ICT in the Foundation Stage: A Position Paper

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Introduction

In the absence of a significant body of research evidence providing measurable learning effects across controlled conditions, any form of focused technical review of the use of ICTs in early education remains impossible at this time. This review should therefore be considered essentially interpretative. In identifying appropriate sources for review we have, however, placed a strong emphasis on studies providing an empirical basis and adopted criteria developed within the Teaching and Learning Research Programme (TLRP) (James et. al., 2003). These criteria recognise that the production of educational knowledge is a collaborative and cumulative process where as McIntyre (cited in James, et. al. 2003) has argued:

Conclusions about implications for policy and practice should only be reached on the basis of careful and balanced overviews and syntheses of all research in the given field (p10 op cit).

While it is recognised that the introduction of new technologies may bring with them new pedagogical approaches, it was considered important to recognise that pedagogy applied successfully in other early learning contexts are likely to be equally effective when applied with ICTs. For this reason we have not restricted our attention to studies concerned exclusively with ICT, but extended the field of interest to include other relevant evidence. Where this occurs specific arguments are included in the review to justify these extensions. We feel that a further advantage of taking this approach has been to provide a more coherent model which might be applied to develop early years ICT practice across the curriculum.

ICT and learner achievement

As David Wood (2003) has argued the IMPACT-2 study; *"failed to provide any uniform evidence of links between school ICT and learner achievement"* (p9). But the use of ICT in schools at that time was still quite limited:

"Since time on task remains one of the best indicators of progress in learning, this finding implies that ICT uses have hardly been tested at or anywhere near the limit. Hence, *it is not clear whether current evidence represents a test of the educational potential of the technology or simply acts as an indicator of limitations of current practice in providing enough access for its use. (p10, op cit, authors own emphasis)*

Little in the way of systematic research and review has so far been carried out in the area of ICT in early childhood but what little evidence there is suggests a similar story. But a significant meta-analysis of the evidence related to the specific application of computers applied in support of beginning reading instruction was carried out by Blok et. al. (2002). This review looked at 42 studies published since 1990 comprising a total of 75 experimental comparisons involving early readers aged from 65 to150 months. On average, each child spent 35 minutes a week working with a wide range of applications developed as extensions to, or the replacement of, some element (or elements) of a regular reading programme. While the authors were cautious about their findings due to the poor quality of many of the individual studies, the overall effect size that they found was 0.2. As Blok et al suggest an effect size of 0.2 is usually considered to be small but we do need to put this in context. As Coe (2002) has argued, for a school in which 50% of pupils were previously gaining five or more A* - C grades, an effect size of 0.2 would raise this percentage to 58%. So, although research convention suggests that a 0.2 effect size is small, an improvement on this scale might actually be considered quite substantial by practitioners and policy makers. What may be even more significant is the fact that Blok et al also found that effect sizes were higher for those groups scoring more highly in pre-tests. In other words it was the more able students who did better with computer based instruction. While focused on a wider age group, other studies e.g. that conducted by the US National Reading Panel (National Institute of Child Health and Human Development, 2000) have shown more general positive effects.

So on the face of it, there does seem to be some limited evidence that computer based instruction may be effective in some areas of the early years curriculum. But the difficulty with this is that while a number of other longitudinal studies have shown us that children provided with predominantly direct or 'programmed' instruction (without the use of a computer) sometimes do better academically than those provided with other forms of pedagogy in the short term (Marcon, 2002), we also know that many of these gains are actually short lived. Highly structured, didactic teaching has also been found to result in young children showing significantly increased stress/anxiety behaviour (Burts et al, 1990). A longitudinal and rigorous study conducted by Schweinhart and Weikart (1997) for example showed little difference in the academic performance of young children provided exclusively with direct instruction, but they did find significantly more emotional impairment and disturbance leading to greater need for special educational provision.

Other studies have similarly shown that an exclusively didactic and ‘formal’ approach to teaching young children can be counter productive (Sylva and Nabuco, 1996). It has been found to hinder young children’s learning, generate higher anxiety and lower self-esteem. While none of these studies were focused on computer based instruction, it seems extremely likely that the effects would be similar in the case of any programmed learning, particularly if they incorporated the kind of animation, sound or access level ‘rewards’ and ‘punishments’ found in many early years computer applications. It is for this reason that most authorities e.g. the US based National Association for the Education of Young Children (NAEYC), Developmentally Appropriate Technology in Early Childhood (DATEC), consider the application of ‘drill and practice’ software less appropriate in early childhood. Unfortunately this kind of software does continue to be applied. But as Clements (1994) put it a decade ago: "What we as early childhood educators are presently doing most often with computers is what research and [NAEYC] guidelines say we should be doing least often" (p. 33).

As Clements (2002) continues to argue in the context of maths instruction:

“…drill and practice software can help young children develop competence in counting and sorting. However, it is questionable if the exclusive use of such software would subscribe to the vision of the National Council of Teachers of Mathematics to be "mathematically literate" in a world where "mathematics is rapidly growing and is extensively being applied in diverse fields." Other types of programs, including computer

manipulatives and other problem-solving programs, appear to hold more promise in this regard."

Any overemphasis upon the effectiveness of ICT in supporting children's development of basic skills might in fact be inappropriate in itself. As Selwyn (2002) has noted, computers and other ICTs have been introduced into schools and pre-schools for a variety of reasons. One very important reason for their introduction has been to begin to prepare children for their future lives in the Knowledge Society. This is a society where knowledge-workers will increasingly be required to control their own learning, and critically evaluate and manipulate information in the development of new knowledge products. In Europe there is a growing awareness that these new foundations for technological literacy, life-long learning and creativity should be laid in the earliest years of a child's education.

The kind of early and 'emergent' ICT curriculum that education for a *Knowledge Society* demands was promoted by the Developmentally Appropriate Technology in Early Childhood (DATEC) project funded by the European Commission CONNECT programme in 2000/2001[1]. The concept has been further elaborated in Siraj-Blatchford and Whitebread (2003) and Siraj-Blatchford and Siraj-Blatchford (2005). In this work the quality of ICT applications has increasingly been seen in terms of their potential for supporting the development of creativity, collaboration, and learning to learn (metacognition). We remain at a very early stage in the development of curriculum objectives of this kind but as Loveless (2002) has noted, these imperatives are increasingly being recognised throughout education.

The application of ICTs Supporting Creativity

A good way to understand the development of young children's creativity may be to consider it in terms of the development and manipulation of 'schemes' (Siraj-Blatchford, J. 2004). For Piaget (1969) and other developmental psychologists, a scheme is an 'operational thought', it may be a recalled behaviour, the recollection of a single action or a sequence of actions. To be creative, children need to acquire a repertoire of schemes, and they also need the playful disposition to try out these schemes in new contexts. These trials may be expressed verbally, in the minds eye, or in the material world. Young children are naturally curious and they learn many of their schemes vicariously; they spontaneously imitate a wide range of the schemes provided by adults and other children. Vygotsky (2004) distinguished between two types of activity, those *that are 'reproductive',* and those involving 'combinations' or creativity: *"Creative activity, based on the ability of our brain to combine elements, is called imagination or fantasy in psychology" (p4).* In their fantasy play, young children quite naturally separate objects and actions from their meaning in the real world and give them new meanings. They should be encouraged to communicate these creative representations because it is in this way that their powers of expression and abstraction may be developed more generally (Van Oers, 1999).

Educators may encourage the discovery of schemes, and provide explicit models for the children to follow in their play. All of this can be supported, and it is already regularly supported by innovative early years practitioners using ICT. Both real and pretend ICTs may be integrated in support of socio-dramatic play and this kind of play is widely recognised to be of significant cognitive and socioemotional benefit (Smalinsky, 1990,

[1] See http://www.ioe.ac.uk/cdl/DATEC

p35). Computer applications such as Granada Learning's 'At the Café' and 'At the Vet's' allow children to imitate adult role behaviours, acting them out in their play and learning to understand them better. Pretend telephones, domestic equipment and point of sale technologies are employed to support children in their imitations and simulations of the adult world and human relationships through symbolic representation. Practitioners are also able to create supportive resources of their own using generic office tools such as word-processors, paint and PowerPoint applications, and ICT has also been found to support creative socio-dramatic activity quite spontaneously. For example, Brooker and Siraj-Blatchford (2002) found that children often make little separation between the on-screen and the off-screen world:

"On-screen images were 'grabbed', scolded, fingered and smacked, with dramatic effect, as part of the small-group interaction with the software. In some instances, they took on an off-screen life of their own, as children continued the game the computer had initiated, away from the machine" (op cit, p267).

