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Evaluation of shared desktop storytelling

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Deliverable D3.1 Evaluation of shared desktop storytelling

ABSTRACT

This document is part of the end-year 1 deliverable for Work Package 3 in the KidStory project. This report describes the work of WP3: evaluations conducted during the first year of the KidStory project.

In accordance with the project philosophies described in the School Activities report from Work Package 2 (described in deliverable 2.1), data were collected using a variety of methods. Qualitative and quantitative analyses were conducted to examine five general areas of research interest:

1. Evaluation of changes in technology
2. Evaluation of changes in design partners
3. Evaluation of schools integration
4. Evaluation of the impact of Year 1 technology
5. Evaluation of educational effectiveness

Over the course of the first year we have conducted 14 different activities in more than 40 visits to participating schools with both 5-year-old and 7-year-old class groups. Six teachers and almost 100 children are directly involved in the KidStory project. Design suggestions from design partners (children and adults) were fed into Work Package1 technical development (described in deliverable 1.1). We have seen changes in all design

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Task D3.1

Contents

1. Introduction

The KidStory project aims to develop new technologies to support collaborative storytelling in primary school children. The concept of collaboration here involves two or more children working together to create and tell a story. This requires the children to share the workspace provided by the computer program – a relatively new aspect of information technology.

Many education technology development projects are created using a laboratory-based design phase followed by field-testing phase, which may be iterative. KidStory is an expansion and extension of this, genuinely involving children and teachers as part of the technology design team. The potential benefits of this approach include technology that is tailored to the needs of users, user involvement in design producing a sense of 'ownership' of the product and, subsequently, a greater chance of successful integration into the usual teaching regime of the school. However this approach is not straightforward. If the design process is to be successful, children and teachers have to learn how to be design partners and researchers have to understand the educational contexts within which they are working.

Initially the KidStory project focused on building up a relationship with the two participating schools. This required introducing the pupils and staff to the project, familiarising them with the existing technology at the outset of the project (KidPad and Klump, described in deliverable 1.1) and their role as research partners (described in deliverable 2.1).

Cooperative Inquiry techniques were used to collect data and describe outcomes from the school activities. These methods were chosen as they have been successfully used before with groups of young children to inform the design of technology and evaluate how it is used (Druin, 1999). Reviews of both psychological and educational literature on peer collaboration have repeatedly demonstrated that working in pairs and small groups can have beneficial effects on learning and development, particularly in early years and primary education (Wood & O'Malley, 1996; Rogoff, 1990; Topping, 1992). Thus, in addition to examining the design process and the technology that is produced, we were able to also look at the educational implications of the collaborative process and how this may be affected by the KidStory project.

From the outset of the project it was recognised that there were a number of potentially interesting, but unexplored issues facing us. These are detailed below.

1. School environments - cultural differences

The cultural differences between the two participating schools, both in terms of educational practice and societal values, were of specific interest to the KidStory project. It was recognised that we needed to be aware of these differences and consider their implications for our research approach. As an example, within the UK education system, where the National Curriculum imposes quite rigid requirements for use of lesson time, the KidStory approach

could even be considered quite “radical”. We knew that this may not be easy and that we would have to "feel our way" through some new issues. In the more “open” Swedish schedule system, where the teacher plans within a general framework of total hours of activities over several years, we did not expect the same kind of difficulties.

2. Working in a real school context

Almost 100 child researchers and 25 adult researchers were involved in the project, a much greater number than had worked together previously. This meant that there was a great amount of data to collect, collate and analyse. In addition, activities had to be tailored to suit the different classroom environments and the needs and capabilities of the children. The very young age of some of the children involved (4/5 years) meant that some of the activities had to be simplified and shortened. This also had an impact on the data collected. For example, the observation of the youngest children was often more dependent on behavioural data than dialogue.

3. Research partner backgrounds

The researchers came from a variety of disciplines and brought different philosophies and research methods to the KidStory project. The value of this was that a variety of complementary methods were applied which could provide a richer interpretation of the project than would be possible with one approach but it was recognised that individuals would have different views. Researcher views and opinions were monitored throughout the first year via self-reflections in written journals.

1.1 Aims and objectives

Due to the large scale of this project and the potential issues to examine in the first year, the KidStory project has necessarily been exploratory. A great deal of data have been collected and will be used to provide recommendations for progression of the project into year 2.

It is important to employ evaluation methods that can be “a system in which the pedagogy is not in tacit conflict with the accounting” (Hawkins, 1996). This is no small challenge when assessing the outcomes of a partnership between adults and children. If children and adults are truly partners, the data collection should, from the children’s perspective, be indistinguishable from the activities in which the research team is engaged. Additionally, it is important to look for change in social and intellectual development using procedures consistent with the growing body of literature suggesting that effective assessment should be both authentic and formative (Wolf, Bixby, Glenn, & Gardner, 1991).

In accordance with the project philosophies described in deliverable 2.1, data were collected using a variety of methods. Qualitative and quantitative analyses were conducted to examine five general areas of research interest:

Evaluation of changes in technology examines the design process used in the KidStory

project, commenting upon the design suggestions provided by the children participating in the project and how these affected KidStory technology development (deliverable 1.1)

Evaluation of changes in design partners examines how the technology researchers, education researchers, teachers and children from two very different cultures worked together and how they changed during Year 1.

Evaluation of schools environment integration examines issues related to working within real school environments and the outcomes that were produced in each school.

Evaluation of the impact of technology examines specific outcomes observed in children using technology developed during Year 1 of the project.

Evaluation of educational effectiveness examines changes in children's cognitive developments in the UK school. Baseline measures and end of Year 1 data have been collected. Planned comparison with control groups not involved in the KidStory project will provide an indication of the educational impact of the project.

A variety of qualitative and quantitative evaluation methods have been used in documenting how the technology has changed as a result of input from children, teachers and researchers and how all of these design partners change during the first year of the project. An overview of these methods is presented in Table 1.1 (see Appendix 1).

1.2 Structure of the report

Due to the nature of the parallel design process, there is no single logical structure for presentation of the evaluations that were carried out. The following six chapters of this report address the five different areas of evaluation interest described above (changes in design partners is presented in two chapters). A summary of the chapters follows:

Chapter 2 examines the use of journals, participatory design artefacts and contextual inquiry notes and describes how the technology changed as a result of direct input from the children, teachers and researchers.

Chapter 3 examines changes in our child design partners. This chapter qualitatively analyses, through the use of journals, how children have changed as a result of various aspects of the project. Examination of the children's journals and analysis of contextual inquiry charts shows how the children changed during the course of the year and what issues may be important for us to focus on in further years.

Chapter 4 examines changes in our adult design partners. Journal analysis is used to identify researchers' and teachers' reflections of working on the KidStory project. In this chapter we also look at the involvement of teachers in the project and how this changed during the first year.

Chapter 5 looks at school environment integration. This chapter focuses on the periods spent in school and examines the outcomes of the various kinds of activities carried out and how they were analysed. Researcher observations and comments from teachers following each school activity were used to assess the degree of success of the activities themselves. Issues to do with working within school environments are discussed as well as cultural differences observed between the UK and Swedish schools.

Chapter 6 examines the impact of shared desktop technology and discusses usability of the technology, collaborative effort and new forms of storytelling as a result of use of the technology.

Chapter 7 evaluates the educational effectiveness of the project. This chapter outlines repeated measures of general ability, narrative, planning and communication skills that will be assessed and examined at time intervals throughout the project. The appropriate tasks are described and the plan for retest is introduced.

Finally, in chapter 8 we present a summary of conclusions drawn from the first year of the project. Recommendations for progression into year 2 are also made.

1.3 References

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Wood, D. & O'Malley, C. (1996) Collaborative learning between peers: An overview. *Educational Psychology in Practice*, 11(4), 4-9.

Wolf, D., Bixby, J., Glenn, J., III, & Gardner, H. (1991). To use their minds well: Investigating new forms of student assessment. Review of Research in Education. 17, pp. 31-74.

2. Evaluation of changes in technology

In this chapter we describe and examine how Year 1 technology changed due to the input of all research partners. Children, researchers and teachers were all involved in an iterative design process, within which feedback enabled the technology to be continually developed and updated.

Design suggestions were derived from participatory design artefacts, contextual inquiry notes and prototype introduction (see deliverable 2.1, chapter 6, for further explanations of these procedures) and also documented in children's, teachers and researchers journals and emails. During our first year, design suggestions were gathered and these were presented to the KidPad and Klump technology developers on a regular basis. This information became a mechanism for developers to decide what kinds of improvements and changes would be made to our applications. Continual gathering of these data and its use by technology developers helped ensure a direct flow of design input from the children and adults into the technology development process. For more information on this technology feedback loop and details about how these design suggestions were addressed, refer to the deliverable 1.1.

As well as providing input to technology development, we were interested in noting where our design ideas came from. In particular, did a research direction occur due to children's input or did it occur due to children and adults elaborating on each other's ideas? Or did it occur due to adult reflections after working with the children?

The following sections illustrate some of the design ideas that came from the school activities and how they were derived.

2.1 Participatory design artefacts and researcher journals

Throughout the school sessions, adult and child researchers have offered design suggestions for the applications being developed in our project. Participatory design artefacts, researcher journals and email have been used to create and collect information to feed into technology changes (as shown in Figure 2.1[1]).

[1] *One interesting use of the participatory design artefacts came near the end of the spring research activities. Children drew their ideas for new KidPad local tools. These were scanned into the computer and brought into the KidPad software environment and demonstrated to the children.*

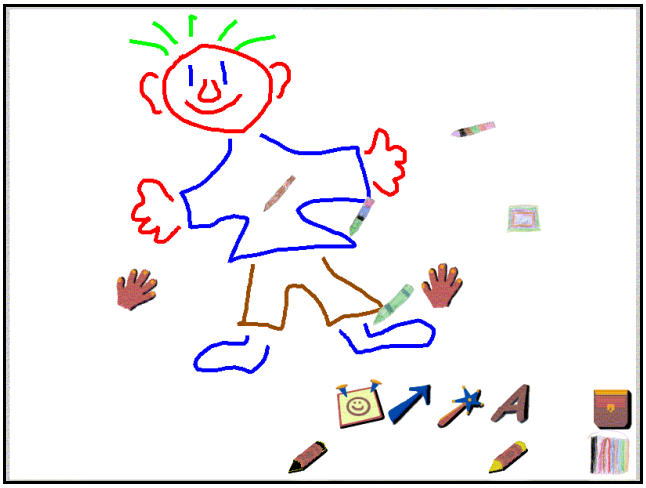


Figure 2.1: Example of new KidPad tools drawn by children, Sweden, June 1999

Participatory design sessions consisted of children and adults working together in small groups to come up with new ideas (see Figure 2.2).

Figure. 2.2 Children and researchers work together to create their 'Christmas story' (Nottingham, Autumn Year 1)

In some sessions they used low-tech materials such as paper, glue, clay etc. to create a 3D model (see Figure 2.3). In other sessions the children drew their ideas in their journals, either in pairs or on their own.

Figure 2.3 Children and researchers working together to create low-tech prototypes of 'something to help them tell stories.' (Nottingham, Autumn Year 1)

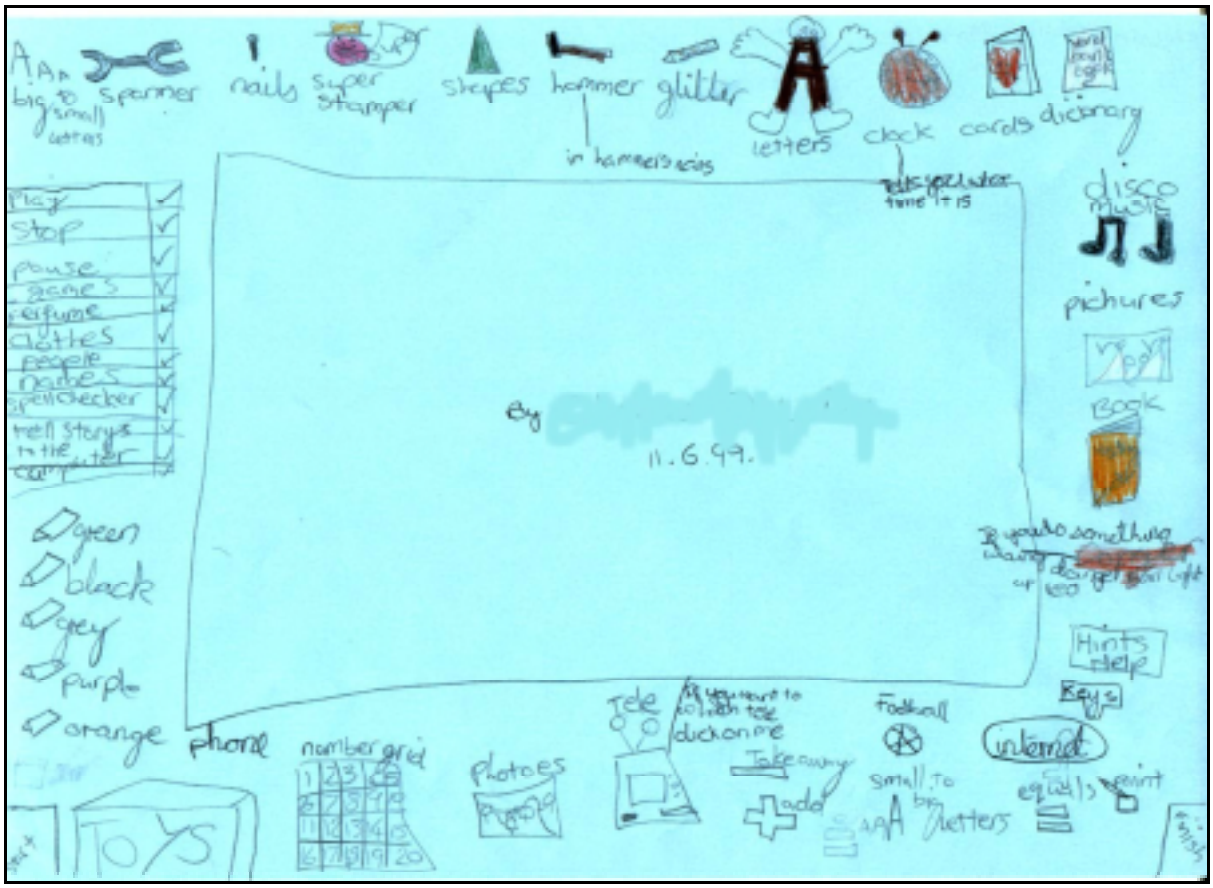


Figure 2.4 Icons, designed by one 7 year old child, Nottingham

The artefacts produced included 3D models of input devices, 'something to help them tell stories' and pictures of new icon designs. Figure 2.4 shows some new design ideas for computer icons produced by one 7-year-old child. These were presented to others within the class as part of the school activity.

Photographs of the models were taken and the presentations were recorded. From these data the researchers made notes of design suggestions made by the children and sent them via email to the technology researchers. The lists below show a selection of the sessions run but more detail can be found in the description of school activities (full details are given in chapter 7 of deliverable 2.1, and summarised in chapter 5 of this also).

Sweden:	UK:
- magic mirror	- the box
- create a story scene	- a device to help in storytelling
- inventing a new sandwich	- inventing a new sandwich
- change an invention (milk-carton)	- change an invention (milk-carton)
- input devices	- input devices
- icon design	- icon design

The children expanded on their ideas by drawing, writing or discussing their ideas with researchers. In some cases, photos of the children's models were included in their journals and an explanation added either by the child or an adult researcher. At other times, the adult researchers included ideas suggested by the children in their journal discussion of a particular school activity. In these cases, the data have been included in the adult journal analyses described in chapter 4 of this report.

2.1.1 Design Suggestions from Children

2.1.1.1 Design ideas for KidPad

The following represents suggestions regarding the KidPad application offered by *children* in their journals in the first year of the KidStory project. As our child partners have continued in their role as inventors and gained more experience in the use of KidPad, the amount of their technology feedback has increased. In the autumn, children offered 35 KidPad design suggestions in their journals. In the spring, children offered 174 KidPad design suggestions in their journals. These results can be seen in table 2.1 (see Appendix 2) which shows the

number of suggestions for different types of improvement that were found in the children's journals during year one. Figure 2.5 gives an example of a design suggestion for KidPad.

Visibly, this increase in design suggestions is yet another indication that our child partners are becoming more comfortable in their role of inventors. Children became more expressive about their wants and needs as the year progressed. In general, children asked most frequently for "pre-drawn" shapes, more colours, sound to tell stories, and easier tools to draw with. As this information was collected from the children, it was passed along to our technology developers as input into the development process.

Figure 2.5 Example of KidPad Design Suggestion from 5-year old child's journal, Sweden:

"I was going to draw a house and then I couldn't. I would like a pencil which is sharp and good. And then I was going to draw a house.": DIFFERENT CRAYON WIDTHS

2.1.1.2 Design ideas for the Klump

The following represents suggestions regarding the Klump application offered by *children* in their journals in the first year of the KidStory project. Children's Klump suggestions, as represented in journals, did not increase through the course of the year. There were 8 Klump design suggestions in the autumn and 5 in the spring. These figures are presented in table 2.2 (see Appendix 2).

The low frequency of Klump design suggestions from children may be due to the implementation schedule of the Klump application, with only two (Contextual Inquiry at Rågsvedsskolan) sessions in the spring. In the future, our child partners will certainly have more experiences with the Klump and more exposure to 3-D environments. Therefore, we

expect to see an increase in children's design suggestions about this application as the second year of our project gets underway.

In general, children seemed very interested in both changing the shape of the Klump and looking inside it. Again, as this information was collected from children, it was passed along to our technology developers as input into the design process (see Figure 2.6).

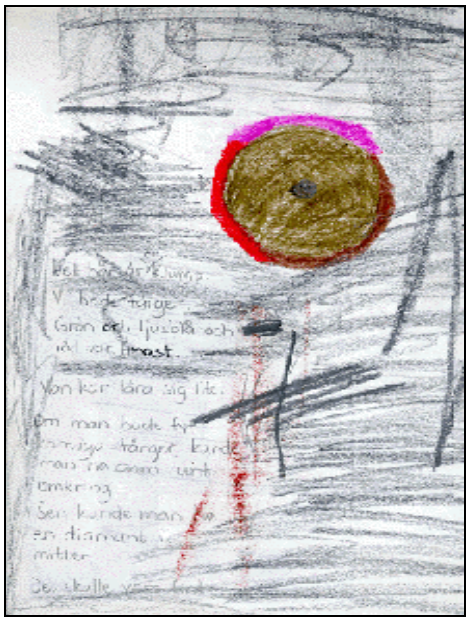


Figure 2.6 Example of Klump Design Suggestion from 5-year old child's journal, Sweden:

"This is a klump. We had colours…If you had square colours you could have them around. And then you could have a diamond in the middle. That would be fine.": CHANGE SHAPES

2.1.2 Design Suggestions from Adults

2.1.2.1 Design ideas for KidPad

The following represents suggestions regarding the KidPad application offered by *adults* in their journals in the first year of the KidStory project. Adults offered significantly more KidPad design suggestions as the year progressed. In the autumn, adults offered 11 design suggestions in their journals. In the spring, adults offered 51 design suggestions in their journals. These figures are presented in Table 2.3 (see Appendix 2).

Interestingly, adult design suggestions were much more spread out, in terms of frequency. Suggestions ranged from simple ideas like wanting more colours and incorporating sound to more complex ideas such as the turn alive tool and levels of complexity for toolboxes. In fact, the highest frequency was in the area of multiple input devices, yet, that had only five suggestions. As with the collecting of design suggestions from all sources, this information

was gathered and passed along to our technology developers for input into the development process.

Examples of KidPad design suggestions from adult journals:

The two children were fighting over control of the mouse. Would have been interesting to have had two mouse at that point.

--MULTIPLE INPUT DEVICES

The crayon is used based on one principle- you grab it with one click, lead it with the mouse, and paint by holding down the left mouse button. The eraser is used by using another system…It's difficult to find the point when the eraser reacts.

--EASIER TO ERASE

The children all had problems with swapping over from tool to tool. They can get cluttered and "stick" under the other tools. All of the children noticed this and found it really frustrating.

--TOOLS THAT DON'T CLUMP/GET STUCK ON EACH OTHER

2.1.2.2 Design ideas for the Klump

The following represents suggestions regarding the Klump application offered by *adults* in their journals in the first year of the KidStory project. Adults began making suggestions about the Klump in their journals primarily in the second half of the year. This may be due to lower familiarity of this technology for members of our research team; it may have taken some time for many of our researchers to properly reflect upon the Klump application. As adults have more experience with the Klump and other 3-D applications, we expect to receive more design suggestions from them. Table 2.4 shows the figures (see Appendix 2).

On the whole, children and adults seem to be thinking about the Klump in a similar way. Adults, like children, seemed very interested in changing the shape of the Klump and looking inside it or pulling it apart. Again, as this information was collected from adults, it was passed along to our technology developers as input into the development process.

Examples of Klump design suggestions from adult journals:

Collaborative actions- can we hold and shape? Stick together and pull apart?

--CHANGE SHAPE

Maybe we could assign objects' behaviours. (walk, run, jump)

-GIVE OBJECTS' BEHAVIOURS

The sound was difficult to hear.

-IMPROVED SOUND CAPABILITIES

2.2 Observations from contextual inquiry

Another set of artefacts to come out of the school activities were the contextual inquiry notes taken by adult researchers. The specific methods of contextual inquiry are detailed in chapter 5 of deliverable 2.1. Throughout the year, adults observed children in using the developing prototypes. These observations helped to identify how the children worked together to use the technology. Usability issues and observation of collaborative behaviours are discussed in more detail in chapter 6 of this report. Here we discuss ideas for technology design changes that resulted directly from our observations of children using the technology.

Through the use of contextual inquiry techniques, we employed note taking as a way to observe our child partners using the technologies that we are developing. This observation process involves recording what our child partners say and do while using technology. Subsequently, we analyse these notes for activity patterns, roles, and design ideas.

When analysing this contextual inquiry information, quotes are matched up with activities against the time line. Then we analyse the quotes and activities by first looking for activity patterns. By activity patterns, we mean actions that children perform repeatedly over the contextual inquiry session. After identifying these patterns of activity, we are able then to identify the roles that children take as they use our technologies. Lastly, we look at all of the previous information and formulate design suggestions.

These six areas of information- time, quotes, activities, activity patterns, roles, and design ideas flow quite naturally into and from each other. Note that the time, quotes, and activities come directly from what the children say and do, with as little interpretation from the researcher as possible. That information is all factual observation. In contrast, the activity patterns, roles, and design ideas come as a result of analysis and interpretation of that information, as shown in table 2.5 (in Appendix 2). (See chapter 6 of deliverable 2.1 for more information about Contextual Inquiry).

Contextual Inquiry Example:

Imagine the following experience of two children- Brittany and David- using KidPad at a single computer with a single input device.

TIME: 10:50

QUOTE: Brittany says to David “I want to move that crayon here!” David replies, “No, I want it there”.

ACTIVITY: Brittany is trying to take the mouse from David, who refuses to let go of it.

ACTIVITY PATTERNS: Struggling for control of input device (Because we notice Brittany and David repeatedly performing this action.)

ROLE: Leader (Because when Brittany and David are struggling for control of the input device, they are both trying to be leaders. Both want to direct the experience.)

DESIGN IDEAS: Multiple input devices (Because multiple input devices would allow the children to work more collaboratively each other and reduce their frustration)

In chart form, this scenario is presented in Table 2.6.

	RAW DATA:			**DATA**	**ANALYSIS:**
Time	**Quotes**	**Activities**	**Activity Patterns**	**Roles**	**Design Ideas**
1050	B: I want to move that crayon here! D: No, I want it there!	B. is trying to take the mouse from D, who refuses to let go of it.	Struggling for control of input device	Leader	***Multiple input devices***

Table 2.6: Contextual Inquiry Entry for Above Scenario

2.2.1 Activity patterns

Table 2.7 (in Appendix 2) shows the activity patterns that we identified in the contextual inquiry sessions of our first year.

Included are the frequencies that correspond to each activity pattern. In total, we identified 16 activity patterns and took note of 550 instances when those patterns were repeated. Activity patterns of greatest frequency include drawing and erasing, struggling for control of input device, storytelling and writing.

2.2.2 Roles

Table 2.8 (in Appendix 2) shows the roles that we identified in the contextual inquiry sessions of our first year. Included are the frequencies that correspond to each role. In total, we identified 11 roles and took note of 559 instances when those roles were performed. Roles of greatest frequency include children as artists, leaders, frustrated users, partners, and storytellers.

Our Contextual Inquiry notes also pointed our important areas for future improvement as well as fruitful features that were well received. Among the features children enjoyed with the Klump was the ability to change the shape's appearance. What children seemed to ask for was the ability to freeze this shape when they arrived at what they liked (see Table 2.9 in Appendix 2)

With KidPad, our contextual inquiry observations showed us everything from children's need for more drawing features, to children's need for more intuitive input devices as well as a possible help system (see tables 2.10 and 2.11 in Appendix 2).

2.2.3 Design suggestions for KidPad

Table 2.12 (see Appendix 2) shows the design suggestions for KidPad that we have identified in the contextual inquiry sessions of our first year. Included are the frequencies that correspond to each design suggestion. In total, we identified 14 design suggestions and took note of 288 instances when suggestions were made in those areas. Design suggestions of greatest frequency include multiple input devices, help options, easier to select tools, ways to fill colour, and ownership options.

Clearly, the need for multiple input devices is heavily supported by the collected data. Of the 288 design suggestions gathered from this data, nearly half of them called for multiple input devices. As with design suggestions from journals, this information was passed along to technology developers for input into the development process. For more information on this technology feedback loop and details about how these design suggestions were implemented, refer to deliverable 1.1.

2.3 Discussion

A variety of methods were used to obtain design ideas from all partners (researchers, teachers and children) involved in the KidStory project. Participatory design artefacts provided a direct way for our partners to work together to produce design ideas, and these activities were very successful during the first year (see chapter 5 describing school activities). Similarly, contextual inquiry observations and analysis provided a powerful way for us to gather important design input. These observations produced design suggestions for; multiple input devices, help options, easier to select tools, fill colour and ownership options.

