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# Kidsmart: The Phase 1 UK Evaluation 2000-2001

John Siraj-Blatchford
*University of Cambridge*

Iram Siraj-Blatchford
*University of Wollongong*, iram@uow.edu.au

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# Kidsmart: The Phase 1 UK Evaluation 2000-2001

## Abstract

As the first phase of their Kidsmart programme in the UK, IBM donated a total of 27 of their Young Explorer Early Learning Centres, complete with Edmark educational software to 14 nurseries in 1999. These Early Learning Centres were initially developed by Little Tykes to serve the needs of 3 to 7 year olds and the Kidsmart aim has been to support early childhood educators in their efforts to apply this new technology to stimulate the development of children's social and cognitive skills. The UK initiative has also involved the British Association for Early Childhood Education (Early Education), who have worked in partnership with IBM to initially identify appropriate settings and in providing suitable training for them, to promote the initiative, and to commission this evaluation. The evaluation has therefore been carried out in association with the British Association for Early Childhood Education (Early Education), and is funded jointly by IBM and indirectly by the European Union as a part of the Developmentally Appropriate Technology in Early Childhood (DATEC) research project. The study has been conducted in the 14 pre-school settings (4 in Scotland and 10 in England) initially identify as appropriate Kidsmart recipient in the UK. They each offer a diversity of early childhood services in mainly disadvantaged areas. The settings included playgroups, nurseries, early excellence centres, family centres, and nursery classrooms. The study seeks to investigate whether the IBM initiative has improved the information and communications technology (ICT) provision offered to the three and four-year old children in the centres, and how the provision may be improved in the next phase of the project. The approach adopted in the study has been informed strongly by the work carried out by the principal investigators in contributing to the European Union funded project: Developmentally Appropriate Technology in Early Childhood (DATEC), and by the position statement by NAEYC (the USA National Association for the Education of Young Children) for developmentally appropriate practices for children from birth through age eight. Both of these initiatives accept as a basic principle that all high quality early childhood programmes should; "provide a safe and nurturing environment that promotes the physical, social, emotional and cognitive development of young children while responding to the needs of families" (Bredekamp and Copple (1997). The study has also been informed by the previous evaluations of the Kidsmart programme that were carried out in the USA by Nancy Nager (1999 and 2000).

## Keywords

uk, evaluation, 2001, phase, 2000, kidsmart, 1

## Disciplines

Education | Social and Behavioral Sciences

# Kidsmart: The Phase 1 UK Evaluation 2000-2001

# Final Project Report

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## Authors: John and Iram Siraj-Blatchford

**PRINCIPAL INVESTIGATORS:**

**John Siraj-Blatchford**
University of Cambridge, Faculty of Education
Homerton College
Hills Road
Cambridge
Js303@cam.ac.uk

**Prof. Iram Siraj-Blatchford**
University of London, Institute of Education
20 Bedford Way
London, WC1H OAL
i.siraj-blatchford@ioe.ac.uk

**Research Assistant:**
**Vasiliki Repana**
University of London, Institute of Education

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**Dedication**
*This report is dedicated to the memory of Ann Kent whose support of the project was both generous and considerable.*

**Background to the Project**

As the first phase of their Kidsmart programme in the UK, IBM donated a total of 27 of their Young Explorer Early Learning Centres, complete with Edmark educational software to 14 nurseries in 1999. These Early Learning Centres were initially developed by *Little Tykes* to serve the needs of 3 to 7 year olds and the Kidsmart aim has been to support early childhood educators in their efforts to apply this new technology to stimulate the development of children's social and cognitive skills. The UK initiative has also involved the British Association for Early Childhood Education (Early Education), who have worked in partnership with IBM to initially identify appropriate settings and in providing suitable training for them, to promote the initiative, and to commission this evaluation.

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**The Developmentally Appropriate Technology in Early Childhood (DATEC UK) Project**

The Developmentally Appropriate Technology for Early Childhood (DATEC) project was a two year research and development initiative funded by the EU Connect programme in association with the Children's Awareness of Technology (CHAT) working group within the European Network of Excellence for Intelligent Information Interfaces (i3). DATEC has aimed to identify the most appropriate applications of information and communications technology (ICT) to support the development of children from birth to 8 years of age. By the end of 2001 the DATEC web site will offer exemplars of good practice from 3 countries, in addition to the UK, these come from partners in Sweden and in Portugal.

**Guidance for Practitioners on Appropriate Technology Education in Early Childhood**
(Siraj-Blatchford J and I, 2001)

The use of ICT in the early years has the potential to enhance educational opportunities for young children. Appropriate ICT can encourage a great deal of purposeful and exploratory play. Among other things it can encourage discussion, creativity, problem solving, risk-taking and flexible thinking. This can all be achieved in a play centred and responsive environment. However, it does demand that practitioners are well trained and skilled in the appropriate uses of ICT with young children. Staff should therefore seek help and support from their local authority to develop their skills as well as the use of appropriate literature and research.

- Supporting practitioners: training and resources

Confidence is beginning to grow among many early childhood educators as they acquire resources and training. Computer print has transformed many nursery displays, enhancing the enrichment of children's print and number environment. These are significant developments that may contribute to supporting children's emergent literacy and numeracy. With the right support and training for staff, ICT applications can be used to support learning right across the curriculum. A wide range of software and hardware can be applied to promote communication between children, between children and their parents/carers and practitioners, and between practitioners and parents. In the UK, programmable toys are now commonly available to children as 'symbolic objects to think with' (Papert, 1982). However, it has to be acknowledged that adults working in early years settings have suffered from lack of resources and poor training opportunities in ICT, it is only recently that there has been a growth in the resources for ICT but this if fragmented and unevenly distributed across different providers.

The number and variety of educational computer programmes (software) on offer has also increased a great deal. Paint programmes are already widely in use, and more and more nurseries are benefiting from the use of touch screens to support very young children in developing an early awareness of 'control', and the opportunity to practice computer enhanced 'finger painting' on the screen. But given the range of computer hardware and software that is now available on the educational and toy market it has become more and more difficult for early childhood educators to make informed choices between them. There is a need to provide early educators with guidance that assists in identifying the most appropriate applications of ICT. DATEC's publication of exemplars and guidance material for parents and early childhood educators is therefore calculated to provide for a pressing community need. This is based on our research with practitioners and researchers in the field.

In our research and meetings with the DATEC partners over the last two years a growing consensus has emerged regarding the most appropriate forms that ICT education should currently take in early childhood. In common with the UK Curriculum Guidance for the Foundation Stage (CGFS) and the National Curriculum (DfEE/QCA, 2000) we have agreed that the ICT curriculum should have two separate strands:

- The first related to developing an 'emergent technological literacy' and children's understanding of the uses of ICT.

- The second to developing children's practical capability with the tools that ICT offers.

We are acutely aware that the adults who support the children's learning have to have these understandings as a prerequisite to supporting children in developing them.

As the 'Early Learning Goals' in the CGFS now suggest, before children complete their 5th year they should be finding out about, and identifying the uses of technology in their everyday lives, and they should also be using computers and programmed toys to support their learning. The CGFS also usefully suggests that we should encourage children to observe and talk about the uses of ICT in the environment, for example, on local walks adults can talk with children about traffic lights, telephones, street lights or bar-code scanners which identify prices in shops. The CGFS is embedded within a play-centred and child-centred philosophy of early education where appropriate pedagogies of modelling, demonstrating, good adult-child interaction and responsive relations are paramount, we condone this philosophy throughout our ICT guidance to practitioners.

