

Running Head: ICT in a Play-based Curriculum

Computer use within a Play-based Early Years Curriculum

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ABSTRACT

Early Years curricula promote learning through play and in addition emphasise the development of computer literacy. Previous research however has described that teachers feel unprepared to integrate ICT and play. Also, whereas research has suggested that effective computer use in the early years is associated with adult direction, further research suggests adult presence can inhibit play and reduce children's engagement. Focusing on twelve settings following the Welsh play based Foundation Phase, this paper explores teachers' experiences of integrating computer use into classroom practice, children's levels of engagement with computer activities and how playful children perceive computer use to be. Teachers confidently delivered a variety of computing experiences. Children consistently rated these activities as play regardless of adult presence and demonstrated moderate to high levels of engagement. Findings and the features of observed practice are discussed in relation to the teachers' role as a play partner and the successful co-construction of the play based curriculum.

INTRODUCTION

Within curricula for the Early Years across the UK and beyond, considerable attention is now placed on children learning through play and exploration. In addition, the New Primary Curriculum, presented at the Public Policy Exchange in Whitehall on 15th July 2009, highlighted that ICT should form a centre piece of children's early learning experiences. The introduction of such initiatives means that ICT and play must now be integrated into the curriculum for children in the early years. Many of the areas where play and ICT appear to function harmoniously rely on a definition of ICT that reaches beyond the desk-top computer, for instance touch technology or the role of technological toys in socio-dramatic play. However, desktop computers remain a predominant form of ICT provision in early educational environments and are likely to do so for the foreseeable future. Whilst both play and computer use are seen as important for children's development within curriculum initiatives, previous research has shown that in practice they are often peripheral to the real business of learning in early years classrooms (Selwyn & Bullon, 2000). Cuban (2001) suggests that computing provision is generally used to extend traditional teaching strategies (e.g. via software designed to support literacy / numeracy) and in addition, a recent report by Aubrey and Dahl (2008) highlighted that teachers felt relatively ill-equipped to deliver ICT within a play based curriculum.

Playful, positive experiences with computers could help to ensure that children leave their formative years with a positive disposition towards ICT that will serve them well as they progress into the formal stages of their education (Reeve, 2009). The benefits of play for early learning are well documented and it is generally accepted that play promotes children's development across domains. However, isolating what separates play as a valuable mechanism for learning and development

has proven problematic. Critically, systematic research has demonstrated that approaching an activity as though it is play rather than not play has powerful developmental potential. Children define play activities as being those that occur without adult presence, those that are self chosen and can occur on the floor rather than at a table (King, 1978; Karrby, 1989; Howard, 2002). Whilst these seem like relatively superficial characteristics, subsequent detailed research into problem solving following practice in conditions defined by children as either play or not play has repeatedly demonstrated that children's perception of an activity has a significant impact on their performance and behaviour. In particular, when children approach an activity as though it is play they show increased motivation and engagement with the task, more purposeful problem solving strategies, higher levels of meta-cognition and self regulation and increased overall performance (McInnes, Howard, Miles & Crowley, 2009, 2010, 2011; Whitebread 2010). Consistent with findings based on children's perceptions of play, studies that have inadvertently elicited children's perceptions of ICT, reveal that they are similarly motivated by experiences which offer choice and control and promote positive affect (Selwyn and Bullon, 2000; Capella, 2000).

These findings are hard to reconcile with those of recent studies about play and ICT in the early years curriculum however, which have focused on guided participation and adults direct involvement with children during computer use (Plowman and Stephen, 2005, 2007; Kennewell, 2008). These findings suggest that ICT may be best integrated into early years curricula when adults guide children's learning experiences via appropriate dialogical interaction (Siraj-Blatchford, 2002). Whilst this research transmits a powerful message that adults can extend children's thinking, the suggestion that these guided learning activities retain a play-like status

within curricula provision is not explored. If adult involvement is interpreted by children as a cue to an activity being formal rather than playful, then we might expect children to see computer use involving adults as less like play. In addition, based on previous research findings, activities that are less like play might also lead to lower levels of engagement. Given this disparity, it is important to understand how ICT, play and learning can be integrated to best effect, and this was the primary purpose of the study upon which this paper is based.