Design suggestions were also extracted from analysis of individual journals. Full details of these are given in chapters 3 (children's journals) and 4 (adults' journals) of this report but it is worth noting here that children and adults did not reflect on technology design in the same way. Children offered design suggestions only, while adults offered feedback about higher level technology development activities, such as implementation and philosophy. It was also noticeable that children offered more design suggestions in the spring term than they had in the autumn, indicating development of their role as design partners during the first year.

All of the design ideas generated via these different data collection methods were fed into workpackage 1 (technology development). As a result, during year 1 KidPad has continuously been updated and tools to fill in colours etc. have been added and evaluated. Klump has also been given additional colours and textures. Full details of technology development are given in deliverable report 1.1. As a result of the data gathered through direct reflection in journals/participatory design artefacts and observation in contextual inquiry experiences, we will continue to develop and refine our technologies.

The feedback loop of suggestions from children and adults into the development process is a key part of the KidStory project. One of the recommendations to enhance this process is that the feedback loop between school activities and design implementation is tightened so that the children can see the results of their design ideas much sooner. In years 2 and 3 we plan a more structured approach to technology feedback with more frequent iterations. This will ensure that technology development keeps up to date with activities in the schools and may demonstrate to the children the value of their role as design partners in the project.

3. Evaluation of changes in child design partners

From the beginning of our research process, the team agreed that all participants, young and old, working in schools or in the labs would keep a research journal. Journals of all children and adults were collected twice during KidStory's first year: once in the autumn and once in the spring. Since journals were collected in both January and June, each analysis represented about six months of reflections. They were analysed by two of the KidStory researchers with backgrounds in qualitative evaluation, educational research, and classroom teaching. To analyse the journals codes were developed that emerged from the raw data. These were not pre-determined codes by the researchers, but rather, were codes drawn out by an initial analysis of the journals. The codes identified from all of the journals are shown in table 3.1 (see Appendix 3). Top level codes are shown in bold and sub-codes are shown in italic.

This chapter describes the changes in child design partners identified via analysis of journals. Analysis of adult journals is presented in chapter 4 of this report.

3.1 Children's Journals

Almost 100 children from Sweden and England were asked to keep research journals for the KidStory research partnership. The journals are a place for children to record their observations and reflections in their own personal way. Children were commonly asked to write or draw in their journals as a concluding part of their project activities in the schools. These journals contained anything from reflections on school activities or technology development, to pictures of stories that were written with the technology, to feedback on technology use. Written text, drawings, digital photographs, output from the computer were all contained in journals.

The children used their journals frequently as a way to communicate their ideas about storytelling, technology, and their collaboration experience. As the year progressed, children were introduced to the notion of being inventors. Children and adults began by re-inventing familiar items such as sandwiches and milk cartons. In Sweden these inventions were photographed and placed into the children's journals. Many times, ideas were simply sketched directly into journals with crayon and pencil. As the year progressed children were using their journals to suggest changes in new technologies. For example, after the children used Klump and KidPad they drew pictures in their journals and described what new features they wanted to see. The children drew the kinds of tools they imagined could be possible in the future.

In addition to offering suggestions on how to change the technology, children also used their journals to keep examples of what they actually did with the technology. For example, in the

spring, adults and children worked in small groups to tell zooming stories with the KidPad software. After they were done, copies of their stories were pasted into their journals.

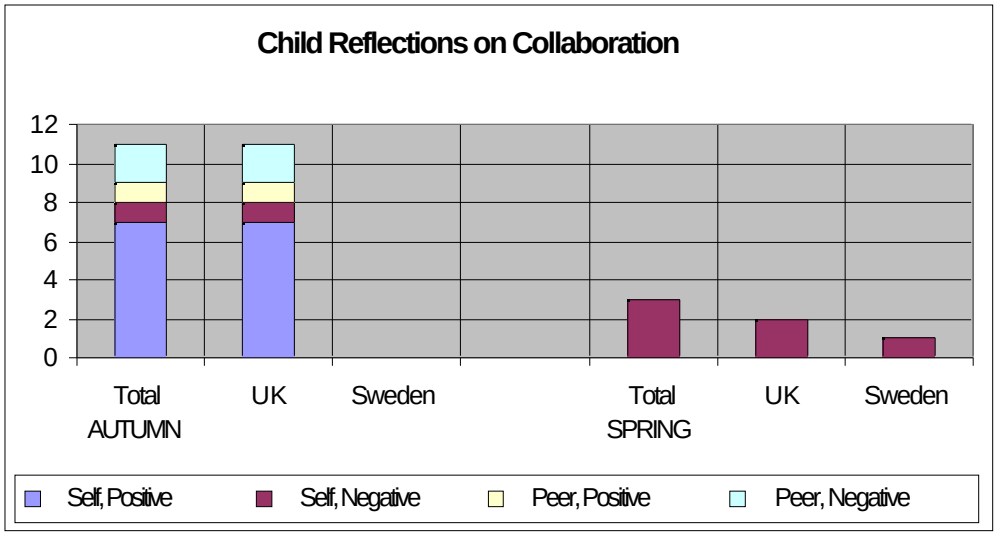
We also noticed that children would on occasion reflect about their collaboration experiences. We found that these reflections needed an adult's help to write down, as many of the children were less able to write down their thoughts as they were able to draw or talk about them.

3.2 Journal analysis: changes in children as design partners

Table 3.2 (see Appendix 3) shows the results of the coding frequencies that resulted from our research process concerning *children* as design partners. This summary presents the general coding categories with accompanying sub-codes separated by time of year (autumn-spring) and country (UK, Sweden). Children's journal reflections in the first year of our project were in five main areas: collaboration, storytelling, inventing, technology use, and technology development. These are discussed in detail in the following sections.

3.2.1 Changes in Collaboration

In this section, we will describe the changes in frequency and content of codes concerning collaboration (see Graph 3.1 for summary). The children's journals were analysed for their personal thoughts and feelings about collaboration. By this, we mean that children were reflecting on their experiences partnering with a peer or an adult. As a result, their reflections were about themselves, their peers, and their adult partners. The comments were both positive and negative in nature. On the whole, we see more positive than negative collaboration reflections in the first year. In addition, we see a decrease in comments about collaboration from the autumn to the spring in the UK.



Graph 3.1 Collaboration Codes by Frequency over Time and by Country

Looking at these frequencies, we see very little reflection about collaboration in the children's journals in both of our school locations. In the spring, there were fewer reflections about collaboration than in the autumn. This may be due to the focus we placed on storytelling and invention activities during the spring. Children were asked more frequently in the spring to be inventors (e.g., of sandwiches, software icons, milk cartons – see deliverable 2.1 for more details) and storytellers (e.g. problem with chicken, group storytelling – see deliverable 2.1 for more details). Journal reflections concerning collaboration made by Swedish children were very minimal over the first year of our project. Surprisingly, there was only one instance of reflection of collaboration made by these children in their first year.

Examples from children's journals:

Positive collaborations:

It was nice to work with my partner. I did some bits and Samantha did some bits as well.

7 yr. old, UK, autumn

Working with Charlotte made me happy.

7 yr. old, UK, autumn

I liked working with my partner because we are best-est friends and he is coming to my 5th birthday party.

4 yr. old, UK, spring

It was messy because me and Bella did it… I wanted to scribble because it's fun scribbling. I like to scribble with Bella.

5 yr. old, UK, autumn

Negative collaborations:

I wanted to draw a small bear, not someone else drawing.

5 yr. old, UK, spring

He wouldn't let me have a go. He was scribbling over my house.

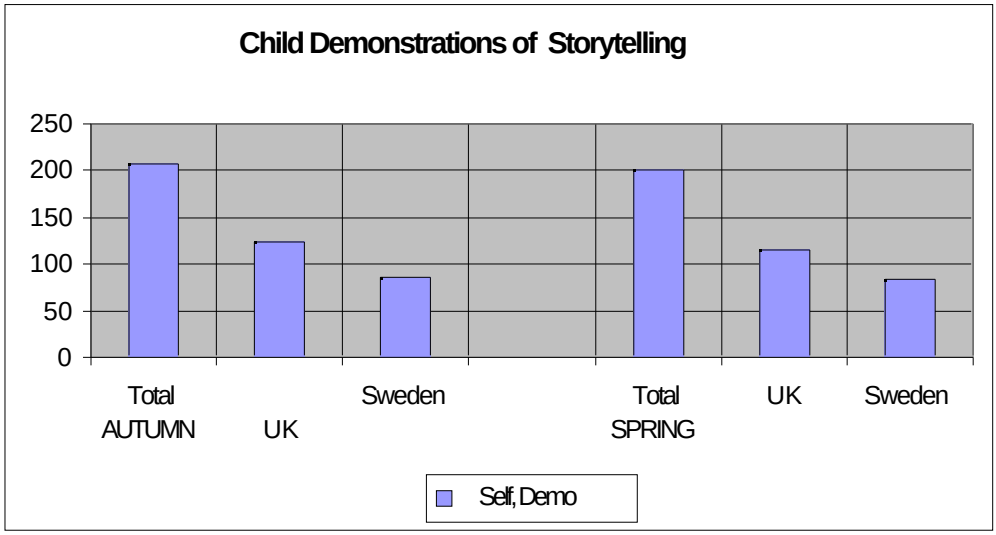
5 yr. old, UK, autumn

I have painted what we made on the computer. One can make it round and pull out as one wants. One could make aeroplanes. I would like to make a flower or crown. Difficult who will decide.

7 year old, Sweden, spring

3.2.2 Changes in Storytelling

In this section, we will describe the changes in frequency and content of codes concerning storytelling (see Graph 3.2 for summary). In reviewing the children's journals, drawings and/or words were coded for frequencies with which children demonstrated storytelling. In general, children demonstrated approximately the same number of storytelling experiences from autumn to spring, with the numbers in the UK and Sweden not showing much change.



Graph 3.2 Storytelling Codes by Frequency over Time and by Country

Interestingly, the frequencies of storytelling remained relatively constant throughout the year in both the UK and Sweden. In the UK, there were 123 demonstrations of storytelling in the autumn and 116 demonstrations of storytelling in the spring. In Sweden, there were 85 demonstrations of storytelling in the autumn and 84 demonstrations of storytelling in the spring.

Even though the KidStory project focused on invention activities in the second half of the year, instances of storytelling demonstrations in the children's journals did not decrease.

This may be due to our progress in technology development. As we develop technologies that support collaborative storytelling, our child partners may be able to more frequently demonstrate storytelling, regardless of whether our particular activities are focused on storytelling or not. In other words, we may now be supporting storytelling with our technologies, as well as the school activities surrounding those technologies.

Surprisingly, we did not see instances of children reflecting upon their storytelling experience. Instead, our child partners demonstrated storytelling. In other words, our child partners have not yet begun to reflect upon their own storytelling strengths and difficulties or to reflect upon learning as a result of storytelling. We expect this to change as our child partners have more storytelling experiences and as they become more reflective of their general KidStory activities.

Example of Child Demonstration of Storytelling:

"When the box landed in my bedroom something knocked on my door. I heard it and then a loud crash landed in my garden. Then I looked out my window and I saw an alien get out of the rocket and he put this box in my bedroom. A note came with it and it said this and then they went back to space but I think in the box is a genie. It will give me three wishes for a pram and doll house and a rocking horse. Dear Laura under this box and don't open it. From 'x'."

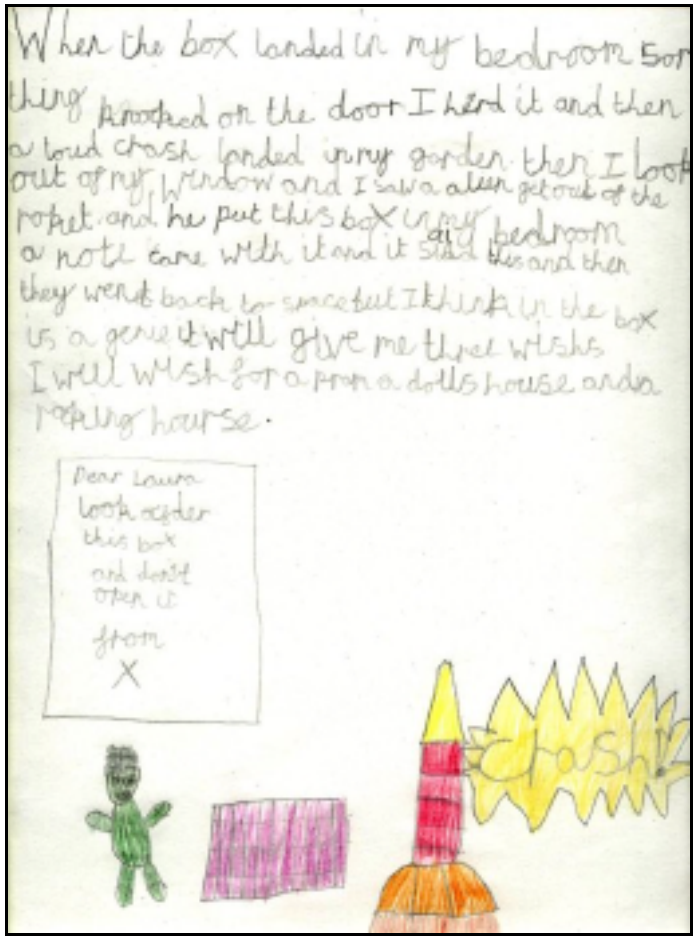
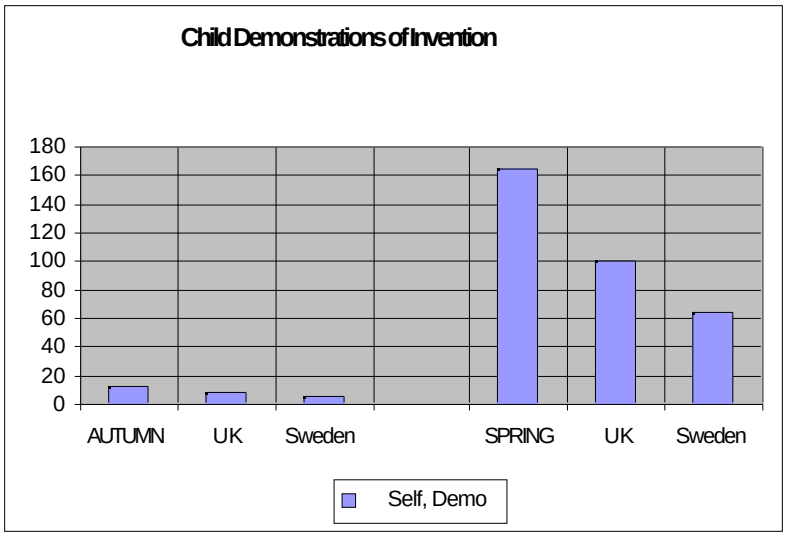


Figure 3.1 Example of Storytelling Demonstration from 7-year old child's journal, England

3.2.3 Changes in Inventing

In this section, we will describe the changes in frequency and content of codes concerning children as inventors (see Graph 3.3 for summary). The children's journals were analysed for their demonstrations of invention. By this, we mean children solving a problem by creating something new. On the whole, we saw a dramatic increase in child demonstration of invention - both in the UK and Sweden.



Graph 3.3 Invention Codes by Frequency over Time and by Country

Clearly, there was a sharp increase in invention demonstration through the first year.

In the autumn, there were 13 instances in the UK and Sweden. In the spring, there were 164 instances in the UK and Sweden. This increase in demonstration of invention may be partially due to the amplified focus on invention in the second half of the year. We believe it is also due to the on-going and developing partnership of the child members of our team. As our child partners become more comfortable and more excited about their role as inventors, we would expect their reflections in this area to increase. We feel that the strong increase in this area is one of the successes of the first year of our project.

As with storytelling, we did not see instances of children reflecting upon their invention experiences. Instead, our child partners demonstrated invention. In other words, our child partners have not yet begun to reflect upon their own strengths and difficulties related to invention or upon learning as a result of invention. We hope to see this change as our child partners have more experiences being inventors and as they become more reflective in general.

Example of Child Demonstration of Invention:

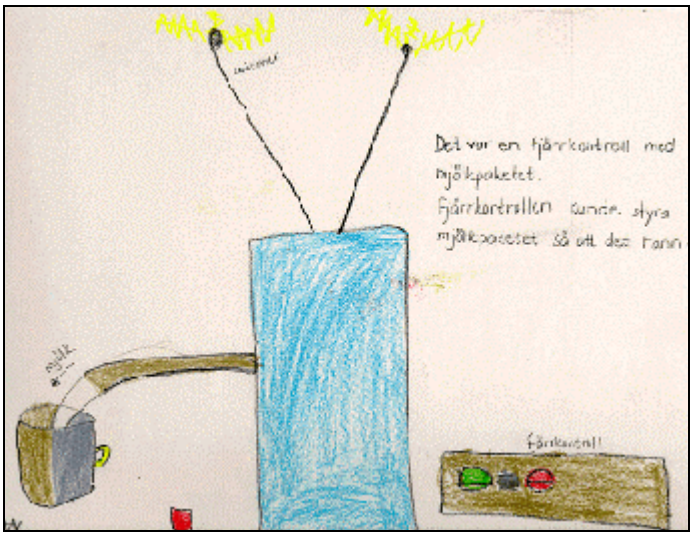
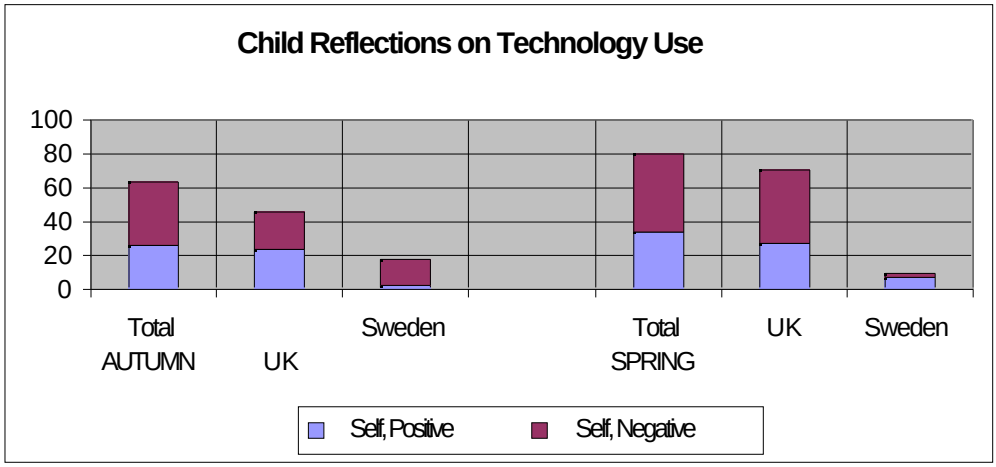


Figure 3.2 Example of Invention Demonstration from 7-year old child's journal, Sweden:

"There was a remote control with the milk package. The remote control could navigate the milk package so it poured"

3.2.4 Changes in Technology Use

In this section, we will describe the changes in frequency and content of codes concerning children's technology use (see Graph 3.4 for summary). The children's journals were analysed for their personal reflections about their use of technology. These comments were both positive and negative in nature. In general, we see reflections about technology increase from the autumn to the spring. We also see more negative than positive reflections about the use of technology.



Graph 3.4 Technology Use Codes by Frequency over Time and by Country

We see the numbers of technology use reflections remaining relatively constant from autumn to spring, although negative technology use experiences increased in the UK and decreased in

Sweden. As with collaboration reflections, we note a surprisingly small number of reflections from our Swedish child partners in the area of technology use. The more continuous use of KidPad in the UK schools may be a main factor in this difference. The increase in comments in the UK and decrease in Sweden from the autumn to the spring may also be due to a concentration in Swedish schools on storytelling and inventing.

In noting that there are more negative than positive technology use experiences overall, we see this as characteristic of the technology development process. Our child partners are developing and using the KidPad and Klump applications as these applications are being created and improved upon. We would expect negative reactions, as technical difficulties are worked out and as the applications become more stable.

Examples of Child Reflections about Technology Use:

Positive Technology Use:

I made a big blob. Lines. It was easy and fun. Because I made a big blob.

5 yr. old, UK, autumn

It's good that you could take different colours. It was funny that you could step inside, find and climb walls. For example, that you could go inside and do something.

7 yr. old, Sweden, spring

We drew fine. I found it easy to use the computer.

7 yr. old, UK, autumn

I like it because you can use the mouse. For those of you that don't know what the mouse is, it is a round sort of ball that you can move about in your hand and in your fingers.

7 yr. old, UK spring

Negative Technology Use:

I do not like it when I use the mouse.

7 yr. old, UK, spring

It was really hard because we didn't get the right colour.

7 yr. old, UK, autumn

Here is the Klump…one can make cars. I want to make cars. It is difficult to know which arrow (cursor) one is.

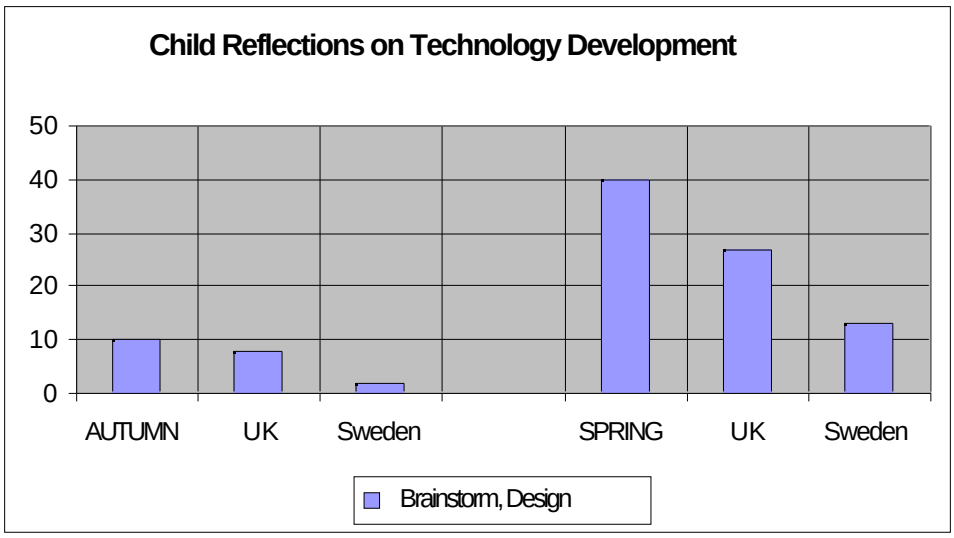
7 yr. old, Sweden, spring

It is difficult to pick up some of the tools.

7 yr. old, UK, spring

3.2.5 Changes in Technology Development

In this section, we will describe the changes in frequency and content of codes concerning children technology development (see Graph 3.5 for summary). Journals were analysed for the children's reflections on the technology development of the KidPad and Klump applications. Reflections in this category include offering design suggestions for the applications we are developing, presenting opinions about the philosophy of our design process, commenting about the implementation of our technologies, and reflecting upon learning as a result of technology development. On the whole, we see a large increase of design suggestions offered by our child partners - both in the UK and Sweden.



Graph 3. 5 Technology Development Codes by Frequency over Time and by Country

We believe that the strong increase in brainstorming by our child partners is an indication of the continued partnership with the child members of our project. As our child partners grow in communication and understand that they indeed have a voice, we would expect the frequencies in this area to increase. We note, however, that all of their reflection in

technology development has been in brainstorming of design suggestions. Our child partners have yet to comment about philosophy of design, implementation, or learning as a result of technology development.

Examples of Child Reflections about Technology Development:

I wish KidPad had lots of colours.

7 yr. old, UK, spring

I want to look inside the blob. It will be all sticky. The bits will stick on my mouse. I want to change the ball into a big square. I want to zoom inside it. It would leave a trail when I zoom inside.

7 yr. old, UK, spring

I wish when I made a mistake on KidPad, I will click on the wand and the mistake will disappear and come the right word.

7 yr. old, UK, autumn

If you click on a paint bucket, a square appears that has lots of colours.

7 yr. old, Sweden, spring

3.3 Journal analysis: changes in children as learners

The children's journals also provide an interesting glimpse into how our child partners change over time with respect to learning. During the course of the year we saw that children changed in their response to these activities and the nature of their output changed. Of course, this is only to be expected since at this stage of educational development children change a great deal. This section presents changes observed in the children via their individual journals.

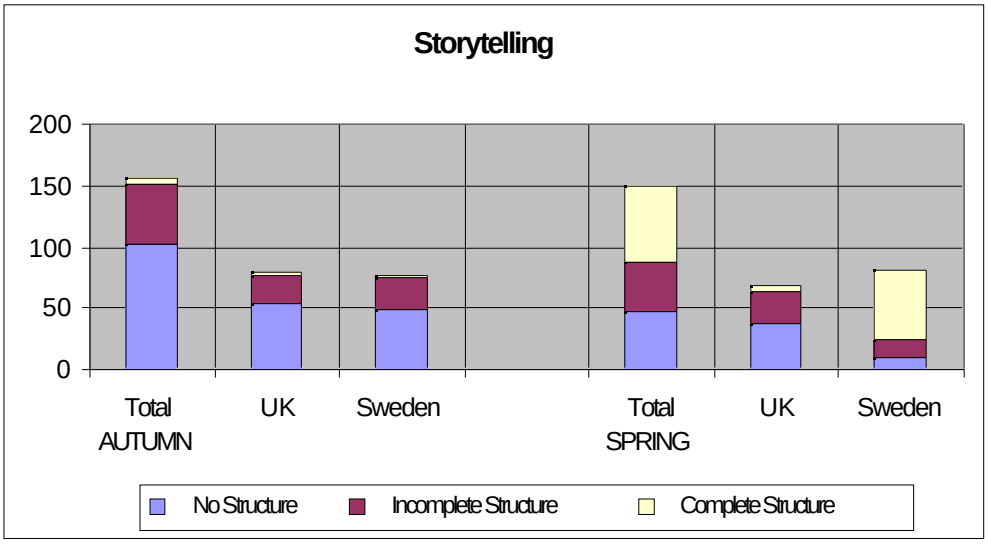
As in the case of design partner changes, the journals are analysed for both content and frequencies. Specifically, we have identified three main areas related to learning. These are storytelling, problem-solving and communication and these areas have accompanying sub-codes, shown in Table 3.3 (see Appendix 3).