In adopting this particular perspective we have accepted the place of ICT education within a broader framework of the technology curriculum. ICT artefacts (hardware and software applications) are seen as 'tools' that are designed and made to serve particular purposes, and it is primarily in terms of these purposes that they should be open to evaluation. Just like any other technological artefacts the tools of ICT carry values, they have been designed to serve particular social needs, they have particular uses and these must be identified in determining their educational value. All of this is specific to the English and Welsh curriculum but less explicit in Scotland and Northern Ireland, however, our research in Scotland suggests that the needs of staff and settings are very similar as are the experiences of children in the home and in the settings. We believe this Guidance is appropriate to all those who work with young children.

- Identifying good ICT practice

Children should have the opportunity to explore and 'play' with the computer as they do with other forms of ICT (e.g. cassette recorders), from an early age and as a pre-requisite to more structured use of applications. The literature review and primary research that has been carried out by us for DATEC during the past 2 years have led us to identify eight general principles for determining the appropriateness of ICT applications to be applied in the early years. We hope that these will not be interpreted in a simplistic way, but that staff will use these points to engage in a discussion about each area and how it might fit into the general philosophy and practice of the particular setting. The guidance might also inform the ICT policy of the setting or be used as a tool to evaluate software programmes or other ICT applications:

*1. Applications should be educational.*
An application is defined here as a use of ICT e.g. the use of a pretend mobile telephone in socio-dramatic play or a computer programme such as Make a Bug (from Millie's Math House, Edmark) integrated as a part of a more general project. The applications employed in the early years should be educational in nature - this effectively excludes all those applications where clear learning aims cannot be identified. However entertaining, most arcade type games provide little encouragement of creativity, or indeed any other worthwhile learning outcome. This is not to suggest that applications should not be fun or enjoyable or used for leisure, only that they should be carefully chosen to have some educational value as well. We are aware that many settings use language and number drill and practice programmes, but have found that these have very narrow educational aims (e.g. practising addition or learning colours). We would suggest that these be used with caution as they promote a very directive form of teaching, normally with the use of an external reward (a smiling face, a tick or a funny sound). Over reliance on these kinds of programme might lead to a reduction in children's intrinsic motivation to learn. In any event there can be more interesting ways of learning about these things! (See point 4 below). Children need a variety of applications that encourage a range of development including creativity, self-expression and language. Applications should be employed after a thorough discussion with staff (and

parents where this is possible) about the educational benefits and constraints of the particular application.

*2. Encouraging collaboration*
The best applications provide a valuable means of encouraging collaboration and in the early years we know that activities that provide contexts for collaboration are especially important. Working alone as well as in collaboration and in a range of other ways in interacting with technology is important too. However, according to Butterworth 'joint attention' and 'children learning to share' and/or 'engaged jointly' provides a better cognitive challenge for young children. Socio-dramatic play provides a context for children to share representations and to articulate their thinking, bringing to consciousness ideas that they are still only beginning to grasp intuitively (Hoyles, 1985). Many screen based applications offer the same possibilities in terms of symbolic manipulation although adult intervention is usually needed to gain the most from software designed to facilitate collaborative problem solving, drawing, or construction. 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 of problem solving (Forman, 1989).

*3. Integration and play through ICT*
ICT applications should be integrated as far as possible with other established early years practices (play, project work) which make the curriculum relevant to the children. The adequacy of much of the ICT educational provision currently provided in schools is open to question in this regard. Primary schools are increasingly opting for computer suites, this discourages the integration of ICT with the rest of the curriculum for the children. Children need to see ICT used in a meaningful context and for real purposes. We have seen excellent examples where children have used a draw programme to make part of a birthday card and then completed it using other material. Another example is where adults have taken children with them to the laundry room and explained and discussed the programme cycles for hot and cold washes. This gives children an understanding of the purposes and uses of ICT as a tool to solve real problems.

The Curriculum Guidance for the Foundation Stage describes play as a 'leading activity' and it is widely considered to be a driving force in the child's development of new forms of motivation and action. Play and imitation are primary contexts for representational and symbolic behaviour, and role-play is therefore central to the processes of learning in the early years. Artefacts such as toys and other 'manipulables' are important because they provide symbols for the children to play with. When children play with both functioning and pretend technological artefacts such as telephones or photocopiers they serve the same purpose. Computer applications also provide a means by which children may engage and interact with a much wider range of 'virtual' artefacts and environments than would otherwise be possible.

This is clearly recognised in the context of emergent literacy and numeracy where educators specifically encourage the child to recognise the value of using symbols to represent artefacts and to quantify them, a form of managing information. But a great deal can be done to promote these processes in the wider play context and in children's play with technological toys. Many settings use computer programmes which manage information as part of their project work. We have seen examples of adults and children collecting information on a topic about the body and using these data to make simple graphs e.g. of eye colour or height.

Another very important reason for employing an integrated approach to ICT is the recognition that this is more consistent with the notion of ICT products as tools. Tools are designed to be applied for particular purposes when required, they are not usually designed

for continuous use for their own sake. The common practice of operating a rota for children to gain access to computers may be seen as entirely contrary to this approach. Equally inappropriate is the common practice of providing access as a reward (or punishment).

*4. The child should be in control*
Generally, applications should be controlled by the child, they should not control the child's interaction through programmed learning or any other behaviourist device. While the evidence suggests that applications of this kind may be effective in developing a range of skills including children's alphabet and phonic skills, counting and early number concepts, the approach is contrary to popular conceptions of good educational practice. There is a real consensus among informed early childhood educators across Europe regarding the importance of developing children's emergent awareness and positive disposition towards literacy and numeracy and it may very well be the case that programmed learning approaches can operate against these principles. A similar case can be made against applications that incorporate 'closed' problem solving; problems that have only one solution. One of the best strategies for solving this sort of problem is simply to try every possible option until you find the right one and this is also the strategy that most children adopt. The irony is that this is precisely the strategy that computers are usually designed to adopt, and given the speed at which they can test the outcomes it is a strategy that they excel in. The kinds of problems that computers struggle with are the sort that have multiple solutions and where the real intellectual challenge is to clarify the problem sufficiently well to recognise when the best solution has been found. Arguably it is just this sort of creative problem solving we should be giving children practice in.

*5. Applications should be transparent and intuitive*
As far as possible, applications should be selected that provide 'transparency'; their functions should be clearly defined and intuitive. What this normally means in practice is that the application completes each clearly defined task in a single operation. Such as the intuitive nature of the 'drag and drop' facility. Another good example of this functional transparency is provided by the Sony Mavica digital camera that saves images on a floppy disk. When the child (or adult) has taken a photograph, they can remove the disk (with the photo on it) and when they put it into the computer, a double-click brings the picture directly onto the screen.

*6. Applications should not contain violence or stereotyping*
Unfortunately we cannot assume that all of the software finding its way into early years contexts is 'tasteful and dignified' but all applications should satisfy (for example) the advertising standards authority code of practice. What we are suggesting here is that where applications fail to meet these criteria it would be difficult to justify their use in any educational context.

7. *Awareness of health and safety issues*
Serious concerns have been voiced about the consequences of encouraging the extended use of desktop computers by young children. We have therefore become convinced that a typical use of any desktop computer application by a child should be comparatively short, normally not extending beyond 10-20 minutes in the case of 3 year olds. This might be extended to a maximum of 40 minutes by the age of eight. Clearly, if a child or group of children is totally engaged in an activity and the completion of this requires a longer period at the computer this should be allowed, but it would not be desirable to encourage children to do this regularly. Apart from the very significant difficulties of providing ergonomic, yet communal workstations, these concerns relate to the hazards of repetitive strain injury, carpal tunnel damage, effects upon sight, obesity, and the possible risks of radiation exposure from monitors. All of these hazards are well documented in the case of usage by adults but little research has been conducted to identify the implications for the youngest children at this early stage of their physical development.

