YOUNG CHILDREN LEARNING IN THEIR PRESCHOOL AND PRIMARY YEARS: A FRAMEWORK FOR PLANNING TO INCORPORATE IT

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A PHILOSOPHICAL FRAMEWORK
Teachers need a strong philosophical framework in order to plan and implement relevant and effective computer-based learning experiences for the children in their classes. This is true for teachers in all schools – from schools sharing one computer between several classes to schools where each child has access to a laptop. However, simply having access to resources does not guarantee effective learning experiences.

The use of technology needs to be considered in relation to the major influences which have an impact on children’s lives; the technology alone should never guide the planning process. In the recent NSW state election campaign both major parties tried to outbid each other in the provision of computers to schools and access to the Internet. Both sets of promises are doomed to fail unless a sound framework is devised within which such wide-scale provision is supported by clear guidelines for planning and implementing appropriate teaching and learning activities (and significant teacher development).

This paper is an attempt to identify and discuss the principles which should guide the design of computer-based learning environments for children throughout their preschool and primary years. The factors that have an impact on what and how we plan include the wider social context, the current policies and practices of specific education systems, the child’s family and community background and our knowledge about how children learn.

We have incorporated this set of factors into a framework of planning which is depicted in Figure 1. It recognises the theoretical, social, educational and technological issues that have direct implications for planning computer-based learning experiences for young children.

THE WIDER SOCIAL CONTEXT
Issues in the wider social context often seem remote from daily classroom interactions, yet we should never lose sight of one of our long term goals – to prepare children to become effective future citizens. In order to do this, we need to be aware of the ways in which our society is changing and equip children to deal with these changes.

While our major focus in this discussion is on technological change, it is important to remember that many of the issues that have the most impact on our lives are political, economic and social in origin. Development and use of recent technologies interact in complex ways with political, economic and social processes – in ways which improve or harm people’s rights and quality of life.

Individuals, communities and nations do not have equal access to computing technologies nor equal participation in the benefits of their use. Consideration of issues of access and participation with new technologies is a key factor in planning computer use.

The nexus between the wider social and economic environment and classroom use of computers has been highlighted by DeVillar and Fallis (1991). They argue that many social and learning problems may be exacerbated by computer use if the wider social learning context is ignored. They are particularly concerned with the rush to include group work and cooperative learning around
computers without the necessary social awareness and training. When planning for children from either ESL backgrounds or from minority cultural groups, awareness of relevant social issues is crucial. For these children in particular, issues of access and equity may be complex and must be thoroughly addressed if these children are to be advantaged rather than further disadvantaged through the use of computer-based technology.

Technological changes also have a direct impact on the lives and futures of today's children. Significant changes in communication and information handling are altering the nature of the world in which they live. While mass media and popular culture have kept pace with these changes, most classrooms have not. More than any other generation that has gone before them, today's children are experiencing an increasing gap between their media of leisure, entertainment and informal learning and their classroom world of school learning.

In classrooms, print continues to be the focus of teaching and learning. While print will always be an important medium, it no longer dominates the world outside the classroom as it did for the last five hundred years. Print will remain the most appropriate medium for some forms of communication, but electronic media, using images (still and moving), sound and text, provide a richer medium for many communication, information and entertainment purposes.

Children need to be literate in the communications of their culture. They need to be able to 'write' (make) and 'read' (make sense of) electronic texts as well as print-based texts. Classrooms need to balance existing text-based literacies with those of image-based literacies. Early childhood teachers have always emphasised talking and listening, and 'making' and 'reading' pictures however teachers of older children have traditionally concentrated on the reading and writing of print-based texts.

In future years, as image processing technologies develop, as virtual reality presents fantasy as fact and the unreal as real, notions of literacy will continually need to evolve. Accepted truths such as 'seeing is believing' and 'experience equals reality' will need to be challenged.

The ability to organise and analyse is also another important literacy. Today's children, who are growing up in the 'information age' obviously need physical access to information but more importantly the skills and understandings to make sense of it. While the current political and educational bandwagon is accessing the Internet, few proponents have been able to argue why access to more information is important. Surely the priority for younger children is knowing when the information they have is the information they need, 'making sense' of that information and creating their own information for others to use.

All of the above issues present significant challenges to teachers who are using computers in their teaching and learning. The following principles stem from the above principles and are meant to act as a guide for teachers.