The paper explores how computer use is integrated into an early years play-based curriculum. Based on previous research it considers the following questions:

- What are teachers' views on the integration of computer use within a play based curriculum?
- In what ways are computers used within a play based curriculum?
- Do certain types of computer use lead to higher levels of engagement?
- Do children see computing activities where an adult is present as less like play?

THE STUDY

Sample

Twelve schools in the South Wales area consented to take part in the study. All schools were following the Welsh Foundation Phase, a play based curriculum for children aged 3-7 years (Welsh Assembly Government, 2003). Table 1 provides a summary of the sample. Schools were selected to represent small, large, rural, semi-rural and urban settings. The school size ranged between 30 and 364 children and the class size between 15 and 60 children. Target classes for the research included those where a single class was taught in isolation (for example, solely the reception aged group) to classes where there was mixed provision (for example nursery, reception

and year one being taught together). This varied provision is typical across Wales (Farrell & Law, 1998).

[TABLE 1 APPROX HERE]

All of the target settings had at least one desk top computer available for use in their classroom, five of the twelve settings had two. Eleven sites also had access to a computer suite. The main type of computer suite was one which was situated away from the class in a designated room for timetabled use. Some classes also had access to a mini-suite that housed three or four computers. These were located within or proximal to, the target classroom.

Phase One – Exploring teachers views and establishing types of practice

Method

We interviewed class teachers from each of the twelve study sites individually to explore their experiences of computer use within the play based Foundation Phase curriculum. The interviews were semi-structured addressing particular issues pertaining to the study but enabling interviewees to introduce related topics that might be important to them (Denscombe, 2007).

All interviews took place in a quiet location within the school setting and were approximately thirty minutes long. Interviews were recorded using a Dionic Linear PCM voice recorder (DDR-5300) and from this, were transcribed in preparation for qualitative analysis using the ATLAS/ti system following the principles of thematic analysis outlined by Braun and Clarke (2006).

Teachers views on integrating play within the Foundation Phase

Teachers described that within the Foundation Phase curriculum, there were no specific requirements for ICT provision, rather that ICT applies to the whole curriculum and should enhance all other areas of learning. Some teachers however, described the need to promote the development of particular computing skills such as mouse control and keyboard skills.

“[the Foundation Phase document]..only has one little statement....and it’s under PSE actually.... to develop confidence in new learning situations”

In general, the teachers felt well equipped to integrate computer use into the Foundation Phase and had access to most basic resources such as a desktop computer with internet access, a variety of software packages as well as laptops, suites and whiteboards. Teachers in classes without a whiteboard expressed that this would improve their practice. Contrary to the findings of Aubrey and Dahl (2008), most teachers described feeling well prepared to deliver ICT in the Foundation Phase, being supported by the school ICT co-ordinators and having received in-house training courses.

“we’ve got an excellent coordinator ... she’s really helpful if you need any advice or certain programmes“

Teachers did, however, describe a variety of challenges to their ICT practice such as budgetary constraints, dated or ill positioned equipment.

*“... our computers are well, I wouldn't say old, but they're not new either
...it's funding really....there's a lot of things you can get ...it would be nice to
have nice little stations and all the heights and everything all measured out
correctly”*

A further challenge was providing less experienced children with additional support.

*“the children haven't got that much experience at home with computers...not
this particular group of children but also children that we've had in the past...
you can tell they're not used to using a mouse for example”*

Teachers sometimes referred to the benefits of computer use across developmental domains as well as the promotion of subject specific skills, for example in numeracy and literacy. Predominantly however, they described its contribution to social and emotional development.

*“They are explaining to one another.... communication skills....explaining to
others....co-operating....taking turns”*

Although the activities teachers planned on the computer generally had quite specific learning outcomes, teachers described that the children in their classes approached activities enthusiastically and would be likely to describe the activities as play.