The evidence regarding the degree of risk associated with these hazards remains unclear; but the precedent set by the UK government in discouraging children's use of mobile telephones in schools is instructive. The hazards of that technology were equally unclear yet the government's decision suggested that where we consider the safety of children, the burden of proof should lie on those introducing a new technology into schools rather than those who would urge caution. By limiting the time children spend at computers we can help to avoid some of these dangers for children. Where the computer use is integrated with other activities (and the computer used effectively as a tool) e.g. in socio-dramatic play, modelling, painting etc. children will benefit from greater movement and exercise away from the computer.

*8. Educational involvement of parents*
Research also suggests that *home-school communication* leads to better understanding and more positive attitudes by teachers and parents about each other's roles. Many studies have shown that when parents, teachers and children collaborate towards the same goals it leads to the improved academic performance of children (Siraj-Blatchford, I. *et al* 2001). Schools also report that children show a more positive attitude towards learning and are better behaved. Home-school links or parent involvement is therefore a component of effective schools that merits special consideration. When it is well planned it can promote higher success in pupils and lead to more successful family environments. But many staff are ill equipped to know what kinds of strategies to adopt to foster better home-school relationships. In the United States the large-scale and longitudinal studies have been conducted by Epstein (1996). Applying Epstein's typology, five main types of home-school improvement can be identified:

*1. Parenting skills, child development, and home environment for learning.*
*2. Communications from school to home.*
*3. Parents as volunteers in school.*
*4. Involvement in learning activities at home.*
*5. Decision making, leadership, and governance*.

While a great deal is often achieved in terms of 1-3, most early childhood educational settings find 4-5 particularly challenging (Siraj-Blatchford et al 2001). Communication between professional educators and parents is crucial in the early years and a more articulated set of aims between the home and early years setting can lead to better outcomes for children. Our research shows that currently there is very little knowledge in settings about the children's ICT experiences at home and that this not an area on which parents are normally asked for information.

**The UK pre-school context**

As suggested above a wide range of new technology has been introduced into UK nurseries in early years settings in recent years. It is now commonplace to see children playing with programmable toys and computers as well as real or 'pretend' mobile telephones, cassette recorders and pretend domestic appliances such as programmable washing machines. Digital cameras and scanners are also being used in some settings. Nursery and kindergarten websites are beginning to appear on the Internet. In addition to this, young children also have a wide range of variable experience in the use of ICT within the home.

The development of technological literacy should be seen as an important curriculum entitlement in any broad and balanced curriculum for the 21st Century, with technology standing alongside literature, science and music as a major cultural form in its own right. As the *Early Learning Goals* in the Curriculum Guidance for the Foundation Stage (DfEE/QCA, 2000) now suggest, before children complete their reception year they should; ***find out***

*about and identify the uses of technology in their everyday lives and use computers and programmed toys to support their learning.* We are also advised that settings should; *Encourage children to observe and talk about the use of ICT in the environment on local walks, for example traffic lights, telephones, street lights, bar-code scanners to identify prices in shops.* They should also: *Encourage children to show each other how to use ICT equipment.*

Further curriculum and pedagogic guidance has been provided for practitioners in the *Curriculum Guidance for the Foundation Stage* (DfEE/QCA, 2000) 'Stepping Stones'. The first of these 'stepping stones' is for children to show an interest in ICT, and the QCA guidance suggests that this is best achieved by providing opportunities and encouraging the use of progressively more sophisticated technological applications. The stepping stones go on to refer to children learning how to operate technology for themselves. This begins with switching things 'on and off' and progresses towards learning about programmes and programming (i.e. switching things on and off in sequence).

The third stepping stone is for children to be completing programmes and using apparatus to perform simple operations for themselves. One aspect of this is to introduce and encourage children to use the language of technology.  The stepping stones suggest that practitioners should help children to become more aware of the technology that is all around them, in the setting, in their homes and in the local environment. These technologies include; washing machines, that store information to complete the wash, rinse, spin cycles that are appropriate to different fabrics and finishes; they also include street lights and signals; telephones; cash registers; and burglar alarms. In all of this there is enormous scope for the integration of technology into play environments. Outdoor play vehicles, and other toys may be controlled by traffic lights; we can draw attention to the need for home corner washing machines to be programmed for different fabrics; and encourage the use of pretend (or functioning) telephones, cash registers, office photocopiers, supermarket bar code scanners, computers etc. in socio-dramatic role play.

'The Early Learning Goals are also broadly equivalent to level 1 of the National Curriculum' (NCp23) and at this stage:

*Pupils explore information from various sources, showing they know that information exists in different forms. They retrieve information from different sources:*

- *people,*
- *books,*
- *databases,*
- *CD-ROMs,*
- *videos,*
- *TV*

*They use ICT to work with text, images and sound to help them share their ideas…to present information e.g. in creating a display*

*They make choices when using such devices to produce different outcomes trying things out and exploring what happens in real and imaginary situations (e.g. in adventure games or simulations)*

*They talk about the uses of ICT inside and outside school and recognise that many everyday devices respond to signals and instructions.*

*They talk about their own use of ICT e.g. in programming a floor turtle.*

Early Years settings in England and Wales are regularly inspected to ensure that the quality of provision is satisfactory according to the above requirements and Inspection reports often make specific reference to the need for greater provision. But according to a recent report from the Office for Standards in Education (OfSTED, 1999) many institutions continue to have difficulties in supplying a range of technological resources such as tape recorders, programmable toys or computers; " although eight in ten local authority day nurseries are now doing so" (ibid).

In Scotland the curriculum guidance for pre-schools is less elaborate and no specific reference is made to the need for this sort of ICT provision, there is more general guidance on technology education.

**The Kidsmart Study Aims and Research Questions**

Nancy Nager 1999 and 2000 Evaluations of the US Kidsmart programme suggests that the following key features of the US initiative have demonstrated strong evidence of programme improvement:

- The presence of adults working along-side the children at the computer.
- The degree of 'comfort' reported by practitioners in having the Young Explorers in their classrooms.
- The extent to which the computers are utilised.
- The extent to which the use of the computer is instructive, as demonstrated by the reduction of children's 'random clicking'.
- The extent to which children support each other at the computer.
- The extent to which boys and girls are equally involved.
- The extension of learning through e.g. adult questioning.
- The level of knowledge practitioners demonstrate regarding the learning opportunities offered in the Edmark software.
- The level of satisfaction expressed by practitioners in the Kidsmart training.

While any systematic evaluation of either the children's 'random clicking', or of the adults use of appropriate pedagogic strategies such as 'questioning', lay beyond the scope of the present study, all of these other features are addressed in the following pages.

In addition to the above, each of the following general questions is addressed in our study:

*How effective has the Kidsmart initiative been in developing Information and Communications Technology Education in the UK pre-school settings over the first year?*

*How 'developmentally appropriate' are the furniture, computer hardware and software for use by children in UK pre-schools?*

*How effective has the UK Kidsmart training been, and what can be done to improve upon it in Phase 2?*

 **Methodology**

We devised an intervention study, the two components of the intervention which were evaluated were the introduction of the Young Explorer computer/s and the training provided by IBM at their training centre and the DATEC support training which was based in the pre-schools.