In the sections that follow, we will describe the changes we saw in children as learners based upon the coding of their journals in the first year of the project. The change in frequency for codes found in storytelling, problem solving and collaboration, were examined for changes

over time, between countries and by age (see Table 3.4, Appendix 3). What follows is a summary and discussion of the coding frequencies that resulted from our research process.

3.3.1 Changes in Storytelling

In reviewing the children's journals, we found numerous examples of storytelling (see Graph 3.6 for summary). These drawings and/or words were coded for their change in structure. In general, we found a strong increase from the autumn to spring in examples of stories that represented a "complete" story structure (see Figure 3.3). By this we mean, these journal entries showed examples of narratives with a beginning (scene setting), middle (climax), and end (summary) with a character.



Graph 3.6 Storytelling Codes by Frequency Over Time and by Country

In the autumn, many examples were found to represent stories with "no structure". They offered little more than a random listing of pictures on a journal page. The activities at the start of the project were less focused on the creation of stories, and more focused on the children's role as design partners. As was pointed out in D2.1, chapter 4, young children as storytellers quite commonly give only a presentation of something that has happened, or a list of events.

Over this first year of the KidStory project, the children's journals showed a sharp increase in "Complete Structure" stories (see figure 3.3) and a sharp decrease in "No Structure" stories, while the number of "Incomplete Structure" stories remained relatively the same over time.

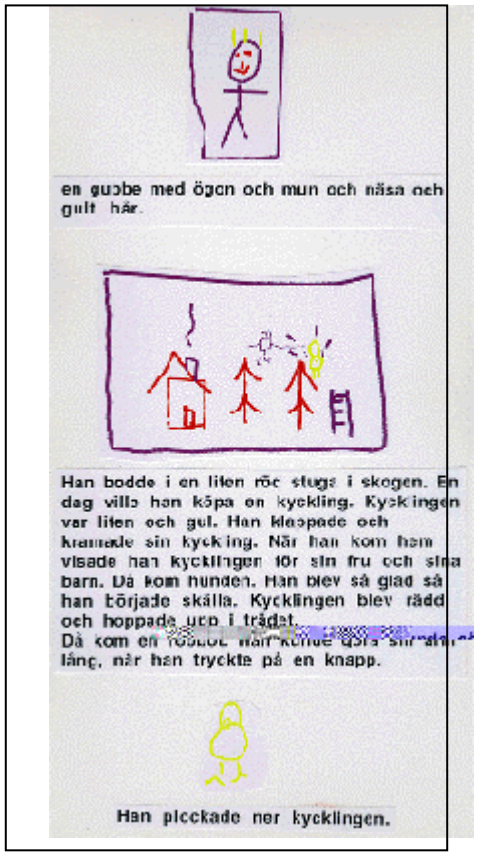


Figure 3.3: Example of "Complete Structure" of group story with KidPad, Sweden:

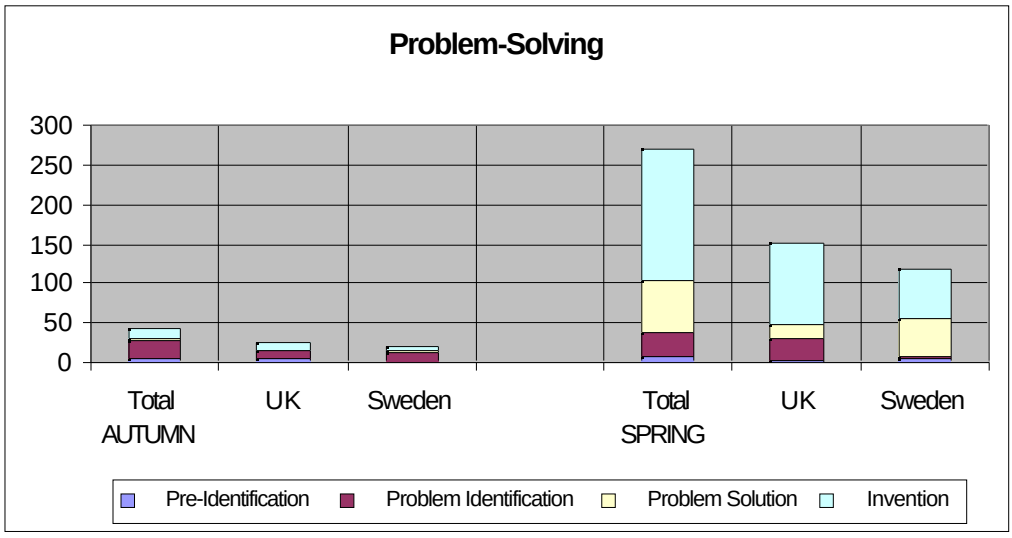
"(picture)A man with eyes and a mouth and a nose and hair. (picture) He lived in a little red house in the woods. One day he wanted to buy a chicken. The chicken was little and yellow. He tapped and squeezed his chicken. The dog came. He was so happy so he started to bark. The chicken got frightened and jumped up in a tree. Then there came a robot. He could lengthen his arm, when he pressed a button. (picture) He took down the chicken.

There were great differences between the frequency of codes in the English and Swedish journals over time. In the autumn, children in both England and Sweden showed relatively the same frequencies: "No Structure" being the most common, "Incomplete Structure" being second most common, and "Complete Structure" being the least common. However, in the spring, the children in England demonstrated relatively the same code frequencies as they did in their autumn journals, while the children in Sweden gave different frequencies. "Complete Structure" was seen in the highest frequency and "No Structure" was seen in the lowest.

The stark difference in England and Sweden frequencies could be attributed to a number of factors, the first of which being the difference in the storytelling expertise in the researchers in Sweden as opposed to the researchers in England. Two of the researchers that work with the schools in Sweden have considerable storytelling experience and may perhaps offer an increased focus on storytelling during the activities they are a part of during the year. This may have been reflected in the focus of the activities run.

3.3.1.1 Changes in Problem-Solving

In this section, we will describe the changes in frequency and content of codes concerning problem-solving (see Graph 3.7 for summary). In reviewing the children's journals, drawings and/or words were coded for their change in problem-solving complexity. We found that the children's problem-solving ability ranged from an inability to actually identify a problem (see Figure 3.4 for example of "Pre-Identification") to an ability to invent something new thanks to the problem at hand (see Figure 3.5 for example of "Invention"). In general, we found the largest increase from the autumn to spring in examples of "Invention".



Graph 3.7: Problem-Solving Codes by Frequency Over Time and by Country

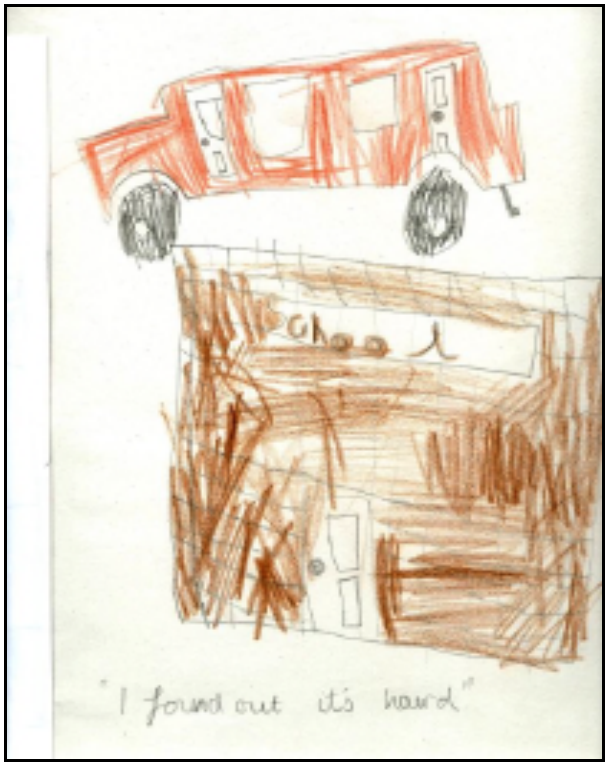


Figure 3.4: Example of "Pre-Identification" from 7-year old child's journal, England:

"I found it hard"

Figure 3.5: Example of "Invention" from 5-year old child's journal:

Sandwich: Egg, Ketchup, Lettuce, Butter, Shrimp, Cheese

In the autumn, children showed the most instances of "Problem Identification". For example

"I was going to draw a house and then I couldn't. I would like a pencil which is sharp and good. And then I was going to draw a house." (Example of "Problem Identification" from 5-year old child's journal, Sweden).

By this, we mean that children were able to identify that there was a problem with something, but they were not able to communicate a solution or invent something completely new because of it.

This change in frequency may reflect the change in activities that occurred from the autumn to the spring. The children were asked more frequently in the spring to be inventors (e.g., of sandwiches, milk cartons, software icons). This is also reflected in the sharp increase of overall number of codes in the problem-solving area. An example of a problem solution can be seen in figure 3.6. In the autumn, there were a total of 44 journal instances coded for problem-solving. In the spring, there were a total of 270, over 6 times as many problem-solving instances.

The differences in these code frequencies, again may have to do with the difference in experience and focus between KidStory researchers in England and Sweden. While the goals of all activities were similar between sites, the actual methods that were used differed due to culture, educational practice, and local school environment. For example, the goal of one session in both England and Sweden was to focus on input devices. In England, researchers worked with children with participatory design to propose new input devices. While in Sweden, the children imagined how a mouse looked, drew it, and then took a mouse apart and then the children drew it again.

Figure 3.6: Example of "Problem Solution" from 7-year old child's journal, Sweden:

"You cut down the tree."

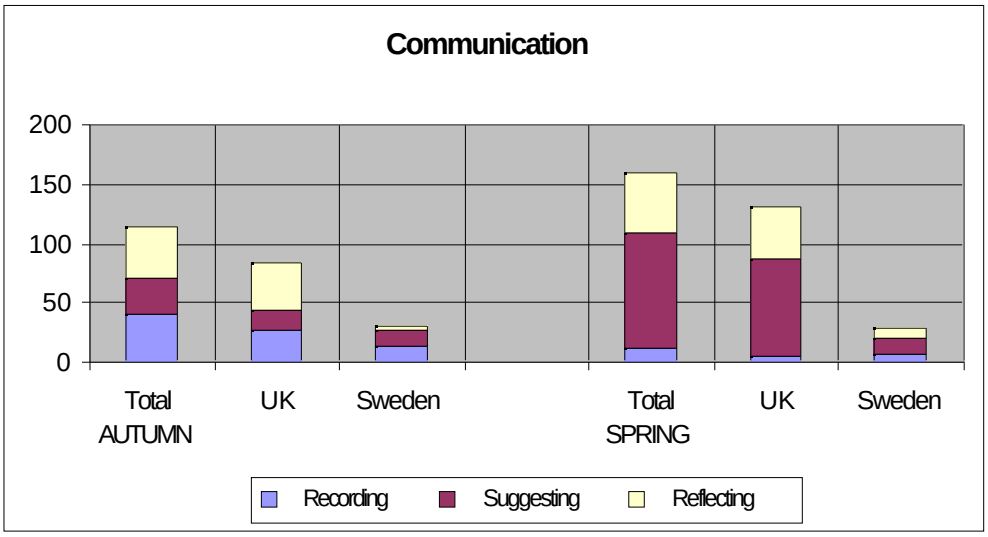
3.3.2 Changes in Communication

In this section, we will describe the changes in frequency and content of codes concerning communication (see Graph 3.8 for summary). The children's journals were analysed for their

change in type of communication. We found that the children's communication instances ranged from recording a thought or event (see Figure 3.7 for example of "Recording"), to a suggestion for change. For example:

"This is a klump. We had colours…If you had square colours you could have them around. And then you could have a diamond in the middle. That would be fine."

To a reflection that includes an opinion or feeling (see Figure 3.8 for example of "Reflecting").



Graph 3.8: Communication Codes by Frequency over Time and by Country

Figure 3.7: Example of "Recording" from 7-year old child's journal, Sweden

"Four red things", "Mountains", "Fruit and water", Restaurants", "The Statue of Liberty", "Ice hockey", "A place to sleep", "Mountains and climb", Easter eggs and food"

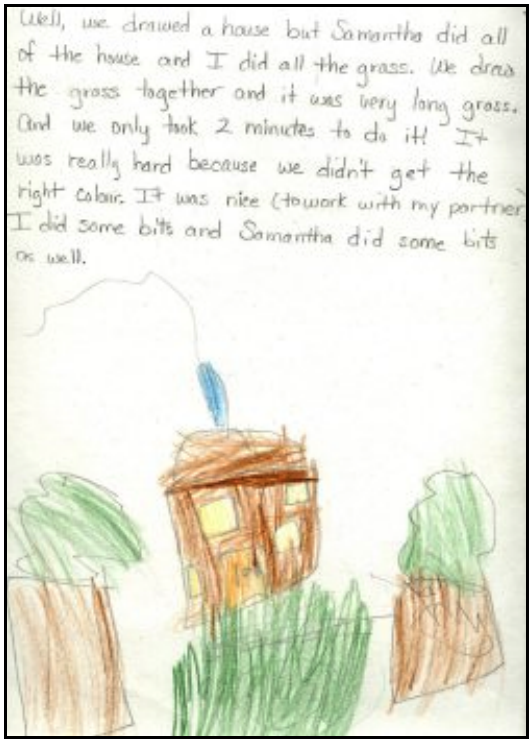


Figure 3.8 Example of "Reflecting" from 7-year old child's journal, England:

Well, we drawed a house but Samantha did all of the house and I all the grass. We did the grass together and it was very long grass. And we only took 2 minutes to do it! It was really hard because we didn't get the right colour. It was nice (to work with my partner). I did some bits and Samantha did some bits as well."

In general, we found the largest increase from the autumn to spring in examples of "Suggesting". These instances of communication took the form of specific suggestions for new technology features for KidPad (see Figure 3.9), or Klump. Communication code frequencies were somewhat evenly split between all three sub-codes during the first 6 months of the KidStory project. In the spring, children's communication instances were not as evenly distributed. The most complex of the communication structures coded, "Reflecting", was seen almost half as frequently as instances of "Suggesting". Children at a young age have more difficulty in reflecting on an experience, as opposed to recording what they saw or suggesting a change on something in front of them.

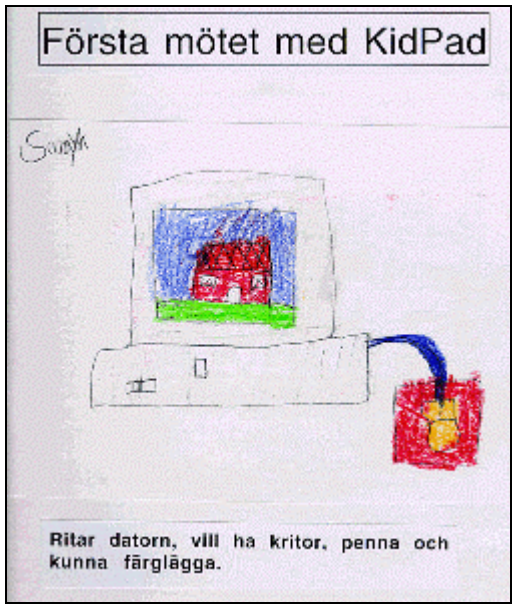


Figure 3.9: Example of "Suggesting" from 7-year old child's journal, Sweden:

"Draw on the computer, wants crayons, pencil and be able to colour."

The children in Sweden and England did not show the same frequency patterns in the autumn. In England, the children showed the most journal instances of "Reflecting" and the least in "Suggesting". On the other hand, children in Sweden showed the most journal instances in "Recording" and the least in "Reflecting". The cause for these initial differences may be educational, cultural, or reflective of differing activities in the first half of the KidStory year. It may also have to do with the individual differences in the children participating in the KidStory research project.

When comparing the 5-year-old and the 7-year-old children over time, a number of differences were found. As was the case with storytelling and problem-solving, the younger children demonstrated less complexity in their communication instances. The 5-year old children showed a much larger number of "Recording" and "Suggesting" instances, than the 7-year old children. On the other hand, the 7-year old children showed the most instances of "Suggesting" and "Reflecting".

3.4 Discussion

Coding of children's journals over the first year of the KidStory project identified five main categories; collaboration, storytelling, inventing, technology use and technology development. Detailed examination of these journals has shown that children's reflections upon their experiences are consistent across all categories. They see their experiences as negative and positive, good and bad.

By far the highest number of entries in the children's journals are related to storytelling and inventing. In both cases, these were demonstrations of stories or invention ideas rather than

reflections upon the experience. Children did offer reflections on the other categories. Comments on technology use tended to be negative, highlighting aspects of the technology that they had difficulty with. These were used to feed into technology design (D1.1).

The building of a school partnership takes time and much of the focus of this year has been on building that partnership. It takes time for children to become reflective. Our child partners are becoming increasingly excited about their role as inventors. And as they become more comfortable in this role, their feedback will become more reflective. During the first year we saw an increase in children's suggestions for technology development from autumn to spring. This can be taken as an indication of the children's developing role as design partners. As children become more confident in their role of inventors and more experienced in their role as partners, we expect to see a number of these areas change. It is likely that our child partners will offer more reflection in many areas, including collaboration, storytelling, and invention.

Children made a few reflections on collaboration, but these were very infrequent perhaps indicating a focus on the activities rather than the circumstances of use. As with other reflections, collaboration reflections were positive (e.g. "I like working with my friend") and negative (e.g. "I want to draw my own picture").

Coding of the children's journals for evidence of changes as learners identified three categories; storytelling, problem-solving and communication. Overall, we saw dramatic changes from autumn to spring in storytelling, problem-solving and communication code frequencies. In storytelling there were obvious increases in "complete" story structures and dramatic decreases in "no structure". In problem-solving increases were evident in "invention" and "solution" instances. In communication there were well-defined increases in "suggesting".

In terms of differences by country, we saw the children in England and Sweden change differently over time in both storytelling and problem-solving. While the children showed similar frequencies of codes during the autumn, their code frequencies changed differently in the spring. In communication we saw children discuss their KidStory experiences in the autumn differently by country. However, over time the frequency of codes in Sweden and England became more similar.

While it may be hard to attribute the exact causes for these changes over time, it is important to note that children *did* reflect change during their first year of the KidStory research experience. Are these changes, however, due to actual learning in each child, or are they merely a reflection of the activities at each KidStory site? Perhaps they are something of both. We expect that as our research continues in the second and third years, a more complete picture of children as learners will emerge from the journal data.

4. Evaluation of changes in adult design partners

This chapter presents the changes in adult design partners. This was done by analysis of researcher and teacher journals. An additional measure, to capture teachers' views from an independent point of view, was carried out in the form of teacher interviews.

4.1 Adult Journals

From the beginning of our research process, the team agreed that all participants, young and old, working in schools or in the labs would keep a research journal. These journals would not be read by anyone except for two designated KidStory researchers (who are less involved in the day-to-day school or technology development activities).

The journals are a place for researchers and teachers to record their observations and reflections in their own personal way. Adult researchers were not told when they had to write in journals, just that it needed to be done at times that seemed important to them. Typically adults may write entries in their journals before and after school activities, project meetings, or after a subsequent event that triggers a thought.

During the first year of the project, most of the KidStory adult researchers managed to maintain a journal. It was noted that the adults within the KidStory project could be grouped according to their role within the project. Four distinct roles were identified as shown in Table 4.1.

Researcher code	Description	Number in group
ER	Education Researcher	6
PC	Project Co-ordinator	4
T	Teacher	6
TR	Technology Researcher	6

Table 4.1. Adult researcher groups within KidStory

Educational researchers were focused on working with children and teachers, carrying out classroom research activities, and collecting data during the experience. Project Co-ordinators were those researchers on the project management committee with responsibilities for site co-ordination and resources. Teachers were those researchers that were employed in England or Sweden in our partner schools. And finally, technology researchers were those

researchers who were primarily focused on the technical development of the collaborative storytelling technologies. Although the majority of the researchers fall into one of these profiles, two researchers fulfil dual roles; one educational researcher and one technology researcher also fulfil the role of project co-ordinator. In addition, it should be noted that while each researcher had certain specific responsibilities in the project, all researchers have taken some part in school activities, technology brainstorming, and offered suggestions on project co-ordination.

Adult journals were either in paper form (and copied for the purposes of data collection) or were kept in email and sent electronically for data collection. Not surprisingly, all of the email journals came from researchers with a technology background, and all of the teachers and educational researchers kept notes on paper. Some of the paper journals contained drawings and/or collections of photos, magazine articles, and more.

4.1.1 Examples of adult researcher journals

It may come as no surprise that a great deal of the discussion centred around our school activities. For example, the technology infusion method of bringing lots of adults into the school setting was a common topic for discussion. One educational researcher wrote:

The technicians had put up the things when we arrived. It was a very special situation with such a lot of adults. I wonder if this affects the children a lot. We were 10 adults.

(January 1999, Sweden)

During that same time, a teacher wrote:

Oh how much people that come one after the other! The whole research team is here. How exciting to see the new computer program. That is what the children think too. The children get extra excited when so many people come.

(January 1999, Sweden).

In addition, teachers also discussed the kinds of activities the children did in the KidStory project and how well they thought the children did with them:

Making something to tell a story… Groups worked well. I was amazed at their awareness of ways to tell a story and how they worked together along side each other. Younger ones (5-year olds) sometimes get annoyed that they are unable to produce what they want as they find

manipulation and equipment usage hard. The feedback session gave value to their work and think it will give confidence if they do another activity like this as they realise that whatever they managed was worthwhile and could be talked about.

(November 1998, England).

Later that year a teacher in Sweden wrote:

This time I was impressed by the children, by their understanding for just the inventor's task. The result as such on paper was not so good for some children. But I think that the result is not the important but their understanding and desire to be inventors. It is long ago I worked with fully Swedish children so it is difficult for me to compare these children with Swedish children. I think that the "normal level" for us personnel is sinking. Our children have many things to struggle with already now in their lives, they shall learn a new language, they shall adapt to different cultures, they have experienced terrible things already, things that fully Swedish children never experience. With many of our children is a restlessness in their souls. We must not have too high demands upon them and let them develop in their own pace. I write this to remind myself, which I have to do now and then. Anyway, we have started arousing their imagination.

(February 1999, Sweden).

Teachers and educational researchers were not the only ones to discuss their impressions of school activities. One technologist wrote at the end of our first KidStory year in the schools:

School sessions are important. Not only do they supply a means of doing participatory design and technical improvements, they work to foster enthusiasm in the project members. (Technologist 1) felt completely differently about his work when he sat with children working with the (software). Also bringing (Technologist 2) into a school session helped ground him in the project and what we are doing. He also became fairly enthused and started to understand what the project is about. The teachers have said also how important the project is for the children and how they get excited when we come.

(June 1999, Sweden).

Another technologist pointed out his surprise in the children’s ability to be design partners:

We had sessions with two young researchers at a time, which went quite well, the children were again very excited and engaged using the software. We had two note-takers at each occasion. One thing the children said really amazed me, that they remembered (a previous) session, and a few of them asked about differences in the software since then.

(May 1999, Sweden).

Researchers also reflected on differences between their 5-year old design partners and their 7-year old ones. Many of the researchers did not expect such large differences in what the age groups can do and for how long:

Much more difficult session with the 5-year olds. Besides keeping them working as a group, (the children) found it hard to get past the shape (of what they felt in the box) and build this into a story. They don't work well in groups. Each has their ideas…

(November 1998, England).

Another educational researcher in England offered some general thoughts a month later:

General observations of the 5-year olds were that they seemed less inhibited than the 7-year olds. They were more willing to explore the software, but did not stay on task (e.g., make a house). This may be because they couldn't translate their ideas to the screen—many of their journals entries were what their (individual) ideas of the house should have looked like. Many of them were very impatient with sharing the mouse—We observed a lot of 'mouse-snatching'!

(December 1998, England).

In addition to discussing school experiences, researchers offered numerous design suggestions for the development of new technology. They also discussed to a great length the communication and collaboration practices of the KidStory research group. Researchers questioned, challenged, and probed what they saw in the research experience.

4.2 Journal analysis: changes in adult researchers

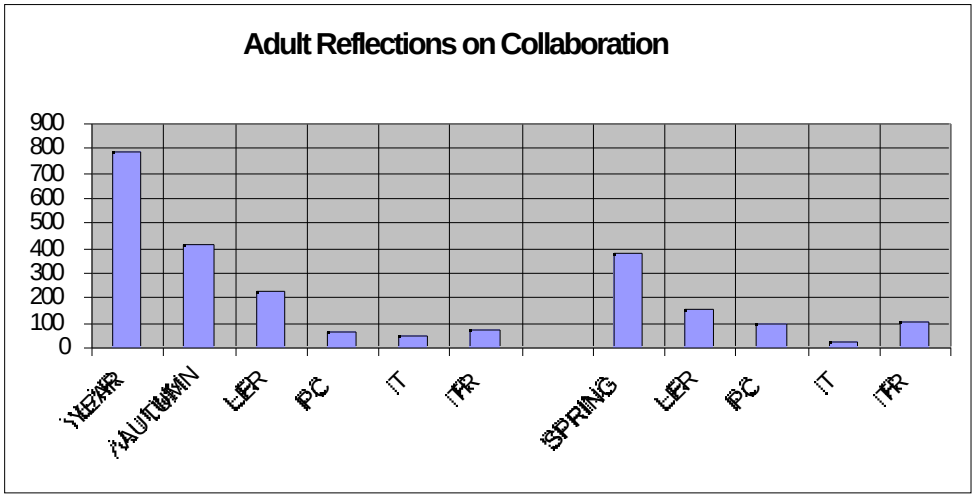
As with the children's journals, adult journals were collected in January and June of the first project year. Thus each analysis represents approximately six months of reflections. Adult journal reflections in the first year of the project were in 11 main areas. The coding structure

identified from analysis of all of the journals is given in Table 3.1, Appendix 3 (previously described in chapter 3). Five areas of reflections were the same as in children's journals; communication, storytelling, inventing, technology use, technology development. A further six categories of reflections were identified in adults' journals; collaboration, cultural differences, evaluation, understanding expectations, infusion design, and general concerns.