Guiding Principles

In order to incorporate wider social issues, teachers need to:

- be aware of the increasing gap between affluent communities and poor and isolated communities. The former benefit from technological advances while the latter are often disadvantaged. Children and their families from these disadvantaged communities need educational programs that provide meaningful learning with both traditional and electronic technologies;

- take account of the social context of learning. Social, cultural and linguistic diversity need to be understood to create a social context conducive to learning. Children need to develop group skills and cooperative learning skills if small group work is to be an effective component of computer use;

- reconsider current language learning practices in terms of the balance of text and images. While children need to learn to use text to communicate effectively, they also need to spend an equivalent amount of time learning to use images to communicate information, ideas and feelings. It is unrealistic to move directly from a print-based environment to a multimedia environment without providing opportunities for children to develop skills in the use of images and sounds. It may be necessary to work in one mode at a time, developing children's skills and understandings in each before adopting a multimedia approach;

- introduce electronic texts with the same degree of care as their paper-based counterparts. All types of electronic texts require additional or different literacy skills than those developed in a paper-based environment. The physical environment of electronic texts include scrolling screens, a shift from the longer page to the wider screen and the loss of physical cues to identify place in the text. Children need to learn different processes in order to search texts skimming, using content pages, headings and sub-
headings are replaced by using menus, identifying navigational aids and free-text searching.

As well as these broad issues in the wider social context, the planning and implementation of computer-based learning experiences in classrooms is affected by the policies, practices and resources available within various educational systems.

POLICIES AND PRACTICES OF EDUCATIONAL SYSTEMS IN REGARD TO IT

During the 1980s, most school systems developed policies and practices regarding the use of computers in classrooms. More recently, organisations that manage early childhood services have also developed policies that include advice about the use of computers (e.g. KU Children’s Services, 1989).

While a number of differences exist in the specific policies of different state and non-government systems, there is consensus about two important points. The first point of agreement is that all children should have access to computers and participate in computer use. The second point relates to how computers should be used in classrooms. Using a range of different terminology, most documents state that computers should be used:

- for learning;
- across a variety of curriculum areas/developmental areas.

However, an issue still to be resolved relates to the development of skills that allow children to move beyond print and develop skills in communicating and handling information using a variety of modes (images, text and sound) and media.

Each of these issues — use of computers for learning, use of computers across curriculum and developmental areas and the need to move beyond print — are given further consideration in the following discussion.

Computers for Learning

Most curriculum documents stress that children should learn about computers by using them for learning. Most teachers translate this into practice by planning for computer use within the framework of existing learning outcomes.

More recent school-based curriculum documents place computers within the context of technology studies, with computers being identified as just one of a range of information technologies that all students should use for learning. Equating it in this way with construction and audio-visual technologies somewhat denies the extraordinary potential of computer use to redefine the learning environment.

Using computers across curriculum areas and developmental areas

Current curriculum documents, at both the national and local level, reinforce the principle of using computers across the various curriculum areas and developmental areas, but do so with less conviction that the curriculum statements of the eighties.

While a number of the documents in the key learning areas make specific reference to computers and certain processes, for example writing with a word processor (English) and handling data with graphing software (Mathematics). They rarely provide a strong framework necessary to help teachers improve the quality of children’s writing as they use word processors or their ability to interpret data as the use graphing packages.

Moving beyond print

Some recent curriculum statements have begun to address this issue. The national statement on English has defined five modes: speaking, listening, writing, reading and viewing (Australian Education Council, 1994a) and the Technology statement frequently refers to designing, making and appraising images. At the state level, the Queensland Department of Education has published a guide, Using Visual Texts in Primary and Secondary English Classrooms. Regrettably NSW has not included ‘viewing’ in its recent English syllabus and nor have most other states.

No education system in Australia has yet addressed the role of computer-based texts in English teaching, though many pay lip service to the role of word processing. Interestingly, New Zealand educators have added visual communication as an integral part of communications skills in their new English syllabus. Within this syllabus framework visual texts include those from film, television, video and computers.

Today’s children need to become confident and effective users of language in the communication and information media of their world. In order to do this, teachers need to address a wider range of literacies and work with a broader range of modes and media.

Texts must be redefined to include:

- spoken, written, viewed, performed and used;
- personal and mass communication;
- traditional and electronic.

