

Developing an ICT capability for learning

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Abstract: Learning effectively with Information and Communication Technology (ICT) requires an appropriate level of ICT capability. This paper explores the ways in which children develop their capability in home and school, and how their skills support ICT activity and learning in each setting. Conditions for developing ICT capability during such activities are identified using a framework for analysing learning situations based on affordances, constraints and abilities. It is concluded that all aspects of young children's ICT capability can be developed effectively through a combination of structured activities in school designed primarily for learning other subjects, provided that subsequent reflective activity is generated. This learning is supported by unstructured activities at home, and provided that they have access to appropriate guidance from more capable family and friends. Suggestions are made concerning the coordination of school and home ICT activities in order to exploit the positive features of each setting, and generate effective learning within and beyond the formal curriculum.

Key words: elementary education, conditions for learning, organising for learning, sites of learning

1. INTRODUCTION

Evaluations of the role of ICT in learning must consider different perspectives (Squires and MacDougall 1994) and recognise that the influence of ICT is dependent on the ICT capability of the user (Kennewell 2001). What the user knows about ICT affects the quality and quantity of the learning with ICT. The features of ICT that aid learning include interactivity and provisionality (Teacher Training Agency 1998). But to exploit interactivity, the user must know how to respond to screen prompts from the software; in order to exploit provisionality, the user must know how to save,

load and edit work in progress. If learners do not have sufficient skills in using ICT, they experience the 'ICT interference factor' (Birnbaum 1990), and ICT becomes a barrier rather than an aid to learning.

The ability to use ICT to carry out worthwhile activity, including the learning of subjects other than ICT, has been characterised as ICT Capability (Kennewell, et al. 2000). Five key components of ICT capability have been identified:

- routines such as using a mouse or double clicking on an application;
- techniques such as adjusting margins to make text fit a page;
- key concepts such as menu, file, database, spreadsheet, web site or hypertext link;
- processes such as developing a presentation, seeking information, organising, analysing and presenting the results of a survey;
- higher-order skills and knowledge such as recognising when the use of ICT might be appropriate, planning how to approach a problem, making and testing hypotheses, monitoring progress in a task, evaluating the result, and reflecting on the effect of using ICT in a particular situation. (Kennewell, et al. 2000)

It is anticipated that those skills will develop together during the course of worthwhile tasks across increasingly challenging contexts, with help from those who are more capable.

2. INFLUENCE OF ICT ON LEARNING

Learning of specific subject matter is expected to take place through goal-directed activity in which there is a gap between the learning objectives and the student's current knowledge. The "learning gap" is bridged through cognitive effort. The learners utilise the affordances and constraints of the setting, such as those provided by ICT, in combination with their existing abilities in the subject matter to be learned, and in generic skills such as ICT capability. Those abilities, together with the affordances and constraints of the setting, provide both potential and structure for activity (Kennewell 2001). For example, when children are learning about the process of volcano eruption, they may use an encyclopaedia on a CD-ROM. The software affords searching by keyword and by successive focusing on subject headings; it also constrains the user to the specific material that the authors have decided to include. This constraint may be very valuable in the case of encyclopaedias designed especially for young children, although over time it will be unhelpful for children seeking up-to-date information. The CD-ROM does not do all the work and the child must know something about the

process of searching and the particular techniques needed to carry out the searches with the CD-ROM. Furthermore, merely accessing information may not bring about learning and a reflective stage is an important element of the learning activity (Kennewell 2000).

The information retrieval scenario described above could take place in either home or school. The technological, human and cultural resources will vary between the formal school setting and the more informal setting of home. However, we may expect the differences in the features of the settings to have fundamental effects on the nature and process of children's learning with ICT. Home ICT activity is characterised by "bricolage" and "hard fun" (Papert 1996), whereas school use is largely routine, unstimulating (Kennewell, et al. 2000) and prescriptive (Sutherland, et al. 2000a).

3. FEATURES OF THE HOME SETTING

In the UK, the technological resources available in homes are increasingly sophisticated and widespread (Harrison, et. al. 2001). Indeed, many homes contain more sophisticated resources than schools (Kennewell, et al. 2000; Downes 1998), affording more effective presentation and access to greater range of information sources. Other affordances arise from the human and cultural resources available to support activity; for instance, the willingness and ability of parents and other family members to help, their networks of social and professional contacts, and the models of ICT activity that they provide (Sutherland, et al. 2000b).

Children's use of the resources may be constrained in various ways (Sutherland, et al. 2000b; Downes 1998). Table 1 illustrates some of the technological, human and cultural features that constrain home ICT use for children; some may have a positive effect on learning, others are potentially negative.

Table 1. Constraints on home use of ICT

Constraint	Example
Location of resources	In a communal room
Preparation needed	Connecting a telephone line for Internet connection
Parental restriction or security provision	Password protection on Internet filtering
Competition of hierarchy with family	Older siblings have priority
Perceived role in relation to technology	Feeling of inadequacy in comparison to more expert members of the family
Imposed priorities for different activities	School has priority over games



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