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## Enabling Technology for Inclusion

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### Περίληψη

Η παρούσα ανακοίνωση αναφέρεται στην οργάνωση ενός προγράμματος διδασκαλίας της πληροφορικής σε εκπαιδευτικούς που εργάζονται, άμεσα ή έμμεσα, με παιδιά πρωτοβάθμιας και δευτεροβάθμιας εκπαίδευσης που παρουσιάζουν μαθησιακές δυσκολίες. Το πρόγραμμα βασίζεται στην άποψη ότι οι εκπαιδευτικοί πρέπει να χρησιμοποιούν τις τεχνολογίες πληροφορικής και επικοινωνιών για την ολοκληρωτική ένταξη (δηλ. φυσική, γνωστική και κοινωνική) των μαθητών στο σχολείο. Η πληροφορική δεν είναι μόνο ένα εργαλείο, αλλά ένας ακόμη τρόπος επικοινωνίας. Η ανακοίνωση περιγράφει το θεωρητικό πλαίσιο στο οποίο βασίζεται το πρόγραμμα και παρουσιάζει συνοπτικά τους σκοπούς, περιεχόμενο, δομή και τρόπους διεξαγωγής του προγράμματος.

**Λέξεις – κλειδιά:** Τεχνολογίες πληροφορικής και επικοινωνιών, ειδική αγωγή, σχολική ένταξη, εκπαίδευση εκπαιδευτικών

**Keywords:** Information and communication technology, special educational needs, inclusion, teacher training

### Introduction

Currently in the UK funds have been made available by the New Opportunities Fund (NOF) for professionals, who work with children with Complex and Severe Special Educational Needs, to be trained in Information and Communication Technologies. One of the six providers approved nationwide by the Department for Education and Employment (DfEE) is the Canterbury Christ Church University College (CCUC) which has long teaching experience, expertise and research activities in both areas of Special Educational Needs (SEN) and Information and Communication Technologies (ICT). The present paper aims to present a conceptual framework for professionals' training in ICT and outline the programme developed with the view to open a discussion and debate about the use of ICT in the field of SEN.

### A conceptual framework

Enabling Technology is concerned with the creative and sensitive application of appropriate technology in order to improve the quality of life of individuals and their range of life opportunities. Enabling technology is not just about access; it is about engagement and inclusion. It is about facilitation of understanding and engagement with knowledge and people. For instance, speech, pictures, symbols, words and animation can be combined in interactive ways to structure concepts to suit the level of understanding of the learner and his/her interests. Words that for some learners 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. These representations can be published or distributed to different audiences provided that the appropriate technology is employed.

## Models of learning

To consider the role of enabling technology within learning we need to know what is actually involved in learning. Decorte (1993) has proposed a useful model of learning that is displayed in diagram 1 below:

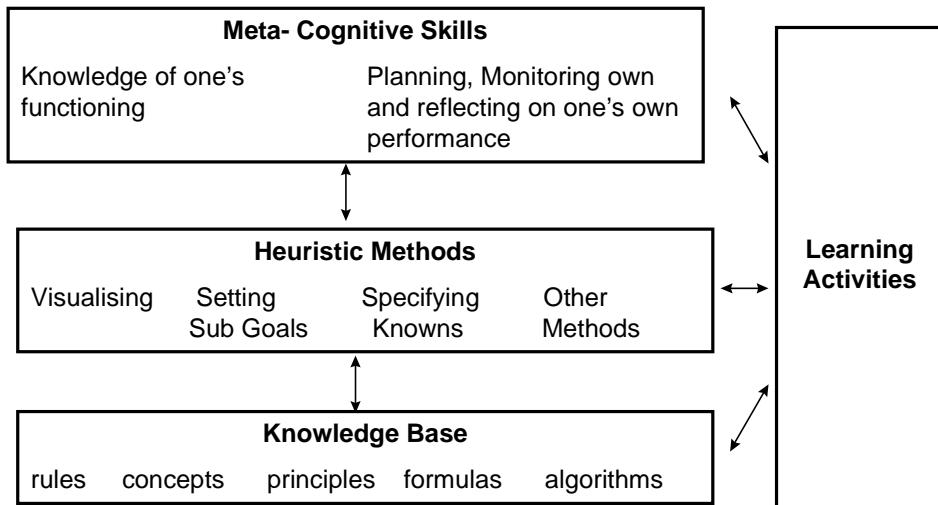


Diagram 1: A Model of Learning

The knowledge base is the subject to be learnt. Whether this is a science, mathematics or English it will invariably have its own concepts, rules and principles. The heuristic methods are general ways of problem solving that can be applied to the knowledge base. They are the usual problem solving skills of attempting to visualise the problem mentally, pictorially or diagrammatically, breaking the problem down into sub sections with sub goals, specifying what is known and what is not known plus any of a range of other methods. Meta-Cognition is the thinking we do about our thinking and how as a consequence we approach a learning task. To be effective, enabling technology can impact on all aspects of this model.

### Is technology, available now, 'intelligent enough' to develop all these aspects of learning?

An expert system needs to have a knowledge base which it can apply to problems. It has to have goals, rules and an understanding of how things operate so that the knowledge it has is used efficiently. Good expert systems will evaluate how well they have solved a problem from the results they have achieved, and as a result, may change their knowledge base or how they do things according to established criteria. Expert systems 'think' about what they have to do and learn from experience.

Within education our aims are similar. We want to build experts but these systems have to operate within learners rather than machines. Can then an expert system teach a learner? This will depend upon what one considers 'teach' to mean.... If you consider teaching to be the input of facts and simple skills that are then tested for 'mastery' I would suppose the answer would be 'yes'.

### The basics are important but they are only the basics

Because, current educational expert systems rarely go beyond the building of a basic knowledge base existing teaching software tends to impoverish learning. In other words, they are not that intelligent. It is easy to print out graphs of test results but it less easy to provide evidence of knowledge and experience gain. Maybe our goal for expert systems should be to enable learners to become experts themselves. In which case the child needs to develop a knowledge base on a particular subject, become aware of this knowledge and how they have

structured it. They need to be able to evaluate this knowledge therefore they need criteria. They need to learn different ways to use this knowledge and apply it to real life problems (meta-cognition)

### **A Model of Information and Communication Technology in Education**

The Teacher Training Agency (TTA), England and Wales, provides a model which categorises the main areas where ICT can have a positive impact on learning, that is:

**Communication** where technology can aid the process of communication, e.g. work can be published to a wide audience electronically. **Presentation** where ideas can be presented in a wide range of formats including sound, video, music, pictures and graphics; **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 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. **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; **Speed** where the laborious aspects of work can be eliminated such as letter formation and the duplication or movement of text, images and sound. Enabling Technology may utilise any or all of them.

Following the English and Welsh Code of Practice on Special Educational Needs, Day (1995) goes on to suggest that a continuum of needs should be considered alongside a continuum of provision. At one end are learners for whom IT provides ‘access to the world of living and learning in a way that no other resource can’ where ‘IT is a lifeline’ and at the other is where IT ‘makes a difficult task easier by acting as a facilitator. At different points along the continuum different levels of technology are required. This ranges from occasional access shared with other learners, through targeted access where the learner has individual use of technology for specific tasks towards designated individual provision allocated to a learner as part of a statement or individual education plan.