Two instruments initially developed for use in the DATEC project were used to collect data

for the evaluation. The most elaborate of these is an Early Childhood Environment Rating Sub-Scale (ECERS) for ICT. The ECERS-R is one of the most widely used observational measures for describing the characteristics of early childhood education (Harms et al 1998). The instrument provides a rating of the quality of the early years environment as well as the resources and the provision offered. This newly developed ICT ECERS subscale (Siraj-Blatchford, J. & I. 2000) (Appendix F) covers three items that reflect the provisions of the foundation stage curriculum applied in England and Wales. These are:

- Information handling and communication skills
- Access and control of ICT tools
- Learning about the uses of ICT

Each one of the three items includes examples that describe the ICT provision, and others related to equipment, facilities, pedagogy and social interactions. A seven-point scale is applied to indicate a range of practices and provisions that are considered inadequate (Level 1) to excellent (Level 7). A level 5 rating represents the kind of 'good' practice that may be expected to fully satisfy the requirements of the foundation stage curriculum and Early Learning Goals.

The other DATEC instrument was developed to review ICT applications (Appendix B), and another three instruments (Appendix C-E) have been developed to provide the remainder of the evaluation data identified above:

- Semi-structured centre manager interview schedule: Each manager was interviewed at the start and at the end of this phase of the programme.

- Practitioner Questionnaire: a total of 42 practitioner questionnaires were returned for analysis at the end of this phase.

- Parent Questionnaire: questionnaires about the ICT home environment were returned and analysed.

**The Findings**

*Effectiveness*
The most significant finding across all of the settings has been that the children have clearly enjoyed, and the parents and practitioners have very much appreciated the improved access to new technology afforded by the Kidsmart units.

While there is broad international agreement regarding the general principles and assumptions that inform the Kidsmart guidance developed for practitioners in the USA, it should already be clear that there are a number of differences in the European pre-school context that needed to be addressed in this evaluation (EDC/CCT, Kidsmart 2000: International Page). As the foregoing account of the UK context shows, the state guidance for ICT educational provision in pre-schools is fairly elaborate in England and Wales, and the aims are in some ways quite distinctive from those applicable in the USA. This is not the only difference, as the EARLY EDUCATION representative attending the Kidsmart International Meeting in June of 2000 found on her visit to one Kidsmart setting in New York:

*"The room displays included work on butterflies which had been initiated with real caterpillars. Other work displayed suggested a greater emphasis on writing and sums that would usually be seen in English nursery schools. From conversations with the staff I gathered the programme was more like a reception class with carpet sessions on what day it was, the weather etc...."* (Ann Kent, Notes, 2000)

This has had serious implications for the initiative from the beginning as many of the Edmark programmes include a question-and-answer mode that most early childhood educators in the UK find inappropriate for day-to-day application.  For this reason we were anxious to identify the most appropriate applications of both the Edmark and other software that were being employed in the settings. This matched the aims of the DATEC project well, as it was already committed to identifying good practice and it provided the basis for this collaboration. Copies of an *ICT Evaluation Review* proforma were therefore distributed to each setting and the DATEC on-site training (provided in addition to the IBM training) that was provided included instruction on how to complete the review whenever a promising application was identified that might usefully be communicated to others. An example of one of these review sheets in included as Appendix B.  Our intention is to create a fully searchable online database of these reviews, which will include information on learning objectives, ideas for integration with other activities and potential for collaboration.

We were also keen to provide an evaluation of the initiative that would show any improvements made in provision in the most appropriate terms, and the ECERS has provided exactly that.  Our findings show significant improvements in every area of the ICT curriculum.  When compared with our control group of (13 one was unable to accommodate a second visit to conduct the ICT subscale) settings, the findings suggest that the ICT provisions made in the Kidsmart settings were initially broadly in line with other similar providers, and that after just one year 69% of the Kidsmart settings have achieved a rating of 'good' or better in at least one of the sub-scales. An improvement of 2 or more points has been achieved in each area.

| | 'Control' | Pre-test | Post-test |
| --- | --- | --- | --- |
| **ECERS Sub-scale** | (average) | (average) | (average) |
| Learning about the Uses of ICT | 2.2 | 2.6 | 4.6 |
| Access and Control of ICT tools | 1.5 | 1.7 | 4.1 |
| Information Handling and Communication | 2.5 | 1.9 | 4.3 |

**Graph A: ICT ECERS sub-scale results in Learning about the uses of ICT**



Preschool centre

■ Pre-intervention  ■ Post-Intervention
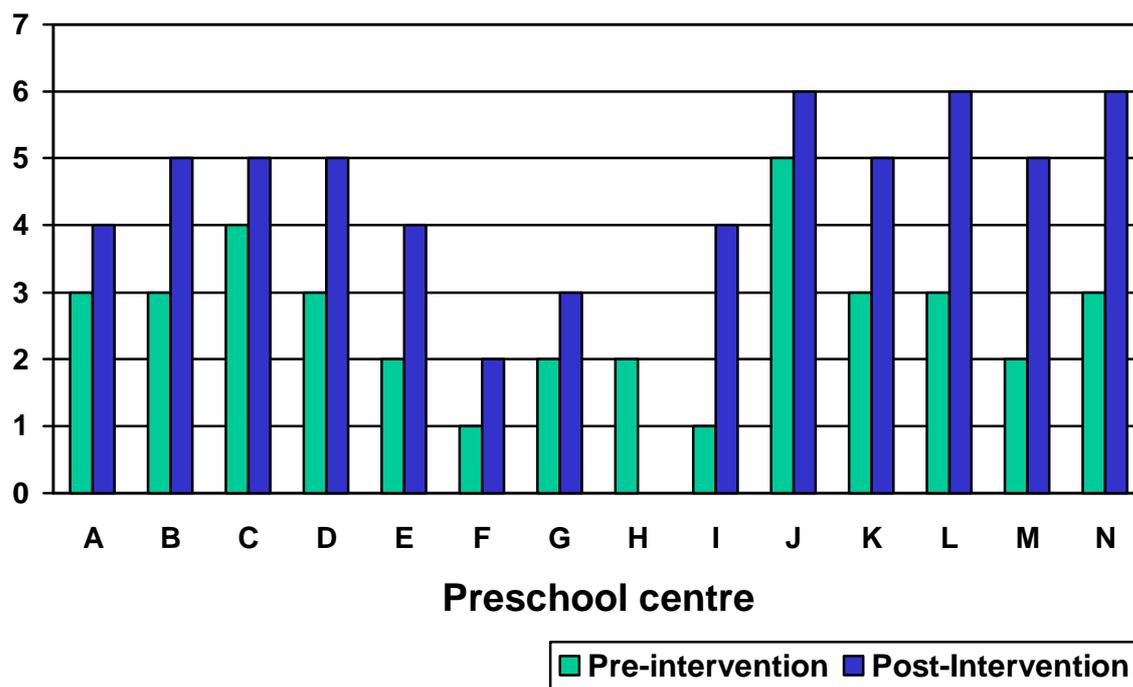
**Graph B: ICT ECERS results in Access and Control of ICT tools**
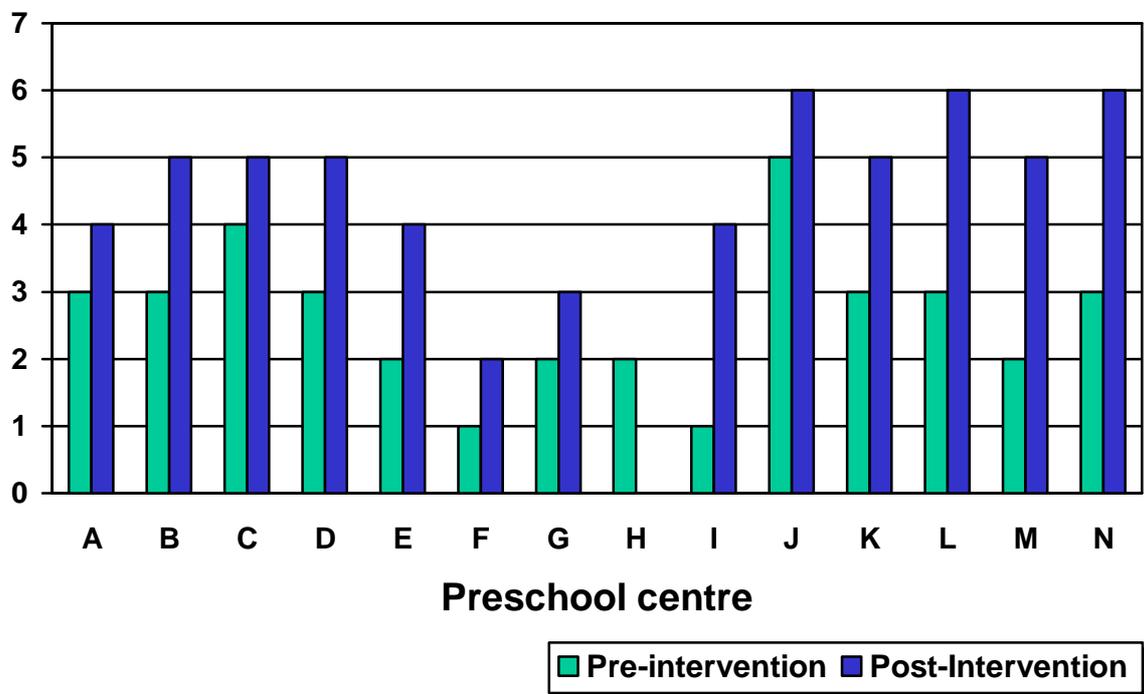