Table 4.2 (see Appendix 4) presents the frequency of adult journal reflections for each code at each point of journal analysis (at the end of the autumn and at the end of the spring terms). The table gives total frequencies for all adults together and is sub-divided to show frequencies reported by groups of adults in accordance with their role (educational researcher, project co-ordinator, teacher, and technology researcher). These are discussed in detail in the following sections.

4.2.1 Changes in Collaboration

Total reflections related to collaboration in the autumn and spring by all adult groups are shown in Graph 4.1.



Graph 4.1 Frequency of adult reflections on Collaboration over Time and by researcher role

A detailed analysis of adult reflections for collaboration sub-codes is given in Table 4.3 (see Appendix 4).

Adults commented about collaboration in relation to themselves, their peers, and their child partners. Comments about collaboration can be described as positive experiences, negative experiences, learning experiences, and calls for change. On the whole, throughout the first year, there were more positive reflections about collaboration than negative ones.

The number of reflections on collaboration remained roughly the same from the autumn to the spring. In contrast, we see a notable increase from the autumn to the spring in the number of both positive and negative reflections that are oriented towards the self. These are comments researchers made that are "I-oriented" statements and that about themselves, as opposed to their peer or child partners. In the autumn, there were 56 positive collaborations and 13 negative collaborations in this area. In the spring, there were 76 positive collaborations and 39 negative collaborations in this area.

Still, the number of negative collaboration instances is high. In our first year, there were 385 positive collaboration reflections and 277 negative collaboration reflections. We would somewhat expect this in the first year of this project. We are getting to know each other and we are becoming comfortable with what we can expect of ourselves and our research partners. In this time period, there would be many instances of negative collaboration. We would also expect that, as we move into our second year, instances of positive collaboration would rise.

Collaboration reflections about one's peer remained relatively constant, except for a sharp increase in the Call for Change category. These are reflections where researchers ask for change in the way their peers are collaborating. This coincides with the overall figure on negative collaborations. We can surmise that, as the project has progressed through the first year, researchers have become more familiar their roles and feel more confident in calling for change. As a result, we would see more expressions of desire to make changes in the ways in which we are collaborating.

With respect to intergenerational collaborations, we see a decrease in the number of reflections from autumn to spring in all but one category, with call for change remaining constant. In particular, we see sharp decreases in both positive and negative intergenerational collaborations. Positive intergenerational collaborations decreased from 57 to 26 from the autumn to the spring; negative intergenerational collaborations decreased from 67 to 19 from the autumn to the spring. This may be due the developing relationship that we have with our child partners. As we witness our child partners improved collaborations with each other and as we have more personal experience collaborating with our child partners, we may be focusing our reflections in other areas.

Clearly, the educational researchers commented more about collaboration than any other peer group. As we moved into the spring though, comments on collaboration were more evenly distributed among educational researchers, project co-ordinators, and technology researchers.

Examples of adult reflections on collaboration:

It gives a good feeling to be able to sit down after each occasion and discuss the outcome and if one could have chosen a different line of action.

Teacher, spring, Collaboration/Self/Positive

At the start of the workshop…we had a lot to learn and understand. The practical sessions really helped to make sense of everything and by the end of the week we were all talking as if we'd done this stuff forever.

Educational Researcher, autumn, Collaboration/Self-Peer/Learning

There must be room for second thoughts and new aspects, at least as long as all involved have not had their say. We need to discuss procedures for this at the next plenary.

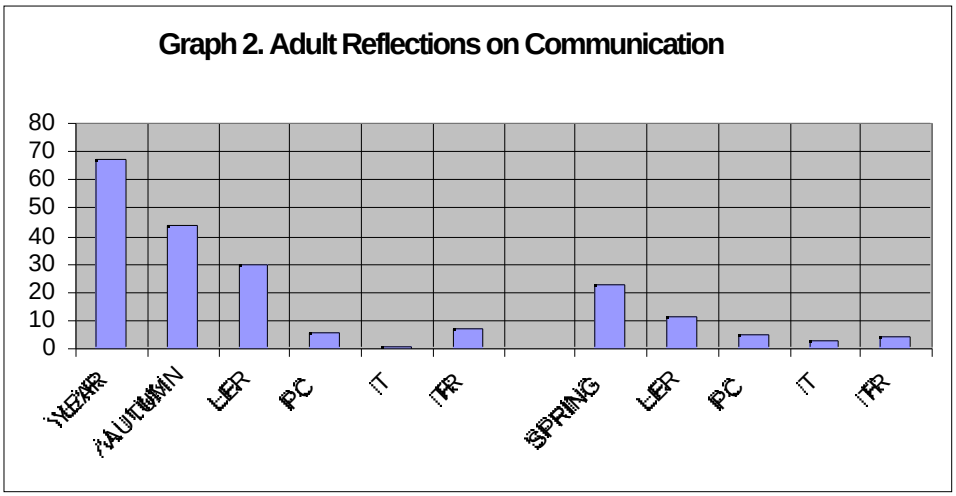
Project Co-ordinator, autumn, Collaboration/Peer/Call for Change

Two children had a go with the computer and they quite liked that they could change the texture, but one of them was very dominant and the other very shy, so the dominant one commanded everything.

Technology Researcher, spring, Collaboration/Intergenerational/Negative

4.2.2 Changes in Communication

Total reflections related to communication in the autumn and spring by all adult groups are shown in Graph 4.2.



Graph 4.2 Frequency of adult reflections on Communication over Time and by researcher role

A detailed analysis of adult reflections for communication sub-codes is given in Table 4.4 (see Appendix 4).

Adults commented about communication in relation to themselves, their peers, and their child partners. Comments about communication can be described as positive experiences, negative experiences, learning experiences, and calls for change. On the whole, throughout the first year, there were more negative communication reflections than positive ones.

Reflections about communication decreased from autumn to spring, with negative communication experiences about one's peer showing the most dramatic decrease. In the autumn, there were 33 negative peer communications. In the spring, there were 3 negative peer communications. This may be an indication that we are communicating more positively with each other than at the start of the project. Since we have built up communication mechanisms for our team, communication seems to be less of an issue at the close of our first year.

It should be noted that we saw no instances when adults reflected upon children's learning in reference to communication, nor did we make any calls for change in this area. This may be due to the early time frame that is being reflected in the journals. As the project continues, we anticipate there will be reflection in this area.

Again, as with collaboration, it was the educational researchers who commented more than any other researcher profile. As we moved into the spring though, comments in this area from educational researchers decreased quite dramatically. Comments about communication remained relatively constant from autumn to spring for all other researcher profiles.

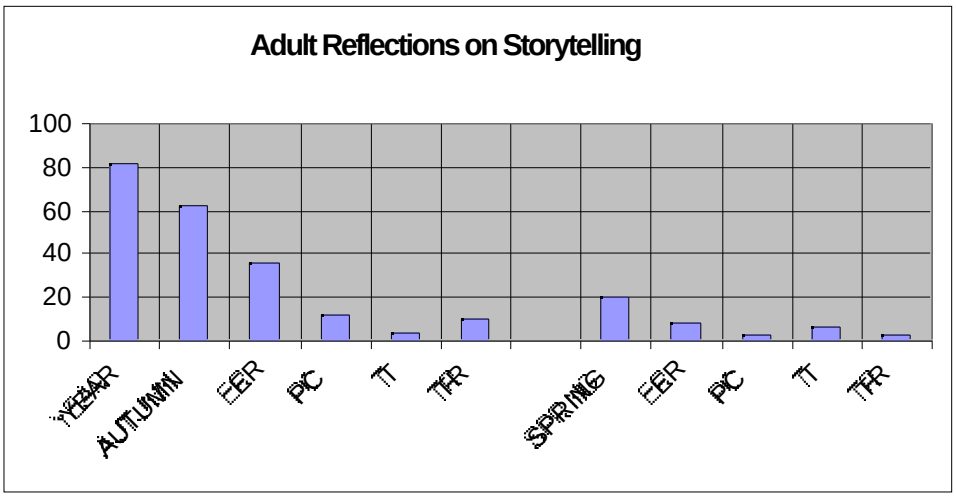
Example:

I know I get frustrated when I don't know what others are doing, yet I am probably not much more communicative than the others.

Technology Researcher, autumn, Communication, Self/Peer, Negative

4.2.3 Changes in Storytelling

Total reflections related to storytelling in the autumn and spring by all adult groups are shown in Graph 4.3.



Graph 4.3 Frequency of adult reflections on Storytelling over Time and by researcher role

A detailed analysis of adult reflections for storytelling sub-codes is given in Table 4.5 (see Appendix 4).

Adults commented about storytelling in relation to themselves, their peers, and their child partners. Comments about storytelling were described as a demonstration, a strength area, a difficulty area, a learning experience, and a call for change. The greatest number of comments on storytelling were intergenerational in nature. That is, adults reflected upon experiences of children as storytellers, as opposed to themselves or their peers as storytellers.

Plainly, the greatest number of storytelling reflections concerned our child partners. In this first year, adults made 2 comments about themselves as storytellers, 5 comments about their peers as storytellers, and 75 comments about children as storytellers.

Understandably, our journal reflections focus on the child as storyteller because that is one of our primary goals of the KidStory Project. It will be interesting to see if adults begin to focus more upon themselves and their peers as storytellers as the project continues.

In addition, the number of reflections about children's storytelling decreased dramatically from the autumn to the spring. In the autumn, there were 57 reflections about children as storytellers, while in the spring, there were 18 reflections in this area. In the initial phase our project, we spent a considerable amount of time discussing storytelling, and how we can aid our child partners in that aim. It may be that, as the year continued, we felt more confident in this area. It may also be that our technologies are supporting storytelling in a very integrated way, and we are focusing more firmly on technology development than on storytelling exclusive of technology development. Sharp increases in the technology development category would support this contention.

It is worthy to note that the distribution of reflections about our child partners' strengths and difficulties with regards to storytelling is relatively the same. That being said, we are

reflecting upon the natural storytelling skills our child partners possess, but also taking notice of this as an area for improvement. Interestingly enough, there was very little adult reflection about themselves as storytellers. Instead, adults considered our child partners as storytellers first, and then our adult peers as storytellers second.

Again, it was the educational researchers who commented more than any other researcher profile. As we moved into the spring though, comments in this area from educational researcher decreased quite a bit. Comments about storytelling decreased for all other researcher profiles, except for teachers. Interestingly, teachers were the only group who talked about storytelling more in the spring, though by a very small amount.

Examples of adult reflections on storytelling:

I think the session was great. We got wonderful stories from all the groups and we felt as if the kids really got to see some of the possibilities of KidPad.

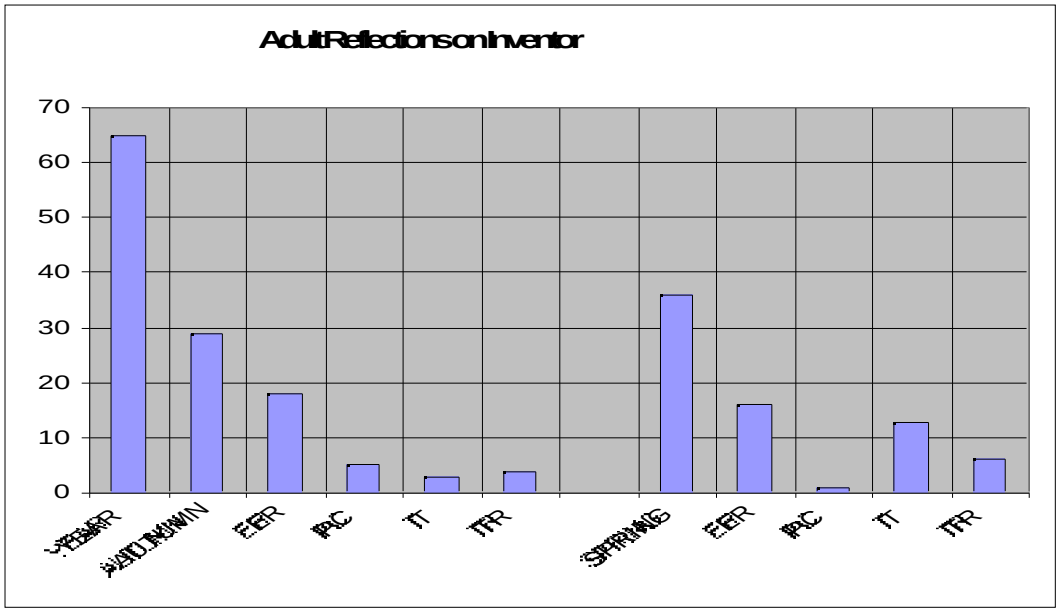
Technology Researcher, spring, Storytelling/Intergenerational/Strength

Writing a class story on KidPad was a new concept for the children. Story ideas came from the individual…Their ideas were very limited to stories they new or to their own experiences.

Teacher, spring, Storytelling/Intergenerational/Difficulty

4.2.4 Changes in Invention

Total reflections related to invention in the autumn and spring by all adult groups are shown in Graph 4.4.



Graph 4.4 Frequency of adult reflections on Invention over Time and by researcher role

A detailed analysis of adult reflections for invention sub-codes is given in Table 4.6 (see Appendix 4).

Adults commented about invention in relation to themselves, their peers, and their child partners. Reflections about invention were classified as a demonstration, a strength area, a difficulty area, a learning experience, and a call for change. On the whole, throughout our first year, there were more reflections about our strength in inventing, than there were about any difficulty inventing.

As with storytelling, the greatest number of invention reflections were about our child partners. In this first year, adults made 7 comments about themselves as inventors, 9 comments about their peers as inventors, and 50 comments about children as inventors.

The number of reflections about our child partners' inventing experiences increased from the autumn to the spring. In the autumn, there were 20 reflections about children as inventors, while in the spring, there were 30 reflections about children as inventors. As mentioned previously, this may be due to the increased focus placed on invention activities in the second half of the year, as well as our child partners becoming more comfortable in their role as inventors.

The distribution of reflections about our child partners' strength and difficulty with regards to invention is not the same. In this first year, we commented about the children's strength in inventing almost twice as much as we commented about any perceived difficulties in inventing. In addition, we reflected twice as much about their strengths in this area in the spring than we did in the autumn.

Visibly, as with storytelling, there was little adult reflection about themselves or their peers as inventors. Instead, adults considered our child partners as inventors first and foremost. Also,

we reflected upon learning as a result of invention activities only in relation to our child partners and never in relation to ourselves or our peers.

Again, it was the educational researchers who commented on invention more than any other researcher profile. As we moved into the spring though, comments in this area from educational researchers remained relatively constant. Comments about invention also remained relatively constant from all other researcher profiles, except for teachers. Interestingly, it was the teachers who talked much more about invention in the spring than in the autumn, probably because of more scheduled specific inventor activities in the spring.

Examples of adult reflections on invention:

Last session, as an inventor, seems to have changes the children's attitudes. They acted more like inventors and had more thought about the KidPad programme than the children before.

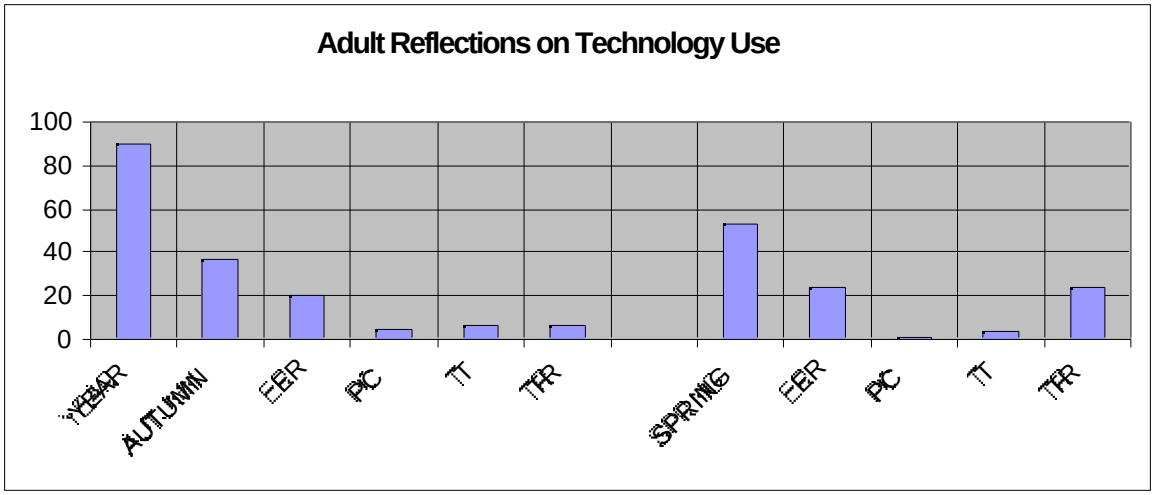
Educational Researchers, autumn, Inventing/Intergenerational/Strength

Most children had understood what an inventor is, some of them did what they heard others did, some did something I had described as an invention… I notice that some of my children have difficulties in imagining and readily imitate an adult or a buddy.

Teacher, spring, Inventing/Intergenerational/Difficulty

4.2.5 Changes in Technology Use

Total reflections related to technology use in the autumn and spring by all adult groups are shown in Graph 4.5.



Graph 4.5 Frequency of adult reflections on Technology use over Time and by researcher role

A detailed analysis of adult reflections for technology use sub-codes is given in Table 4.7 (see Appendix 4).

Adults commented about technology use in relation to themselves, their peers, and their child partners. Comments can be described as positive experiences, negative experiences, and learning experiences. On the whole, there were more negative technology use reflections than there were positive ones.

As with Storytelling and Invention, the greatest number of reflections were about our child partners. In this first year, adults made 23 comments about their own technology use, 6 comments about their peers' technology use, and 61 comments about the children's technology use. Clearly, at this phase of the project, we are focusing on the child's personal experiences with the technologies we are creating.

The total number of technology use reflections increased from the autumn to the spring. There were 37 reflections in the autumn and 53 reflections in the spring. The number of positive intergenerational experiences observed by adults nearly doubled from the autumn to the spring, while the number of negative intergenerational experiences remained roughly the same. Perhaps due to the increased collaborative nature of the technologies we are creating, adults are beginning to sense a more positive technology use experiences from our child partners.

In the autumn, educational researchers commented more in the area of technology use than any other researcher profile. While in the spring, it was the educational researchers and technology researchers who commented equally as much. Technology researchers showed a dramatic increase by illustrating four times the number of reflections than they did in the autumn, while all other researcher profiles showed a decrease. This may be an indication that technology researchers are becoming much more attuned to the experiences of those using the applications which they are developing.

Examples of adult reflections on technology use:

The children now look forward to using the KidStory computer. Jake says, "Why can't we stay on it for longer?

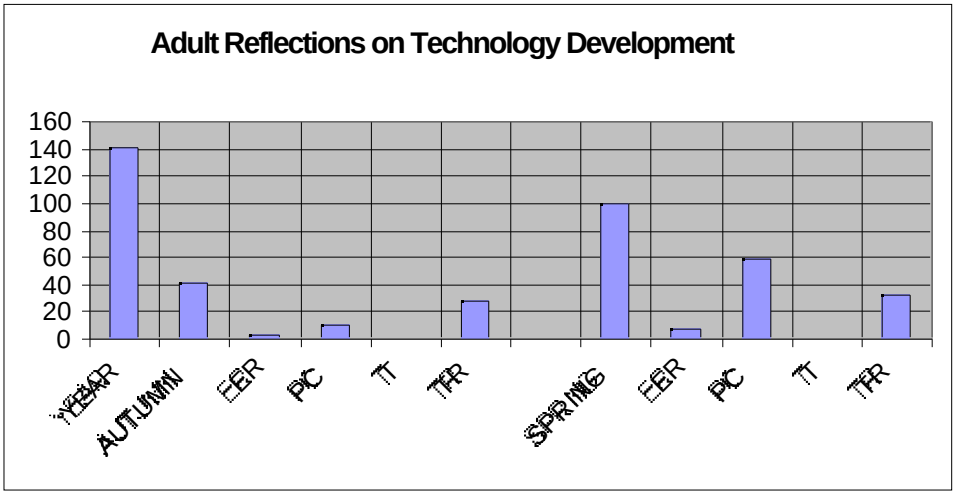
Teacher, spring, Technology Use/Intergenerational/Positive

Many of [the children] had problems using the computer. This put them off using it- they seemed to be afraid of making mistakes. Only a few of them really explored the package.

Educational Researcher, autumn, Technology Use/Intergenerational/Negative

4.2.6 Changes in Technology Development

Total reflections related to communication in the autumn and spring by all adult groups are shown in Graph 4.6.



Graph 4.6 Frequency of adult reflections on Technology Development over Time and by researcher role

A detailed analysis of adult reflections for technology development sub-codes is given in Table 4.8 (see Appendix 4).

Adults commented about technology development by brainstorming design suggestions and by reflecting on design philosophy or the design process. In addition, we commented about technology implementation or reflected on technology development as a learning experience. On the whole, we see a dramatic increase in reflections about technology development as we progressed through the first year of our project.

Discussions increased in almost all technology development sub-categories. In the autumn, there were 41 technology development reflections. In the spring, there were 100 technology development reflections. The Process subcategory is the only subcategory where we see a decrease. This may be an indication that, after a year of our project, we are increasingly comfortable with the process of technology development. Instead, we are focusing on offering design suggestions and comments about the implementation of our technologies.

Predictably, the majority of technology development reflections for the year were from technology researchers. Also, the technology researchers were the only profile that had reflections in all of the technology development sub-codes. Given this is their expertise, this came as no surprise. Interestingly, though, it was our project co-ordinators that showed a remarkable increase in reflection in terms of design suggestions and design philosophy from the autumn to the spring. Project co-ordinators offered 7 reflections in these areas in the

autumn and 53 reflections in the spring. Also interesting to note is the absence of any discussion of technology development from the teachers in their first-year journals.

Examples of adult reflections on technology development:

We think it'd be useful if there was a way to load a picture without having to save the current picture (Maybe a hotkey that will take you to the bulletin board without saving or a special tool?)

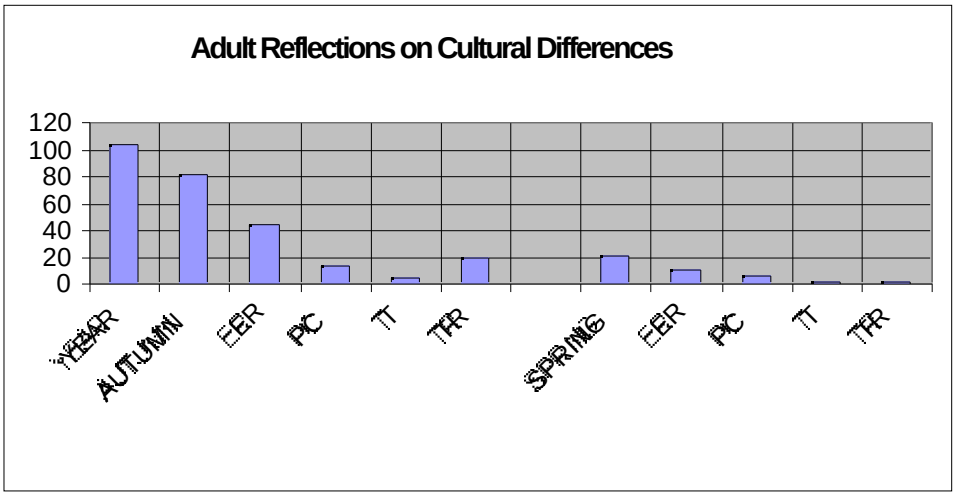
Technology Researcher, spring, Tech. Dev./Brainstorm/Design Suggestion/KidPad

I think the 3D application should take a completely different route than the KidPad application. It should compliment it, not copy it.

Technology Researcher, autumn, Tech. Dev./Brainstorm/Design Philosophy/Klump

4.2.7 Changes in Cultural Differences

Total reflections related to communication in the autumn and spring by all adult groups are shown in Graph 4.7.



Graph 4.7 Frequency of adult reflections on Cultural Differences over Time and by researcher role

A detailed analysis of adult reflections for cultural differences sub-codes is given in Table 4.9 (see Appendix 4).

When adults commented about cultural differences, they were attempting to understand the ways in which the researchers in our project are similar to and different from each other. Comments about cultural differences were directed toward a peer or towards our child partners. Reflections in this area were about geographical differences, discipline differences, and age differences. On the whole, the largest number of reflections were about age differences in our child partners, with notice of geographical differences of our peers and our child partners not far behind.

Sensitivity to cultural differences seemed to lessen as we moved from autumn to the spring.

There were 82 reflections about cultural differences in the autumn and only 21 reflections in this area in the spring. The sharpest decrease was in the area of age differences. When adults reflected upon age differences, they were taking notice of the differences between our 5-yr. old and 7-yr. old partners. In the autumn, adults commented about the differences between 5-yr. old and 7-yr. old children 49 times. In the spring, adults commented in this area only 3 times.

In terms of cultural differences due to geography, we see a sharp decrease in this area as well. When adults reflected upon geography differences, they were taking notice of differences they attributed to belonging to different countries. In the autumn, adults made 28 reflections in this area. In the spring, they made 16 reflections in this area.

Interestingly, we see very little adult reflection about perceived differences due to adults coming from different disciplines. There were only five occurrences of this in the autumn and no occurrences of this in the spring. Instead, we attribute our differences to age or geography.

In terms of cultural differences, it was the educational researchers and technology researchers who commented most frequently in this category. In addition, it was these groups who showed a dramatic decrease in this discussion from autumn to spring. It is worthy to note that comments in cultural differences from all researcher profiles decreased from the autumn to the spring. We can surmise that as the year progressed, we began to take more notice of our similarities and less notice of our differences. Also, we may be getting more comfortable working with children of different ages, as well as peers of different geographical identities.

Examples of adult reflections on cultural differences:

It was confusing, inspiring, and thrilling to go to USA and back. Very intensive days and many different communications going on. It is not so easy to meet a new world.

Educational Researcher, spring, Cultural Differences/Geography/Peer

It was great to visit the Albany School (UK). The 5-year olds were different [than in Sweden]. They were trained to be in school and in a big group with one teacher. Very different from the Swedish day care centre.