Well-designed on-screen applications provide for a wide variety of possible responses by the children. Adventure games and simulations often offer particular strengths. They also allow the child to try things out, and if they don't work, they can try something else. Programmable toys provide even more possibilities and many of the benefits of older pupils using Logo identified in Becta's (2003) Research Briefing for ICT in Mathematics will apply in a similar way to young children's use of programmable toys. These include the encouragement of problem-solving skills, the development of geometric concepts, collaboration, and higher level thinking. Clements (2000) has been a long term advocate of Logo and in an early study (Clements & Gullo, 1984), that involved 6 year olds in a range of activities over a period of three months, found gains on both the Torrance Test of Creative Thinking and on a test of reflectivity which were not matched by the control group. Clements & Gullo also found improvements in terms of metacognition, and in terms of the children's ability to verbally describe a route on a map.

The application of ICTs to Support Learning to Learn (Metacognition)

Plowman and Stephen (2002) cite Haughland (2000) and Yelland (1999) in arguing that many practitioners have felt that screen-based activities are less effective than three-dimensional manipulatives. But others have argued that computers provide a means by which young children may be supported in their manipulation of symbols and representations on the screen in a useful manner that allows them to distance themselves from the signifying objects. Screen-based activities might therefore support the processes of verbal reflection and abstraction (Forman, 1984). This is a theme specifically addressed by Bowman, et al (2001) in the US National Research Council's report *Eager to Learn: Educating our Preschoolers*. The report strongly endorses the application of computers in early childhood:

"Computers help even young children think about thinking, as early proponents suggested (Papert, 1980). In one study, preschoolers who used computers scored higher on measures of metacognition (Fletcher-Flinn and Suddendorf, 1996). They were more able to keep in mind a number of different mental states simultaneously and had more sophisticated theories of mind than those who did not use computers" (p229).

The Concise Dictionary of Psychology defines metacognition as: having knowledge or awareness of one's own cognitive processes (Statt, 1998). Metacognition has been associated with effective learning in numerous contexts (Larkin, 2000), and the concept has been applied by educators seeking to design effective pedagogy. There is a general consensus that metacognition develops as the individual finds it necessary to describe, explain and justify their thinking about different aspects of the world to others (Perner *et al* , 1994; Pelligrini, Galda, and Flor, 1997; Lewis *et al* , 1996). For most children such a 'theory of mind' develops at about 4½ years (Tan-Niam *et al* .,1999). Research shows that children's pretend play becomes reciprocal and complementary at about the same time (Howes and Matheson, 1992). Research has established that a child with a 'theory of mind' is able to understand that other people have minds of their own, that 'other individuals have their own understandings and motivations, and that they usually act according to their own understanding and motivations even when they are mistaken.

It can be seen from the above that those applications likely to be effective in supporting the development of metacognition are also those most effective in supporting socio-dramatic play, and these are also the applications that tend to be more effective in supporting communication and collaboration.

The application of ICTs Supporting Communication and Collaboration

There is therefore general agreement among developmental psychologists and educationalists that collaboration is especially important in the early years. It is within communicative and collaborative contexts that creativity and metacognition are developed in early childhood. When children share 'joint attention', and 'engage jointly' in activities we know that this provides a significant cognitive challenge in itself (Light and Butterworth,1992). Collaboration is also considered important in providing opportunities for cognitive conflict as efforts are made to reach consensus (Doise and Mugny, 1984), and for the co-construction of potential solutions in the creative processes. But most unfortunately, as Crook (2003) has argued, software designers have too often assumed that their task has been to develop applications that support the learner in solitary acts of learning. What they have failed to recognise is the fact that the practices of private reflection and interrogation that is required to learn on ones own is first developed through socially-organised learning (op cit). Also, while the value of ICT in supporting collaborative learning in schools has been demonstrated (Crook, 1994), successful collaboration does not automatically occur simply whenever we bring children together to share the same computer. As Crook (1994) has shown, teachers often need to orchestrate collaborative interactions if there are to be learning gains, and he also warns us that:

"…while there is considerable evidence that ICT can be a powerful resource in helping to support joint working and classroom collaboration between school age pupils, it must be recognised that the social systems of pre-school environments have different dynamics". (Crook, 2003, p13).

Programmable toys and many, if not most, screen based applications do offer the possibility of collaboration in terms of symbolic manipulation, but adult intervention is often needed to gain the most from software even when it has been designed to facilitate collaborative problem solving, drawing, or construction. The UK Effective Provision of Preschool Education (EPPE) (Sylva *et al,* 2004), and Researching Effective Pedagogy in Early Childhood (REPEY) (Siraj-Blatchford *et al,* 2002) studies have found that the most effective foundation stage settings combined the provision of free play opportunities with more focused group work involving adult instruction. This more balanced approach would therefore appear to be the most desirable model to promote with ICT as well. Given the previous identification of communication and collaboration, and metacognition as central features of early childhood development, it isn't at all surprising that the EPPE/REPEY research suggested that adult-child interactions that involved some element of 'sustained shared thinking' were especially valuable in terms of children's early learning. These were identified as sustained verbal interactions that moved forward in keeping with the child's interest and attention. They were initiations that were most commonly elicited in practical activity and they may often occur in the context of children's use of ICT. Unfortunately the evidence suggests that too often there will be no adult present at these times to provide the necessary scaffolding and support.

The Researching Effective Pedagogy in the Early Years (REPEY) project

The DfES funded REPEY project (Siraj-Blatchford *et al,* 2002) involved 12 pre-schools selected on the basis of having good to excellent child outcomes on cognitive and social and behavioural development. These settings were effective 'outliers' from 141 settings as part of the Effective Provision of Preschool Education (EPPE) project which followed the progress of 3,000+ children since 1998. The children in all 12 REPEY settings were 3-5 years-old. The analysis included child and adult observations (over 600 hours), practitioner and parent interviews and documentary analysis of policy and other documents.

Although the EPPE project findings showed these centres to be effective in promoting learning they were found to be less effective in integrating ICT into the curriculum. The 'excellent' strategies they had developed tended not to be applied in the context of ICT.

The quality of the ICT learning environment in the settings was measured using an ICT Early Childhood Environmental Rating Subscale (ICT-ECERS) which covered provisions for the development of:

- Information handling and Communication Skills
- Access and control of ICT tools
- Learning about the uses of ICT

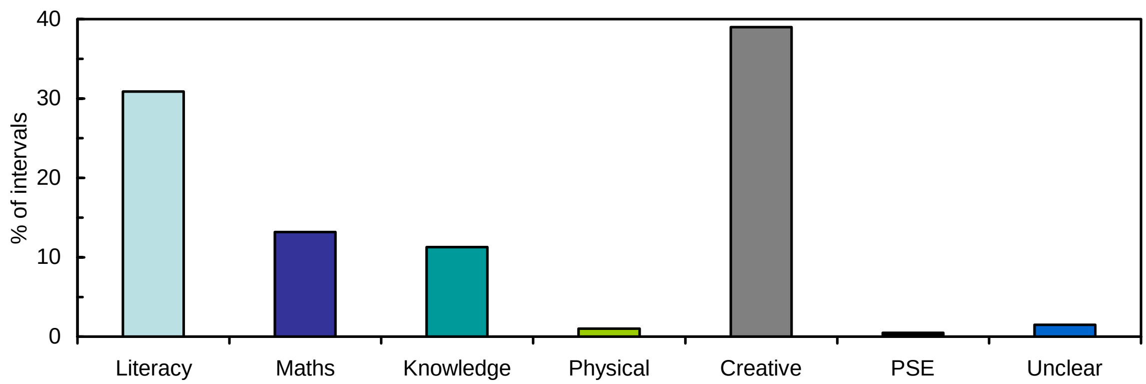
This rating scale was modelled on the ECERS (Early Childhood Environmental Rating Scale) (Harms, Clifford & Cryer, 1998) and its construction was strongly informed by the Curriculum Guidance for the Foundation Stage (QCA, 2000). The instrument was originally devised as part of the Developmentally Appropriate Technology in Early Childhood (DATEC) project referred to previously.