This notion goes well beyond the use of a computer in the classroom to support existing practices, such as typing up and publishing paper-based texts. It challenges teachers to look beyond print, to restore the emphasis on talking and listening (which usually declines over the years of schooling) to include viewing as a distinct language mode, and to expand the definition of texts in their teaching of English, to include mass media texts and computer-based texts.

Literature studies need to encompass mass media and computer-based texts as well as the book form of narrative and to deconstruct messages and meanings within the images as well as the words. Studies of styles, such as humour, need to include prose, performances, newspaper cartoons, television shows and even video games. The range of factual texts selected to support a Science or a Society and its Environment topic needs to include videos, audiocassettes and electronic texts as well as books. Such changes would reflect the reality of children’s lives outside the classroom as well as help to develop the literacies needed for our changing world.

The following table (Downes & Fatouros, in press) provides examples of both traditional and electronic texts that need to be explored in today’s classrooms. While many teachers are already familiar with the scope of the texts listed, a balance needs to be achieved in terms of priority and effort to help children develop skills and understanding in all forms of texts (see Table 1).

Simple examples of classroom practice which recognises the need for a better balance include:

- young children, altering the whole-class morning news session to include opportunities to record their news onto an audiocassette; not only could other children in the class listen to the tape at the listening post, the tapes could also go home with children for parents to hear;
- eight to nine year olds, using one of the older 8-bit or 16-bit computers as an electronic message centre; free writing and reading activities could then include writing and reading electronic messages as well as paper-based messages. Use of the 'find' facility could provide an introduction to free text searching;
- older children using a digital camera to import images of native plants found around the school as part of a multimedia information report.

In all of these classrooms talking, listening, reading, writing and viewing have been extended to include electronic as well as traditional media.
Guiding principles

In relation to education policies and practices, teachers need to:

- become familiar with the policies and syllabuses that relate to the use of technology for learning, but not be limited by these;
- identify outcomes related to the use of technology in all curriculum documents; broaden classroom outcomes to include ‘viewing’ and ‘making’ both media texts and computer-based texts;
- provide a balance of learning activities, including opportunities for:
  - exploring the use of images, sound and text to communicate and handle information. Children may initially need time to develop their skills using a single mode (images, text or sound) before working with multi-media texts. For example younger children could develop talking and listening skills with tape recorders, telephones and answering machines before combining spoken texts with images and written text. Similarly children could work with cameras (still and video) and photo copiers before making multi-media texts at the computer;
  - exploring electronic texts as well as paper-based texts. Reading from the screen, finding information within an electronic text, interacting with electronic texts all require skills. They need to be as carefully developed as all the paper-based skills we traditionally develop in the early years.
- using technology in a range of curriculum and developmental areas. Children need plentiful opportunities to see the computer as a useful tool in many areas of their lives. For example, computer technology may be just as useful for creating designs for fabric or clothing as it is for learning about mathematics or researching information for a science report.

Having considered relevant issues in the wider social context as well as the support and the constraints existing within particular curriculum frameworks, teachers also need to acknowledge and plan for the diversity of experiences that children bring along as a result of their interactions within their own homes.

**HOME INFLUENCES**

In order to provide meaningful learning experiences, teachers need to recognise and respond to the individual needs and interests of children within the context of their family background. The diversity of family backgrounds should be reflected and valued in all aspects of the classroom environment, including the use of technology.

Some of the diversity in family life stems from technological advances. Research into the use of home computers in Australia indicates that between 30% and 60% of children have a computer at home before they begin formal schooling, and that it is this access to a computer at home that influences young children’s understanding and awareness (Burgess & Trinidad, 1991). In a recent survey of children in selected schools in South West Sydney, more than 35% of children had more than one television and telephone extension, a VCR, a computer and a dedicated game playing machine such as a Super Nintendo. (Downes, 1994).

The dominant view of computers by young children is as an entertainment or game-playing device; very few young children use the home computer for homework or writing (Burgess & Trinidad, 1991; Yelland, Wojcik & Newell, 1993). As children approach the later grades of primary school the range of school-related activities increase help (Downes, unpublished — current research). These include typing up stories (often from early hand-written drafts) and ‘doing’ projects. One interesting feature of these older children’s talk is the predominant use of the word play ‘...play with the CD ROM to find out...’, ‘...play with the typing programme (WP) to make the heading stand out...’. The notion that computers were for playing games seemed firmly entrenched in their perceptions.