*“(they think its play)...because it's so visual it's ...you know they're not sort of
sat down...they don't feel that it's structured, they've got the freedom to control
what goes on you know... even with an adult there, they're in control“*

Teachers' descriptions of computer use throughout the day

Teachers were asked to describe how the children in their classes used computers throughout the day. Responses could be thematically grouped into those which related to (1) planned type of provision (2) teacher presence (3) the facilities being used and (4) group size.

(1) Type of provision

Teachers referred to three different types of planned computer use in the classroom; continuous, enhanced and focused provision. These three types were consistent with the guidelines for activity provision within the Foundation Phase training documentation (Welsh Assembly Government, 2008).

Continuous provision involved minimal adult presence and children were free to choose whether to participate and what activity they would complete. Most teachers described how continuous provision happened at a certain time of the day. Sometimes continuous provision was constrained because of large class sizes, fear of damage to the equipment and having to provide fair usage to all children using time slots.

“...if the children are not involved in a task with an adult and they're doing continuous provision, they can choose to go on there whenever they want”

Focused provision involved the direct teaching of specific skills and often involved the whole class at the whiteboard or in a computer suite. Here the teacher planned and directed a specific task in order to develop a skill, subject knowledge or

achieve a particular outcome. Children did not have choice about whether or not to participate in focused tasks.

“(focused work is)...more sort of language based and maths based activities in the morning that’s when I’d use an adult and it would be more structured”

Enhanced provision lay somewhere between continuous and focused, wherein the teacher might suggest an activity that would extend or apply a previously learned skill but the child would be offered a certain degree of choice about whether or not to participate. During enhanced provision adults might be present but generally this was at the request of the children.

“the areas are set up so that they can actually go to them independently but we put programmes on... sometimes we may use it in relation to language so we may say we want you to go on the computers and do the work there”

(2) Teacher presence

The teachers described being present or peripheral when children used the computers. Presence through the whole of an activity was generally related to focused tasks where there was a set learning outcome and the teacher gave direct instruction.

“If it’s a focused task, the adult will go in to teach”

“it’s going to depend on how the children respond whether or not what they’re drawing is what we’re really expecting in the outcome, what we’re wanting..... if they’re not providing it then we’ll try and direct with the questioning”

During activities that met descriptions of enhanced or continuous provision, the teachers described being on the periphery, when and if the children requested their support.

“there’s not usually an adult there (during free activity)...there’s one around but not specifically sitting next to them, telling them what to do or guiding them”

(3) Facilities being used

The teachers referred to children’s use of the internet and particular learning software using the classroom computer as well as a classroom computer linked to the whiteboard or use of a computer suite.

Large computer suites tended to be situated away from the main classroom and were available to the whole school. These were generally used weekly on a timetabled basis with the whole class and were not described as being part of children’s daily provision.

“we have a set time...every Tuesday morning... they do a designated ICT lesson every week”

A mini suite comprised fewer computers than a large suite and could not accommodate the whole class. These tended to be located in an area within the main classroom or in a small adjacent room nearby. Mini suites were used for a variety of purposes to suit what teachers had described as focused, enhanced or continuous provision. Teachers described how a mini suite particularly suited the needs of early

years provision, where constant access rather than intensive formal lessons are important.

“we installed those downstairs (the mini suite near to the class compared to the full suite that is upstairs) so we could access them constantly.... upstairs is similar to ours.... (but) more for whole class teaching”

Eleven of the twelve teachers described using whiteboards as an integral part of computing provision, most often in relation to focused activities. Whiteboards were also used during enhanced and continuous provision by the children independently, but this was less frequently described and sometimes explicitly stated not to be the case.

“we use it for maths games we use it for everything really....always focused provision though...never continuous”

“with the whiteboard we’ll take a group of about four on a particular day.... it’ll be their chance to have some kind of input.... I’ll put something specific on...we’ve got Easy Teach and there’s like a maths focus”

In addition to traditional computer use (the focus of this paper), teachers also described children’s use of other types of ICT such as Beebots, CD Players, Listening Stations, Remote Control Cars or Digital Cameras.