The scores attributed to the scales reflect the practices observed rather than any future plans that the centres might have, however, the practitioners were questioned at the end of the observation period for clarification of their current practices. The ICT-ECERS measures from 1 to 7 with 1 = inadequate practice, 3 = minimal practice 5 = good practice and 7 = excellent practice. The following table shows the average level of provision that was being made in developing the ICT curriculum in these 'effective' pre-schools according to the ECERS ICT subscale during 2001:

ICT ECERS Item:	**Item Score:**
Information handling and Communication Skills	2.5
Access and control of ICT tools	1.58
Learning about the uses of ICT	2.25

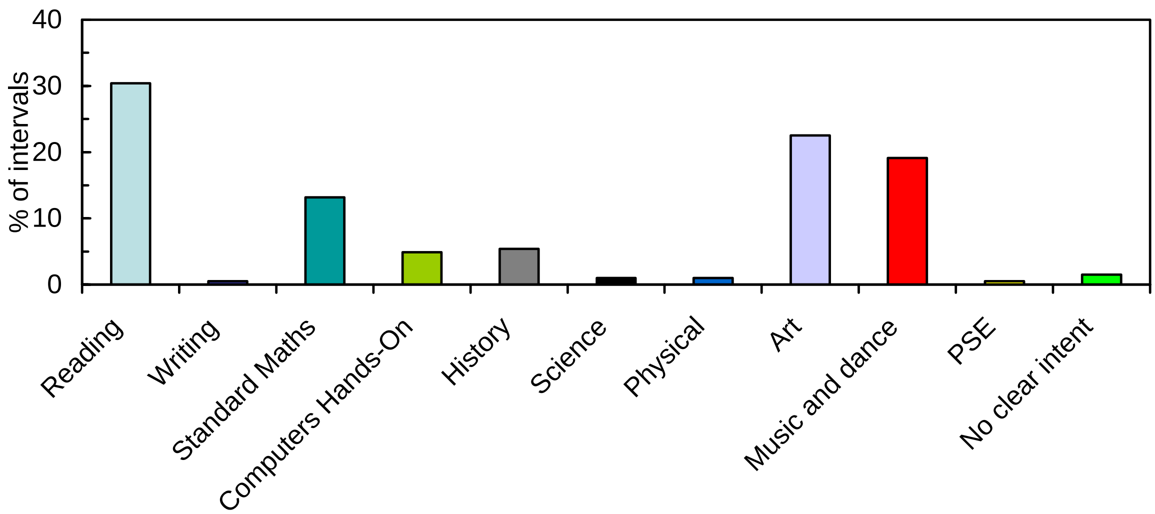
As can be seen most of the practice observed at that time was between inadequate and minimal. In fact a good deal of uncertainty was expressed by practitioners regarding the appropriate use of computers. Specific concerns were expressed regarding the inappropriate ergonomics, and about equality of opportunity. Practitioners were also anxious that the children should move around more and spend as much of their time as possible interacting with others. The respondents were especially concerned regarding the amount of time that children spent at the computer (on several occasions individual children were observed to be playing at the computer for periods of 35-40 minutes at a time). As Figure 1 shows, when children were using a computer, they were found to be using it mainly as a tool intended to develop creativity (through computer painting programmes etc), or for the acquisition of literacy.

Figure 1: Curricular areas (proportionally) in which children use computers



When the curricular areas were examined in more detail it was possible to see that when children were experiencing the creative area of the curriculum through computers there was an equal split between art and music and dance programmes. However, while children experienced the literacy area with computers this occurred almost exclusively through reading (figure 2). The category 'computing hands-on' refers to time the children spent developing their computer skills, for example opening and closing programmes, using the mouse, and printing.

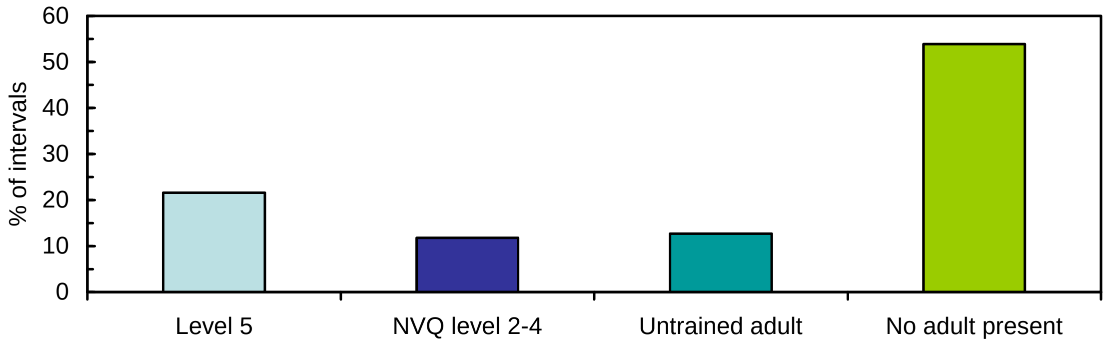
Figure 2: Children's learning activities when computers are used



Examples of practitioners helping children access software and supporting them when they got into difficulties were frequently recorded throughout the observations. Given the inadequate adult-child ratios, and the tendency for children to be working in a group of only two at a time on the computer, it wasn't surprising to note that in only a few cases was this support extended beyond two or three minutes . In the majority of cases adult support was limited to intervention when the children experienced problems or required supervision.

Figure 3 shows which practitioners (if any) were present when the children were computing. Overwhelmingly it can be seen that the children used computers primarily without an adult present. However, when adults were present, they were more likely to be fully qualified teachers (Level 5).

Figure 3: The adults who engage with children in computing activities

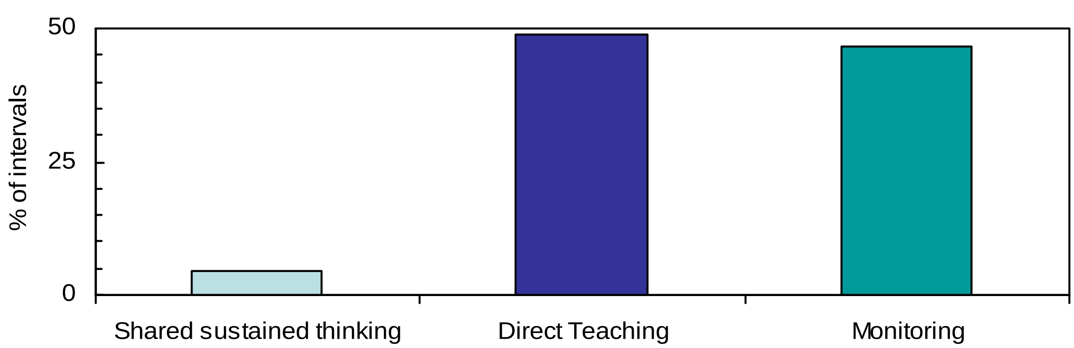


Where settings were accustomed to having an adult working for extended periods with small groups of children the computer appeared to be integrated more easily into the curriculum. Where this was less the case, it sometimes presented difficulties. One nursery teacher explained the difficulty particularly clearly.

I suppose that's part of the way that we want to work is to be able to step in and out of their learning. It's more difficult to have things that need to be kept controlled. That involves changing our way of working a little bit. (Siraj-Blatchford et al, 2002)

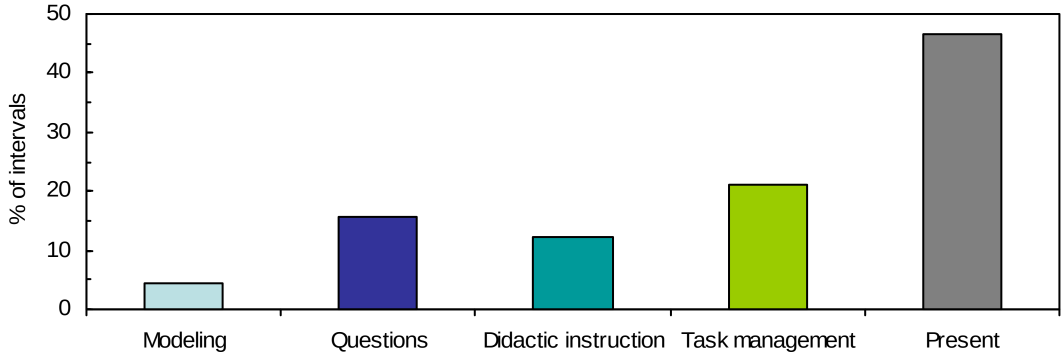
Figure 4 displays the proportions of different cognitive pedagogical interactions that practitioners engaged in with children while they were computing. This shows that most practitioners commonly used direct teaching and monitoring interactions with children whilst they were computing.

Figure 4: Cognitive pedagogical interactions



In terms of social pedagogical interactions, two main types of social interaction were employed; encouragement (65%); and behaviour management (35%), and as Figure 5 shows, generally speaking, the children were left to work independently, with the practitioner providing encouragement, questioning, instructing and managing only when necessary. It is interesting to note that practitioners rarely engaged in scaffolding and there was little evidence of 'sustained shared thinking' during children's computing activities.

Figure 5: Cognitive pedagogical interaction sub-categories



The practitioners were specifically asked what they felt that children learnt from their time at the computer. Their responses were often defined by the declared objectives of software being applied but their responses also demonstrated a clear a lack of confidence in the matter. In common with many other contemporary studies (e.g. Siraj-Blatchford, I. and J., 2000), the most frequent references were made to the development of hand-eye co-ordination and the fine motor skills associated with controlling the 'mouse'. Several respondents also referred to the importance of the children gaining confidence with the technology because they would be required to use it when they started school. While some references were made to the value of the computer in supporting number and language and literacy, and frequent references were made to the children's on-screen painting, few practitioners were using the equipment to achieve specific learning goals. In only two of the settings, the potential of the computer in motivating children in early literacy was emphasised and the equipment was clearly being exploited effectively to that end.

In most settings, the children worked at the computer in groups of 2-4 and several respondents referred to the quality of the children's collaboration. However, our observations and at least one respondent suggested that the quality of interaction was actually quite variable. In one setting we heard how children often fought over the mouse but in another the practitioners had discovered an innovative means of extending the children's collaboration by running two adjacent computers with the same software at the same time.