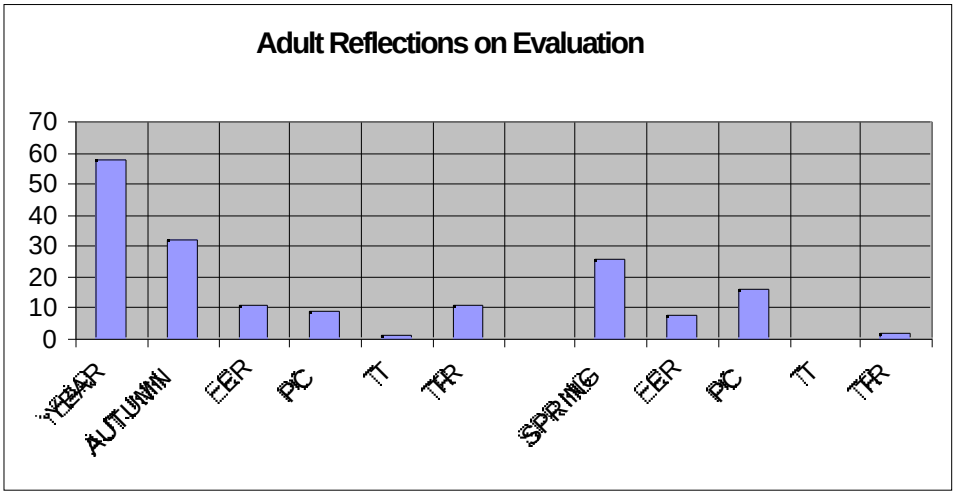
Educational Researcher, autumn, Cultural Differences/Geography/Intergenerational

General observations of the 5-year olds were that they seemed less inhibited than the 7-year olds. They were willing to explore the software, but did not stay on task.

Project Co-ordinator, autumn, Cultural Differences/Age/Intergenerational

4.2.8 Changes in Evaluation

Total reflections related to communication in the autumn and spring by all adult groups are shown in Graph 3.13.



Graph 4.8 Frequency of adult reflections on Evaluation over Time and by researcher role

A detailed analysis of adult reflections for evaluation sub-codes is given in Table 4.10 (see Appendix 4).

In discussing evaluation, adults commented about the philosophy of our evaluation measurements and provided suggestions related to the project's evaluation components. The frequencies of reflection about evaluation showed a slight decrease over the course of our first year.

Project co-ordinators showed a strong increase in reflections on evaluation in the spring, whereas all other profiles showed a decrease over this period. Much of the projects'

reflections on evaluation have been a result of a continuing discussion of the qualitative and quantitative components of project evaluation.

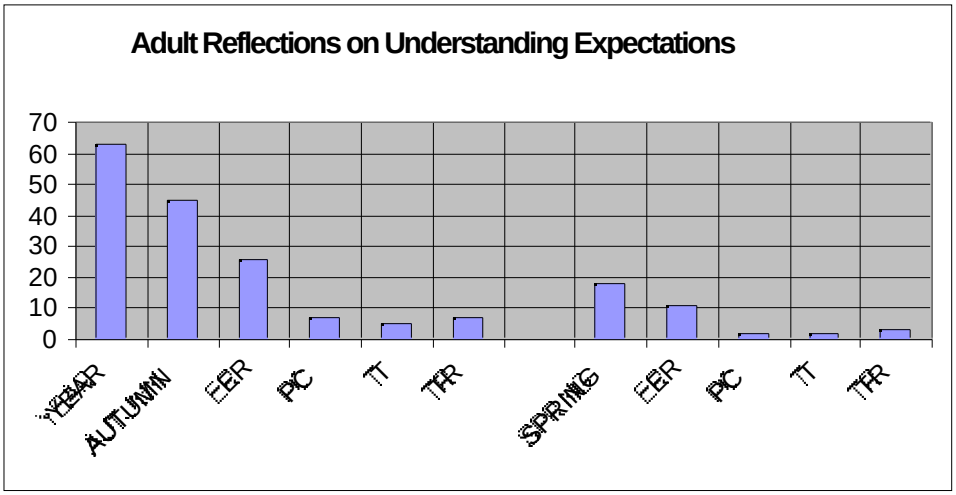
Example:

For evaluation work package 3, we know and acknowledge that there are differences in how the sessions in Stapleford (UK) and in Rågsved (Sweden) will be performed, even under the same headings in the plan… it is important, though, that the differences do not hamper the school session work and the use of Cooperative Inquiry, as the dominant methodology.

Project Co-ordinator, Spring, Evaluation/Process/Philosophy

4.2.9 Changes in Understanding Expectations

Total reflections related to communication in the autumn and spring by all adult groups are shown in Graph 4.9



Graph 4.9 Frequency of adult reflections on Understanding Expectations over Time and by researcher role

A detailed analysis of adult reflections for understanding expectation sub-codes is given in Table 4.11 (see Appendix 4).

When adults commented in this category, they were attempting to understand their own role in the project, as well as the roles of their peers and their child partners. Comments about expectations were about oneself, one's peers, or one's child partners. On the whole, we saw a sharp decrease in discussion about expectations.

As the first year of our project has progressed, researchers seem to be growing more comfortable with their expectations of themselves, their peers, and their child partners. In the autumn, there were 45 reflections in this area. In the spring, there were only 18 reflections.

The largest number of reflections in expectations have been related to the self. In other words, the individual researcher is considering his own personal role and what is expected of himself within the framework of the project. In fact, there were more comments from individuals attempting to understand their *own* role than the combined comments where individuals considered the roles of their peers and child partners. This shows a desire on the part of our researchers to understand what they expect of themselves and often times, what their peers are expecting of themselves.

Educational researchers reflected the most in Understanding Expectations. As we progress through our first year, though, we see researchers in all profiles, including educational researchers, commenting less in this area.

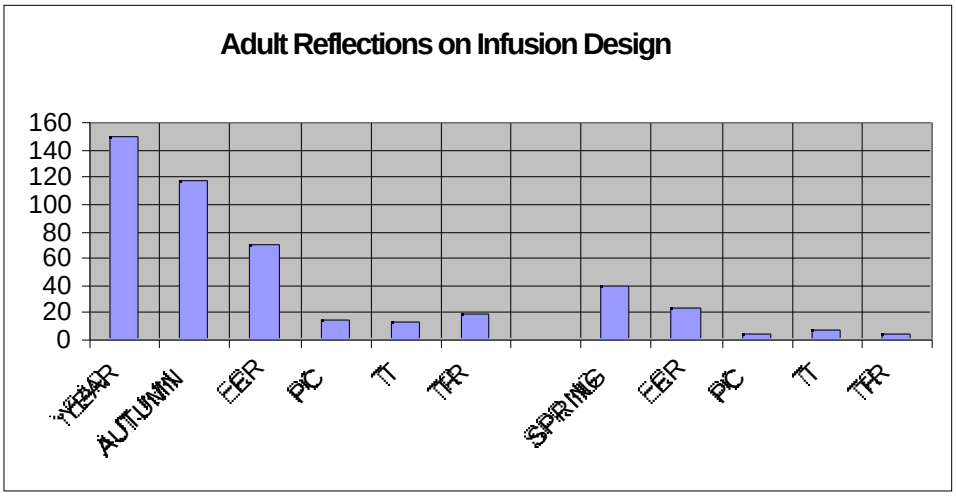
Example:

(Researcher) started working with the program. I kept quite passive, I feel unsure of my role now. Maybe I am too passive.

Educational Researcher, autumn, Understanding Expectations/Self

4.2.10 Changes in Infusion Design

Total reflections related to communication in the autumn and spring by all adult groups are shown in Graph 4.10.



Graph 4.10 Frequency of adult reflections on Infusion Design over Time and by researcher role

A detailed analysis of adult reflections for infusion design sub-codes is given in Table 4.12 (see Appendix 4).

When adults commented about Infusion Design, they were commenting about school-related activities. Adults commented in this area by reflecting upon the following points: the philosophy or methods used, the ability of our child partners, the content of the scheduled activities, the effort to plan and complete the school sessions, and the social nature or group dynamics related to those activities. Overall, the largest number of comments have been in Social, with Ability and Content not very far behind and about equal to each other in number.

Comments about infusion design dropped dramatically from autumn to spring. In the autumn, there were 118 comments about infusion design, while in the spring, there were only 40. We might attribute this to the increasing confidence level of our researchers. As our partnership with the schools continues to grow and as our researchers become more comfortable partnering with children, we would anticipate that there would be less concern with school-related activities.

Not surprisingly, our educational researchers commented most frequently in this category. The planning and conducting of the school activities was a primary goal of the educational researcher. Also, the methods of partnering with children employed in the schools were new to most of the educational researchers at the start of this project. Therefore, we would expect much discussion in the infusion design category in the autumn as educational researchers become more familiar with these methods. We take note, however, that reflections on infusion design dropped across all researcher profiles.

Examples of adult reflections on infusion design:

I was very surprised at their ability [5-yr. olds]. The initial brainstorming of storytelling methods was very good- the children came up with lots of ideas.

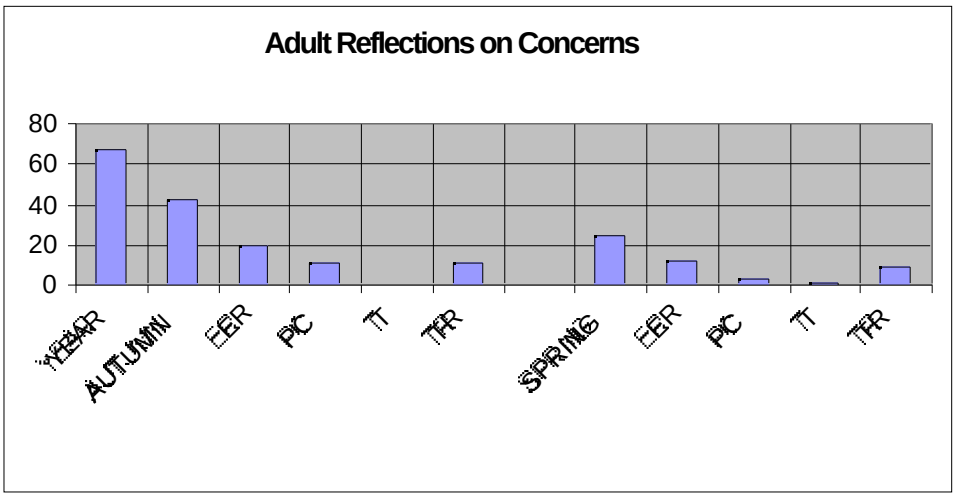
Project Co-ordinator, autumn, Infusion Design/Ability

The box- superb idea for getting them thinking- good that the object was unrecognisable and they, therefore, couldn't be too specific about naming it.

Teacher, autumn, Infusion Design/Content

4.2.11 Changes in Concerns

Total reflections related to communication in the autumn and spring by all adult groups are shown in Graph 4.11



Graph 4.11 Frequency of adult reflections on Concerns over Time and by researcher role

A detailed analysis of adult reflections for concerns sub-codes is given in Table 4.13 (see Appendix 4).

Some concerns highlighted in the adult journals of our first year include time, gender differences, and noise. On the whole, comments about concerns dropped at the first year of the project continued.

The largest number of concerns were about time. Concerns about time were mainly focused on time management and on the balancing and accomplishing of responsibilities within the project. In addition, concerns about making sure that our child partners has sufficient time for technology use were expressed. Concerns about time dropped somewhat from the autumn to the spring.

Concerns about gender differences observed in the Swedish school were primarily noted in the autumn, but were not at all reflected upon in the spring. Noise concerns dealt with the amount of "background sound" in the school classes during our scheduled sessions. Concerns about both gender differences and noise decreased at the project continued through the year.

Example:

Researching laptops, ordering, waiting, and installing the desktop computers have taken so much out of my time, it's ridiculous. That, in combination with school activities taking up at least 1.5 days a week…

Technology Researcher, spring, Concern/Time

4.3 Examination of how adults changed *in terms of researcher role*:

4.3.1 Educational Researchers

Collaboration was the area educational researchers discussed most frequently. Although the frequency with which they discussed collaboration decreased from the autumn to the spring, it was still the area that they reflected upon most consistently. We can surmise that educational researchers, who are spending considerable amounts of time in the schools, are witnessing many forms of collaboration. Therefore, they have been quite reflective in this area.

The least frequent area of discussion for educational researchers was in Technology Development, with their frequencies in this category remaining relatively stable from autumn to spring. We may see reflections in this area increase. As the project progresses and as educational researchers feel more confident about making suggestions related to design, philosophy, and implementation of technologies, this may change.

Discussion by educational researchers about Cultural Differences and Infusion Design dropped drastically as the year progressed. It seems that educational researchers have become more comfortable with the variety of cultures and ages that characterise our partners. They also seem to be more comfortable in the classroom environment with respect to infusion design activities.

4.3.2 Project Co-ordinators

As with educational researchers, Collaboration was the area project co-ordinators reflected upon most frequently. Interestingly though, project co-ordinators spent more time in the spring than in the autumn commenting about collaboration. Understandably, project co-ordinators would take a keen interest in the collaborative nature of our team and look for ways to improve upon that collaboration.

The least frequent area of discussion for project co-ordinators was in Inventor and Technology Use, showing equal frequencies in those two areas. Unsurprisingly, these numbers are low likely because project co-ordinators, on the whole, have spent less day-to-day time in the schools and in the labs developing technology for KidStory. As a result, they witness technology use and invention-related activities less than other researcher profiles.

We see large increases in technology development discussion for the project co-ordinators from the autumn to the spring. This shows an interest on the part of project co-ordinators to become more involved in all aspects of technology development.

4.3.3 Teachers

As with educational researchers and project co-ordinators, Collaboration was the area teachers discussed most frequently. We note a decrease in discussion about collaboration for teachers from the autumn to the spring. We maintain that teachers, in the interest of classroom management and learning objectives, would quite naturally have a continuing interest in children's collaboration.

The area of least discussion for teachers was in Technology Development, with teachers offering no reflections in this area. We do note, however, that teachers did show an increasing interest in Invention as the year progressed. We can surmise that in the future, teachers may have more reflection in this area.

4.3.4 Technology Researchers

As with educational researchers, project co-ordinators, and teachers, Collaboration was the area technology researcher reflected upon the most. Technology researchers commented more frequently about collaboration in the spring than in the autumn. Clearly, this is a strong area of reflection for all members of our project.

Technology Researchers commented the least in Inventors and Understanding Expectations. With regards to Inventing, it may be that technology researchers are focusing more clearly on technology development, and reflecting less on the nature of invention. With Understanding Expectations, on the whole, technology researchers were either quite comfortable with their expectations of themselves, their peers, and their child partners or were not as expressive about those concerns.

Areas of interesting change for technology researchers include an increase in reflection about Technology Use and a decrease in commenting about Cultural Differences. As implementation of technologies becomes more of a project focus, technology researchers seem to be more thoughtful about the reactions of team members to those technologies. Also, technology researchers seem to be taking less notice of the differences between team members and more notice of the similarities.

4.4 Teacher involvement in the KidStory project

The KidStory project involves teachers as research partners as well as children. Since teachers have a different role to play with respect to children's learning they also have a different role to play with respect to research and design. They are the experts in teaching and in managing children in their respective contexts. They have duties and responsibilities to the children's education that lead to different sets of goals and agendas. Moreover, this differs across the two cultural and educational systems involved (Sweden and England). With all this in mind, we set out to involve teachers from the outset in all aspects of the

project which involved designing activities as well as technologies, methods of evaluation and so on. In addition, we realised that our involvement with the two schools would have a potentially significant impact on teachers' professional development and possibly on the school as an organisation, through, for example, our impact on the head teacher. For instance, at Albany School, the teachers had relatively little experience of using IT and we were intending to "immerse" the teachers' and children in technology. We expected that this might have a lasting effect on teachers and children's attitude towards and use of IT in more general terms. Teachers' professional development could be affected by the very fact of being so deeply involved in a research project.

In the UK, at least, there is a good deal of rhetoric in initial teacher training and in continuing professional development, about the need for "evidence-based practice". However, teachers are not necessarily trained to carry out research in the kind of way that might provide an evidence base for their teaching. Working with academic researchers, especially with expertise in the psychology of learning and in educational research, might have effects on teachers' perceptions of their teaching and of their children's' learning. In order to provide as objective as possible an account of this type of impact we employed the assistance of two experienced academics in the field of teachers' professional development to carry out a small interview study.

4.4.1 Teacher workshops and review meetings

In brief, as outlined in D2.1, teacher workshops and review meetings were carried out at both schools throughout the year. Teachers were involved in planning and reviewing school activities. Teachers gave feedback in this way, through use of journals and also in participation in school sessions

4.4.2 Teacher initiations

During the course of the first year of the project the teachers have become more involved in the KidStory project. Some interesting activities have been initiated by teachers themselves as outlined below:

- A teacher from Rågsvedsskolan initiated a link between the two schools by sending a fluffy toy " Birdy Num Num" to Albany school. This bird arrived with pictures of the Swedish children at school and a camera with which to take photos of the children at Albany. This kind of initiative enables links between the schools, teaches children about different cultural sessions and reinforces the children's understanding of the nature of the project.

- Rågsvedsskolan were already on the internet at the start of the project, however Albany school have connected during the year. Both schools have exchanged email addresses and a correspondence should develop.
- Albany school have asked researchers for help in creating their own WebPages.
- The Head teacher at Albany has recently asked if other teachers could be involved in the project as she felt that this would raise the profile of IT in the school. We discussed the re-organisation of classes imposed by new Government regulations concerning teacher-pupil ratio in classes. The consequence of this is that the 5-year-old class that we have been working with during Year 1 of the project are to be split across several classes next year. This may mean that additional teachers may be able to participate in the project in the following years.
- Teachers at both schools are keen to build a relationship between the schools and have asked to make exchange visits. A visit to Rågsvedsskolan for the Albany teachers is planned to take place in the next 3 months.

Teachers from Albany School were invited to join in some of the discussions at the project plenary meetings held in Nottingham in January 1999. They were very enthusiastic about this and contributed greatly to the planning of term 2 school activities. During the term 2 activities both teachers were more involved in the school activities and occasionally took the initiative to run activities without the KidStory researchers. An example of this is that the teachers asked if they could have a computer with KidPad on it for each classroom. This was provided and the teachers allocated 30 minutes of every day for use of KidPad. This is extremely positive and suggests a high probability of eventual successful integration of KidStory technology within the classroom. The only potential problem is that we may not be able to monitor children’s progressions with the technology if we are not there to see them use it. We have to ensure that the feedback loop into the project is not broken.

At Rågsvedsskolan researchers and teachers have on repeated occasions discussed recent research on children's language development. The single sessions have been discussed from cognitive aspects. These discussions have raised many questions such as : Did the children understand what to do? Was it sufficiently concrete? What does work of this kind mean for children with Swedish as second language? Why was there chaos? How do you effectively make children co-researchers? Can we organise the session in a different way next time? Suggested books and courses have also been discussed. The teachers have made accounts of work between the sessions with connection to the project. The teachers of the 5-year-olds have continued work under the invention theme. With the 7-year-olds the sandwiches that the children had invented in a KidStory session were manufactured with real ingredients. At an open house for the parents teachers arranged exhibitions of the children's diaries and inventions.

4.4.3 Teacher interviews

Teacher interviews were carried out in order to obtain some indication of the extent and type of effects the project was having on teachers' perceptions of their teaching and their children's learning. We also wanted to have an independently obtained account of teachers' views of the project and their involvement.

For evaluation at Albany school, we approached a senior academic in the School of Education at the University of Nottingham, Dr Alma Harris, who is Deputy Director of the Centre for Teacher and School Development and an internationally renowned expert in the field of teacher development. She commissioned a colleague who also works in this field but is based at the University of Leicester's School of Education (Dr Christine Wise) and who knew nothing about the KidStory project. This enabled us to design and conduct an interview study completely "blind" to the aims and methods employed in the KidStory project. These researchers designed a simple interview schedule for teachers (see table 4.14 in Appendix 4).

The interviews have been carried out and are currently being transcribed. They will be analysed by Dr Harris and the results fed back to the project. In this way the interviews serve as a completely independent account of teachers' reflections, uninfluenced by members of the KidStory team.

The same kind of evaluation is planned for teachers at Rågsvedsskolan. This will be carried out in the near future.

4.5 Discussion

Coding of adults' journals over the first year of the project identified 11 main categories; collaboration, communication, storytelling, inventing, technology use, technology development, cultural differences, evaluation, understanding expectations, infusion design, and general concerns. For each code a comparison of frequency of reflections for different adult role groups within the KidStory project was made. This highlighted different patterns of frequencies.

By far the greatest area of discussion was in collaboration, both in the autumn and the spring. In the first half of the year, the educational researchers expressed the largest number of reflections about collaboration, compared with other members of the project. In fact, educational researchers commented more about collaboration than all other researcher profiles combined. This evened out somewhat as we moved into the second half of the year. Clearly, an intergenerational, international, interdisciplinary project of this scale involves a huge amount of collaboration. As individuals, we have all come into this project with varying expectations and unique previous experiences regarding collaboration. As a result, in the first of year of our project, we have spent a considerable amount of time thinking about our successes and our challenges in this area.

The second major area of reflection was in Infusion Design, though we note a sharp decrease of discussion in this area from autumn to spring. Reflections about infusion design were oriented towards our school activities. Since we were beginning our partnership with the schools in the autumn, we were not surprised to see focus on school-related activities to be high at this time of the year and then decline later in the year. Again, educational researchers have had the most reflections in this area, in contrast with other members of the project. Given that the planning of school activities and the formation of our school partnerships have been performed primarily by our educational researchers, this was not surprising.

Discussion on Technology Development and Cultural Differences were the next most frequently reflected upon category. With respect to Technology Development, we see a strong increase in reflections from autumn to spring. Not surprisingly, we see that in the autumn the majority of discussion on technology development was offered by our technology researchers; Technology development is their area of expertise. Interestingly enough though, in the spring, it was our project co-ordinators who accounted for the majority of discussion in this area.

With respect to Cultural Differences, as with Infusion Design, we note a sharp decrease of reflection in this area from autumn to spring. Initially, project members spent a considerable amount of time reflecting upon differences in age, geography, and discipline with regards to other project members. Perhaps, this is an indication that we are beginning to take notice of the similarities with our peers and child partners, as opposed to our differences. Similarly, we see much less discussion in “Understanding Expectations” in the spring. It is likely that team members have become more comfortable with what is expected of themselves and their peers. This offers yet another indication that our partnership is continuing to grow.

This look at researcher journals provides us with many lessons learned. Discussions are needed regarding the successes and the challenges surrounding collaboration in our first year. We need to continue to find new mechanisms to open up the lines of communication. We need to continue to have more productive and enjoyable collaboration experiences in the second and third years of our project. As improved collaborations occur, we will increasingly notice the similarities in each other and disregard the differences.

In any technology development experience, there will a wealth of feedback. Much of the feedback won’t happen immediately. In the early stages, much of the feedback will be negative. As the applications become more stable and the bugs worked out, positive feedback become more prominent.

Differences arose this year, particularly in relation to methods and evaluation. Visibly, researchers in our project come from different research backgrounds and use differing research methodologies. Therefore, when team members come from such varying disciplines, there will be much discussion about methods and evaluation. This will change the nature of the collaboration, at least until a common language is established.

In this type of project it is important to remember that teacher involvement is equally as important as that of the children. Teachers have played a significant role in the success of the work to date. In both schools teachers have effected changes in technology, kept journals, been involved in school sessions and contributed to meetings.

At Albany school, the teachers have integrated the KidStory technology into their everyday teaching. We feel that this has demonstrated that the process has already been extremely successful. At Rågsvedsskolan teachers have developed on the KidStory themes and discussed research issues and theories.

It is expected that both schools will gain from the project in terms of professional development. Complementary to the analysis of teachers journals, teachers at Albany School were interviewed by an independent team of educational researchers in order to find out their views of the project and what impact it has had on them. Results from this independent analysis will be fed back to the KidStory research team when completed and a similar exercise will be conducted with the teachers at Rågsvedsskolan.

5. Evaluation of School Environment Integration

5.1 Aims and objectives

The activities carried out in each of the participating schools are described in deliverable 2.1, chapter 7. This chapter presents a summary of the outcomes of these school activities derived from immediate researcher and teacher observations made during each "activity".

The objective of the current chapter is to comment upon issues identified during the course of these activities related to working in a real school environment and any differences that were experienced between the two educational cultures.

During the first year of the project school activities were organised in two main phases to run during the autumn and spring terms in each school. The first phase ran from October to December 1998, the second phase ran from February to July 1999. In order to aid interpretation of outcomes, and in particular, to draw comparisons between the two different school environments, examination of the activities at each school has been conducted according to activity type within each phase. This means that the order of activities given here is not the same as described in deliverable 2.1, chapter 7, where those have been presented in chronological order.

Project meetings were held before and after each phase to plan and review activities and progress. Teacher reviews were held at the end of each phase to obtain feedback from the schools (these are presented in section 7.1 of deliverable 2.1).

5.2 Autumn Term

During the autumn term three different types of school activity sessions were completed. These introduced the Cooperative Inquiry methods that would be used. For each activity type we have examined the content and approach taken in each school and compared the outcomes. General points derived from subjective researcher and teacher observations for each session are discussed below.

5.2.1 Introductory sessions

Two introductory sessions were planned. These were aimed at establishing relationships between the child/teacher/researcher partners and introducing the data-collection methods that would be used throughout the project.

In order to provide a tangible activity for the children, tasks involving some element of problem solving were used as introductory sessions. At Rågsvedsskolan a magic mirror

theme was used to encourage children to complete a story. At Albany School a magic box theme was used, which required children to discuss where the box came from, what was inside it and who sent it.

5.2.1.1 Activities at Rågsvedsskolan

Activity	Objectives	Data collection	Researcher observations
The Magic Mirror (I). A large blank mirror presented with a story about an old lady glad finding the mirror: "what did she see?". 5 and 7 year olds (5/11/98)	Listening to a story. Drawing a picture, telling about their story individually.	Individual drawings put into journals.	5 year olds drew pictures of the mirror and gave details about it. Only a few told a story. 7 year olds were able to tell short stories, either about the future or the past. There were notable differences in the stories told by older and younger children.
The Magic Mirror (2). Presenting the mirror and story again, adding that the mirror was given to us by the old lady. Magic spell "one, two, three, what can we see", what would you like to see? 5 and 7 year olds (25/11/98)	Continuation of theme. Listening to a story. Drawing a picture, telling about their story individually.	Individual drawings put into journals.	Children remembered the story from the previous session. Children not confident to tell their own stories. Older children referred to specific situations (e.g. Christmas).