**Graph C: ICT ECERS results in Information Handling and Communication Skills.**
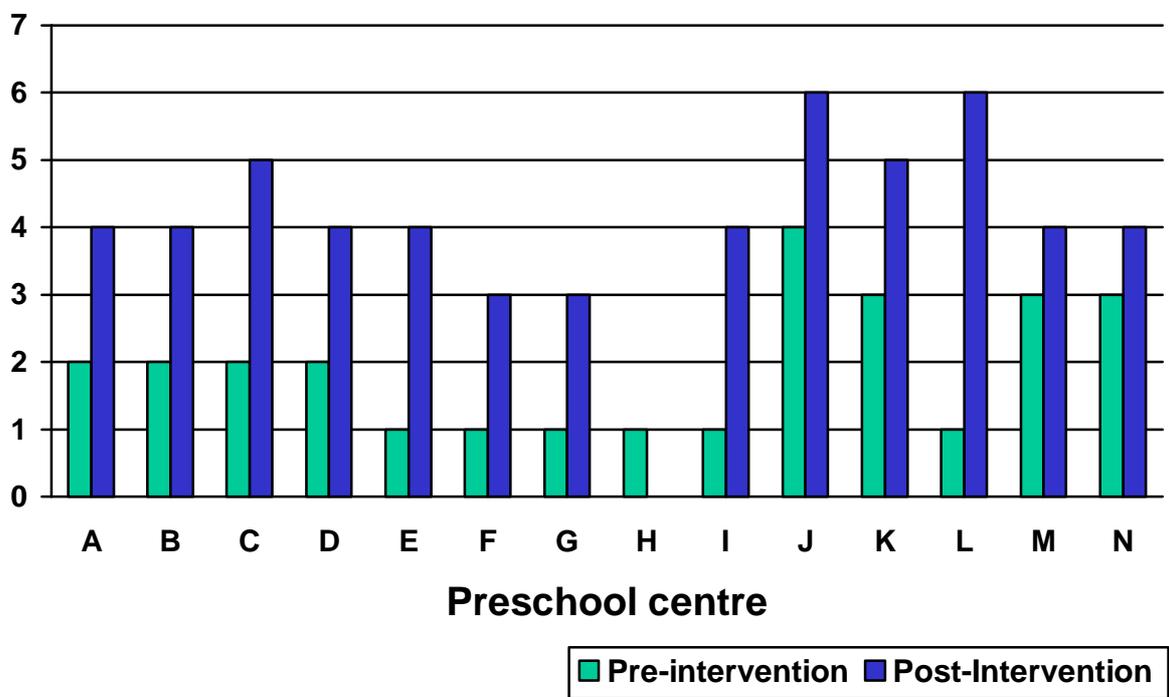
We also asked the practitioners how 'comfortable' they felt about having the Young Explorers in the their classrooms. After the first year Nager (1999) reported that approximately 25% of the US practitioners were 'not too - but getting more comfortable' with the computers. At the end of the second year 51% of these teachers reported that they were 'very comfortable' and 43% that they were 'comfortable'. The UK situation appears to be comparable with many practitioners feeling some initial discomfort, but gaining in confidence as they build up experience.

### Graph D: How comfortable are you with the computer in your classroom / setting?
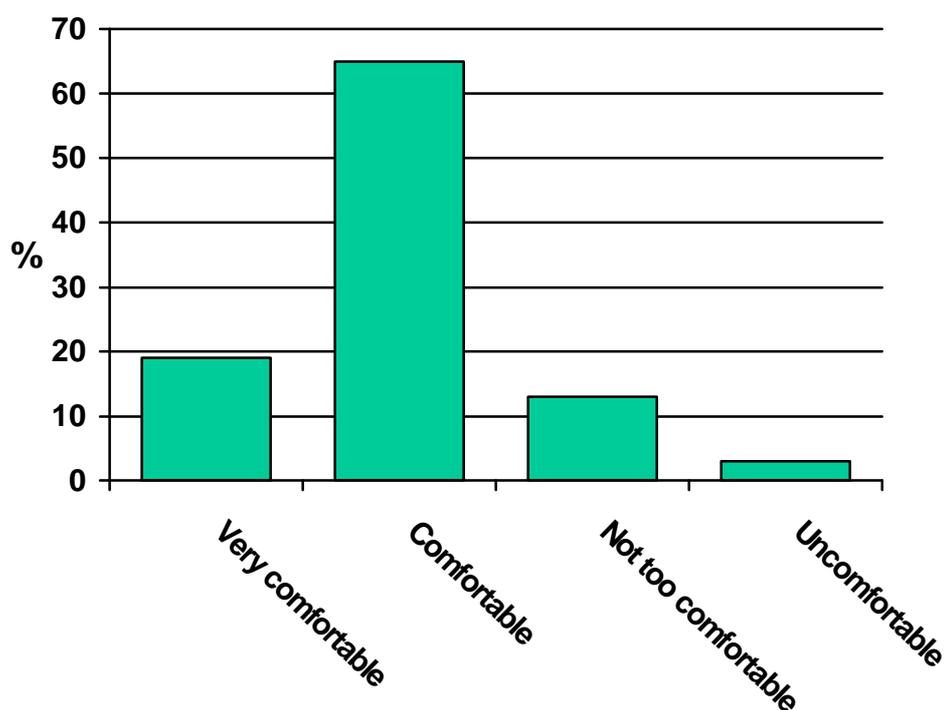


At the start of the project none of the settings had an ICT curriculum development plan or a written policy (See Appendix A). Half of all the settings have now developed ICT plans and four of the settings have developed ICT policies. In one setting quite remarkable progress has been made in the last year:

*"At the moment we have 3 computers, 1 with a touch screen, we have video conferencing, telephones that children can actually speak to each other, a pretend bar code machine, a digital camera, a scanner which is not attached yet, cassette players, a microwave oven, and some pretend equipment that children can use in the home corner like a washing machine".* (M-J)

In the same setting one of the practitioners reported:

*"I feel that because we have staff who are innovative and creative with the computer we have extended the possibility of children's use. We have made children's books and put them on disk, we have used the digital camera for a variety of uses and have used photos to*

*make books, puzzles, and games. We have made our own 'My World' screens which are directly related to the ELGs".* (P-J3)