The potential of integrating ICT within socio-dramatic play was not always fully recognised but examples of good practice were sometimes apparent. Some respondents also expressed reservations about the use of some aspects of ICT but the general level of provision was clearly related closely to the resources that were available.

The benefits of in-service training were clear to the REPEY respondents and the practitioners generally looked forward to finding the time and the resources to develop their capabilities further.

Training needs and opportunities

As the Editors of *New Perspectives for Learning*[2] have argued in the context of the compulsory school sector, numerous research programmes across Europe have now demonstrated that:

"…the availability of technology alone cannot bring about radical change"

"…while some (potentially effective) technologies are embraced (by educators) others are resisted"

"The use of technology in classrooms is found to be socially contextualised, interacting with the institutional and organisational cultures of schools and reflecting elements of the prevailing social relations in and around the context of use"

This has particularly important implications for training, as Galton (2000) has argued, practitioners value research when it is focused on specific teaching and learning contexts and practices. But few research interventions have led in the past to sustained change in partner institutions. Galton cites McLaughlin in arguing that teaching and learning research products therefore need to be anchored in concrete teaching contexts. As Black and William (1998) have put it:

> *Teachers will not take up attractive sounding ideas, albeit based on extensive research, if these are presented as general principles which leave entirely to them the task of translating them into everyday practice – their classroom lives are too busy and too fragile for this to be possible for all but an outstanding few. What they need is a variety of living examples of implementation, by teachers with whom they can identify and from whom they can both derive conviction and confidence that they can do better, and see concrete examples of what doing better means in practice.*

Resources are also required if changes are to be sustained, teachers need to be aware of the overall objectives of the changes, and they need to be involved in extended 'supportive communities of practice' that are inclusive of senior managers.

One recent initiative that has adopted this model very closely has been the European Kinderet project funded by the EU (Leonardo da Vinci). Kinderet will not be reporting its complete findings until later in 2005, but the survey data collected in this project with regard to the UK training needs are presented here in full[3]. Kinderet has aimed to identify and understanding the theoretical and practical needs of early childhood educators in terms of their use of ICT and to work in collaboration with them in developing resources to support their colleagues. This approach has also informed the

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[2] *(Editorial) Issue 5, April 2003) edition of New Perspectives for Learning (publication dedicated to reporting on 'Insights from European Union Research on Education and Training') http://www.pjb.co.uk/npl/npl5.pdf*

[3] For further details of the project readers should refer to the project website: http://www.eseb.ipbeja.pt/kinderet/

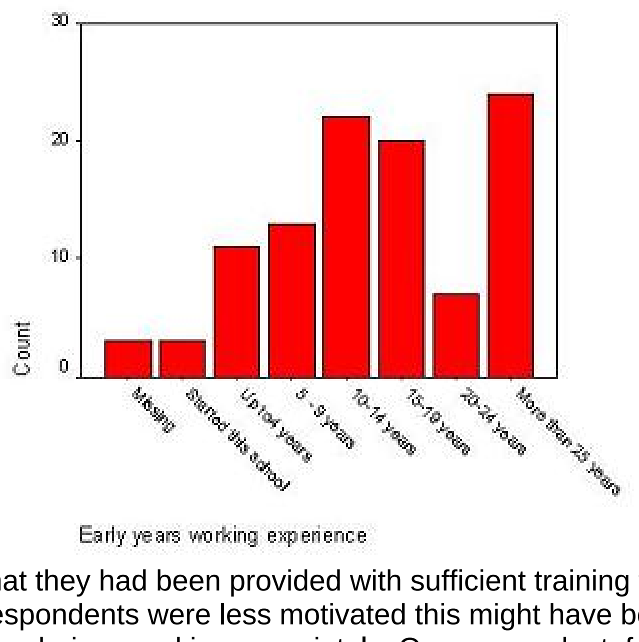
development of the training and evaluation of Northamptonshire LEA's Foundation Stage ICT Strategy involving lead reception classes (further details provided below).
The Kinderet survey was applied in 2004 to identify practitioner training needs. The six page questionnaire was composed of eighteen questions roughly divided into 4-subsections to elicit the following information:

- The personal and professional characteristics of respondents
- How ICT was applied to the Curriculum
- The availability and application of ICT resources
- The training needs and preferences of practitioners

The survey was carried out with an opportunity sample provided through involvement in the IBM KidSmart initiative. A common characteristic of each of the settings was therefore that they had been selected for involvement with IBMs KidSmart programme because they were serving the needs of relatively disadvantaged communities. All the settings involved would also therefore have at least one computer and many will have benefited from training provided as a condition of their LEA's involvement in the initiative. A total of 99 valid questionnaires were returned.

The questionnaires represent the views of an eclectic range of practioners, from a variety of pre-school settings and with a range professional qualifications (34.34% Graduate, 40.40% Further Education and 25.25% 'Other'). In terms of the respondents' years of experience (see figure 6), the largest proportion fell between 10-19 years with a large portion having 25+ years experience.

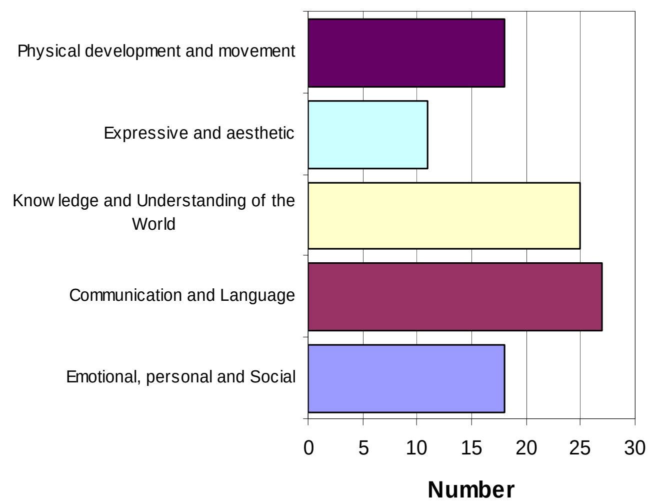
Figure 6



While it might have been assumed that years of experience and the age of the respondents would have been a good predictor of varying opinions of the value of Information and Communication Technology (ICT), this does not seem to be the case. No significant correlation was found been age of respondent/length of service and either their confidence in or their concerns for ICT, 91.9% of respondents felt ICT was an 'important' or 'very important' area of the curriculum and only 38% felt that they had been provided with sufficient training to provide it. Where individual respondents were less motivated this might have been an indication that the technology was being used inappropriately. One respondent, for example, reported: "I do feel it (the computer) has a detrimental effect on speaking and listening skills – less interaction with peers, staff etc. (R 57)". This suggests that either inappropriate 'drill and practice' or (worse) 'arcade' style games were being used predominantly.

Figure 7 shows the particular areas of the curriculum that practitioners felt ICT could contribute to the most. The respondents were asked what objectives they had for the use of ICT and they were also asked separately what they felt that children learnt from there use of the tools. Interestingly their responses were quite different. While only 5% reported specific software skills (e.g. number/ letter recognition etc) as an educational objective of using ICT, 20% felt this was a major learning outcome.

Figure 2: Areas of application



Similarly only 3% considered the development of social skills (e.g. sharing/turn taking) as a learning objective, 23% saw it as a learning outcome. The references to social skills referred exclusively to issues of co-operation which suggests the need to raise practitioners awareness of the importance of children talking together and developing their collaboration skills. It is also significant that while the development of fine motor skills such as mouse control was seen as an important objective and outcome (25% and 23% respectively), the development of technological awareness/technology education through using ICT was considered important as an objective by only 16%, and observed as a learning outcome by as few as 6%. Again this suggests the need to raise awareness of the issues. It seems likely that the reduced proportion of practitioners emphasising fine motor skills as an important learning outcome, compared with the REPEY and earlier Kidsmart findings, was a reflection of the training provided through the KidSmart initiative (see Siraj-Blatchford J. and I., 2004).

Table 1: Software Selection Criteria Category	Number of respondents who rated this important
Age appropriate	44
Developmental Appropriate	22
Educational	34
Graphics/Visual/Audio	26
Child Friendly/Ease of Use	39
Fun/Interesting	18
Recommendation	6
Price/Cost	9

Table 1 shows the responses to the question about the criteria used to select computer software. Interestingly only two respondents referred to the children's own opinions in this and only one mentioned the need to avoid software depicting violence. In fact all of the responses were highly generalised and provide little information about what criteria the practitioners might apply in judging the software 'appropriate' or 'educational'.

Practitioners are concerned about the difficulties that are inherent in evaluating ICT applications prior to purchase and many are actively seeking support with this.