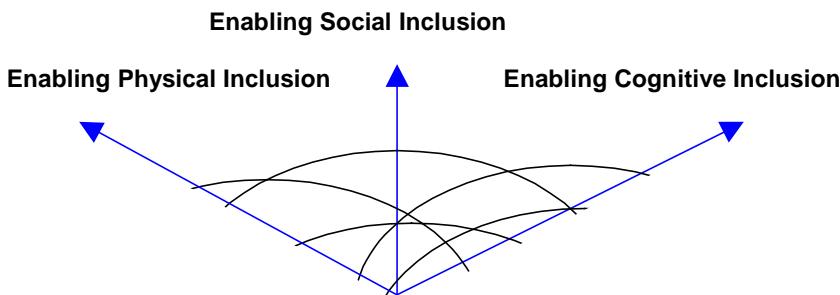
Day (1995) suggests that, for learners with special educational needs, technology can provide them with access to the curriculum if appropriately utilised within their individual education plans. However this rather undersells the potential that technology can have in re-shaping the curriculum to create alternative ways of successful learning. Access Technology may be necessary but alone not sufficient for inclusion. The goals of inclusion being not merely access but active engagement in learning tasks that are worthwhile alongside one’s peers.

### **A model for inclusion**

Perhaps it is unrealistic to argue that all people should become experts. One might be really negative and argue that some people with learning difficulties are unlikely to become experts at anything so it is unfair and unrealistic to expect them to try. However, Warnock (DES, 1978) suggests that the aims of education should be the same for all children and the perception that a child may not achieve them at all or achieve some of them after a very long period and great effort by child, career and teacher, should not stop us from aiming for them. How many children have learning difficulties because they have learnt facts and skills without understanding ?

The approach taken in this paper for the conceptualisation of special educational needs moves away from deficit view of special needs where there is ‘something missing’ within the individual towards a model that takes into account individual biological and psychological strengths and deficits alongside community (social) strengths and deficits. These include the availability and application of technology as well as other issues such as the curriculum, institutional structure and organisation, and pertaining values. Figure 1 represents the continuum of provision recognised in Warnock (DES, 1978) and the Code of Practice (DfEE,

1994). The lines represent the different degrees of inclusion that an individual may have as a result of all the three parameters.



**Figure 1: A developmental model of inclusion**

Each dimension of inclusion in figure 1 may be a result from the following the very tentative equation:

$$\text{Inclusion} = \text{Access} + \text{Engagement}$$

From our model, inclusion is concerned with access and engagement at a physical, social and cognitive level with one's peers in tasks that are at an appropriate level and worth while. It is about increasing engagement with a menu of learning opportunities (Moore, 1992) that are a response to the needs and rights of a diversity of learners. Including means being part of a dynamic relationship rather than a fixed state. Inclusion is a process characterised by evolution rather than revolution building upon existing knowledge and experience. Technology is now the versatile tool for handling information and communication. ICT is therefore a central tool for inclusion. But like any tool it needs to be understood and evaluated.

The enabling use of Information and Communication Technology requires a creative mind set. Hart (1996) has proposed a method of 'innovative thinking' which she suggests may be employed to avoid the attribution of deficits to a child so that the teacher can act positively to include a learner within classroom activities. She suggests that five questioning moves help us to *move beyond* what we already think and know about the situation, that is:

- Making Connections by exploring how the specific characteristics of the child's response might be linked to features of the immediate and wider context.
- Contradicting by teasing out the underlying norms and assumptions that lead us to perceive the child's response as problematic.
- Taking a child's eye view by trying to enter the child's frame of reference and see the meaning and logic of the child's response from the child's perspective.
- Noting the impact of feelings by examining the part that our own feelings are playing in the meaning we bestow on the situation and in leading us to arrive at a particular interpretation.
- Suspending judgement by recognising that we may lack information or resources to have confidence in our judgements and therefore holding back from making judgements about the child's needs while we the steps to add to our resources (Hart, 1996).

### **From Innovative Thinking to Universal Design for Learning**

The five questions provide us with a framework for listening to the voices we need to take into account. The response to issues arising from these questions and concerns can be framed the context of universal design. The Centre for Applied Special Technology (CAST) has proposed three principles of Universal Design for Learning that can be applied to curriculum and set a working agenda for inclusion.