*The extent to which the computers are utilised*

The UK practitioners report on the equipment being used for between 50-90% of the time available and 50-100% of this time is considered to be 'productive' use. These figures appear to be broadly in line with the US experience (Nager, 2000). But the variation in responses that we found even from the same setting suggest that there is still a wide variation in understanding what might constitute a 'productive' use of the computer, as one particularly indiscriminate practitioner put it:

*"The children are always enthusiastic and keen to use computers. Even if programmes are not being used as intended the children are still commenting on pictures, colour etc." (P-F4)*

*The presence of adults working along-side the children at the computer*

There remains a wide variation in attitudes towards the need for supervision all but 4 of the practitioners and managers referred to between 40 and 75% of the children's time on the computer being closely supervised. One manager suggested that in her setting only 25% of the time was supervised, and another practitioner said that 100% was supervised. This appears to compare well with the US experience where Nager (1999/2000) reports only 25% of the teachers present for under 25% of the time children spend on the computers, and 25% being present for between 25 and 50% of the time.
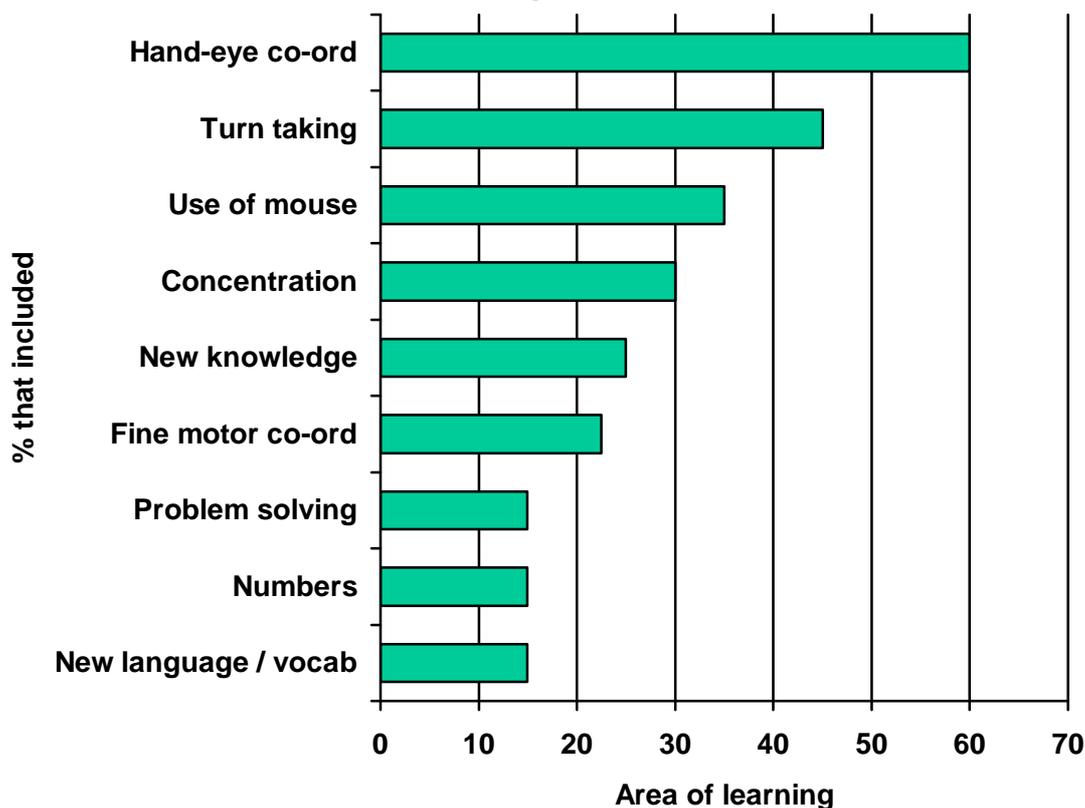
*The extent to which the use of the computer is instructive*

As suggested above, in the UK ICT education is concerned partly with the development of ICT literacy; it is about learning about ICT, as well as learning with it. The recognition of this by practitioners is therefore crucial. Our initial interviews with setting managers showed that for many the term *ICT education* was taken to mean 'computer education' alone. Our interviews at the end of the year showed a great deal more recognition of ICT as a much broader term denoting all the technologies providing access to information and communication. There has also been substantial progress in many settings with respect to ICT provision in socio-dramatic play and in involving the children more in operating the technology around them. In one setting for example, children have been involved for the first time in the design of new socio-dramatic play areas (e.g. shops/offices using pretend and real technology). Practitioners have also taken children with them and discussed with them the programming of the dishwasher and the washing machine used to launder the nursery aprons. In another setting the children visited a supermarket and observed checkout operators working with bar code scanners. On their return to the setting the bar codes were identified on a range of products and a pretend scanner was constructed for the children to play with.

It has only been through involvement in the Kidsmart initiative that many settings have learnt how ICT may be integrated right across the pre-school play-based curriculum. In our initial interviews our respondents referred exclusively to the integration of computers with a limited range of curriculum subjects.

We asked them what they considered children learnt from their use of the computer but their responses showed a heavy concentration on the learning most directly associated with the children physical and social interacting with and around the equipment (Graph E):

## Graph E: What children learn from their use of the computer



*The extent to which children support each other at the computer.*
The study shows that most children sit and work together at the computer in pairs, although groups of three or more are also common. The data also suggest that the children take turns and collaborate when they are together at the computer although many of the practitioners comments suggest some variation in their understanding of the term 'collaboration' and there appears to be a good deal of potential for further development in this area. As one setting manger reported:

*"They cluster around it I would say that it is not programmed in well to fit within the curriculum. It is generally overseen by members of staff but it is not to my mind as an integral part of the curriculum and I would like to develop that. The children are enthusiastic and they want to play with the computer. Those that have experience from home help others and what I would really like to see is children working together around the computer, the screen and the keyboard rather than isolating themselves" (M-A)*

*The extent to which boys and girls are equally involved*
70% of our respondents suggested that boys and girls were gaining equal access to the computers. But in 30% of cases the boys were felt to be gaining more access and for most

practitioners this is an issue that they are concerned to address.

In one setting the manager argued that it was a good thing that the boys dominated the computer because in the absence of that the nursery had little to offer them. He argued that the nursery philosophy and environment was influenced strongly by women and that most activities e.g. 'dressing up' were much more motivating for the girls. The manager was concerned about the educational underachievement of boys and saw the computer offering some real potential in terms of compensation.

*The level of knowledge practitioners demonstrate regarding the learning opportunities offered in the Edmark software*
We asked managers and practitioners about their favourite software at the start and at the end of this phase of the programme. Where computers were already in use in the settings a very broad range of software was used (comparable to that referred to in the parent section below). At the end of the year the Edmark software came out strongly as those most commonly used, with Millie's Math House (especially Build a Bug), Baileys Book House, Sammie's Science House and Trudy's Time and Place House (especially the Jelly Bean Hunt) all specifically referred to. The other clear favourites were Leaps and Bounds (Brilliant Computing), My World and Switch on Travel (Granada), and Tizzy's Toybox (Sherston). We also asked them what criteria they applied in selecting software and the majority referred to the suitability for the particular age/stage/ ability of children; the quality of graphics; children's preferences as well as the degree to which the activities provided were 'open ended'.

Most of the practitioners believe children achieve much more in the setting if they have a computer at home, with only two practitioners qualified this response by saying that the children had an 'initial' advantage, and that the others picked it up quickly. One practitioner wasn't sure. When we asked them in what way the children benefited from their experience at home; 43% referred to 'mouse skills', 30% to their skill and independence in accessing programmes, and 18% their confidence.