As the QCA (2004) recently reported, in the Foundation Stage we are still in a situation where: *"Many practitioners are not confident enough with their own use of ICT to allow children to use technology to enhance their learning in all areas"* (p7). The analysis of the practitioners wishes with respect to training courses are provided in Table 2, and there are few surprises in these findings. In the practical delivery of training number 7 on the list of priorities, the need for training on 'software evaluation' might usefully be collapsed into number 2 'working with recommended software'. The emphasis on desktop publishing and the creation of web pages reflects the desire among many practitioners to create their own resources and to present the children's work more effectively to parents. The explicit reference made to programmable toys in the Desirable Learning Outcomes has led to their widespread introduction but training has failed to keep up with provision in this area.

While a number of reports refer to practitioners having fairly high levels of access to the internet and e-mail, the actual use of these technologies in the foundation stage remains very limited. According to the evaluators of Evaluation of Curriculum Online (Finch and Kitchen, 2004) only 10% of teachers in nursery schools and 15% in primary schools reported use of Internet resources with the children once a week or more often. The study also showed that 19% of nursery schools and 11% of foundation stage classes in primary schools still have no Internet connection available for the children's use. As the sample for this study did not include private and voluntary sector providers this is also likely to seriously understate the problem. It is also likely that questions related to simple access to the internet leave many of the realities of the situation hidden. The DfES (2003) Survey of Information and Communications Technology in Schools didn't collect statistics for the foundation stage, but it has reported, for example, that only 60% of the total population of primary school teachers have e-mail accounts provided and funded by their school, LEA, by Becta or the DfES. It is likely that the percentage of foundation stage practitioners without such access will be much greater especially in the non-maintained sector.

The poor reliability and the inadequate support that is often offered in maintaining ICT equipment has been a recurring complaint and the expressed desire to learn more about computer maintenance and computer troubleshooting is therefore unsurprising. The desire expressed by practitioners to learn more about curriculum integration and about the nature (aims and objectives) of computer and technology education is particularly encouraging given the arguments presented above. These areas do appear to be priorities for development.

Table 2: Training required

	Training Areas	**% of answers**
1	Office Tools (e.g. PowerPoint)	70,0
2	Working with new (recommended) software	67,3
3	Desktop publishing (e.g. Publisher – text handling, graphics and images)	59,6
4	Programmable toys, floor and screen turtles	56,4

5	How to create web pages	55.8
6	ICT Curriculum Integration	53.1
7	Evaluating educational software	52.9
8	Computer maintenance and troubleshooting	51.9
9	Computer/Technology education	46.5
10	Training to use e-mail	44.7

The Kinderet respondents were also asked about the reasons they had not attended ICT courses in the past. Fifty-four percent of respondents cited 'lack of time needed' as the main reason for not attending. Lack of financial support was another frequently cited reason (46%). The lack of time may also indicate an awareness of the financial implications for their employer as most training courses are offered during school days, which would require the pre-school setting to factor in the cost of supply cover or the setting aside of an in-service day for training (when there are a number of other items competing for attention). Kinderet also looked at the respondents preferred timing of training.

Little interest was expressed in the options of 'evening in-service' and 'supported self-taught' courses which may suggest a problem with training outside of school hours, as both evening and self-taught courses require practitioners' to use their own time, which has already been identified as limited. However, both the whole-day and half-day in-service options allow practitioners to access the necessary training during regular working hours, while being paid regular working wages.

Practical workshops were the most favoured form of training (73%), with single short subject courses as the second most popular, though trailing behind with only 31% of respondents preferring this. Training opportunities that involve self-directed learning (distance learning, on-line training) and/or those that seem to have a more theoretical basis (discussion seminars, accredited certified training courses) received little expressed interest. It appears that most practitioner respondents (who cited insufficient time as one of the main reasons that they had not attended training sessions), want to be provided with practical suggestions that are based on the trainers own practical experience, which they can then apply in their own classrooms. When asked about appropriate institutions or authorities to provide ICT training, the respondents chose local schools and the local authority as the most suitable. Universities and hardware and software manufacturers were both overwhelmingly regarded as inappropriate. While universities and industrial companies may be both proficient, and resourced, to offer ICT training, they may appear less suitable to early years practitioners who want training to be practical and relevant to day-to-day application. In this regard, local schools and local authority organisations, who have access and knowledge of the Curriculum Guidance for the Foundation Stage and associated Early Learning Goals and expectations, seem the 'safer' and more suitable choice.

Many practitioners continue to feel insecurity in their use of technology in the classroom and, at an early stage in the development of the Kinderet project, it was argued that training should take into account two dimensions: the attitudes of practitioners and the acquisition / development of knowledge, understanding and skills. But as Carioca (1997) argued, in the processes of practitioner training, we must also recognise the need to develop positive dispositions towards life-long learning: *"... teachers' personal and* *professional development must be faced as a subsystem of a lasting education process" (op cit p139).*

In May of 2003 IBM convened a European Conference in Brussels on *Early Learning in the Knowledge Society*. The conference made a number of significant recommendations that included the need: *To support knowledge building and co-operation at all levels for practitioners, policy makers and parents.* The delegates drawn from 21 countries felt that knowledge building and co-operation was required at regional, national and European levels to help disseminate research findings, share best practice, and assist policy development for Early Learning (IBM, 2003). It is in this respect that the Northamptonshire LEA's Foundation Stage ICT Strategy involving lead reception classes may be seen as a significant exemplar of local sustainable good practice:

The Northamptonshire Model

The Northamptonshire ICT Strategy (NICTS) was launched in 2003 with a budget commitment of £1.5 million to 2006. The initiative has been developed in collaboration with the counties nine nursery schools with the aim of ultimately providing for the full range of Northamptonshire foundation stage providers. The foundations for the strategy were developed in 2001/2 with major initiatives supporting ICT in the nursery schools and classes that led to teachers reporting positive learning impacts in all areas of the Early Learning Curriculum (Ager and Kendall, 2003). The Strategy already provides an ICT entitlement for all Reception year pupils to be provided with 30 minutes a week of adult supported ICT activity (mostly delivered through small group activities). It also provides for additional time for consolidation and practice. The entitlement specifies a recommended minimum of 10% of all teaching and learning time involving ICT integrated across the curriculum. References are also made to entitlements related to diversity and equality of access, parental involvement, enhanced assessment and recording and the support of trained practitioners (See Appendix). Significant training and material resources are also being provided to support the strategy. In the past year, Lead Reception Teachers have been playing a key role in developing their own practice as well as a range of skills that are to be employed throughout the continued term of the strategy to support schools within their local clusters. Over the next two years it is intended that this process will continue and extend the support, sharing good practice with all of the non-maintained foundation stage settings as well.

An evaluation of the Lead Reception Class phase is to be published in April 2005 and one aspect of this has been to record the baseline of provision and to indicate any progress being made by the Reception teachers in developing their practice. The evaluation used the same instrument (ICT-ECERS) that was applied in REPEY (see p6 above) and it was applied by the same independent evaluator, and while the level of support and the funding provided by Northamptonshire has been quite exceptional, the results achieved are nonetheless extraordinarily good. The following table (Table 3) provides a comparison of the baseline with the average REPEY scores (observed in 2001). The improvement here may well be an indicator of more general improvements being made by committed LEAs during this period. To illustrate the degree of improvement that the strategy has produced a comparison is also made between these scores and those achieved by a random sample of UK settings involved in IBM's KIdSmart initiative in 2003. In developing the rating scale, the intention was to pitch level 5 at the level required of the Foundation Stage Early Learning Goals. Any achievements above this might therefore be taken to represent excellence above and beyond that standard.

Table 3 ICT ECERS Item:	REPEY Score:	NICTS Baseline	NICTS End of year	IBM KidSmart
Information handling and Communication Skills	2.5	3.6	5.2	4.9
Access and control of ICT tools	1.58	3.4	5.5	5.2
Learning about the uses of ICT	2.25	3.4	5.5	4.8

Conclusions

The knowledge and expertise that the effective early years educator brings to bear on the problem of supporting children's learning are curriculum knowledge and pedagogic strategy. As *educational technology,* ICT provides the educator with a range of tools that may be applied in combination with particular pedagogies to support the learning process. But practitioners are often unaware of the particular *pedagogic affordances* provided by any individual tool. Opportunities for professional development and formal training are therefore crucial. As Wang and Ching (2003) have argued, more early childhood studies are needed to look at the affordance and semiotic mediation of ICTs in facilitating and transforming early learning activities. If we are to monitor and develop our practice, Foundation Stage settings should also now be included in DfES and other surveys of Information and Communications Technology provision.