“In their independent tasks they’ll be using things like Beebots... digital cameras and microphones”

(4) Group size

Teachers described various social contexts for computer use in their classrooms. These included a child using the computer alone, children working in pairs, small groups or as a whole class. The reasons for particular group size were often related to the nature of the task (whether it was freely chosen or a directed task), to facilitate fair usage or to meet the logistic demands of large class size.

Teachers described how children often used the computer alone and that they might be directed to do so by the teacher (to complete a particular activity for example) or could choose to do so as part of continuous provision.

“sometimes within a focused task and you’ve got certain outcomes that you need from it....it could be with me ... one to one”

“(when it’s free choice)....there’s enough chairs for them to pair up or if they like they can go up there alone”

All teachers frequently described children using the computers in pairs and often mentioned the benefits of this, such as learning skills from one another or sharing information. Paired use of the computer was often a means of ensuring fair access. Children could be directed to work in a pair or were able to choose.

“you might get a younger child and an older child....they might be saying ‘oh yeah this is how you use a mouse’ or when I’ve observed them...you can see a

lot of language going on, helping each other ...I might put them in pairs...to encourage an older one to help a younger one”

“staff try and keep an eye and have a tick-list on who’s going on there....they usually go on there in partners”

Around half of the teachers described the use of small groups for computer activity. This was often in relation to mini suites. Other descriptions included when children spontaneously created a group when using the computer by gathering around what one or two other children might be doing.

“well they’ve got little stickers for each area so they’ve got to put their sticker on and it’s two stickers by the computer for two to go on there, but they do like to watch the others... they’ll automatically get a chair from somewhere else and you’ll very often get four or five standing there, they’ll join in ‘cause ... they’re attracted with songs and sound and stuff so they join in”

“you might have three working together but it would be a specific focussed task.... they would have something specific they’ve got to research or look at and then they feed back on the information they’ve got”

“(sometimes) they’re... on their own at the computer but there’s a group around them and they interact with one another..... they like to see what other people are doing and learn- they’re learning from them as they watch”

Reference to whole class activity in relation to computer use generally pertained to tasks described as focused. This approach was used in the large computer suite or in class with the whiteboard. During whole class activity, teachers described leading the activity, demonstrating or doing direct teaching.

“there’s probably one or two specific lessons we do a week (a whole group session around the whiteboard) ...”

The characteristics of computer use described by teachers is summarised in Table 2. Teachers described how they used computers throughout the day in relation to continuous, enhanced and focused forms of provision. These different types of provision were related to the level of choice children had about participation and the level of teacher involvement and direction. Teachers also described different types of computer use according to social grouping; whether children were alone, in pairs, small groups or participating as a whole class. Use of different facilities was also described, for example the classroom desktop computer, use of a suite or the interactive whiteboard. The following section considers whether these different characteristics of practice impacts of children’s level of engagement.

[TABLE 2 - APPROX HERE]

Phase Two - Exploring children’s levels of engagement with the identified types of computing practice

Method

To explore whether different types of computer use impacted on children's level of engagement, children's computer use at each of the 12 settings was video recorded for one full day. Teachers were asked to conduct their planned classroom activities without regard to the presence of the researcher as far as was possible. We endeavoured to collect footage of episodes of computer use in each sample classroom that represented the pre-identified characteristics which emerged as a result of the teacher interview analyses. A Panasonic HDC-HS300 video camera with a 120g hard drive plus tripod, were used to make the observations. Permission for the inclusion of children in the video observations was obtained from the parent or primary carer of each child. Children who could not be observed were identified at the start of each day. The practitioners and the researcher made sure these children stayed out of view of the camera. Sometimes this required the camera to be switched off mid way through an observation and in one case it required the deletion of the end of a clip during which a child for whom permission had not been granted had appeared in camera shot. The videotape was reviewed after each day of observation to ensure all episodes recorded met ethical guidelines for parent/caregiver permissions.