We also asked the managers and pre-school practitioners how they thought the computer might contribute to achieving the early Learning Goals (or the Scottish learning targets) (see Graph F). Interestingly, these responses were quite different from the responses to our questions about the most likely learning outcomes. The emphasis this time was on literacy, numeracy, colours and shapes.

*The involvement of parents*
A total of 156 parent questionnaires were returned and while a good deal of the data collected for DATEC using this instrument has little relevance to the IBM evaluation we were anxious to check and see whether either the initial level of provision, or the extent of any improvement in provision were related to the extent of provision in the home. We found no evidence of this.

The parents reported that an equal number (49%) of the boys and girls were given the opportunity to operate a desktop PC (with or without adult support) in the home. While it is difficult to judge at this time of strong growth in the UK home computer market, this suggests a usage in the home somewhat above the national average.

We asked parents what software they used with their children at home and a total of 75 different early learning and edutainment programmes were cited! This constitutes an extraordinarily wide range within which the favourites (apart from Microsoft Paint and Wordprocessor packages) were:

The Tweenies
Learning Land

The Jump Ahead Series (Havas)
Noddy (Tell Tale)
Thomas the Tank and Friends

**Graph F: How do computers assist in teaching the ELGs?**
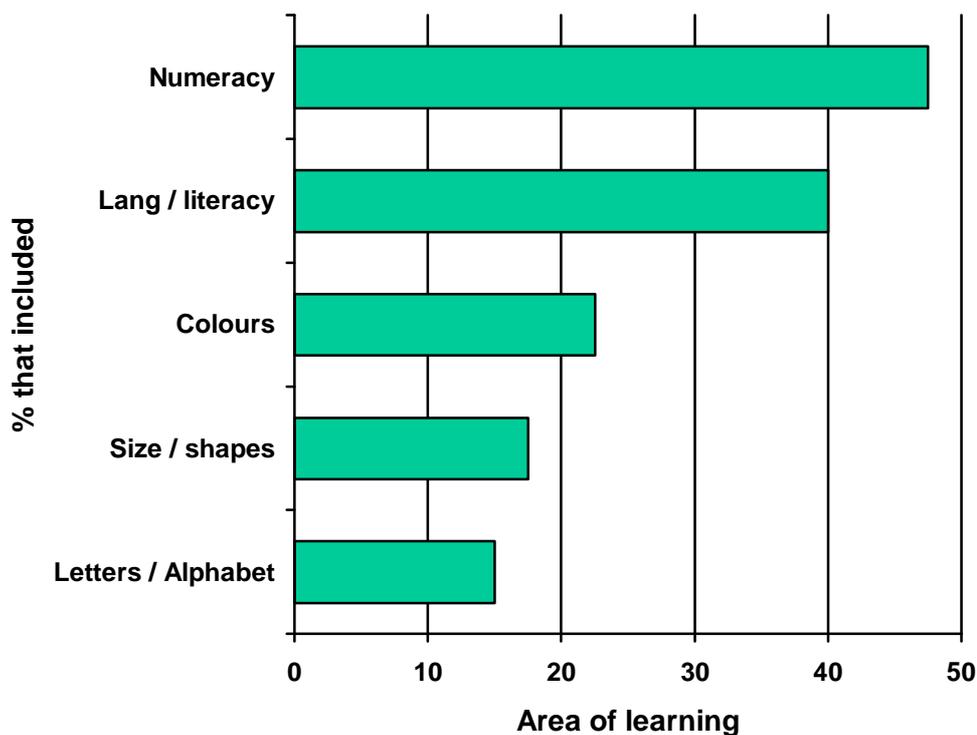


Amongst the numerous other titles mentioned were programmes produced by The Learning Company, Disney Interactive, Fisher Price and Dorling Kindersley. If nothing else the variety of software titles referred to suggests that parents might benefit from greater involvement in future pre-school developments. Even more significantly, where parents are provided with the means to do so, the research suggests that they may contribute in a major way to supporting their children. The key to this form of educational partnership seems to be in the development of curriculum and pedagogic continuity between the home and the setting. It may well be that the application of common computer software products could present a major step in that direction.

*The Young Explorer Early Learning Centres*
The equipment has shown itself to be both durable and effective. While a few of the settings had already obtained computer equipment prior to their involvement with Kidsmart this was mostly obtained second hand and little appropriate software was available. In one setting we were informed that they had a computer but that the speakers were not working and 'the children are better at using it than the staff'. In another we were told:

*"Well we have within the family centre a development plan that includes ICT for the office-based staff but we haven't got a development plan on ICT for the nursery. We have had computers down in the nursery that have been donated 3 years ago but they didn't last too long. They were used by children of different ages but I suppose they didn't have the*

*appropriate training to use them properly."* (P-I7)

These settings have been especially impressed in the way that the children have recognised and accepted the Young Explorer furniture as an appropriate part of their pre-school play environment.

The Young Explorer bench has been designed to provide seating for two children and according to the documentation it is "scaled to place the monitor right at the child's eye level while the mouse and keyboard is within easy reach of little arms"[1]. Unfortunately, for the vast majority of the 3 and 4 year-old children attending the UK settings the bench is much too low, and alternative seating has often been used. The mouse supplied with the units was also too big for little children's small hands and a 'mini-mouse' replacement was therefore requested.

The Young explorer is also fitted with a flat membrane keyboard for developed for ease of operation by young children and for easy cleaning but some of the UK settings found that it was too sensitive. On her visit to the American pre-school, Ann Kent (Early Education representative at the Kidsmart International Meeting in June 2000) found that the staff had replaced the membrane keyboard with an adult keyboard because they had found that even their two-year olds could manage it, and they were concerned that all the children should learn how to treat the equipment properly. While our survey suggests that practitioners are not 100% convinced of the logic a significant number felt strongly that the children should be using a lower case keyboard, this was reported at an early stage and lower case keyboards were therefore sent to all of the settings with the replacement mouse.

A small minority of practitioners argue that the computers lack 'child friendliness':

*"The children become very disappointed when the computer crashes - they al get frustrated because their work disappears off the screen and they don't know what has happened. The children enjoy working with the computer but the printer takes too long to print out their pictures".* (P-N1)

*The Training*
Nager's (2000) evaluation reported upon the level of satisfaction expressed by practitioners in the Kidsmart training. She found that 32% of the US teachers found the training that they received 'very helpful' and 19% 'somewhat helpful', only 2% found them 'a little helpful'. In the UK for many of the practitioners, the Kidsmart training was the only training that they had received. Most found this 'somewhat helpful' but there was a strong feeling that the kind of training that they really needed at this stage was geared more closely to their developing basic computer skills than addressing either the potential of the Edmark software, or the development of an effective early years ICT curriculum:

*"I enjoyed being part of the IBM training even though I haven't learnt anything. I prefer someone to come in the school and show us the capabilities of the computer"* (P-J7)

Four of the settings came into the project significantly later that the others and, while the centre managers and/or ICT co-ordinators did attend some of the IBM sessions in Feltham, they were too late joining the project to received the DATEC on-site training. This provided some opportunity to evaluate the effectiveness of the DATEC training, and we can see that

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[1] www.ibm.com/ibm/ibmgives/grant/education/programe/kidsmart.html

these settings do not show equivalent gains in their ECERS ICT sub-scale scores to those who did benefit from the ICT curriculum training, please refer to the earlier graphs. These settings will be provided with the DATEC training in phase 2 on the programme.

Practitioners in the UK have made little use of the manual so far, but this correlates with Nager's (1999), phase 1 evaluation findings, where practitioners believed the document to be useful, but where there was little evidence of application at that stage.