Apart from the NAEYC and DATEC guidance referred to above, guidance for early years practitioners is provided by the British Educational Communications and Technology Agency (BECTA) and online resources are provided by IBM in supporting their KidSmart programme. Plowman and Stephen's (2002) review conducted for Learning and Teaching Scotland is primarily concerned with the research and development of new technologies for young children but the paper also provides an evaluation of the case for and against children using ICTs. Many of these sources refer to the specific contribution that is being made by innovative practitioners employing desktop computers, programmable toys, and in applying ICT in socio-dramatic play. The paper will therefore conclude by addressing each of these in turn:

The use of desktop computers in early childhood

Some serious concerns have been raised about the sedentary nature of computer use and the potentially damaging effects of inappropriate ergonomics (Healey, 1998, Cordes & Miller, 2000). Plowman and Stephen's provide a particularly critical account of the use of desktop computers (p11) and argue for the development of new technologies more appropriate for the early years (see also Siraj-Blatchford, 2004). The DATEC guidance (Siraj-Blatchford I. and J., 2002, 2005) suggests that the ergonomic difficulties associated with young children using desktop computers might be overcome by adopting applications that involve the children in working part of the time away from the computer. As long as suitable seating, cushions and foot-rests are provided children may also be usefully taught to take some responsibility themselves for these aspects of health and safety from an early age.

While many pre-school settings now recognise the need to integrate ICT across the curriculum, less emphasis is often placed on integrating the computer in pedagogical terms. The term ‘integration’ should be understood as relating to the way in which ICT is incorporated into student learning. Yet it is clear from the practitioner surveys reported above that integration is currently understood exclusively in curriculum terms. It seems likely that this will need to change if we are to see further progress. While it is clear that open-ended, generic, problem-solving and simulation applications offer children the greatest screen-based opportunities for learning and development, programmable toys may ultimately have even greater potential.

Programmable Toys

In programming a toy to behave in a certain way, children have to see the problem from the robot’s perspective. They have to *decentre,* adopting a body-centred system of reference which Papert (1980) termed ‘body syntonicity’. A wide range of ‘intelligent’ toys have also entered the domestic market in recent years and some of these toys have been found to provide support for collaboration (Luckin *et al.* 2003). There are a great many research questions to be explored in this context but one of the most significant features of many of these toys is that their behaviour has been programmed to ‘develop’ as they apparently ‘learn’ from their play with the child. Often the ‘learning’ in this respect is more apparent than real but the effects that play of this kind might have on children is worthy of greater research attention. In the mean time our knowledge of those toys that are effective is growing but more needs to be done to support practitioners in developing strategies for their application.

Socio-dramatic play

Early Years practitioners have shown that there is enormous scope the integration of technology into young children’ s play environments. Outdoor play vehicles and other toys may be controlled by traffic lights; home corner washing machines may be programmed for different fabrics; children are already using pretend (and sometimes functioning) telephones, cash registers, office photocopiers, supermarket bar code scanners computers, etc. in their socio-dramatic role play. Functioning computers can also be integrated into the children’s pretend play and successful experiments have been conducted using suitable software and touch screens in simulated travel agents, offices, and shop environments. The possibilities are endless and the learning potential considerable. While there is clearly a need for more in the way of ICT props (of both the software and hardware variety) to be developed, a great deal can be achieved by innovative practitioners working with the children in creating their own improvisations.

Postscript

Following much of the same logic as that applied by Greeno (1991), to the case of mathematics, it can be seen that to be technologically ‘literate’ is to possess *a structure of facts, concepts, principles, procedures and phenomena that provides resources for the cognitive activities of knowing, understanding and reasoning* (op cit).

In the field of technology, more than any other, we should recognise that this kind of literacy cannot be achieved by identifying and teaching children all of the understandings, skills and often subtle and hidden qualities and capabilities that constitute a knowledge of technology as it presents itself to us today.

Innovation is rapid and today's knowledge is all too soon redundant. A better way forward is to think of the qualities and capabilities of literacy as symptoms or indicators of a more general and basic condition of knowing technology. Such an approach recognises that technological expertise is dynamic, highly complex and intuitive. It is something that develops gradually as a result of exploring technology, and it includes within it a strong commitment to the processes of self-development and lifelong learning.

As Seymour Papert has observed, in the early 1940s and 50s all the fastest ships crossing the Atlantic were European, and as the American's were embarrassed about that they built the SS United States to be the fastest ship in the World (at a cost of $79 million). The maiden voyage of the SS United States was on July 3rd 1952. But unfortunately for them the British Overseas Aircraft Corporation (BOAC), had inaugurated the world's first commercial jet airline service two months before that, on May 2 1952. The service was provided by Sir Geoffrey De Havilland's 36-seater Comet (estimated cost £250,000). Overnight it became completely irrelevant which ship could travel across the Atlantic more quickly. As Papert argued, it is worth remembering this story when thinking about schools:
" *Are we trying to perfect an obsolete system or are we trying to make the educational jet plane? (Papert, 2001, p. 112)*

Technology moves on, and this has profound implications for society. The pace of change in modern societies is particularly challenging for the school curriculum, which must respond (however indirectly) to these economic and cultural changes. As Car has argued, the curriculum must be recognised as; *" a socially-constructed cultural artefact which (like society itself) has to be made and re-made in response to changing historical circumstances"* (p 330).
From this perspective it is clear that the challenge for the early years is the most acute. While it is recognised that the need to prepare children with the knowledge and skills appropriate to their roles as future producers and consumers is only one of our educational priorities. It is a major priority and it requires particularly careful foresight. The three and four-year-olds of today will complete their statutory education in 2017 and 2018 and, given the exponential rate of technological development and advance that we are already experiencing, we can be sure that the economic and cultural realities at that time will be quite different to those experienced today. It is the context of these future contexts that decisions need to be made about the early years curriculum now. For us it seems clear that it is the breadth of the alternative learning goals provided by communication, collaboration, creativity and metacognition that offer the greatest potential.

References

Ager, R. and Kendall, M. Getting it right from the start: a case study of the development of a foundation stage learning and teaching ICT strategy in Northamptonshire, UK, inWright, J., DcDougall, A, Murnane, J. and Lowe, J. (2003) *Young Children and Technologies: International Federation for Information Processing Working Group* 3.5, Open Conference, Australian Computer Society, Syney NSW

Black, P. and Wiliam, D. (1998) 'Assessment and classroom learning', *Assessment in Education,* 5, 1, pp7-73

Blok, H., Oostdam, R., Otter, M. and Overmaat, M. (2002) Computer-assisted instruction in support of beginning reading instruction: a review, *Review of Educational Research*, Spring, Vol. 72, pp. 101-130

Bowman, B., Donovan, S. and Burns, S. (Eds.) (2001) *Eager to Learn: Educating our Preschoolers, Committee on Early Childhood Pedagogy*, National Academic Press, Washington USA

Brooker, E. and Siraj-Blatchford, J. (2002) "Click on Miaow!": How children of three and four experience the nursery computer, *Contemporary Issues in Early Childhood,* Volume 3, Number 2, 2002

Burts, D., Hart, C., Charlesworth, R. and Kirk, L. (1990) ' A comparison of frequency of stress behaviours observed in kindergarten children in classrooms with developmentally appropriate versus developmentally inappropriate instructional practices', *Early Childhood Research Quarterly,* Vol. 5 pp. 407-423

Carr, W. (1998) The Curriculum in and for a Democratic Society, *Curriculum Studies, Vol. 6, No. 3,* Online 11th March 2005 at: http://www.triangle.co.uk/pdf/viewpdf.asp?j=cus&vol=6&issue=3&year=1998&article=wc&id=62.253.128.14

Clements, D. (1994) The uniqueness of the computer as a learning tool: Insights from research and practice. In Wright J., and Shade, D. (Eds.), *Young children: Active learners in a technological age.* Washington, DC: NAEYC.

Clements, D. (2000) From exercises and tasks to problems and projects – unique contributions of computers to innovative mathematics education, *The Journal of Mathematical Behaviour*, 19, (1), pp. 9-47

Clements, D. and Gullo, D. (1984) Effects of computer programming on young children's cognition, Journal of Educational Psychology, 76, pp1051-8

Coe, R. (2002) It's the Effect Size, Stupid: What effect size is and why it is important, Paper presented at the *Annual Conference of the British Educational Research Association*, University of Exeter, England, 12-14 September 2002, Online 11th March 2005 at: http://www.leeds.ac.uk/educol/documents/00002182.htm

Cordes, Colleen and Miller, Edward (Eds.) (2000) *Fool's gold: A critical look at computers in childhood*. College Park, MD, USA: Alliance for Childhood, Online 11th march 2005 at: http://www.allianceforchildhood.org/projects/computers/computers_reports.htm

Crook C. (1994) *Computers and the Collaborative Experience of Learning*, London, Routledge

Crook, C. (2003) cited in International Business Machines (IBM) (2003) *Early Learning in the Knowledge Society: Report on a European Conference, 22-23rd May,* Brussels

Departm,ent for Education and Skills (DfES) (2003) *Survey of Information and Communications Technology in Schools 2003*, Online 11th march 2005 at: http://www.dfes.gov.uk/rsgateway/DB/SBU/b000421/index.shtml

Dois, W. and Mugny, G. (1984) *The Social Development of the Intellect,* Oxford, Pergamon Press

Finch, S. and Kitchen, S. (2004) *Evaluation of Curriculum Online: Report of the baseline survey of Foundation Stage providers,* National Centre for Social Research, Prepared for Department for Education and Skills, Online 11th March 2005 at: http://www.becta.org.uk/page_documents/research/curriculum_online/foundation_stage_report.pdf