**Principle One : Provide Multiple Representations of Content**

Key information is represented in alternative modalities - textually, visually or auditory. Unlike the printed page, computers can present information in multiple media formats. Instead of using verbal language or written text, there are now a variety of means in which a learner can build representations of his or her understanding of the world which can be readily be changed and re-presented.

**Principle Two : Provide Multiple options for expression and control**

The dominant mode of expression on web pages has been through the production of text but there has been a move towards the use of multi-media authoring which encompasses artwork, photography, drama, music, voice recording and animation because they can be stored digitally and manipulated. This convergence of digital media facilitates different ways for learners to explore and build understandings and then demonstrate what they have learnt through publication. In addition differences among students' ability to use different kinds of tools mean that a wide range of ways of using the computer have to be considered. Many current curriculum based activities are locked into one method of expression and control. This is probably a result of the limitations of systems of assessment as well as an artefact of technology. e.g. 'Write a story' rather than "create narrative"

***The 'Problem' of Generalisation and 'Transfer'***

When learners with special needs first used computers the emphasis was on the 'need' to encourage transfer and generalisation' (Hope, 1986). It was as if any achievement of a child with special needs using a computer was in doubt until they could achieve the same feat with more prevalent technology such as pen and paper. For Keane in 1986 word-processing was not part of 'everyday writing'. Technology was then at the margins of education but we argue that it has since earned its place as a powerful tool for inclusive learning and participation in society.

Within the principle of multiple forms of expression the problem of generalisation and transfer is a problem of meta-cognition. What has the learner actually learned about applying the rules and concepts she has used ? Does she have a framework for applying this knowledge to other problems presented in different ways ? Transfer and generalisation are not about proving you can carry out a task in a preferred medium.

**Principle Three: Provide Multiple options for engagement and motivation**

This acknowledges that learning has an important emotional component. Learners need to feel safe and confident in their ability to respond to the challenges presented to them. Without the flexibility resulting from innovative use of technology this task might not be possible.

***Enabling Engagement: Scaffolding Across Proximal Zones***

Sitko and Sitko (1996) elaborate the role of technology in scaffolding as "providing additional support to allow students to accomplish an activity that they would otherwise be unable to do without that support". But what if the learner needs prolonged support from this scaffolding? Does this permanent scaffolding become a prosthesis for learning? Does this mean we are becoming dependant upon technology?

***But, what is independence?***

When educators talk of the aims of becoming an independent learner they should take into account the technological tools they are assuming to be available. Today, we can assume the availability of pen and paper but tomorrow what other technology will be readily available?

***Inauthentic labour***

Underwood (1990) has suggested that I.T. can free learners from the 'inauthentic labour' within a learning activity. For example, a learner can search through a database with thousands of records in seconds with a computer whereas this might take hours by hand. The learner is therefore freed to concentrate in the essence of the task rather than the method. Smith (1982) has made a similar distinction within the process of writing, that is, between composition and transcription. The latter is concerned with the secretarial aspects of writing,

the letter formation, punctuation, capitalisation, spelling and layout whilst the former is concerned with the shaping of meaning through the use of words, syntax and genre. Smith suggested that too much concentration on the transcription might be at the expense of composition. For many people, the increasing capability of computers to look after the transcription involved in writing has been one of the most enabling aspects of technology. A basic word-processor will form the letters in the way you want, put spaces between words, indent and justify your text and allow you to change your words.

### **Target Drift & the Inauthentic Labour within Learning**

In Underwood's (Underwood and Underwood, 1990) language transcription is 'inauthentic labour' which can be carried out by the micro-technology whereas composition is the authentic labour. However, if one is writing for an audience one can anticipate that transcription, which is concerned with the way writing appears to the reader, may become important. Therefore at different stages of a learning activity some aspects may be more important than others. An excessive focus upon one element of the task may divert the learner from achieving other learning outcomes. We can call this target drift and it can occur when the teacher is not confident with the technology or the goals of the activity are not clearly defined. For example, printing a coloured graph out as a bar chart or pie chart because it is possible rather than considering what it is showing, or spending an inordinate amount of time choosing fonts for a piece of writing outlining a project. Target Drift occurs when a superficial aspect of the learning task becomes the focus of the learners efforts. So content must not be sacrificed for presentation. But how do we judge content?