*Special Educational Needs*
Several practitioners referred to the need for more training to provide appropriate ICT for young children with special educational needs. In two settings in particular a good deal of work was being carried out using switches and software such as Switch on Travel (Granada). Any adequate evaluation of this work lay beyond the scope of this pilot study but further attention to the matter is clearly warranted.

*Internet*
Many of the settings have still not gained access to the Internet and have therefore been unable to access a good deal of valuable support information and other early childhood sites. The reasons for this delay are very varied but in some cases the problem is clearly the cost of extending and or providing additional telephone lines. There are also those who have yet to see the value or potential of obtaining access. Again this is an issue that deserves greater attention in Phase 2 of the UK programme.

**Summary and Recommendations**

The findings suggest that the ICT provisions made in the Kidsmart settings were initially broadly in line with other similar providers, and that after just one year 69% of the Kidsmart settings have achieved a rating of 'good' or better in at least one of the ECERS ICT sub-scale items. An improvement of 2 or more points has also been achieved in children's learning about Information Handling and Communication, their Access and Control of ICT tools, and their Learning about the Uses of ICT.

While any systematic evaluation of children's 'random clicking', or of the adults use of appropriate pedagogic strategies such as 'questioning', lay beyond the scope of the study, these are both extremely important matters that deserve more systematic analysis.

In terms of practitioner confidence and 'comfortability', the UK situation appears to be similar to that found in Phase 1 of the US programme with many practitioners feeling some initial discomfort, but gaining in confidence as they built up experience.

The study shows the development of a broader recognition of ICT as denoting a wide range of the technologies providing access to information and communication.

There has been considerable improvement in the provision for technology in children's socio-dramatic play with some settings making remarkable progress in such a short time.

There is still a wide variation in understanding of 'collaboration' and what constitutes the 'productive' use of computers and this warrants further attention in future training.

Even at this early stage, the UK practitioners appear to spend an as much, or more time working alongside children on the computer as in the US.

Practitioner responses showed a clear recognition of the learning most directly associated with children's physical and social interaction with and around the computer; the development of hand-eye co-ordination, social skills such as 'turn taking' and their use of the

mouse. When asked how they thought the computer might contribute to achieving the early Learning Goals (or any Scottish learning targets) the emphasis this time was on Literacy, Numeracy, colours and shapes. These responses suggest the lack of any clear awareness of the children's learning outcomes. Some attention might therefore be usefully given to formative assessment and recording practices. A greater awareness of other, less obvious developmental benefits and potentials such as collaboration and creativity needs to be developed.

In 30% of cases, the boys were felt to be gaining more access to the computers and for most practitioners this was an issue that they were concerned to address.

Despite many early concerns expressed about the Edmark software, a number of applications have became firm favourites with both the children and adults.

Most of the practitioners believe children achieve much more in the setting if they have a computer at home but no effort has yet been made to develop an ICT educational partnership in any of the Kidsmart settings. This is a development to be encouraged.

While practitioners expressed an appreciation of the ICT curriculum training that they received they do clearly require more whole staff basic computer skills training at an early stage. This finding has already been acted upon and in the second phase of the Kidsmart programme in the UK all of the settings have been identified in partnership with local authorities who have agreed to provide this basic training. Local authorities have also agreed to identify a member of their staff to attend a Kidsmart national 'training the trainers' session and to feed back the ICT curriculum development training to their local settings.

The replacement of the standard mouse and the keyboard were appreciated by most of the practitioners and managers. The ergonomics of the bench remains a problem that we believe is best addressed by encouraging greater integration of the computer into activities demanding time away from it.

Issues surrounding gaining access to the internet and in providing for special educational needs remain outstanding and of concern to some of the settings.

There are a number of differences in the European pre-school context that need to be addressed and this is particularly the case with respect to staff development and the provision of a more integrated and 'emergent' pre-school curriculum. By the end of 2001 DATEC will be publishing (through CD-Rom and on the internet) curriculum guidance, and detailed accounts of exemplary practices. IBM sponsorship would secure this ongoing work and also support the development of a full searchable database that would hold reviews of the best applications identified in the Kidsmart settings.

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**Appendix A**

## ICT Policy for CENTRE X

### Why do we teach ICT?
We live in a rapidly changing technological world where technologies are extending human capacities we therefore need to help to prepare pupils to understand, experience and make an active contribution to this world in order to learn, communicate and develop the appropriate skills.

### Aims
To encourage children to find out about and identify the uses of technology in their everyday lives and use computers, programmable toys and familiar equipment to support their learning and communication.
To be clear about all learning outcomes as ICT is integrated throughout the Foundation Curriculum

### QCA Early Learning Goals
By the end of the reception year most children child be able to:

*'Find out about and identify the uses of technology in their everyday lives and use computers and programmed toys to support their learning.'*

### Objectives

· To encourage children to use IT as a tool to access other forms of learning and develop the skills needed to do this.
· To develop children's understanding of everyday uses of information and communications technology.
· To develop technological literacy through a range of products which children will be familiar with and which will be easily understood and accessed.
· To integrate technology in socio-dramatic play as a reflection of the world about us.
· To encourage children and staff to use the Internet to gain knowledge and support learning

· To use ICT for communication purposes - with parents, other agencies, other early years practitioners and children and staff with each other.
· To encourage children to work collaboratively, sharing knowledge, skills and enjoyment.

To develop a skills-based approach to computer use which puts the child in control of the equipment rather than the other way around.  To integrate ICT throughout the whole of the Foundation Curriculum

### Teaching Method
The environment of the nursery will be one which reflects our present technological world and where children can access equipment, computers and programmable toys with ease and confidence. Wherever possible ICT will be integrated within and across the early years curriculum. ICT will be integrated with the socio-dramatic play context The staff will be available to assist children 'm accessing ICT and develop their individual skills

### Planning
Long term, medium and short term plans will include ICT.  There will also be a cross-curricular, focused approach to planned ICT with the early years curriculum.
Each child has an individual assessment record which is used to inform planning.

## Assessment and Record Keeping

Each child's developmental assessment record will 'include ICT skills and knowledge which will be continuously used for planning and sharing with parents. ICT equipment will be used to record the progress of children e.g. use of the digital camera and computer software

## Equal Opportunities and Differentiation

All children will have equal access to technological equipment regardless of gender, race, culture or ethnicity, disability or class. However positive action may be taken to ensure that children who have a special need are given priority of access. These needs may be due to physical disability or social need due to financial constraints 'm the home background or needs in relation to a gender bias which might be apparent within boys and girls access to technology.

Differentiation within a class group will be implemented through the assessment procedures where each child has an individual education plan and through the target-setting procedures.

## Staff Development

All teachers and those staff who wish can access the NGfL staff development training programme which starts in May 200 1.

A programme of training will be undertaken by all staff to increase skills and knowledge so that they are able to use ICT for planning, teaching, record keeping, communication and access to further knowledge. This will be led by the NOF sponsored training consultants - CAPITA. The ICT co-ordinator will also provide some training. All staff may access training provided by the LEA or other outside agencies. UUU is the staff development co-ordinator

## Communication and Early Excellence Programme

An web site for the centre will be designed and regularly updated for use by current and prospective parents, students and early years practitioners who wish to know about our service. A video will also be available for the same purpose.

## Health and Safety

Health and safety procedures regarding computer use and use of electrical equipment will be adhered to as set out in the health and safety policy. e.g. timing of computer use incorporating a break, ergonomics, testing of electrical equipment etc. Each member of staff accepts the responsibility for the health and safety of pupils 'm their care

## Responsibilities

VVV is the ICT co-ordinator
WWW is the Web Site co-ordinator
XXX is the Curriculum co-ordinator for Knowledge and Understanding of the World.

March 2001

# Appendix B-F:

# For further information of access to instruments please contact John Siraj-Blatchford: Js303@cam.ac.uk