Fletcher-Flinn, C. and Suddendorf, T. (1996) *Do computers affect the mind?, Journal of Educational Computing Research, 15 (2) pp.97-112*

Forman, E. (1989) The role of peer interaction in the social construction of mathematical knowledge, *International Journal of Educational Research,* 13, pp. 55-69

Galton, M. (2000) Integrating Theory and Practice: Teachers' Perspectives on Educational Research, TLRP Annual Conference, 2000. Online 11th March 2005 at: http://www.tlrp.org/acadpub/Galton2000.pdf

Greeno, J.G. (1991). Number sense as situated knowing in a conceptual domain. *Journal in Research in Mathematics Education*, 22, 170-218.
Harms, T., Clifford, M. & Cryer, D. (1998). *Early Childhood Environment Rating Scale, Revised Edition (ECERS-R)* Teachers College Press.
Haugland, S. (2000) Early Childhood Classrooms in the 21st Century: Using Computers to Maximise Learning. *Young Children,* 55, 1, pp. 12–18.
Healey, J. (1998) *Failure to Connect,* New York, Simon and Shuster
Howes, C. and Matheson, C.C. (1992) Sequences in the Development of Competent Play with Peers: social and pretend play, *Developmental Psychology*, 28, pp. 961-974
International Business Machines (IBM) (2003) *Early Learning in the Knowledge Society: Report on a European Conference*, 22-23rd May, Brussels
James, M., Pollard, A. Rees, G., and Taylor, C. (2003) *Of warrants and Warranting: building confidence in our conclusions*, TLRP Occasional Paper.
Larkin, S. (2000) How can we discern metacognition in year one children from interactions between students and teacher, Paper presented at *ESRC Teaching and Learning Research Programme Conference*, 9th November
Lewis, C., Freeman, N.H., Kyriadicou, C., Maridaki-kassotaki, K. and Berridge, D. (1996) Social Influences on False Belief Access: specific sibling influences or general apprenticeship? *Child Development*, 67, pp. 2930-2947
Light, P. and Butterworth, G. (Eds.) (1992) *Context and cognition: ways of learning and knowing,* Hemel Hempstead, Harvester Wheatsheaf
Loveless, A. (2002) *Literature Review in Creativity, New Technologies and Learning*, Report 4, NESTA Futurelab Series
Luckin, R., Connolly, D., Plowman, L. and Airey, S. (2003). *Out of the Box, but in the Zone? Can digital toy technology provide a more able peer for young learners?,* International Conference on Artificial Intelligence in Education 20
Marcon, R. (2002). Moving up the grades: Relationship between preschool model and later school success. *Early Childhood Research and Practice, 4* (1).
National Association for the Education of Young Children (NAEYC) (1998) *Position Statement: Technology and Young Children – ages 3 through 8*, Online 11th March 2005: http://www.naeyc.org/about/positions/pdf/PSTECH98.PDF
Papert (1980) *Mindstorms: Children, Computers and Powerful Ideas*, New York, Basic Books
Papert, S. (2001) Keynote address to the special forum on 'ICT and Education at the OECD on 2nd April, reproduced in full in OECD (2001) .*Schooling for tomorrow - learning to change: ICT in schools,* Online 11th March 2005 at http://www1.oecd.org/publications/e-book/9601131E.PDF
Pelligrini, A., Galda, L., and Flor, D. (1997). Relationships, Individual Differences and Children's Use of Literate Language, *British Journal of Educational Psychology* 1997 Jun;67 (Pt 2):139-52
Perner, J., Leekam, S.R. and Wimmer, H. (1994) Three-Year-olds' Difficulty with False Belief, *British Journal of Developmental Psychology*, 5, pp. 125-137
Piaget, J. (1969). The Mechanisms of Perception. London: Rutledge & Kegan Paul.
Plowman, L. & Stephen, C. (2003) A 'benign addition'? A review of research on ICT and pre-school children. *Journal of Computer-Assisted Learning*. 19 (2). Also see Ict In Pre-School: A 'Benign Addition?, Learning and Teaching Scotland, Online 11th March 2005 at: http://www.ltscotland.org.uk/earlyyears/files/benignaddition.pdf
Qualifications and Curriculum Authority (QCA) and Department for Education and Emplyment (DfES) (2000) *Curriculum Guidance for the Foundation Stage*, London, QCA/DfES

Schweinhart, L.J. & Weikart, D.P. (1997). 'The High/Scope Preschool Curriculum Comparison through Age 23' in *Early Childhood Research Quarterly*, 12, pp. 117-143.

Selwyn, N. (1999) 'Resisting the Technological Imperative: Issues in Researching the 'Effectiveness' of Technology in Education' from the online journal *Compute-Ed*, Vol 5 Online 11th March 2005 at: http://pandora.nla.gov.au/nph-arch/2000/Z2000-Jun-5/http://computed.coe.wayne.edu/Vol5/Selvyns.html

Siraj-Blatchford, I., Sylva, K., Muttock, S., and Gilden, R. (2001) *Researching Effective Pedagogy in the Early Years, a Report to the DfES*, London, University of London Institute of Education

Siraj-Blatchford, J. (2004) *Developing New Technologies For Young Children*, *Stoke on Trent, Trentham Book*

Siraj-Blatchford, J. and Siraj-Blatchford, I. (2000) *IBM KidSmart Early Learning Programme: UK Evaluation Report – Phase 1 (2000-2001),* IBM White Paper, London, IBM

Siraj-Blatchford, I. and Siraj-Blatchford, J. (2000) (Revised 2005) *More than Computers: Information and Communications Technology in the Early Years*, London, Early Education (Ther British Association for Early Childhood Education)

Siraj-Blatchford, J. & Siraj-Blatchford, I. (2004) *IBM KidSmart early Learning Programme European Evaluation,* IBM White Paper, London, IBM

Siraj-Blatchford, I. and Siraj-Blatchford, J. (2005) *A curriculum development guide to ICT in Early Childhood Education*, Published in collaboration with Early Education*, Stoke on Trent, Trentham Books*

Siraj-Blatchford, J. and Whitebread, D. (2003) *Supporting Information and Communications Technology in the Early Years*, Maidenhead, Open University Press

Smilansky, S. (1990) Sociodramatic play: Its relevance to behavior and achievement in sch*ool.* In Klugman, E. & Smilansky, S. (Eds.), *Children's Play and Learning*. New York: Teacher's College.

Statt, D.A. (1998).*The concise dictionary of psychology* (3rd ed.). London and New York, Routledge

Sylva, K., Melhuish, E., Sammons, P., Siraj-Blatchford, I. and Taggart, B. (2004) *Effective Pre-School Education: A longitudinal study funded by the DfES 1997-2004*, SureStart, London, DfES Publications

Sylva, K. and Nabuco, M. (1996). 'Research on quality in the curriculum', *International Journal of Early Childhood*, 28, 2, 1–6.

Tan-Niem, C. Wood, D. and O'Malley, C. (1999) Play, imitation, reciprocity and theory of mind, *The Australian Journal of Research in Early Childhood Education,* 6 (2) pp.73-83

National Reading Panel (2000) *Report of the National Reading Panel – Teaching Children to Read: An evidence based assessment of the scientific research literature on reading and its implications for reading instruction,* Washington DC, US Government Printing Office

van Oers, B (1999) Teaching Opportunities in Play, in Hedegaard, M & Lompscher, J., *Learning Activity and Development,* Aarhus University Press, Aarhus

Vygotsky, L. (2004) Imagination and creativity in childhood. *Journal of Russian and East European Psychology* 42, 1, 4 – 84.

Wang, C. and Ching, C. (2003) Social Construction of Computer Experience in a First-Grade Classroom: Social Processes and Mediating Artifacts, Paper Presented at AERA 2003 in Symposium: Perspectives on Studying Artifacts in Physical and

Virtual Learning Environments. Online 11th March 2005 at: http://lrs.ed.uiuc.edu/aera/03/artifacts/AERA03-Wang.PDF
Wood, D. (2003) *Think Again: Hindsight, Insight and Foresight on ICT in Schools*, European Schoolnet, Online 11th March 2005 at: http://www.eun.org/insight-pdf/ernist/David_Wood_Think_Again.pdf
Yelland, N. (1999) Reconceptualising schooling with technology for the 21st century. *Information Technology in Childhood Education Annual*, pp. 39–59.

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For more help and information contact: **01604 750333**

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Northamptonshire County Council

The Reception Year Entitlement

Foundation Stage ICT Strategy

Context

Electronic and digital technology is developing at an incredible speed. We live in a highly technological society and for the vast majority of us the use of these technologies has become central to our everyday lives. For adults and children ICT enables access to communication and learning that otherwise could not take place. It is vital that children are able to make sense of the world they live in, that they feel at ease with the technology that surrounds them and that they develop the necessary knowledge, skills, understanding and attitudes that will enable them all to utilise these technologies to their full potential. They will then grow up to be 'digitally literate' confident citizens who are able to live, learn and take an active part in society and who are equipped for the new jobs and challenges that the future may bring.