Of the 53 episodes of computer use recorded across the 12 classrooms, 39 met initial criteria for analysis in that i) the nature of computer use remained constant and ii) the children using the computer remained constant. The average length of each episode was 22 minutes and 40 seconds (SD = 13 minutes and 42 seconds). In each episode the central four minutes was selected (two minutes either side of the midpoint to the nearest second). Children's level of engagement was assessed using the Leuven Involvement Scale. Observation using the scale yields a score between 1 (lowest level of engagement) and 5 (highest level of engagement) via the presence of signals and cues (Laevers, 1994). In each clip at least one child was shown throughout and could

be clearly observed and rated. In six of the clips it was possible to observe two children. Consequently a total of 45 engagement scores were obtained.

Results and Discussion

Across all 45 clips, the mean Leuven score was 3.6 (SD = 1.05), indicating medium to high levels of engagement in computing activity. Only seven observations had low engagement scores of '1' or '2', whilst eight child observations showed very high levels and were scored as '5'. For analysis, the clips were grouped according to the pre-identified characteristics resulting from teacher interview analysis and the means and standard deviations for these grouped comparisons is shown in Table 3.

[TABLE 3 - APPROX HERE]

There was no significant difference in children's engagement according to provision type (Kruskal-Wallis Test, $p = .881$) or teacher presence (Mann-Whitney U Test, $p = .990$). Whilst there did appear to be slight increase in engagement when children used the computer within a mini-suite, this difference was not significant (Kruskal-Wallis Test, $p = .586$).

The clearest difference in the data is between the observations of children in whole class activity compared with the other group sizes. In the former involvement is low, whilst it is generally high during other social contexts, particularly in small group activity. Group size was shown to have a marginally significant effect on the involvement scores (Kruskal-Wallis Test, $p = .054$).

The moderate to high levels of engagement found across most types of computer use suggest it is a suitably motivating activity for children in Early Years

classrooms. Children were in most cases actively engaged. It is important to note that teacher presence did not impact on children's level of engagement. This is in contrast to previous findings in Early Years settings (McInnes et al., 2009, 2010, 2011) and supports the idea that practitioners are accepted as play partners during computer use. Whilst these conclusions are based on null effects, the lack of engagement in some episodes, notably those using whole class computer use, confirms the sensitivity of the widely-used Leuven measure that we employ here.

Phase Three – Exploring the impact of teacher presence on children's perceptions of computing activities

Method

A total of 103 children (aged 4 – 6 years) across each of the 12 sample sites participated in small focus groups that used a game like procedure to rate the playfulness of computing practice according to teacher presence. Twelve pairs of video clips were selected for presentation. Each pair portrayed the same type of computer use but differed in that a teacher was either present or not present. Children were asked to become 'special agents' and using a secret ballot card, were asked to rate how much like play they thought each activity was (0 being not like play and 5 being a lot like play). To facilitate children's understanding of the measure, the secret agent ballot card pictured Lego towers of various heights which the children could tick or circle (see Figure 1). Actual Lego towers were placed in the centre of the table and the researcher explained that less bricks indicated 'not much like play' and more bricks indicated 'a lot like play'. This reminder was repeated for each clip. Children posted each response into a brightly coloured ballot box. Sharing of responses at this

stage was minimised by presenting the activity as a 'secret mission'. One clip was rated before moving on to the next.

[FIGURE 1 - APPROX HERE]

Although the playfulness ratings yielded interval data (0 being low and 5 being high) it was treated as continuous so that the distribution of ratings from each group of children could be adjusted to a shared mean (standard deviation remained unadjusted). This was done to enhance the comparability of ratings collected from the different groups of children across all of the sample sites.

Overall, children rated the clips of computer use as very playful (mean playfulness rating = 3.69, SD = 1.60). There was no significant difference in children's ratings of the clips according to whether or not a teacher was present and data ran contrary to expectations. The mean playfulness rating when a teacher was present in the recorded activities was 3.88 (SD = 1.6), higher than when a teacher was not present where the mean rating was 3.58 (SD = 1.59).

These results mirror the findings of Part 2. Teacher presence is not seen as reducing the playfulness of computer use. Whilst this conclusion is based on null effects, the measure used here was directly derived from measures used by Howard (2002) and McInnes et al. (2009, 2010, 2011). These studies consistently reported strong negative effects of teacher presence on children's perceptions of the playfulness of an activity. In the current study, it seems teachers help children play with computers rather than getting in the way.