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**Table 1** Examples of Traditional and Electronic texts

<table>
<thead>
<tr>
<th>Personal Communication</th>
<th>Speaking/Listening</th>
<th>Writing/Reading</th>
<th>Creating/Performing</th>
<th>Making/Viewing/Using</th>
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<tbody>
<tr>
<td><strong>traditional</strong></td>
<td><em>conversations</em></td>
<td><em>letters</em></td>
<td><em>role plays</em></td>
<td><em>person-to-person</em></td>
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<td></td>
<td><em>discussion</em></td>
<td><em>notes</em></td>
<td><em>mimes</em></td>
<td>explanations or</td>
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<td></td>
<td><em>interviews</em></td>
<td><em>messages</em></td>
<td></td>
<td>demonstrations</td>
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<td></td>
<td></td>
<td><em>diaries</em></td>
<td></td>
<td>using visual aids</td>
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<tr>
<td><strong>electronic</strong></td>
<td>*telephone conver-</td>
<td><em>electronic mail</em></td>
<td><em>virtual reality</em></td>
<td><em>audio tapes</em></td>
</tr>
<tr>
<td></td>
<td>sations*</td>
<td><em>(letters, messages,)</em></td>
<td><em>electronic role</em></td>
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<tr>
<td></td>
<td><em>answering machine</em></td>
<td><em>replies</em></td>
<td><em>playing</em></td>
<td><em>video tapes</em></td>
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<tr>
<td></td>
<td><em>messages</em></td>
<td><em>faxes</em></td>
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<td></td>
</tr>
<tr>
<td><strong>Mass Communication</strong></td>
<td>Speaking/Listening</td>
<td>Writing/Reading</td>
<td>Creating/Performing</td>
<td>Making/Viewing/Using</td>
</tr>
<tr>
<td><strong>traditional</strong></td>
<td><em>newstimes</em></td>
<td><em>books</em></td>
<td><em>plays</em></td>
<td><em>displays</em></td>
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<td></td>
<td><em>lectures</em></td>
<td><em>advertisements</em></td>
<td><em>readers theatre</em></td>
<td><em>museums/galleries</em></td>
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<td></td>
<td><em>debates</em></td>
<td><em>newspapers</em></td>
<td><em>non-verbal</em></td>
<td><em>mass explanations</em></td>
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<td></td>
<td><em>recitals</em></td>
<td><em>notice boards</em></td>
<td><em>performances</em></td>
<td><em>demonstrations</em></td>
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<td></td>
<td><em>assembly items</em></td>
<td></td>
<td></td>
<td>using visual aids</td>
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<tr>
<td><strong>electronic</strong></td>
<td><em>radio</em></td>
<td><em>bulletin boards</em></td>
<td><em>movies</em></td>
<td><em>videos</em></td>
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<td></td>
<td><em>audio tapes</em></td>
<td><em>on-line magazines</em></td>
<td><em>virtual reality</em></td>
<td><em>TV shows</em></td>
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<td><em>data bases</em></td>
<td><em>video games</em></td>
<td><em>computer-based</em></td>
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<td><em>adventure games</em></td>
<td>visual presentations</td>
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<td></td>
<td><em>computer-based</em></td>
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<td>multimedia texts</td>
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AUSTRALIAN EDUCATIONAL COMPUTING, MAY 1995
Clearly children's experiences with computers at home have an impact on their perceptions of this technology. If children's previous experiences have been limited, either due to level of access or type of software, then this situation must be addressed in the classroom. Similarly, as home computers become more prevalent, there may need to be a reconsideration of how the limited number of computers in the school should be used.

**Guiding principles**

When planning to incorporate children's family experiences, teachers need to:

- take account of the diversity of experiences with computer technologies in the home but also recognise and plan appropriately for those children whose first experience of computer technology will be in the classroom;
- be prepared to offer separate, additional experiences, at least initially, in order to meet the needs of all learners;
- plan to provide explicit teaching of computer-related vocabulary and concepts for children who have limited experience with computer technology;
- invite family members into the classroom—this may be to watch and learn from their children, or it may be to provide assistance for particular software programs or particular projects;
- plan a variety of experiences using different types of software to develop children's understandings that computers can be more than games machines;
- become familiar with the world of electronic games that children play outside of school. Engage children in conversations about games, plots and action in the same way as you would discuss books or children's writing. Respond to key issues that children identify in their conversations, for example, violence, gender roles or the fantasy/reality dichotomy.