### **What is authentic Learning on a computer ?**

If the computer can take over many inauthentic labours of learning, how can we tell when it has taken over the authentic labour of learning as well? To what extent are the learning outcomes resulting from computer use of the learner or those (i.e the various people who designed the system) of the technology? Yet again, this difficulty as been recognised in guidance for the use of ICT in initial teacher training in Engalnd and Wales

*Trainees should be taught to identify....Criteria to ensure that judgements about pupil attainments are not masked because ICT is used.*

*(DfEE, 1998: Circular 4/98)*

It seems then that the nature of teacher training may make the difference in the use of ICT in educational contexts. The training programme outlined next attempts to consider the main issues discussed so far.

### **The development of a training programme**

In the light of the framework outline above, a programme has been devised specifically for the training of the following groups of professionals who work with children with Complex and Severe Special Educational Needs, that is, head teachers and teachers; special educational needs co-ordinators working in mainstream schools, special schools and pupil referral units; and advisory teachers working in Local Educational Authorities and Special Educational Needs support services );

### **The aims of the programme**

The programme aims for professionals to;

- increase their generic ICT skills and competencies;
- have an overall knowledge and critical understanding of the field of SEN;
- establish a critical understanding on how and when ICT can be used, or not, for both (a) *administrative purposes* such as reducing the time spent in assessment, target setting, individual educational plans; facilitating

communication and partnership with parents, other professionals and agencies, and (b) *educational/pedagogical* such as raising the quality of pupils' learning experience and the standards that they achieve; establishing criteria for the usage and evaluation of ICT, enabling the 'voice of the child' to be heard and responded to in appropriate educational and social ways; enhance their continuing training and professional development;

## Content of the programme

### 1. Knowledge Base

**Generic ICT skills** such as use of word processing, excel, power point, data base, internet, e-mail, web-board, web-board conferencing; Health and Safety Issues, the data protection Act; Usage of the Internet, email and web-board to access information, exchange information and communicate with others;

**Introduction to the field of SEN.** Introduction and knowledge and critical understanding of the field of SEN and current policy developments (National Special Educational Needs Specialist Standards, Code of Practice etc);

**Using ICT for administrative purpose.** Usage of existing data base for record keeping, sending letters to parents and other professionals (administration purposes);

**Using ICT for educational/pedagogical purposes.** Usage of existing software for assessing pupils' needs, setting targets and writing individual educational plans (educational/pedagogical purposes, and administration); Usage of existing software to enhance pupils learning experience and achieve high standards (educational/pedagogical purposes) in *communication and interaction, cognition and learning, behavioural, emotional and social development and sensory and physical development needs*.

### Heuristic Methods

An introduction on **how professionals can use existing ICT** resources (hardware and software) and/or create and develop their own/customised material to use ICT in their teaching and learning methods and strategies, and the delivery of pupils' individual educational plans, and **how professionals can modify their teaching and learning strategies and methods**, and pupils' individual educational plans to make effective use of existing ICT resources and/or their own/customised material;

### Criteria for heuristic methods

**Level of Pupils' engagement**, that is, to what extent ICT facilitates pupils physical, social and cognitive participation and development (DES,1978, DfEE,1994)?