5.2.1.2 Activities at Albany School

Activity	Objectives	Data collection	Researcher observations
The box (1). A brightly coloured box and a message. Children discuss what might be inside and draw their ideas. 5 year olds (9/11/98)	Children get used to researchers leading their class activities. Creative thinking, group discussion.	Individual drawings put into journals.	Session very lively and active. 5 year olds more tactile – had to touch the box. 7 year olds more inquisitive – wanted to now why the researchers had received it. 7 year olds suggested ways to investigate (e.g. X-rays) asked

7 year olds (12/11/98)			about carrying out experiments.
The box (2). An object had been placed inside the box and there was a hole in the box. Children could put their hand in to feel the object but not see it. 5 year olds (16/11/98) 7 year olds (19/11/98)	Continuation of theme. Collaborative work.	Group poster and presentation (video recorded).	7 year olds very involved, some quite complex ideas for where the object came from, some collaboration in making poster. 5 year olds only came up with superficial ideas, individual working on poster (copying). Group sizes (6/7) too large – need more adults in session (especially 5 year olds).

5.2.1.3 Discussion

The first point to note is that the specific activities carried out in each school were different. At Rågsvedsskolan the children were asked to continue a story whereas at Albany School the children were asked to think about why the box had been sent to them. It was considered that these different approaches were better suited to typical introductory class activities at each school. This was partly influenced by differences in class structures between the two schools as well as educational approaches. At Rågsvedsskolan the class sizes were smaller (maximum 14 children in three groups, two with 7-year olds, one with 5-year olds). At Albany School there were 28 children in each class and activities have had to be run with the whole class where possible. The teachers at Albany School felt that an open-ended story would be too abstract for the children, particularly the five-year-olds who had just entered school. They wanted a concrete problem for the children to solve and it was considered that the 'box' scenario would be more useful in this culture.

These differences aside, the common elements between the two activities were:

- introducing KidStory researchers leading a classroom activity
- the children listening as a group to a problem scenario
- creative thinking
- children discussing their ideas in small groups
- introducing children's journals as the medium for expression of individual ideas.

In both schools these sessions were viewed very positively with high levels of enthusiasm from everyone involved. Some differences were observed between the different age groups of children. The 5-year-old children tended to focus on the *object* (i.e. the mirror itself or the

box) whereas the 7-year-old children were generally able to cope with the *concept* of discussion (i.e. the story within the mirror or the story behind the box). At Rågsvedsskolan there were differences in the kind of stories told by the children according to age (see chapter 4 of work package 2 report, D2.1). At Albany School differences were observed between the children in terms of curiosity concerning the box and its background and complexity of ideas suggested according to ages of the children.

In preparing their posters for presentation to the rest of the class, we did see some of the 7-year-olds working together collaboratively but the 5-year-olds tended to work independently and to 'copy' ideas. The 5-year-olds were very shy at presenting their ideas to the class and at Albany School the 7-year-olds had to present in groups of 6 or 7 – this was too many for effective presentations.

Continuation of the theme from one session to the next was very successful. At the second activity, all classes remembered the previous activity and why the KidStory researchers were in their school. Many of the children were able to develop their ideas, building upon the first activity (to different levels depending upon their ages).

5.2.2 Participatory design

Participatory design sessions were held with each class at each school. The purpose of these was to establish the role of researchers, teachers and children as equal design partners in the KidStory project and to provide design ideas for technology development (deliverable 1.1).

5.2.2.1 Activities at Rågsvedsskolan

Activity	Objectives	Data collection	Researcher Observations
Participatory Design - The Magic Mirror 3 Repeating story and magic spell, what would you like to see? Creation of a scene in children-adult groups with low-tech means on physical mirror templates. 5 and 7 year olds (2/12/98)	Continuation of theme. Short listening. Collaborative group design. Suggestions for technical development (D1.1)	Models created. Group presentation (video recorded).	5 year olds very active but not at all interested in collaborating. Adults had a hard time. Groups proud of their work but not interested in listening to others. 7 year olds did collaborate more and the children were more eager listeners. Telling about design rather than story.

5.2.2.2 Activities at Albany School

Activity	Objectives	Data collection	Researcher Observations
Participatory Design (1). Design a device to help in storytelling. 5 year olds (26/11/98) 7 year olds (23/11/98)	Whole class brainstorm for ideas. Collaborative group design. Suggestions for technical development (D1.1)	Models created. Group presentation (video recorded).	7 year olds grouped by ability (as in normal class activities) - models differed by ability group. Role of adults differed for each group. 5 year olds very difficult for children to work collaboratively and to listen to all the presentations.
Participatory Design (2). Create a model to tell a story about Christmas. 5 year olds (14/12/98) 7 year olds (15/12/98)	Collaborative group design	Models created. Group presentation (video recorded).	Very imaginative ideas. Children extremely excited (near to Christmas holiday). Enthusiasm for ideas presenting. Very difficult to run sessions with few adults.

5.2.2.3 Discussion

These sessions yielded some very imaginative design ideas for technology development (the design artefacts have already been presented in chapter 2 of this report).

Again, age differences were observed; the 5-year-olds found it very difficult to work collaboratively and did not have patience to sit and listen to other groups presenting their work. The 7-year-olds were more interested in listening to each other, but at Rågsvedsskolan it was noticed that the 7-year-olds talked about their design rather than the story they had created.

At Albany School there were also differences in the models according to “ability” levels of the 7-year-old children. The researchers also reported that they had played different roles within their design group depending upon which “ability” group they had been assigned to. The low ability children did not seem to be able to work collaboratively to produce one design model. The adults had to force interesting ideas from individual children and pull together these disparate ideas into something coherent. There was also a lot of copying of

ideas – the children repeated what someone else had said rather than building upon their own idea. Researchers found that high ability children would more frequently use their own suggestions to build on other group members' ideas and could keep their focus on the shared goal. They would co-operate by dividing out tasks to group members. The role of the adult in the groups would be a facilitator to help group decision making and make sure less dominant children could contribute to designs. The sessions became more difficult because of the large number of children and the small number of present adults.

5.2.3 Contextual Inquiry on children working in pairs

Contextual Inquiry (CI) was used to observe the children working together in pairs. The method of contextual inquiry is described in deliverable 2.1, chapter 6. The results of the analyses of contextual inquiry notes have already been presented in chapter 2 of D3.1. In this section we will present researcher observations of how well the children worked together in pairs when asked to do so. In both schools, pairs of children were observed using a typical 2D drawing package (already available at the school) to work together to draw a picture. At Albany school these pairs had previously been observed working together to create a story and draw their ideas on one large sheet of paper.

5.2.3.1 Activities at Rågsvedsskolan

Activity	Objectives	Data collection	Researcher Observations
Contextual Inquiry. Children working in pairs to draw a picture using Kidpix (several occurrences). 5 and 7 year olds (14/12/98)	Collaborative working (pairs) using computer drawing package (Kidpix). 10-15 minutes.	Pairs picture printouts. Individual drawings in journals. CI notes (speech & actions) Video recording.	Notes by a technology researcher on lessons for the KidStory tools: Children, esp. 5 year olds, distracted by animation player. Too many and complex interface options. A good drawing tool must be fast. Make icons easily understood by children. Predefined shapes hampers creativity. Floodfill should not "leak" through small holes.

5.2.3.2 Activities at Albany School

Activity	Objectives	Data collection	Researcher Observations
Contextual Inquiry. Children work in pairs to create a story about a magical land or nursery rhyme land. 5 year olds (1/12/98) 7 year olds (30/11/98)	Collaborative storytelling (pairs). No-technology (shared piece of paper).	Pairs drawing on paper. CI notes (speech & actions) -pairs. Presentation to class (video recorded).	Both age groups worked very well in pairs. Notable differences in collaborative behaviour: 'dividing' line drawn down centre of paper. 'invisible' line down to centre of paper. True sharing of space on the paper. 5 year olds concentration lasted 20 mins maximum. More confident presentations.
Contextual Inquiry (2). Children working in pairs to draw a picture using Kidpix. 5 year olds (8/12/98) 7 year olds (7/12/98)	Collaborative working (pairs) using computer drawing package (Kidpix). 10-15 minutes.	Pairs picture printouts. Individual drawings in journals. CI notes (speech & actions). Video recording of target pairs.	5 year olds explored the software more. 7 year olds tried harder to create accurate pictures. More time on the computer would be better as it takes a while to get used to it. Researchers needed question children about their journal drawings and to write explanatory notes.

5.2.3.3 Discussion

In both schools, the usage of KidPix (Broderbund, http://www.broderbund.com/) have two common features:

The 5-year-olds were more exploratory in their use of the technology

The 7-year-olds year olds had more specific plans of what they wanted to draw and spent a lot of time trying to create accurate pictures.

When drawing on a large shared piece of paper (activity conducted at Albany School only),

there were noticeable differences in collaborative behaviour. At one extreme there was “no collaboration at all”, where the children drew a dividing line down the centre of the paper so that they could each draw individual drawings in “their own space”. At the other, there was “full collaboration” where the children genuinely shared the available work space and worked together to complete one comprehensive story. These differences were apparent between different age groups of children but also between different levels of general academic “ability” (as defined by the school) within the 7-year-old class.

The 5-year-old children found it difficult to stay on-task for the duration of the planned session (40 minutes). After 20 minutes many of them had completed the task as far as they were able. This meant that fewer contextual inquiry observations were possible during the 5-year-old sessions than the 7-year-old sessions.

5.2.4 Conclusions from activities in the Autumn term

5.2.4.1 Rågsvedsskolan

The introductory sessions followed by the Participatory Design storytelling and the Contextual Inquiry with KidPix was in general successful and greeted with enthusiasm by pupils and teachers. Observations and lessons for the continuation was a need to strengthen the children in their role as inventors and to be aware of and allow for strong individual differences between the children, even within the same age groups. The children were surprisingly good at retelling a story.

5.2.4.2 Albany School

In general the review of the first term of activities was very positive. Comments from teachers indicated a high level of enthusiasm within the class groups with many of the children working to task very well. However, it was recognised that we need to work differently with each age group – presenting the tasks more simply to the 5-year-old class and completing our observations in a much shorter time.

5.3 Spring Term

At the Kidstory plenary meetings held in Nottingham in January 1999, it was decided that the activities in the schools needed to be more structured and run to a specific theme. As the KidStory project aims to facilitate children as designers of new technology for storytelling, identified themes to support this were; inventing something new, use of computers, and storytelling (creating and presenting).

Six class activities were proposed and these are shown in table 5.1 (see Appendix 5). The activities are described in chapter 7 of the report D2.1 from work package 2. In addition to these activities, observations of children using the new technology, individually and in pairs, were conducted at each school.

5.3.1 Understanding invention

The objective of these activities was to enable the children to understand how new things are created and that we can change things if we don't like them or to make improvements. It was hoped that this would encourage them to be creative in their suggestions for technology design ideas and not limit their suggestions to how they know things are at the moment (e.g. a computer consists of a mouse, a keyboard and a monitor). We wanted them to see that there is no 'correct' answer, but that we would be interested in all of their ideas. Of course we could not expect the very young children to adopt these concepts easily, for many of them their expectations of school are that they are learning from adults – they may find it difficult to appreciate that we expect to learn from them. For this reason, these activities had to be presented in an appropriate way. We wanted the children to learn this new role of invention gradually and so we started with a familiar concept (activity 1 – invent a new sandwich) then introduced re-design of an existing familiar object (activity 2 – redesign a milk carton).

5.3.1.1 Activities at Rågsvedsskolan

Activity	Objectives	Data collection	Researcher Observations
To be an inventor – inventing a new sandwich. 5 and 7 year olds (11/2/99)	Making a sandwich in groups. Telling about their sandwich.	Journals. A photograph of the sandwich was put into individual journals and the children wrote about them. Photographs of their sandwiches.	Very successful, all the children were enthusiastic. Older children are limited by what they know of the real world, younger children have more courage to create anything. The concept of being an inventor is very useful but the children needed to understand this via a practical session.
To change an old invention into something better – a milk package.	Individual drawings of a new design. Telling about	Journals	The children thought this task was a bit stupid! Some children gave very good ideas and showed that they had enjoyed their role as inventors.

5 & 7 year olds (25/2/99)	their designs.		Others found it difficult to change what is already there. It may take the children a long time to grasp this important role for them in the project.

5.3.1.2 Activities at Albany School

Activity	Objectives	Data collection	Researcher Observations
Inventing a new sandwich 5 year olds (15/4/99) 7 year olds (19/4/99)	Working in groups to make a sandwich. - 5 year olds (5 groups) - 7 year olds (4 groups) Presentation of designs to class.	Video of target group. Researcher notes on collaboration within the group.	Variability in group working for both year groups. Some groups worked collaboratively to produce one sandwich, others worked independently. In most cases the sandwiches contained real food (little deviation from reality). Some novel ideas for shape of sandwiches and features (use a remote control to make the sandwich bigger or smaller depending on how hungry you are). Most groups had 4 – 6 children with one adult. Very difficult to get larger groups to collaborate at all.
Problem solving – redesigining the milk carton 5 year olds (22/4/99) 7 year olds (7/5/99)	Group discussion of existing design and brainstorm ideas. Working in pairs to draw and write about new design.	Journals. Video target group. Presentation to class.	5 year olds very enthusiastic. Some pairs worked very well, others did their own thing individually. Confidence in presenting their work is improving although they still get fidgety when listening to others. 7 year olds - some very good ideas. Children got very involved in design (no time left for presentations).

5.3.1.3 Discussion

In both schools inventing the new sandwich activity was very successful. It was felt that the children needed this kind of practical activity to understand the concepts we were presenting them with in the KidStory project. All the children were enthusiastic and there were some

very creative ideas.

The children did seem to still be limited to how they understand the world to be – many of the sandwiches contained sensible food (with some gruesome additions such as slugs and worms!). This seemed to be more so for the 7-year-old children, who perhaps have more fixed ideas about the world, than the 5-year-old children who were more adventurous. There were some novel ideas for the shape of the sandwich and some additional features such as a remote control to change the size of the sandwich to suit your level of hunger.

The degree of collaboration varied between groups and ages of children. Some groups worked together to make parts for one sandwich but in others the children all worked on their own individual ideas. In the younger children there was a lot more evidence of collaboration – not in sharing ideas but in helping each other to do things (e.g. one child holding the adhesive tape while another used the scissors to cut the tape). At Albany School it was found that the larger the group of children (i.e. above 4), the harder it was to get them to work together.

The second activity (redesigning the milk carton) was not quite so successful with the children. Possibly they thought that there was not much wrong with the existing design and so were reluctant to come up with new ideas. In spite of this, some very interesting ideas were produced and the children did seem to understand their role as inventors. At Albany School we noticed an improvement in the 5-year-old children's presentation skills.

5.3.2 Problem solving

Based on the experiences from the milk cartoon invention / problem solving at Rågsvedsskolan there was felt that the children's role as problem solvers needed another session. From previous experience, the educational researchers knew that an imaginative problem close to the children's everyday thinking would be fruitful.

5.3.2.1 Activities at Rågsvedsskolan

Activity	Objectives	Data collection	Researcher Observations
Problem solving – how will the chicken come down from the tree? Story told by researcher about grandfather's chicken scared by a dog high up in a tree. Discussion and then individual drawings on how to get it down. 5 and 7 year olds (18/3/99)	Listening to a story. Short discussion of what solving a problem means.	Journals Individual drawings. Telling about their drawings.	Problem solving gives the children something concrete to work with. We could see differences in children's belief in their own capacity to create something.

5.3.2.2 Activities at Albany School

No equivalent activity was carried out at Albany School.

5.3.2.3 Discussion

The session was very successful, every child, even those reluctant in other sessions, immediately took on the task of solving the problem. Several quite imaginative solutions, using equipment such as ladders and aeroplanes but also letting trees grow or other animals help, in some cases in complex co-operation, came up. The session proved its value, especially for the normally less active and less computer versed pupils.

5.3.3 Creating stories using KidPad

These activities allowed us to observe how the children would use year 1 technology for creating and telling stories. It was intended that all of the children were familiar with KidPad before these activities took place. Due to differences between the two school environments these activities were performed in slightly different ways. At Rågsvedsskolan the activity was carried out in small groups of four children, whereas at Albany School these activities were carried out with the whole class (~28 children) working together on one story.

5.3.3.1 Activities at Rågsvedsskolan

Activity	Objectives	Data collection	Researcher Observations
Group story with KidPad 5 and 7 year olds (8/4/99)	Creating a story in groups of four. Researcher using KidPad.	Each story was put into the children's journals (both words and pictures).	The objective was to show the children how to use KidPad. This session demonstrated the value of zooming for storytelling.
Group story with KidPad 5 and 7 year olds (27/5/99)	Creating a story in a group of four. One child using KidPad.	Video	It was difficult for the child using KidPad. When a group of children create a story it goes back and forth and you need to be quite dominant to decide what to draw. It is also difficult to draw accurately with KidPad. This made the session too slow for the story creators to maintain their concentration.

5.3.3.2 Activities at Albany School

Activity	Objectives	Data collection	Researcher Observations
Class story telling using KidPad **7 year olds** (10/5/99) **[The development of this story is described in section 6.2.2 of this report. Illustrations from KidPad are also**	Demonstration of a story created in KidPad. Showing functions of technology (zooming, links, home, text, save).	As class creating a story. Teacher drawing in KidPad. Journals. Contextual	Children involved in story creation for almost an hour. Story development based on visuals rather than text (teacher commented that usually the children will write a story and then draw pictures – this was the other way around). They didn't want to give the story an ending – wanted to use the features of KidPad to re-tell their story in a different way the next time.

shown]		Inquiry notes. Post-session interview with teacher	Children and teacher very skilled at using KidPad (they had been practising between sessions).
Class story telling using KidPad **5 year olds** (6/5/99)	Group creation of story. Teacher drawing in KidPad (assisted by children and researchers)	Video of story. Contextual Inquiry notes. Post-session interview with teacher	A very good session. Many of the children were familiar with the tools in KidPad. Enthusiasm and long concentration on task. Teacher commented that it was good for the children to see adults having difficulties with the technology. Also for the children who knew how to do things to show other children.
Second Class story telling using KidPad **7 year olds** (7/6/99)	Teacher directing story creation but ideas from children. Children taking turns to use KidPad.	Video Note-taking Journals	KidPad crashed twice during this session and both times the story was lost Technology must be stable if it is to be integrated into the classroom
Second Class story telling using KidPad **5 year olds** (27/5/99)	Teacher directing story creation but ideas from children. Researcher drawing using KidPad.	Video Note-taking Journals	The children spent 40 minutes creating a story using all of KidPad's features (zooming, links, home key, etc) then the computer crashed and the work was lost. Excellent on-task concentration for 5 year olds! Many of the children can now use all the tools in KidPad. Lots of excitement and enthusiasm.

5.3.3.3 Discussion

The teachers commented that the group storytelling activities helped the children learn the features of KidPad. Those in the group that knew how to use links and zooming demonstrated these features, within the context of the group story, to the other children.

The types of stories created were visually based. The pictures were drawn first and then the dialogue around the pictures was created. . It is often true 'that we know more than we can tell.' Language limitations can crush creativity perhaps. KidPad allows more creativity. The stories were also of a different structure to the traditional ones they would create in their exercise books. The stories did not follow a linear structure and were not limited by their ability to write a story, because of this the children created complex story structures (see section 6.2 of this report).

There was not always an ending to the story created. Using KidPad to create a story means that there does not need to be one ending. The same story may be extended and changed each time the child re-visits it. The group story creation activity was very successful, especially in the UK when the teacher structured the activity. This can be demonstrated by the complex stories created (see chapter 6, this deliverable for an example of a class story), the amount of time the children concentrated on the story creation for (up to an hour) and the enthusiasm the children showed for the activity.

5.3.4 Participatory design

The participatory design activity in the spring term was aimed at obtaining design ideas from the children for ways to interface with the computer. The activity started by taking a mouse apart to see how it works and then looking at other current input devices, such as a joystick, spaceball, and digital pad. The class were then asked to brainstorm new ideas and then work in small groups to design their own input devices for KidPad.

5.3.4.1 Activities at Albany School

Activity	Objectives	Data collection	Researcher Observations
Participatory design of input devices **5 year olds** (17/5/99) **7 year olds** (24/5/99)	Class examination of existing input devices. Working in groups to create a new input device. Presentation to class.	Video Researcher notes on their own group.	Some groups worked collaboratively, others still do separate designs. Variety of design ideas (remote control, input device to resemble a person or object, moving different parts to activate functions). Talking to the computer is a common suggestion Confidence at presentations is noticeably improving.

5.3.4.2 Activities at Rågsvedsskolan

With one of the 7-year-old groups at Rågsvedsskolan a teacher conducted an exercise where the pupils discussed and drew how they think a mouse works. This is a first step in participatory design of pointing devices, of which sessions will be conducted in the beginning of the autumn 1999.

5.3.4.3 Discussion

This participatory design activity has so far only been carried out at Albany School and will be completed at Rågsvedsskolan at a later date.

As in the autumn term, the participatory design activity yielded a lot of design ideas and was enjoyed by all the children at Albany School. There were notable changes in all aspects of this activity:

- more of the children (particularly the 7-year-old group) were collaborating on their designs
- there was greater variety of ideas and innovative suggestions for ways to interact with computers (e.g. talking to input devices that resemble people, the computer talks back to you, several people interfacing with the computer at the same time).
- Presentation skills also seemed to have markedly improved in terms of confidence, group participation and paying attention to others.

5.3.5 Designing icons

The activity was designed to allow the children to suggest ideas for icons that they would like to see in KidPad.

5.3.5.1 Activities at Rågsvedsskolan

Activity	Objectives	Data collection	Researcher Observations
Making icons 5 & 7 year olds (27/5/99) (3/6/99)	Working in groups the children had designed their own icons for KidPad. These were scanned into KidPad and shown to the children.	The icons	The children enjoyed seeing their own icons. This is a powerful way to demonstrate to the children that they are co-designers in the project.

5.3.5.2 Activities at Albany School

Activity	Objectives	Data collection	Researcher Observations
Icon design **5 year old class** (8/6/99)	Class discussion about the icons in KidPad. Individual drawing of new icons for KidPad.	Video Journals	Many children duplicated the icons already in KidPad and other drawing software packages they use. Some novel ideas.
Icon design **7 year olds** (within school timetable)	Class session run by teacher in response to children's suggestions for KidPad.	Icon designs in journals Presentation to researchers (video recordings)	Every child suggested something new. Range of ideas (more crayons, a time-machine that allows you to review and replay your story).

5.3.5.3 Discussion

At Rågsvedsskolan this activity was very successful. The children came up with a lot of design suggestions and were very pleased to see their designs incorporated into KidPad at the next session.

At Albany School the 5-year old children found this activity very hard to do and many of them simply duplicated icons that they had used in KidPad itself or other drawing software packages.

This activity had been done with the 7-year-olds by the class teacher. This meant that the KidStory researchers were not present during the activity and did not participate in the design activity or receive the children's design ideas until a later date. Thus, it was not possible to incorporate these icon designs into KidPad within the time-scale of activities at the school.

5.3.6 Use of KidPad

As additional activities to the main class sessions described above, the children were given demonstrations and practice in using KidPad. These activities ran concurrently alongside the class activities with the requirement that all children had used KidPad before the group storytelling activity (described in section 5.3.3 of this chapter).

5.3.6.1 Activities at Rågsvedsskolan

Activity	Objectives	Data	Researcher Observations

		collection	
KidPad. 5 & 7 year olds (14/1/99)	Working in pairs with KidPad – whatever they wanted to do. Drawing their thoughts of inventions.	Contextual Inquiry. Individual drawings put into journals.	KidPad did not work properly so some of the children felt that they failed in what they were doing – this is not acceptable. The computer should work properly and must not be too delicate.
Paired use of KidPad 5 & 7 year olds (22/4/99) (15/4/99)	Working in pairs with KidPad (no set task).	Contextual inquiry.	Technical notes informing KidPad development (see deliverable D1.1). It seems difficult for the children to say how they want the technology to be changed.
Single use of KidPad 5 & 7 year olds (20/5/99) (29/4/99)	One child working with an adult – to provide individual help.	None	The researcher provided individual help to each child, answering all questions and showing them what they could do with the technology.

5.3.6.2 Activities at Albany School

Activity	Objectives	Data collection	Researcher Observations
Creating a story using KidPad **5 year olds** (6/5/99) (10/5/99)	Demonstration of a story created in KidPad. Showing functions of technology (zooming, links, home, text, save).	In groups (approx 6 children) create their own story in KidPad. Write about KidPad in journals.	Very involved and attentive to presentation but in groups it was difficult to keep them on task. 2 or 3 children would concentrate on the computer but the others would get very distracted. The children drew objects but would not link them to make a story. Teacher suggested working in pairs was best.
Observation	Drawing a	Contextual	Children needed demonstration

of pairs using KidPad **5 year olds** **7 year olds** alongside each class activity.	picture together in KidPad. Creating a story together in KidPad	Inquiry Video	before they would use zooming and linking. There were difficulties in co-operating to share the mouse. The children often went off task and scribbled or explored features of the technology before instead of concentrating on the task.

5.3.6.3 Discussion

Although the children understood that the technology was being developed and so it may not be "stable", they still found it very frustrating when it crashed and they lost their work. Sometimes technical errors made the children feel that they had made mistakes and this is not good for children of such a young age. The children also found it difficult to draw accurately using a mouse in KidPad and this frustrated them.

Working in groups of more than two children was not very successful; only the two most dominant children would participate. The others walked around the room or looked out of the window. They may not have been able to see the screen or control the mouse and therefore had no motivation to work towards a shared goal.