Having considered the diversity of experiences that children have had as a result of their family and community background, teachers also need to base planning decisions on aspects of learning that are common to all children. This can be achieved via a sound knowledge of theories of learning.

**THE CHILD AS A LEARNER**

Our beliefs about how children learn need to shape the way in which all teaching and learning activities are implemented. Computer-based learning experiences are no exception. Young children learn in an integrated way and this learning is most powerful within a supportive social context. The role of the adult during computer-based learning experiences is to continually monitor group dynamics as well as children's skills and understandings and gradually provide less direction as children demonstrate the ability to work independently.

**As the technology available in educational settings increases in both amount and sophistication, there is a danger that it may be used for its own sake.**

Children also need opportunities to actively explore their environment and interact with adults, other children and materials. In this way, children are able to construct their own knowledge and understandings rather than being instructed. Within the learning context created by the use of high quality software, children are able to set their own pace, create new challenges, solve problems and develop new skills and understandings. They are also able to explore powerful ideas within the supportive context of using the software.

**Guiding principles**

When considering the needs of young children as learners, teachers need to:

- ensure that planning decisions are based on children's strengths and needs and not on features of the technology. For example, if a planned outcome is to develop further social skills, then one way of achieving this may be within the context of a computer-based learning experience; this might preclude the use of electronic and talking books where the children interact with the characters on the screen, rather than with each other (Fatorous, unpublished current research);
- focus on the social context created by the use of computer technology, not on the technology itself. The computer may serve as a cognitive support, not by itself, but because of its impact on the social life of the classroom (Sheingold, 1986);
- consider the interaction between the learner and the computer. The software should provide an empowering environment, scaffolding children's learning by enabling them to solve problems and complete tasks that they are unable to complete without assistance, or without the removal of some of the obstacles. However, the software and the way in which it is used should still allow the 'cognitive struggle' to continue in order to promote learning (Sewell, 1990). Children should not become over-dependent on the software; rather they should still be able to take an increasing amount of responsibility for completing the task, just as they do when an adult is scaffolding their learning;
- provide a balance of computer-based learning experiences. There should be opportunities for free play (especially when exploring a new software program), opportunities for child-defined purposes and also specified tasks within a unit of work.

**CONCLUSION**

As the technology available in educational settings increases in both amount and sophistication, there is a danger that it may be used for its own sake. This is particularly so with the latest wave of multimedia because it is so engaging. Teachers and children alike are attracted by the high entertainment value of the animation, video images and sound capability. In this context it is very easy to confuse engagement with learning.

In order to use technology to its fullest educational potential we have put forward a framework of planning that is firmly based on learning theory but also takes account of:

- the diversity of children's experiences with technology;
- the curriculum framework of educational systems;
- significant changes in the skills and understandings needed to function effectively in today's society.

Figure 2 highlights the key issues in relation to each of these major influences on planning. First, wider social issues which result in changes to the way we communicate and handle information need to be considered. This is essential if we are to prepare children to be effective future citizens. Second, we need to identify the support as well as the constraints that exist in educational systems. These have an impact on what resources are likely to be available as well as what learning outcomes need to be addressed. Third, the diversity of
experiences that children have with technology outside the classroom must be acknowledged in order for teaching and learning activities to be relevant to the needs and strengths of individuals. Finally, as with all planning, theories of learning should guide practice. The guiding principles presented for each of these areas of influence suggest how we might begin to implement this approach within our classrooms.

References
Downes, T (current research, unpublished) involves discussions and interviews with a 5-12 yr old children about their access, use and perceptions about computers in their homes.

Figure 2 Key principles for planning

YOUNG AUSTRALIAN DeVillar, R.A. Department within learning Finally, learning activities to acknowledged technology outside experiences diversity of today's world, which recognises the complexity and outcomes; as well as in multi-modal contexts Work with images, sounds and text separately as well as as paper-based texts in an environment that encourages: - play and purposeful use, - interaction with others, - control of the technology.

CHILDREN NEED OPPORTUNITIES TO...
- Work with images, sounds and text separately as well as in multi-modal contexts
- Work with electronic texts as well as paper-based texts
- in partnership with families and communities;
- in an environment that encourages:
  - play and purposeful use;
  - interaction with others;
  - control of the technology.

Fatouros, C (current research, unpublished) involves analysing the types of interactions preschool children have as they use different types of software.