The Foundation Stage

A quality Foundation Stage ICT curriculum will provide the basics required if the children are to become 'digitally literate'. In the Foundation Stage children will learn about everyday technologies and ICT, they will use ICT to enhance and support their learning and many children will use ICT to access learning and the curriculum.

Within the Foundation Stage curriculum ICT is a part of the area of learning: 'Knowledge and Understanding of the World'.

The QCA curriculum guidance states that:
'In this area of learning, children are developing the crucial knowledge, skills and understanding that help them to make sense of the world.'

By the end of Reception most children will achieve the Foundation Stage early learning goal for ICT which is that:
'Children should find out about, and identify the uses of technology in their everyday lives, and use ICT and programmable toys to support their learning'.

Everyday technology: the vast range of electronic and digital equipment that we all use everyday of our lives; equipment that is all around us wherever we go and whatever we are doing and that shapes the way we live our lives.
This includes mobile phones, cash machines, barcode scanners, traffic lights, street lights, pelican crossings, washing machines, dishwashers, microwave ovens, televisions, videos, tape recorders, ICT-based/electronic toys and games, cameras, camcorders, calculators, photocopiers and computers.

ICT: all electronic or digital equipment that allows us to gather, store and retrieve information and that allows us to communicate, present and exchange this information.
Currently this includes tape recorders, cameras, camcorders, data projectors and interactive whiteboards, personal computers (desktop, laptop and tablet) with a number of different input devices, a range of appropriate software, the internet, on-line resources, webcams and e-mail.
Many of these devices are now also available as toys that actually work as well as the adult versions.

Learning for young children is a rewarding and enjoyable experience in which they explore, investigate, discover, create, practise, rehearse, repeat, revise and consolidate their developing knowledge, skills, understanding and attitudes. During the foundation stage, many of these aspects of learning are brought together effectively through playing and talking.

To enable children to 'find out about and identify the uses of technology in their everyday lives' children should have opportunities:

- To explore, investigate and operate these technologies
- To discover and observe their uses within the setting and outside it
- To discover, practise, rehearse and repeat the uses of these everyday technologies through role-play with toys that simulate the real technologies
- To discuss the use of these technologies including the enormous impact they have on our everyday lives
- To learn the correct vocabulary associated with everyday technology, in particular through hearing adults model the use of this language
- To dismantle these technologies to investigate what's inside them

For children and practitioners to 'use ICT and programmable toys to support their learning' then:

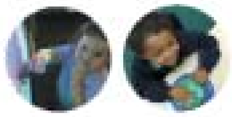
- ICT and programmable toys should be used appropriately in learning and teaching across all six areas of learning within the Foundation Stage curriculum and across all areas of experience within the Foundation Stage setting to enhance learning
- ICT should be used as a tool to enhance communication between
  - > Children
  - > Children and Foundation Stage practitioners
  - > School and home
- ICT should be used as a tool to enhance collaborative learning
- ICT should be used to increase parental involvement in their children's learning
- ICT should be used to enhance the management of children's learning

For some children and practitioners, ICT will be the means by which children access learning and the curriculum.

Learning and teaching activities should be planned for groups of children, pairs of children and individual children and should include adult-directed, adult-structured or child-initiated activities. They will be organised mainly as small group or individual activities but will also be organised as large group or whole class activities.

Whilst completing activities involving the use of ICT, children will sometimes learn alongside each other but for the vast majority of the time they will learn with each other and through each other.

Transforming
teaching & learning through ICT



The entitlement model below is based on current good practice. Due to the emergence of newer technologies, models of good practice and a growing body of research into their uses, it is intended that this entitlement model will change and develop over time.

It is recognised that though a number of schools will be close to delivering this entitlement, other schools will require a number of years to achieve it and that the steps to achieve the entitlement for their children will be included in their school development plan. The funding available through the Foundation Stage ICT Strategy will accelerate the rate at which schools achieve the entitlement.

An ICT entitlement model for Northamptonshire's Reception classes

All children are entitled to:

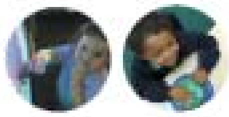
- The Foundation Stage ICT curriculum delivered through a minimum of 30 minutes a week of adult-directed activity taught within the Foundation Stage area. This will often be a small group activity and can be delivered through a number of short activities over the week.

- Sufficient time, in addition to the 30 minutes outlined above, for consolidation and practice of the knowledge, skills and understanding being developed through adult-directed, adult-structured or child-initiated activities. These activities will be organised for groups of children, pairs of children and individual children.
- The appropriate and effective use of ICT within all areas of experience to support and enhance learning and teaching across all areas of learning, in adult-directed, adult-structured and child-initiated activities (currently a recommended minimum of 10% of teaching and learning time, though this should be adjusted to reflect the needs of the children).
- A learning and ICT provision that supports diversity and therefore equality of access and opportunities to learn and make progress whatever their age, attainment, ethnicity, special needs or competence in English.
- Use ICT to access learning and the curriculum. For some children this will require the use of ICT for a large proportion of every day.
- Enhanced parental involvement in their learning and home-school communication through the use of ICT.
- Enhanced assessment, recording and reporting of their learning through the use of ICT.
- Foundation Stage practitioners who:
  - > are confident and competent users of ICT
  - > have a good understanding of the Foundation Stage ICT curriculum
  - > have a good understanding of how appropriate ICT can be used to enhance learning across all six areas of learning
  - > understand that ICT can be used to access learning and the curriculum and know when and where to go should they need advice or support
  - > can use ICT for the management of learning including the planning, recording, reporting and assessment of learning

To achieve this entitlement:

- Every Reception class should have a range of **everyday technologies** for the children to use, and for them to play with in role-play.
  - > To deliver the ICT curriculum
  - > To enhance learning across all six areas of learning

- Every Reception class should have at least one **tape recorder** permanently dedicated to use within the Foundation Stage.
  - > To deliver the ICT curriculum
  - > To enhance learning across all six areas of learning
  - > To record trips, the day's activities, any special events and to enhance curriculum presentations to parents, governors and other audiences and enhance the school website
- Every Reception class should have a **minimum of four programmable toys** (of at least two different types) permanently dedicated to use within the Foundation Stage (or one programmable toy per four children where there are 16 or less children in the reception year).
  - > To deliver the ICT curriculum
  - > To enhance learning across all six areas of learning
- Every reception class to have a minimum of **two digital cameras** and a **digital camcorder** permanently dedicated to use within the Foundation Stage area.
  - > To deliver the ICT curriculum
  - > To enhance learning across all six areas of learning
  - > To produce digital, still and video for use on a computer in the classroom or entrance, recording trips, the day's activities, any special events, to enhance curriculum presentations to parents, governors and other audiences and enhance the school website. In particular to enhance parental involvement in their children's learning
  - > To produce digital pictures to enhance assessment, recording and reporting



- Every reception class should have a **minimum of two networked desktop PCs** (or one PC where there are eight or less pupils in the reception year) sited within the classroom or foundation stage area and with a range of software and a number of input and output options.
  > To deliver the ICT curriculum
  > To enhance learning across all six areas of learning through the use of
    o appropriate software
    o the internet
    o e-mail
    o online services
  > To enhance communication between children, children and adults, and between adults through the use of e-mail
  > To support diversity and therefore equality of access and opportunities to learn and make progress whatever the children's age, attainment, ethnicity, special needs or competence in English.

Pairs of children and groups of children can work collaboratively around a desktop computer independently or under adult supervision.

- In addition to the two PCs detailed above the school should have **minimum of two** (or one where there are 16 or less pupils in the reception year) **laptops/tablet PCs** with a range of appropriate software permanently dedicated to use **within** the reception class/es or Foundation Stage area.
  > To deliver the ICT curriculum
  > To enhance learning across all six areas of learning

Portable technology can be used wherever learning is taking place.

- Every school to have a **minimum computer/Reception year child ratio of 1:8** and these computers (PCs or laptops/PC tablets as described above) are permanently dedicated to use within the foundation stage area and all PCs are permanently sited within the foundation stage area.

- **Two webcams** sited within the classroom/foundation stage area.
  > To deliver the ICT curriculum
  > To enhance learning across all six areas of learning
  > To encourage communication both within the setting and with adults and children outside the setting

- An **interactive whiteboard** sited within the foundation stage area.
  > To deliver the ICT curriculum
  > To enhance learning across all six areas of learning
  > To encourage collaborative working

All use of the computers or any technology within the classroom by parents will enhance parental involvement in their children's learning.

- **Foundation Stage practitioners** should have access to
  > a programme of continuing professional development
  > advice and support when ICT is required to enable access to learning and the curriculum
  > examples and models of good practice

and be committed to working
  > in partnerships
  > as part of a wider network