Children did learn to use all the features of KidPad even though not all of them are activated through mouse interaction (e.g. use of keys such as home, page up, page down). Children found it difficult to say how the technology should be changed. This may be due to their inexperience with using the technology. They need to be familiar with the features of the technology to be able to comment on them. This may also be due to the way activities were planned and executed. When the focus was on the difficulties associated with a certain part of the technology (e.g. input devices), the children found it easier to come up with ideas for improvement.

5.3.7 Use of KidDive

Interactively (with two mice) forming a blob on the screen, the "Klump" (in KidDive), was demonstrated to and tried by some children, in January. In order to follow up on this for the rest of the children, and get children designers' ideas on new and missing features, after a development period, Klump sessions with Contextual Inquiry were arranged at Rågsvedsskolan in May. As we only have access to one or two two-computer and two mice equipment for Klump it is efficient to have it in parallel with similar sessions for other students with KidPad.

5.3.7.1 Activities at Rågsvedsskolan

Activity	Objectives	Data collection	Researcher Observations
Paired use of KidDive 5 and 7 year olds (14/1/99) (6/5/99) (13/5/99)	Working in pairs exploring KidDive.	Contextual Inquiry	The children were very enthusiastic about the Klump. KidPad requires the children to produce all the work. KidDive is already there and the children react to it.

5.3.7.2 Activities at Albany School

No equivalent activity was carried out Albany School. This activity is to be performed at a later date. The Klump was demonstrated at Albany school in conjunction with the KidStory plenary in Nottingham on January 18th 1999.

5.3.7.3 Discussion

As a result of the two Contextual Inquiry sessions with each of the two 7-year-old and the 5-year-old groups at Rågsvedsskolan the Klump has been tried by most of the pupils, trying the 3D-model tool in pairs each controlling a mouse. Almost every child was very enthusiastic with the version of May, among the few that tried the January version there were some quite sceptical / afraid of the version in January. This is probably partly because of new features but also a result of having seen it earlier. The feed back from the children was rather extensive and will strongly influence the next version. The feed back loop should be much shorter in the future.

5.3.8 Conclusions from activities in the spring term

5.3.8.1 Rågsvedsskolan

In the Spring term a very considerable effort was put into infusion and evaluation of the technology at Rågsvedsskolan. A lot has been learnt from 3 groups of enthusiastic children and teachers, and we have systematic Contextual Inquiry data on KidPad and Klump from most of the pupils.

The use has, for lack of equipment and support, been concentrated to the scheduled sessions, with a tiny use on other times. It is very important for the coming year to see to that the

technology is available more permanently, as support for use as a regular part of the education.

5.3.8.2 Albany School

During this term both teachers requested and were given a PC with KidPad to keep in their classroom. They supported the project by allocating 30 minutes of everyday for use of KidPad. Given the time restrictions imposed by the National Curriculum this is very substantial! This meant that every child had an opportunity to use KidPad at least once every week.

The technology is not stable enough to be integrated within the normal school activities. The teachers recognised that this was due to the developmental nature of the project and that part of innovation and invention is instability. However, they did find it extremely frustrating when the computer would suddenly crash and the children had lost a lot of hard work. The inability to print pictures created in KidPad was also frustrating as it meant that there was then no record of the children's efforts.

5.4 Discussion

The first year of the KidStory project has involved intensive periods of time spent in our schools. As has been described in D2.1, chapter 2 description of school systems, class structures between the two participating schools were very different. In Sweden, we worked with three class groups; one group of fifteen 5-year-olds, one group of thirteen 7-year-olds and one group of fourteen 7-year-olds. In the UK we worked with two class groups; one group of twenty-eight 5-year-olds and one group of twenty-eight 7-year-olds. This difference, in addition to differences in available space and teaching methods at each school (see chapter 2 of deliverable 2.1 for more details), meant that we had to conduct our class activities in different ways at each school.

In Sweden, researchers visited Rågsvedsskolan on 19 days, each time spending most of the day working with children from each of the three class groups and in the UK, researchers visited Albany School on 25 days, each time spending half a day working with one of the two class groups. As a result, the KidStory researchers have conducted 14 different class activities in each of the two schools, involving a total of 98 children.

During the autumn term we experienced a very positive start to the project in both schools. All the children and teachers were extremely enthusiastic about being involved in the project and the introductory sessions went very well. As already mentioned, differences in teaching methods resulted in these activities being carried out differently in each school. However, in both cases these sessions established the KidStory researchers' role in leading class activities and introduced the children to how they would be working on the project.

Participatory design sessions yielded some very imaginative ideas for technology development and Contextual Inquiry observations gave some indications of how the children use technology. Examples of these are given in chapter 2 of this report.

Informal observations highlighted differences between ages of children and ability levels in terms of how well they collaborated together and presented their ideas. In the first few weeks of the project activities at Albany School were the same for both the 7-year-old and the 5-year-old children. However, this proved to be problematic because the 5-year-old children found it difficult to concentrate throughout the entire length of the sessions. They also found it considerably more difficult to collaborate, and felt that they wanted to maintain ownership of their work. This age group also found presenting difficult and they were not as interested in listening to other people's presentations. Although we have seen considerable improvement over the year it is evident that activities must be specifically tailored to the age group concerned.

The issue of group sizes has differed between the schools. In Nottingham we found that both the 5-year-olds and 7-year-olds collaborated more successfully in whole class groups and pairs when using the computer. While class stories were preferred in Nottingham, in Sweden small group storytelling sessions with the technology, were preferred. In Nottingham the small groups used laptops while projected screens were used in Sweden.

The introduction of themes to the class activities during the spring term was very successful. The children gradually took on their role as inventors and provided more design ideas in the spring term (as discussed in chapters 2 and 3 of this report). but it was still difficult to get children to comment on technology design. Implementation of design ideas into technology development to show the children was very successful at Rågsvedsskolan. Presentation skills improved at Albany School. Storytelling with technology had to be done differently in each school but it was felt that this diversity yielded better outcomes. KidPad is very good for storytelling but needs improved stability for classroom acceptance.

On the whole, class activities have proved extremely successful, a firm partnership has been established, children and teachers are adapting well to their roles as designers and inventors and everyone involved in the project has spent a considerable amount of time using, designing and inputting to the technology development.

6. Evaluation of the impact of shared desktop technology

In KidStory development of new technologies must be closely linked to evaluation of the impact of these technologies for children's collaborative storytelling. This chapter takes a closer examination of how the children used the shared desktop technology developed during Year 1 of the KidStory project. Three aspects are examined in particular; use of the new

technology, stories created using the technology and observations of how the children collaborated in the classroom.

6.1 Use of new technology

6.1.1 Use of KidPad

The school activities (detailed in chapter 5 of this report) include details of all classroom use of KidPad. There were many variations in use of technology between Nottingham and Stockholm schools. The predominant technology use was of KidPad, this was integrated into the school sessions and, in the UK, into daily class activities. Klump was used more intermittently in the first year of school activities.

6.1.1.1 Rågsvedsskolan

During the first sessions at Rågsvedsskolan, when children used KidPad in pairs, researchers observed and commented upon how this activity was not working well. The problem was partly due to system failures unavoidable in software which is in the early stages of its development. There were also some observations that the children had difficulty using KidPad and did not make use of all of the features that the technology offered them.

This influenced how KidPad was used in following sessions. Each child used the technology with an individual adult tutor. This provided the children with individual help, answering all of the questions they had about KidPad and demonstrating the features of the technology and how these could be used in story creation. Asking the children about features they want different or miss gave a possibility for feedback to the KidPad developers providing concrete changes. Several children noted that the Swedish letters å, ä, ö were available in a new version.

The next activities were structured so that the children were asked to use the technology to create and tell stories. The children worked in groups of four and an adult researcher controlled KidPad for them. This session focused on the value of using zooming as a tool for storytelling. The following session had a similar focus, but one of the children in the group controlled KidPad. This session showed that it was difficult for the child with control of the mouse to decide what to draw. Suggestions from other members of the group moved quickly back and forth, the child with the mouse needed to be dominant enough to make this decision. It was also noted that the children had difficulties using the mouse to draw. The child drawing was often very slow, this meant that the story creators lost their momentum and concentration. The individual sessions with the children had the impact that many of them could suggest / advise how to illustrate the story, which was sometimes useful for the child that drew but mostly added to the frustration.

6.1.1.2 Albany School

During the first session at Albany school the children also used KidPad in pairs. They were given tasks to do such as 'work together to draw a house'. The use of KidPad ran alongside the class activities and children were asked to use it to support their activity. For example alongside the first session of the second term the children were asked to represent the sandwich they had just invented using KidPad. Alongside the second session the children were asked to represent their recently invented milk carton using KidPad. Researcher observations of this technology use also found that children were not exploiting all of the features that KidPad offered them. The children were also not using the technology to create stories. This was due to the nature of the task set.

The next school activity started with a demonstration of all of the functions of KidPad. This explained how to zoom, create links, and use the 'home', 'text' and 'save' options. The remainder of the session with the 5-year-olds was spent creating stories using KidPad in groups of 4-6 and an adult researcher. It was very difficult to keep the children on task during this session. Two or three children would concentrate on the story being created but the others would become distracted. Many of the resulting stories were disjointed and therefore required the researcher to rigorously structure the activity. The researcher would ensure that the children took turns but the children seemed to produce separate objects and would not link them together to create a story. From this session onwards each class had a computer with KidPad installed and used it regularly.

The following session was with the 7-year-olds. As the small group story creation had not worked well in the previous session it was decided to change how this session was run. After the demonstration of a story created in KidPad, showing how to incorporate the relevant features, the class embarked on the creation of a story by the entire class. The children were involved in this story creation for almost an hour, which was a considerable amount of time to keep a child's attention. The story development was based around visual images rather than text. The teacher commented that usually the child would start with text and then add pictures.

A similar session was run with the 5-year-olds. This was also a good session and it was evident that a number of the children had become familiar with the features of the technology and knew how they could be used in story creation. The children were enthusiastic and concentrated for a long period of time on the task.

The following sessions for both the 5 and 7 year olds were also class story creation, with a similar structure to the previous sessions. This time the children took turns in using KidPad themselves to represent class ideas. Again the session created a lot of enthusiasm and a long concentration time.

In the final school session adult researchers demonstrated the new version of KidPad (with collaborative tools, the 'alive' tool and two mice input) by telling a story and using this to

show how new features of the technology could be used. The classes then used the technology to tell their own class story. This time two children controlled the two mice. This seemed to work quite well as they could more quickly and easily keep up with suggestions from the class. However, co-ordination from the class teacher made it easier for the children to decide who should draw which suggestion.

6.1.2 Use of Klump

Due to the difficulties in this product's stability and the processing power required to set the technology up (the product will run on two PC's, not laptops) there were fewer times when this was used in the schools.

6.1.2.1 Rågsvedsskolan

Children worked in pairs (with one mouse each) exploring Klump at Rågsvedsskolan. There were mixed reactions to the Klump at the first session. Some children pairs were almost afraid of it but most were very enthusiastic. In the following sessions, when the children were more acquainted almost all were very enthusiastic about Klump as they could react to its movement

6.1.2.2 Albany School

Klump was used by some of the children at Albany School. These children were asked to explore Klump. Children made suggestions such as not wanting the mouse pointer to go off the screen and they wanted sound to go inside the Klump.

6.1.3 Discussion

The ways in which the class sessions have evolved, each plan of use for KidPad being dependent on the success of how well it was used in the previous session, has provided a context to how the technology can be used practically in a real school setting. At Albany School it was interesting to note that the teachers began to use this software as a matter of course in their lessons. This gave the children additional 'practice' time and saved the need for the 'individual' sessions. So far the indications are that the children, at first, need to be shown how to use the features of the technology and then need plenty of opportunity to practice using them. In order to collaboratively create stories the children have required a lot of structure. This has been, in Sweden, provided by an adult researcher in small group story creation, and in the UK, by a teacher in whole class story creation. When left to their own devices the children have created less complex stories. It would be interesting to study in more detail how the latest version of KidPad (with input from two mice) may affect how the

technology is used.

Our observations have shown that the children need to be familiar with the technology in order to contribute to design ideas. When the children have not used the features of the technology they are unable to comment on their practicality. At the end of year 1 the growing familiarity with the tools make the children more reflective about what can be changed and what is missing. The final activity in Nottingham and Stockholm, designing / drawing icons for KidPad tools, was quite successful, where the familiarity was a strong factor. Evaluation of KidPad and Klump as storytelling tools in the classroom will continue into Year 2 of the project.

6.2 Storytelling with new technology

During the first year we noticed differences in the stories produced when using the KidStory technologies. Some of these differences were described in chapter 3 of this report, detailing the change in structure of the stories in children's journals during the first year of the project.

6.2.1 Complex non-linear stories

Another way in which researchers on the project have noticed that children's stories changed was the way in which the stories have developed and are represented, as illustrated in the following example:

> *"I noticed that the children seem to be producing stories in their journals which reflect the way in which they would have structured their stories had they created them using KidPad. The structures are based on visual images and the children are verbally narrating the story around their picture by pointing to the relevant parts of the pictures and linking this to their dialogue."*
>
> Researcher, UK, commenting on children's story creation

At the beginning of the project, when the children were asked to create a story they would start by writing. They would then draw pictures around the story to support it. Further into the project, in a number of cases, story creation has started with pictures. In some of the children's journals there are a number of drawings with complex links between pictures. KidPad has given children a different medium to use to create stories. This medium allows the children to represent stories in complex, non-linear ways and the method of doing this has been transferred from the technology to the textbook.

"Children's stories, and it is storying that they do very well, are frequently scattered with the seed of powerful imaginative ideas. One of the challenges for the teacher is to create frameworks which allow children to continue to sow these imaginative seeds but which also nurture their growth and development and their manifestation in literary form."

(p.131, McMahon and O'Neill, 1993)

Perhaps, from learning this new way in which they can represent stories and ideas children are more able to show their imaginative ideas and tell a story without being as limited by their written ability.

Other exploratory methods of story creation have discovered change in the way the story is created. McMahon and O'Neill (1993) express how a computer-based story-creating tool allows children to express stories in different ways to traditional medium.

"While the technologies of pen and paper and the printing press bind the concrete manifestations of the story into a linear form, hypertext allows the links and connections made between aspects and elements of the story to be realised in an alternative, non-linear form, readily conceptualised by children."

(p. 125, McMahon and O'Neill, 1993)

Examples of non-linear structured stories from children's journals can be seen below. These are examples from one of the last 'KidStory' sessions of the year. The dialogue of both are based around the children's drawings. The drawing was the starting point for the creation of the story. The stories were told verbally to the researchers and by pointing to their drawings the children could convey how each element of the story related to the pictures drawn. The children's experience of using KidPad to create and tell stories throughout the year may have influenced the way in which they have created these stories.

Figure 7.1 7-year-old from Nottingham school. Story from journal 7/6/99

Figure 7.1 shows the story produced by a 7-year-old boy at Albany School. When asked to tell his story to adult researchers there was a long and detailed response. The quotes repeated when the child re-told the story exactly match those detailed in the picture. The arrows within the picture are used to direct the 'reader' as to how the story develops.

"The aeroplane held a little old man and a big old man and a little boy and the ghost from the other story. They were flying to Australia and then the little old man said "how far?". The big old man said "Go away!" to the little old man. The boy said " Why is that cloud going 'peep peep'?". Then the ghost said " I am a ghost ggggggo away!!".

[Follow the arrows as the plane flies to Australia]

Then they landed and the ghost said "Whooooo". The little old man said "It's a ghost." And the boy said "Snake!". He was scared.

Figure 7.2 shows a story structured around an annotated picture. From this the child could tell their story.

"The little girl is sitting down. The ghosts don't know what it is. The ghosts run away because they are frightened. The little girl ran after them."

Figure 7.2 7-year-old from Nottingham school, Story from journal 7/6/99

6.2.2 Entire Class Stories

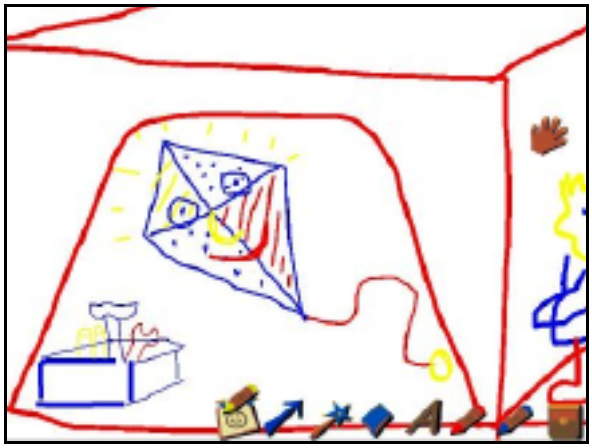
The creation of entire class stories, with the teacher as the facilitator produced complex, structured stories. The children concentrated on the stories for a long time (up to an hour) and when asked, could re-tell the stories using the zooming and linking features of the technology. The stories created were far more advanced than those created by pairs of children with limited adult support. The following example shows the development of a story by the 7-year-old class at Albany School. The children all sat around the computer and gave suggestions for the story. The teacher used to mouse to draw their ideas in KidPad.

Story title: A day with a magic kite

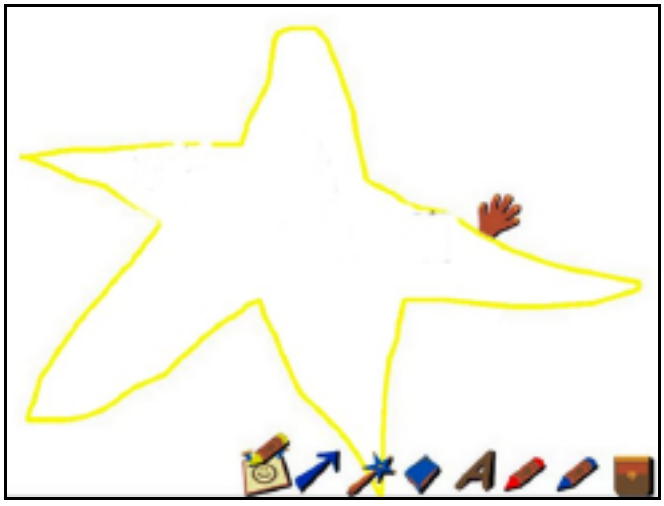
6.2.3 Development of the story:

Teacher	Children
"How do we start?"	"Draw a kite."
"What sort?"	"Big" "Lots of colours"
"Does it look like a magic kite?"	"No"
"How can we make it look like a magic kite?"	"Add colours" "Put yellow lines around so we know it's magic" [to make it sparkle] "Put a mouth on, so it can talk" "Big blue eyes"
"Where is this magic kite?" Teacher asks one child to chose from the suggestions, she says "Toyland". Teacher says "Maybe it takes us to Toyland, so where do we find it?" Another child answers: "In a garage" **Here the teacher was taking ideas from the children but directing them towards a story that could move on. She felt it important that the kite didn't start in Toyland but could take us to Toyland.**	<u>Various suggestions:</u> In a shed A magic shop The sky A forest A garage Across the ocean In a tree In magic toyland
Teacher draws a garage around the kite.	"I think you should draw some tools in the garage - a toolbox."
"Have I got anything in my toolbox?"	"Yes"
"Are they things that are going to help me on my day?" Teacher draws a battery, a spanner and a hammer in the toolbox [uses zooming].	<u>Suggestions:</u> Some batteries in case the kite runs out of magic. A spanner in case the handles fall off, also to fix the toys that the kite has broken. A hammer to put the nails back in the broken toys.
"Who's going to tell me what's happened so far?"	"There's a person walking to the garage and he finds the toolbox and says 'Wake up

	magic kite, wake up – it's time to go to Toyland'."



"Let's have a look at Toyland now." [Uses hand icon to move to clear part of the screen]	
"Think about what it will look like"	"It could be a star that's a planet"
Teacher draws a big yellow star.	



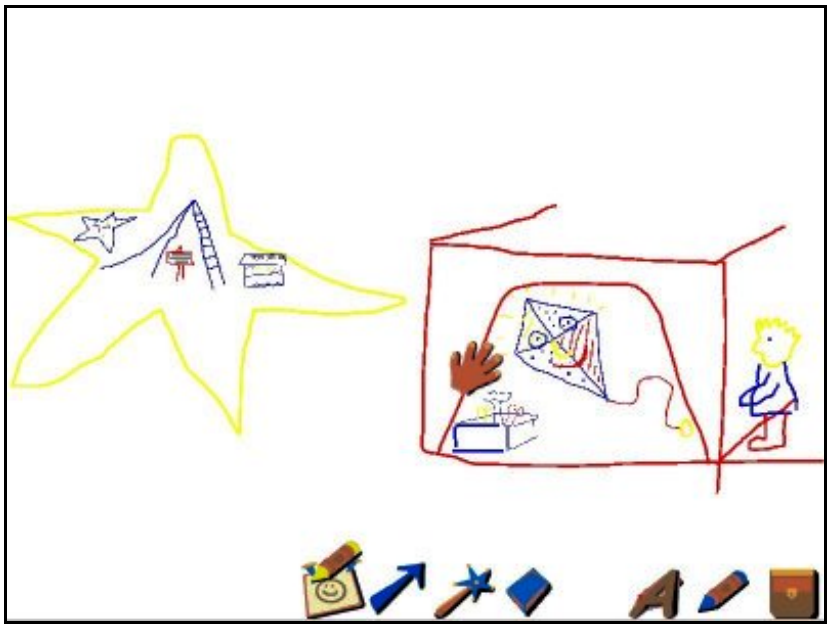
"What does Toyland have on it?"	"A toystall"
"What toys have we got?" The snail suggestions were rejected as the intention was to kill the snails. Teacher said "No, I don't like to kill things". Teacher draws Noddy, fairy and a car [uses zooming].	<u>Suggestions:</u> Noddy A snail electrix A snail race A fairy A car

“So, on Toyland we’ve got a toystall – anything else?”	“A swimming pool for the toys”
“OK, where shall we put it?”	“There [pointing to side of star]”
“What shape is it?”	“Star shaped”
“What’s in the swimming pool?”	“The magic kite”
“Who’s in the swimming pool with the magic kite?”	“The boy who went with it”
“What else is on the planet?”	“A big slide”
“Where?”	Lots of children shout out suggestions. Teacher asks child sitting quietly – “In the middle”
Teacher draws a sign post under the slide.	“A sign saying how old you are to go on the slide” [A brief discussion about how old you should be to go on this slide – the children decide ages 8 and 7].
“How should you write that?” Teacher uses text tool to write on the sign.	A discussion about the correct wording for this type of sign.

"Who's going to tell me the story so far?"	One child repeats exactly the earlier account of the story (up to Wake up kite..)
"S, what happens here?" [pointing to Toyland]. "Who's in the swimming pool?"	"The land is Toyland and it's the shape of a star. It's where there are lots of toys. There was a slide you can slide down and a sign saying you can only go down if you are 8 or 7. And there's a swimming pool." "The kite and the boy."

"Now wouldn't it be clever if we could jump in really quickly?"	B says he knows how to make a link. He makes a link from the garage to the star. M makes a link from the slide to the toystall. C makes a link from the car to the fairy.
[To adult researcher] "How do I get back to the start?"	Adult researcher "Press the Home key"
"So we need to put some words with this – K will you tell the story."	K clicks first link – "This boy goes to the garage to get his magic kite to go to Toyland. He got his kite and the kite took him to Toyland. He went to the signpost

	and jumped from the signpost to Toys R Us. Then he went to the car to look at it and jumped from the car to the fairy. That's the story."



"Should we put 'The End'?" "I don't think we should – you could use the story that we've started writing together and put in new links and write your own endings to the story. What an adventure he's going to have!"	Lots of shouting from the children – K wants to type 'The End' in the toybox. K types 'bye bye for now'.

6.2.4 Post-session interview with the teacher

Asked what was her role was in the story development, the teacher answered:

"I wanted the story to come from the children but I couldn't help getting involved. I had an idea that I didn't want the kite to start in the Toyland but I wanted it to take us there."

When asked if she was trying to 'teach' story creation she replied:

"This was totally different. When we write stories the children usually write the story first and then draw pictures to illustrate it. In this we started with the pictures and created the story around them. I was trying to get them to move the story along. This story didn't really go anywhere and it didn't end – but it's really exciting because it hasn't finished."

This example demonstrates that KidPad can provide a framework for the creation of complex, non-linear stories in contrast to the linear form dictated by written text, which is usually the

way that story writing is taught in schools. Thus, there is a potential that KidPad could be used as an additional classroom teaching aid to support learning of story creation in young and pre-literate children.

6.3 Collaboration in the Classroom

6.3.1 Contextual Inquiry

Contextual inquiry was used as a means to examine how children use technology. This method uses adult observations of our children working together using technologies (See chapters 3 and 6 of deliverable 2.1 for full details on Contextual Inquiry). A summary is also provided in section 2.2 of this report.

As with our examination of design ideas through contextual inquiry charts, activity patterns and roles were used to define codes for collaborative behaviour.

In this case we are using Contextual Inquiry to examine how children work together when using the technology. The specific codes we have identified are as follows:

Behaviours displayed	**Description of behaviour**
Struggling for control of the input device	Grabbing the input device out of partner's hand. Showing frustration.
Sharing control of the input device	Negotiating the use of the input device through agreement. In these instances, even though children share the input device, they often times do not work in unison. Showing some partnership.
Practical co-operation	Agreeing on what to create, what actions to take even though one partner at a time has actual control of the input device. In these instances, children are working in unison. Involves verbal agreement on actions to take. Showing partnership.

Frequencies for each of the three codes, along with a graph that further illustrates the differences between these sub-codes, are shown in table 6.1.

Child as Learner, Year 1	**CI**
Collaboration	
Struggling for Control of the Input Device	98

Sharing Control of Input the Device	26
Practical Co-operation	14

Table 6.1: Summary of Changes in Learners Reflected in Contextual Inquiry Charts, Year 1

6.3.1.1 Struggling for Control of Input Device

We observed incidences of children displaying difficulties in working with each other when they were at a single computer display with a single input device. Although at times children did share control and co-operate, more often than not, each child wanted control of the input device. When our child partners struggled for control of the input device, they repeatedly grabbed the input device from each other and were often very frustrated.

