the classroom to see what its actual impact is. Abbott (2001) making reference to developments in other European countries, claims that ICT should be evaluated in such a way as to challenge the ICT chauvinism created in the UK. He argues that there is much tension between a technology that has change at its core and an education system

that intents preserving the status quo. For this, he advocates a middle way, namely the gradualist approach to change.

The third tier of training should address curriculum planning and using ICT to manage learning. For McLean there is a world difference introducing a few ICT activities to spice up the teaching or to address particular points, and produce a curriculum where experience of each Year (e.g. Year 6) is built on to the experience of the previous Year (e.g. Year 5). This has yet to come.

Clearly, these initial reports from trainers and schools support further the preliminary findings of OFSTED about the lack of a sound pedagogy for ICT uses. This echoes the SCAA's (1997) earlier recommendations that further reseach is needed to determine and establish a pedagogy for ICT, to determine the effects of ICT in improving the learning outcomes of different groups of pupils not all of whom benefit from the use of ICT in the same way and possibly to explore different models of education.

All issues, outlined above in the running of the NOF ICT training programmes, have also been the main concern during the development of the NOF ICT training for SEN at CCCUC in which the author of this paper was involved. An additional difficulty faced in delivering this programme had to do with the lack of basic mainstream hardware necessary for training in the field of the SEN.

Action points for schools intending to undertake training

ICT training is an expensive and demanding exercise. For schools and teachers to get the most out of it they need to consider certain questions which need to ask trainer providers before sign with any of them. Kenny (2000b) summarises these questions as follows:

- Find out whether the training has been prepared by teachers or university people, how long it will take and what demands it will make upon your time and/or additional funding;
- Ask trainers whether their training programme is accredited and/or nationally approved, whether they have their own internal quality assurance and whether they have been subject to external TTA quality assurance;
- Ask for the names of the schools the trainers have worked with. Ring them and ask for their experiences;
- Ask whether the training is predominantly face-to-face or distance and whether they are using mentors and who are they;
- Find out the credentials of the authors of specialist materials, ask to see samples of these materials, ask how relevant they are to your training needs, how well do they use technology and how interactive they are.

Market research before embarking to any training programme is a key to success.

CONCLUDING REMARKS

ICT has increasingly gained a place in educational practice. Twenty years ago, its credence was mainly due to the fact that they assisted traditional ways of teaching and learning (access). Today, apart of its supportive nature, ICT also offers an alternative way of knowing and communicating enabling individuals to be fully engaged in many every day activities, and as such tends to become mainstream practice. This probably justifies governmental initiatives and funding (at least in the UK) to increase ICT literacy. Such initiatives, however, have their own problems. Lessons learnt from the application of the UK paradigm in teacher ICT training may be

considered, evaluated and modified in the light of the particular educational, technological and cultural context of Greece to avoid some of the pitfalls and get the best of the similar exercise undertaken here. In addition, attention must be given to the fact that there is a need to develop a pedagogy appropriate for the use of Technology in Education.

Whatever reservations exist, the fact is that ICT is here and has been proved to be a powerful medium for enabling learning and enhancing the quality of life of many people and especially those with a disability and/or special educational needs.

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