GENERAL DISCUSSION

Contrary to the findings of Aubrey and Dahl (2008), the teachers in the current study described feeling relatively well equipped to integrate computer use within a play based curriculum and felt supported by in house training and the school ICT coordinators. Interestingly, whilst previous research has found that computers are often predominantly used to extend the traditional teaching of particular skills such as numeracy and literacy (Cuban 2001), in the current study, whilst some teachers did describe their use for this purpose, the predominant response related to the way in which computer use facilitated children's social and communication skills.

Some of the challenges the teachers described such as outdated equipment, are perhaps unsurprising considering the budgetary constraints of schools and the speed at which technology evolves. The challenge of providing additional support for children with lower levels of computing skill however was a less predictable finding which perhaps requires us to question assumptions we might make about children growing up in contemporary society. Whilst market research suggests a significant proportion of the population in the United Kingdom own a computer, for some households, particularly those with lower income levels, this may not be the case. Even in households where a computer is owned, children may not necessarily be experienced in using it. Increased use of computer games and consoles is frequently cited as a reason for children engaging in lower levels of outdoor play and changing patterns of play behaviour more generally (Attewell, Garcia & Battle 2003; Frost, 2006). Use of a computer keyboard and mouse however, is no longer essential for engaging in such games, yet these skills are those which are necessary for computing activity in school.

Again, in contrast to previous research which has suggested that computer use is often peripheral to the real business of learning in the classroom (Selwyn & Bullon 2000), the teachers in the current study described the successful integration of

computer use throughout the school day in a variety of ways. The types of use varied according to the number of children using the computer, whether or not the teacher or classroom assistant were involved in the activity and what type of activity was being completed. The teachers discussed the different activity types as being continuous, enhanced or focused. These three types of provision are those prescribed in the Foundation Phase curriculum training programme (Welsh Assembly Government, 2008). Continuous provision was described as activity that was available freely throughout the day, was selected and undertaken independently by the children and only involved an adult on request. In contrast, focused provision was described as the direct teaching of a particular skill with planned learning outcomes that children were required to participate in. These activities were always led by the teacher or classroom assistant. Enhanced provision appeared to combine qualities from the two other types. Sometimes it was directed and sometimes chosen by the child, sometimes it involved an adult and sometimes it did not. These activities were those that were designed to enable children to practice and master skills previously covered in focused sessions.

Although the curriculum training guidelines suggest that teachers should be involved in continuous provision, playing alongside children, supporting them and asking questions about their activities (Experiential Learning in Practice WAG, 2008), the pattern of adult involvement described by the teachers in the current study is consistent with research demonstrating that teachers rarely involve themselves in children's free play (Garrick et al. 2010; Howard 2010). Previous research has demonstrated that when children are unused to teacher involvement in their play, their presence is often seen as a cue to signal that an activity is not play (Karrby, 1989; Howard, 2002). Teacher presence during computing activity in the current study however, led to no difference in children's ratings of how much like play an activity

was. Although not significant, the trend in the data in fact ran contrary to this and play ratings were higher when a teacher was present. Similarly, whilst previous studies have demonstrated that children show increased motivation and engagement in classroom activities that do not involve an adult, are freely chosen and child directed, in relation to computer use in the current study, there was no difference in levels of engagement according to the type of provision or whether or not a teacher was present. This pattern of findings suggests that teachers are managing their interactions with children using computers effectively, supporting the learning process whilst also facilitating children's autonomy, choice and control. Research suggests that this can be achieved via the use of open rather than closed questions (Payler, 2007; Siraj-Blatchford & Manni, 2008) however messages about classroom activities might also be communicated in other subtle ways.

McInnes et al. (2011) conducted a detailed analysis of classroom interaction in two settings, one where children saw adult presence as a cue to signal an activity was not play and one where children did not use this cue. As well as using more open rather than closed questions, in the class where children did not see adult presence as inhibiting play, children were given authentic opportunities to exercise choice and control throughout the day, for example making choices about when to start or stop an activity. Similarly to Westcott and Howard (2007), they also found that the teacher was involved in children's activities throughout the day, rather than predominantly in those which had prescribed learning outcomes. They propose that these features are central to co-constructing a play-based curriculum that maximises playfulness and learning concurrently.