### What purpose ICT is used for

that is,  
to what extent ICT is used for accessing information, presentation, accuracy, speed, provisionality, communication;  
to what extent ICT is used by pupils for multi representation of the content of their work (e.g. textually, visually, auditory);  
to what extent pupils use multiple options for expression and control (e.g. use of multi-media);

To what extent ICT is used to increase pupils motivation and engagement by offering safe, non-threatening environments for work;

### What is known and can be done about:

The curricular demands;

The pupil (by asking, for instance, what the learner already knows; what are his/her responses; what these responses mean to him/her and the professional; how else his/her responses may be understood; what might help the pupil to produce desirable responses);

The professional (what opportunities/tasks offered will engage the pupil in the learning process and increase his/her outcomes);

ICT and its role in supporting the task set out to enhance the pupil's engagement and learning experience;

#### **Issues for consideration and concern**

**Scaffolding:** has the assistance provided to the pupil by ICT contributed for him/her to achieve something or this assistance has become permanent with a result for the pupil to be dependent on ICT?

Is ICT used for inauthentic labour or it has taken the authentic labour of a task as well?

Is there a target drift?

### **3. Meta-cognitive skills**

**Professionals' meta-cognitive skills.** Professionals undertaking the training will have the opportunity to 'think about their own thinking and learning' about the use of ICT through the assessment process. Assessment is continuous and impeded into the course from the beginning of the course and essential for progression during the delivery of the course.

**Pupils' meta-cognitive skills.** By considering the criteria for heuristic methods professionals will eventually provide opportunities for pupils to think about their learning with the view to develop transferable skills.

### **Teaching and Learning strategies**

The programme has been developed for groups of participants of mixed ability in ICT. A core component of the course is the specific support given to teachers to develop their own ICT professional development action plans, as course requirement. At the outset of the programme of study participants will have completed their own audit of personal and professional ICT skills to identify their training needs and develop an action plan. In this way the programme ensures the provision of starting points and paths which respond to participants articulated training needs. The programme allows individual participants to work at their own pace and have adequate support.

### **Mode of delivery and duration of the training programme**

The courses will normally run over three terms with 24 hours face to face teaching and training, 24 hours (at least) individual study (distance learning supported by on-line support), 24 hours application and evaluation (distance learning supported by on-line support);

Face to face delivery will be organised in well-equipped locations which have the necessary range of software and devices, e.g. overlay keyboards, voice and speech software, touch screens, switch assessment kits, selection set software, symbolic communication sets plus communication aids. Interactive tutorials offered are based on primary and secondary school curriculum by exploring a range of software available to increase pupils accessibility to the curriculum. This is a 'hands on' training programme.

**Training materials will include** face to face teaching, on-line basic skills tutorials through the Xplanatory and DISTRICT sites, access to a web-based conferencing site; access to a number of software developed to support the learning of children with complex and severe special educational needs, web-base conferences on complex and severe learning needs, web publication of selected reports on classroom work, study guides for the programme and each module with links to resources, exemplar lesson plans and other materials to support teaching. The publication 'Enabling Technology for Inclusion' will be a course reader.

### **Evaluation of the training programme**

The programme will monitored and systematically evaluated in terms of (a) **processes** to identify what has worked, and what has not worked in the training and why; (b) **impact** which the training had on individual participants' learning experience and continues professional development; (c)**structures** to identify structures which may have been in place in institutions

as a results of the training of individual members of staff; (d)**Outcomes** to identify the extent to which the training has made difference to pupils academic and behavioral outcomes, and professionals own knowledge and critical understanding of the use of ICT with children with Complex and Severe Learning difficulties;

For the purpose of such evaluation, data will be collected at the beginning, throughout the delivery (at least once a term) and the end of the training. Data will be collected via questionnaires (e.g. audit of professionals own ICT skills) and individual participants' portfolios.

### Concluding remarks

ICT has increasingly gained 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. However reservations always exist. Albeit its powerful impact, ICT is not always considered learners' best friend. It is often claimed that ICT cannot maintain motivation and cannot replace the rapport established in face to face teaching, and personal tutorials. For this, it is important for professionals to remember that there is a need for conscious effort to 'humanise ICT rather than to de-humanise learning'.

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