As has been described, previous research has found that teachers are more likely to dedicate their time to structured learning activities rather engaging with

children in their free play and as such, children have learned to associate play with no teacher presence. Research has also demonstrated that through their classroom experiences, children often associate play with particular times of the day, particular locations or particular social contexts. These cues have often led to children dichotomising classroom activities as play or work. Valuable lessons could be learned from the findings of the current study in relation to classroom practice more generally. Findings indicate high levels of engagement and playfulness across the various types of computing provision regardless of teacher presence, location or social context. In this study it was evident that children were used to teacher involvement in their computing activity, it took place at different times of the day, in different locations and in different social contexts. We suggest that children's experience of this diverse classroom provision has prevented them from developing a dichotomous perception of their activities. Findings from the current study would suggest that the blend of continuous, enhanced and focused provision is an effective means of integrating computer use within a play based curriculum.

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Figure 1: 'Secret Agent' Ballot Card used by Children in the Focus Groups to Indicate 'How Much Like Play' Each Video Clip Was

Table 1: Descriptive Information on the Sample Schools

Site	Location	No. children on roll	*Class observed	Total no. children in class	No. desktop computers in class	Laptop in class	Smart-board in class	Access to computer suite
A	Semi-rural	212	R	32	1	Y	Y	Y
B	Urban	293	N / R / y1	60	1	Y	N	N
C	Urban	230	R / Y1	28	2	N	N	Y
D	Semi-rural	224	N	25	2	Y	Y	Y
E	Urban	364	R	42	2	Y	Y	Y
F	Rural	60	N / R / y1 / y2	29	1	N	Y	Y
G	Rural	30	N / R / y1 / y2	15	2	N	Y	Y
H	Semi-rural	90	N / R	28	2	N	N	Y
I	Urban	220	N / R	58	1	N	N	Y
J	Semi-rural	230	R	37	1	N	Y	Y
K	Rural	142	N / R	47	1	Y	Y	Y
L	Urban	226	R / y1	21	1	Y	Y	Y

**some classes were single groups and others were mixed.*

Codes used are: R-reception, N-nursery, y1 –year one, y2 – year two

Table 2: Characteristics of computing practice described by teachers

<u>(1) Planned types of provision</u>	
<i>Continuous</i>	- Activity available during free choice time
<i>Enhanced</i>	- Computer activity suggested by the adult
<i>Focused</i>	- Direct teaching of a particular skill
<u>(2) Teacher presence</u>	
<i>Present at all times</i>	- Present throughout the activity
<i>Peripheral</i>	- In the background setting, near to the activity
<u>(3) Facilities being used</u>	
<i>Mini-suite</i>	- two or more computers in a small room in/adjacent to class
<i>Classroom computer</i>	- single computer in the classroom
<i>Whiteboard</i>	- linked to a computer in the classroom
<u>(4) Group size</u>	
<i>Single child</i>	- One child at a time
<i>Pairs</i>	- Two children
<i>Small groups</i>	- Three or more in a small group
<i>Whole class</i>	- Whole class activity

Table 3: Mean and Standard Deviations of children’s task engagement (as measured by Leuven Involvement Scale) for data grouped according to pre-identified characteristics of computer practice

	(n) observations	Mean involvement level	Standard Deviation
(1) Type of provision			
Continuous	15	3.67	1.11
Enhanced	15	3.53	1.06
Focused	15	3.60	1.06
(2) Facilities being used			
Single Computer	28	3.54	1.07
Mini-Suite	12	3.92	0.67
Whiteboard	5	3.20	1.64
(3) Teacher presence			
Teacher Present	23	3.61	0.98
Teacher Not Present	22	3.59	1.14
(4) Group size			
Single Child	13	3.69	1.11
Pair of Children	15	3.40	1.06
Small Group	15	4.00	0.65
Whole Class	2	1.50	0.71