Our child partners struggled for control of the input device much more than they shared or co-operated with each other. In fact, children struggled for control of the input device 98 times — more than twice the number of times they shared control and engaged in practical co-operation combined. It is clear from this that children want to very directly participate in their technology use.

Often, when children did not have control of the input device, they were bored and frustrated. This is reflected in the gathered data regarding the roles that children took when using our technologies. We saw 60 instances where children were Frustrated Users and 24 instances where children were Bored Users (see section 2.2 of this report, for more information about Roles). Table 6.2 shows a partial contextual inquiry session, which illustrates Struggling for Control of the Input Device.

	RAW DATA:			**DATA**	**ANALYSIS:**
Time	**Quotes**	**Activities**	**Activity Patterns**	**Roles**	**Design Ideas**
10.05	E: Can you draw whatever you want? [Adult:Yes.] E: (To K) A Christmas Tree? K: Yes!	K. Takes the mouse rapidly, draws a red tree, and takes the yellow crayon.	Drawing	Artist	
10:05		Draws something in the corner, rubs out, continues.	Drawing Erasing	Artist	
		E. Tries to take the mouse.	Struggling for control of input device	Leader	Multiple input devices
	E: But I want the long one! E: Noo! [Difficult to erase.] E: There. E: But what's this? [Windows Start menu appears.]	E. Gets the mouse, tries to get the blue crayon, looks irritated when she cannot get the blue one, gets it.	Difficulty selecting tools	Frustrated User	Easier way to select tools

Table 6.2: Sample Contextual Inquiry Experience which illustrates "Struggling for Control of the Input Device"

6.3.1.2 Sharing Control of Input Device

We observed children sharing control of the input device 26 times. In these instances, although children show some co-operation by sharing the input device, they do not come to an agreement about what will be done.

Table 6.3 is a section of contextual inquiry notes, which illustrate Sharing Control of the Input Device.

	RAW DATA:			**DATA**	**ANALYSIS:**
Time	**Quotes**	**Activities**	**Activity Patterns**	**Roles**	**Design Ideas**
		K. Goes on with clouds, concentrated.	Drawing	Artist	
		E. Looks around, yawns.		Bored User	
10.10	K: What can you do with the 'A'? [Adult explains.] E: Are you ready? K: I want to save it. [Adult shows how to save.]	K. makes everything with the box, asks about the "A" (Adult shows her). Writes her name.	Seeks help Writing	Learner Writer	Help option
10.12	K: Don't paint on my tree!	The children change places.	Sharing control of input device	Partners	Multiple input devices

Table 6.3: Sample Contextual Inquiry Experience, which illustrates "Sharing Control of the Input Device"

6.3.1.3 Practical Co-operation

We observed children show practical co-operation only 14 times. Practical co-operation is the least frequently occurring code. Children are finding this kind of collaboration difficult with the technology hardware and software we are providing them with.

Table 6.4 shows contextual inquiry notes, which illustrate Practical Co-operation.

	RAW DATA:			DATA	ANALYSIS:
Time	**Quotes**	**Activities**	**Activity Patterns**	**Roles**	**Design Ideas**
	K: The button? Press now! E: Thanks.	E. Draws beside of Ks drawing, draws a little star.	Drawing	Artist	
	K: Eh! Hello? [Problems with the Windows Start menu.] K: But! K: There! (Writes her name)	Something happens, everything disappear. (Adult helps them)	Writing	Writer	
	E: Shall we write "and"? K: Yes! E: Ready!		Practical Cooperation Writing	Partner Writer	
		K .worried doesn't want E to destroy her drawing.	Shows Ownership of drawing	Owner	Make ownership options

Table 6.4: Sample Contextual Inquiry Experience which illustrates "Practical Co-operation"

6.3.1.4 Use of Contextual Inquiry to examine co-operation

The analysis of contextual inquiry notes has shown frequencies of difficulties faced when children co-operate to share one input device when working on a joint task. The frequencies showed that a high number of children had difficulty sharing one input device when working towards a shared goal.

6.3.2 Informal observation of Collaboration

One of the main aims of the KidStory project is to develop technologies that support and encourage children's collaboration. In addition to the contextual inquiry observations described above, researchers made informal observations of collaborative behaviour during the school activity. The informal observation in the schools of groups of pupils working with

the first iterations of KidStory technologies has demonstrated a number of differences in the ways in which the technology is used, which may be dependent on the setting.

An observation from a researcher at a session in Sweden commented on a dominance between partners and listed some possible causes for this.

> *"We noticed dominance from one partner, but not enough observations were made to determine what was going on. Suggestions included one mouse responding faster than the other, right hand position dominance (expected position for mouse control in single mouse use), the person sitting on the right was more involved/motivated (sitting closer to the screen) - was this where they chose to sit or a consequence of their position?, and male dominance. This is something we could look at with more pairs."*
>
> Education researcher, Sweden, Spring

The most successful groupings of participants have been:

- One adult and one child at the computer, where the adult tutors the pupil to use the technology, and

- Two children of similar ability, where the children work together to reach a common goal.

Larger groups of children have been difficult to manage. There have been few experiences of more than two children working together on a common goal. In the UK when group members were not directly manipulating the computer their attention wandered, when it was their turn, they did not work towards the common goal of the group. In Sweden it was reported that during group story telling sessions the child with the mouse could not keep up with the ideas generated by the rest of the group. The rest of the group therefore lost momentum and concentration with the story creation.

These observations reflect the findings from a number of studies in the field of Computer Supported Collaborative Learning (CSCL). Some of the literature linking collaborative behaviour to the settings within which the computer is used, including ability mix and gender, is reviewed in deliverable D2.1, chapter 'Children as Collaborators'. O'Malley (1992) categorises different factors that have been found to influence effective collaboration at the computer; these include group size, gender, and ability mix. She reports on how group sizes may affect collaboration. Pairs have been reported as more effective than larger groups and groups of three more competitive than pairs. This factor may be compounded by the age of the children.

From our informal observation of behaviour (see chapter 5 of this report) we have found that the youngest children (aged 5) have the most difficulty in working collaboratively and cannot work effectively at all in groups greater than 2. This informal observation has a good deal of support from the developmental literature. Wood, Wood, Ainsworth and O'Malley (1995) found that 3 year olds were very poor at both engaging in and benefiting from peer tutoring.

Ashley and Tomasello (1998) found similar results for dyads ranging from 24 to 42 months of age with co-operative problem solving tasks. By the time they are around 3.5 to 4 years, pre-schoolers are just beginning to be capable of maintaining a shared tasks focus, with support. By the time they reach school age (5 years in the UK) they are at least able to benefit from peer interaction, but they are significantly poorer at collaboration than 7-year-olds (Wood et al., 1995). By 7 years, children are capable of working quite well together in pairs and small groups, given adequate support. Researchers have linked these growing capabilities to developments in children's social understanding — in particular, their ability to understand others' mental states: beliefs, wishes, desires and intentions (Tan-Niam, 1998; Wood et al., 1995; Ashley & Tomasello, 1998).

Entire class group sessions, advocated by the class teachers and supported by KidStory technologies, have been very successful. These experiences are reported in more depth, giving context detail, in chapter 5 of this report and also illustrated in section 6.2.2. These types of collaborations are very much structured by the class teacher, who will bring the class back to task frequently, guiding the experience. Although the products from these sessions have been complex, well-structured stories, the process of collaborative construction of the story is still very much teacher dominated.

Two examples of informal observation of collaboration are shown in tables 6.5 and 6.6. Crook (1994) describes a study in which pairs of 10 year old children have collaboratively created a story using a word processing programme. Two conditions are necessary for a situation to count as "collaborative learning". Firstly, children must share a common goal or task focus; secondly, they must be actively engaged in solving the problem, constructing some shared understanding or artefact. In this case the researchers focused on the creation and use of a shared narrative. These features have been examined in the examples below. The difference in the ages of the children in the Crook study and the KidStory project means that there are fewer examples of complex discussion and reasoning around the creation of the shared narrative. There may also have been a greater dependency on 'direct demonstration' – using the computer to show the other child and physical behaviours. By using video and tracking actions on the computer, future evaluations may capture more of this non-verbal collaboration.

The passage shown in Table 6.5 came from two 7-year-olds from Rågsvedsskolan, who were collaboratively creating a story on KidPad. In the collaborative creation of stories the children must build up a common understanding of the shared narrative (Crook, 1994). The passage demonstrates the incorporation of the idea that the characters are monsters. D's contribution to the story (that they are monsters) is at first ignored. D persists with this idea until it is accepted by E who announces *"It's going to be a monster"*.

D: You can draw yourself and then	D: gives the mouse to the other child

I draw myself. Not too big! Further down. Who is that?	
E: I don't know. D: The man can be here. E: A monster am I, aren't I?	E: chooses a red crayon, draws a face with eye and mouth, draws a body
D: I'm going to be…	D: takes the mouse
E: Yes there. The camera, we'll see.	E: points at the screen at the symbol save
D: I'm very big. Look at the shoe! E: Chewing monster!	D: draws a giant with the blue crayon
D: It's going to be a monster.	They talk about giants and monsters
E: What hands!	

Table 6.5 Two 7-year-old collaborating to create a story

The passage in Table 6.6 gives an example of a less collaborative session at the computer. This is from another set of 7-year-olds from Rågsvedsskolan using KidPad. Unlike the first passage there are no examples of an idea from one child being accepted by another child. Although Ab controls the mouse for most of the session, he is not willing to share his ideas with Al. Al, seems frustrated that he does not have control of the mouse. His ideas are being ignored and Ab will not explain what he is drawing – there is no shared understanding of the narrative. When Al takes over the drawing he deletes the entire screen "*I erased the whole thing, it's better that way*." Ab grabs the mouse back and continues to draw. One indication of collaborative behaviour is the statement from Al who states: "*It's your story too, so think.*" He shows awareness of a shared goal and an attempt to get Ab to help them work towards it.

Blue text = Ab has mouse

Red text = Al has mouse

10.11	Al: Go here! Al: Click on the yellow! [Al giggles.] Ab: What are you laughing at!? How stupid you are! Al: Get with the hand! Al: But draw, Ab! Ab: I'm drawing poop! He, he. Al: Do what you want, I don't care! Al: What's that – tall – leg? Al: C'mon, stop it, that's no fun! Ab: I'm going to draw… Ab: Wait, I'm doing it wrong! Al: What are you going to do now? Erase that blob! Ab, shape up! Erase that big one! Al: May I help you now? Al: Oh, there, there! Al: Abdi, what are you doing? [Researcher explains that they have to switch.]	Ab: erases, tries to erase only some details	By constantly giving Ab orders and questioning what he is doing Al tries to get involved in what Ab is drawing on the screen. He wants to help to create a shared narrative.
	Al: I erased the whole thing, it's better that way.	Al: takes the mouse, erases the lot	As he has not been involved in the previous drawing and has no understanding of it he gets rid of it.
10.12	Al: Ab, I want to use any pen I like! Al: Ab…! Al: Oh, that's a better man!	Ab: takes the mouse again, draws with blue crayon, erases	
		Al: takes the mouse	
		Ab: takes the mouse from Al	
		Al: leans back, looks at the others	
		Ab: draws with the blue	
	Al: Do this! Ab: No…	Al: shows Ab, is bored	

		Ab: draws, erases	
10.13	Al: But draw all the way down![Points.]	Al: hits his head, is leaning over the table	
	Ab: A man! I can't draw that well on the computer.	Ab: expresses difficulties, draws very concentrated	
	Al: I hope you can draw better on paper! Al: Eyes, nose and a mouth and ears! Triangular ears? Well, what's that?	Al: critical of Ab's drawing	
10.14		Al: takes the mouse	
	Al: Ab, do you know what you're doing? Al: You removed that star! Al: Again, again! Ab: Where are you? Ab: I want to erase.	Ab: takes it back, erases, picks up the magic wand, sounds a bit worried	
	Al: No, that doesn't work, we haven't made a single story…!	Al: is upset over the little time there is left for him	
	Al: Ab, can I do it? [Researcher forces Ab to give the mouse to Al.]	Ab: doesn't want to leave the mouse	
10.16	Al: It's your story too, so think!	Al: draws a face	Al tries to get Ab to collaborate – he is aware of the common goal – to create a story together
	Ab: Are you going to draw a red eye? Al: Cut it out, Ab! Al: Yes, but I can't draw that way, the way that I like.	Ab: pushes Al	
	Al: Here… Almost like yours! [He's drawn a man with hair that looks like Ab's.] Ab: No way!	Al: draws a man	

		Ab: stamps his feet, talks to the adults	Ab frustrated as he does not have control – does not want to be involved any more.
		Al: keeps on drawing Ab: does something else Al: keeps on drawing	

Table 6.6 Two 7-year-olds creating a story together but not collaborating

6.3.3 Structured Evaluation of Collaboration

Data collection for studies of computer supported collaborative learning has mainly come from testing of relevant skills or knowledge before and after the computer-based activity. In the KidStory Project, planning and speaking and listening skills, which are known to correlate with collaboration skills, will be monitored throughout the project (see chapter 7 of this report for details). However, we are also interested in analysing the process of collaboration and how it changes over the course of the project. It is recommended that we select a smaller sample of children from the participating classes within the schools so that we can observe in much more detail how collaboration changes with respect to verbal and non-verbal behaviour.

There is still limited knowledge about the process of collaborative learning (Barfurth, 1995). There is debate over how collaboration should be defined and what behaviours and talk best represents effective collaboration. Crook (1994) expresses a need to define

"a suitable conceptual vocabulary for analysing talk and action that constitutes collaborative work." (P.121)

This need is strongest for the observation of young children, where dialogue is often limited and physical behaviours must be interpreted. A number of coding schemes used to examine the collaborative behaviour of children's collaboration are reviewed in D2.1, chapter 5. Coding schemes have been developed which examine verbal collaboration, non-verbal collaboration and creative collaboration. We will be developing an appropriate coding scheme based upon what is relevant and useful from several of these studies in order to relate processes of verbal, non-verbal communication and collaborative behaviour to our other outcome measures.

The informal observations reported above are the first step in the development of suitable categories or criteria which we may use to identify children's collaborative behaviour when using KidStory technologies to create stories. Over the next year we recommend that this collaborative process is examined in more detail. A more formal approach to the observation of collaboration within an experimental design, may produce results where behaviours may

be attributed to features of the technologies used and the settings in which they are used. By collecting video recordings and tracking actions made on the computer verbal and non-verbal examples of behaviours may be recorded and linked to features of the technology.

6.4 Discussion

In the first year of the project we have explored the impact of the technology on its use in the schools and children's storytelling and collaborative behaviour. KidPad was used frequently in the schools and so we have the most information about the impact of this technology. We now have some idea of how this technology can and is being used in school and how children aged between five and seven will use the technology.

In both schools the children needed varying amounts of tuition and demonstration in order to understand the software and how features could be used in the creation of a story. Sufficient practice time was also necessary for the children to be able to use the technology effectively. The children need to be allowed to get used to the technologies, through exploration, tuition and practice, before they are fully able to use the technologies productively, to create stories. We have found that the technology was used differently in schools in the UK and Sweden. In the UK the teachers began to use the KidPad as a matter of course in their lessons and used it to support teacher structured class stories. In Sweden the technology use was more dependent on the involvement of the researchers and small group story telling was favoured.

Although it was not possible to take the Klump into schools very often, the children enjoyed using Klump and were very enthusiastic about using it. Further exploration as to how this technology may be integrated in schools will take place in Year 2 of the project.

The KidStory project has allowed children to use the technologies to create and re-tell their stories. We have noticed that some of these stories take the form of complex non-linear stories. Researchers and teachers have commented on how the process of creating stories in KidPad bases the structure around visual images rather than narrative text. There have also been examples of this non-linear visual based story being transferred to story creation with pen and paper. In year 2 we will take a closer look at the types of stories being created by children. We believe that there is potential for using KidPad as an additional aid for classroom teaching. This was most apparent in the UK when teachers structured and entire class story using the programme.

We have observed different patterns of collaborative behaviour when the children have used KidPad and Klump dependent on the setting within which the technology is used. Factors such as group size and ability have affected the way in which the children have worked together. Children have used KidPad in order to collaboratively create a shared story. We have found examples of children working together to build a shared narrative. We have also seen examples of dominance and poor co-operation when two children have shared the same

mouse. The introduction of both technology platforms with two mice and tools which encourage collaboration may change this behaviour.

In the next stage of the KidStory project we recommend that the new physical interfaces developed to change the computer input are evaluated with respect to collaborative learning and storytelling. The next stage for the *evaluation* of children's collaboration will be the development of suitable codes, which will focus on verbal and non-verbal collaborative behaviours, with relevance to the young age group of children we are concerned with. These observation codes will be tracked from video recordings of the children and automatic computer tracking of the children's interactions. The evaluation of the collaborative 'process' of children interacting and creating stories with new iterations of the technology will be performed within a more formal experimental design. This may produce results where the children's behaviours could be linked to individual features of the technology.

6.5 References

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7. Evaluation of educational effectiveness

One of the aims of our evaluation is to determine the effects of the KidStory project on children's learning and development. This includes determining the effects of working with project members as researchers as well as the effects of using the technologies we develop.

One of the requirements of our partnership with the UK school in particular is that we can demonstrate educational effectiveness of our activities. This will be based on measures to identify skills in children of different ages. Areas of skill development related to the KidStory project that were identified by teachers at Albany School include; IT skills, collaboration, problem-solving, communication, confidence and self-esteem. The UK National Curriculum describes attainment targets and indicators of skills within these areas (DfEE, 1995).

As the Swedish education system does not operate on the same basis as the UK system, not all of these measures are appropriate for evaluation within the Swedish school. A full description of the school environments for each participating school is given in D2.1, chapter 2 on "School Backgrounds".

7.1 Methods

Methods and measures for the evaluation of educational effectiveness are summarised as follows and explained in further detail in the following sections:

7.1.1 Whole Group Evaluation

In the UK some evaluations are being conducted for the whole class as well as matched class groups not participating in the project. This is to provide data for comparison of the target group with their peers and to provide (as far as possible) a control group for comparison with non-participants in the KidStory project. In Sweden the equivalent measures are being taken solely with the participating classes.

Baseline Assessments (5-year-olds, UK; 5-year olds and 7-year-olds, Sweden)

Standard Assessment Tests (SATs) (7-year-olds)

Story re-telling task (at start and end of school year, both age groups, UK and Sweden)

These measures are being collected both for the class with which we are working and, in the UK, for two comparison classes that are not involved with the project.

7.1.2 Target Group Evaluation

There are too many children involved in the project to allow detailed assessment of development for each child. Furthermore the areas of skill development which may be supported by the project is potentially broad and as yet unknown. For these reasons we are focusing the more detailed evaluations (i.e., video recordings) on a small group of children. For practical reasons we have assigned 6-8 children from each class to a target group. All observations and assessments are being carried out on this group. This does not exclude other children in the class from the activities. They will all complete most of the tasks and be given opportunity to use the computers but we will not collect all the data for children outside of the target groups. We will follow the 5-year-olds throughout the lifetime of the project in order to track their progress longitudinally and compare it with non-participants.

Some of the assessment measures used are time intensive, requiring up to 2 hours of a researchers time to carry out the task with each child. It would be impractical, within the scope of this particular project, to carry out these assessments with a whole class and a control class. Therefore two of the tasks, the referential communication task (at start and end of school year) and the planning task (at start and end of school year) have been carried out with only 10 children from one age group (5 years). This group of 10 includes the aforementioned target group.

7.1.3 Baseline assessments and SATs

Baseline Assessments were introduced in UK schools for the first time in September 1998. The purpose was to provide a profile of children's abilities as they entered school against which to compare their progress later (e.g., in terms of SATs at age 7 and 11). Baseline assessments were completed by teachers for all children joining Albany School, UK, in Reception (approx. 5 years of age). The teacher records the skill level for each child by observing their performance over their first month in the school and then completes the assessment by ticking a box marked a - e indicating their level of skill on this particular task. For our purposes the assessment form has been redesigned eliminating the sections not deemed relevant to the project (see table 7.1 Appendix 7). The areas assessed were Social Development (Interaction, Concentration and Motivation); Physical Development (Fine-motor skill); Literacy (Speaking, Listening, Reading and Writing) and Mathematics (Spatial skills). The data for all Albany school's Reception class children has been recorded. A new intake of Reception children in January were assessed and their data has been kept as control data.

In Sweden equivalent assessment measures have been taken with the participating classes. However, there was no control group. Follow up assessments will be carried out on a yearly basis.

7.1.4 Cognitive and Social Development

In the KidStory project we are interested in the extent to which collaboration between children (both and with and without the technology) has benefits for storytelling ability, communication skills, and more general cognitive and educationally-relevant skills such as planning (see session 6.3 for a detailed discussion). Previous research (e.g., Flynn, Ding & O'Malley, 1998; O'Malley, Ding, Flynn & Wood, in preparation) has shown relationships between young children's narrative abilities, their skills in referential communication, their planning abilities and their abilities to collaborate. The same tasks are being used in KidStory as indirect measures of collaboration.

7.1.4.1 Referential Communication

One indicator of children's abilities to collaborate is the extent to which they are aware that their partner may not necessarily have the same knowledge or beliefs as they do. This can be measured by studying the extent to which children are able to use unambiguous referents in speaking and the extent to which they both notice and seek clarification in cases of ambiguity. We therefore employed a task that we know from previous research to be a valid and reliable indicator of such referential ability in young children.

This task investigated both children's abilities to produce communications as a speaker and their ability to understand communications as a listener (Lloyd, 1995). Performance on this task has been found to correlate positively with children's abilities to collaborate (Flynn et al., 1998). Six sets of pictures of familiar items were used (see Figure 7.1). Each card differed in detail; for example, a clown may have yellow trousers and a red bobble hat whereas another clown may also have yellow trousers but a blue bobble hat. Similarities and differences between the cards were established. In the speaker condition the child was required to give verbal descriptions of their item. In the listener condition the child received six unambiguous messages and seven ambiguous messages from the adult. The ambiguous message did not give the child enough information to choose the correct card. A screen was placed between the child and the adult. In the speaker condition the child was asked to choose a card and describe it so that the adult could find the same card. If the child's description was adequate then they were asked to hold up the card to see if they matched. If the feedback was not adequate to select one card, the adult prompted by firstly repeating the child's message. If this elicited no response the experimenter said, " I don't know which one you mean." If there was still not enough information the experimenter responded with, "I've got two like that."

In the listener condition children were encouraged to ask questions when the message was ambiguous and they did not know which one to choose. Children should be able to select immediately when the message is unambiguous.

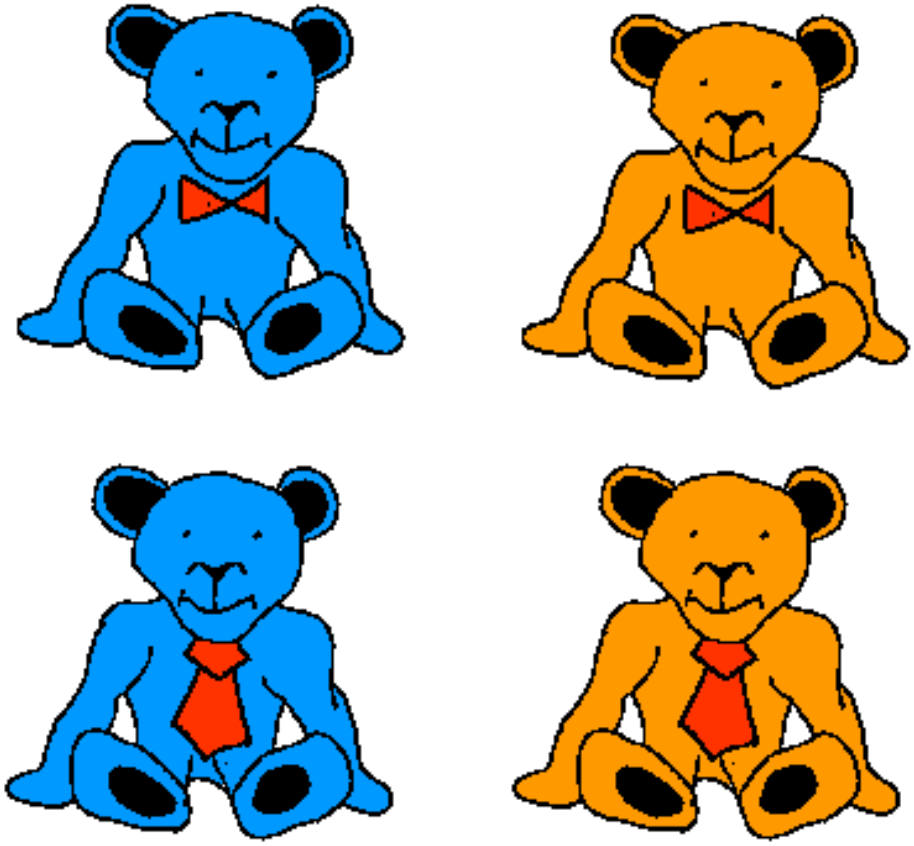

Figure 7.1 Example card used in the Referential communication task

Analysis

The scoring scheme for these shown in table 7.2.

Speaker Condition	Score
All critical features in one sentence	5
All critical features included in more than one sentence without feedback	4
All critical information included after one feedback (message repeated or yes)	3
All critical information included after more than one feedback (I don't know which one you mean, I've got two pictures like that)	2
All critical information never provided	1
Listener Condition	Score
Child correctly identifies all withheld critical attributes	5
Child only partially identifies withheld critical attributes	4
Child identifies withheld attributes after one or more prompts	3
Child chooses a picture before identifying all withheld attributes	2
Child chooses a picture immediately, showing no recognition of ambiguity	1

Table 7.2 Scoring scheme for referential communication task

7.1.4.2 Planning Task

Another indicator of children's abilities to collaborate is their ability to plan. We therefore used a task which we know from our previous research (Flynn et al., 1998) correlates with measures of collaboration.

This task examines children's responses to combinatorial problems (see English, 1992). In this version, children were required to dress male and female monsters in combinations of outfits, where no two monsters should be dressed in the same outfit (see Figure 7.2). Children were required to make as many different outfits as possible with the clothes provided. They were given five sets. They were always given more items and clothes than they needed. Children were scored on goal attainment, how many items they completed and strategy used.

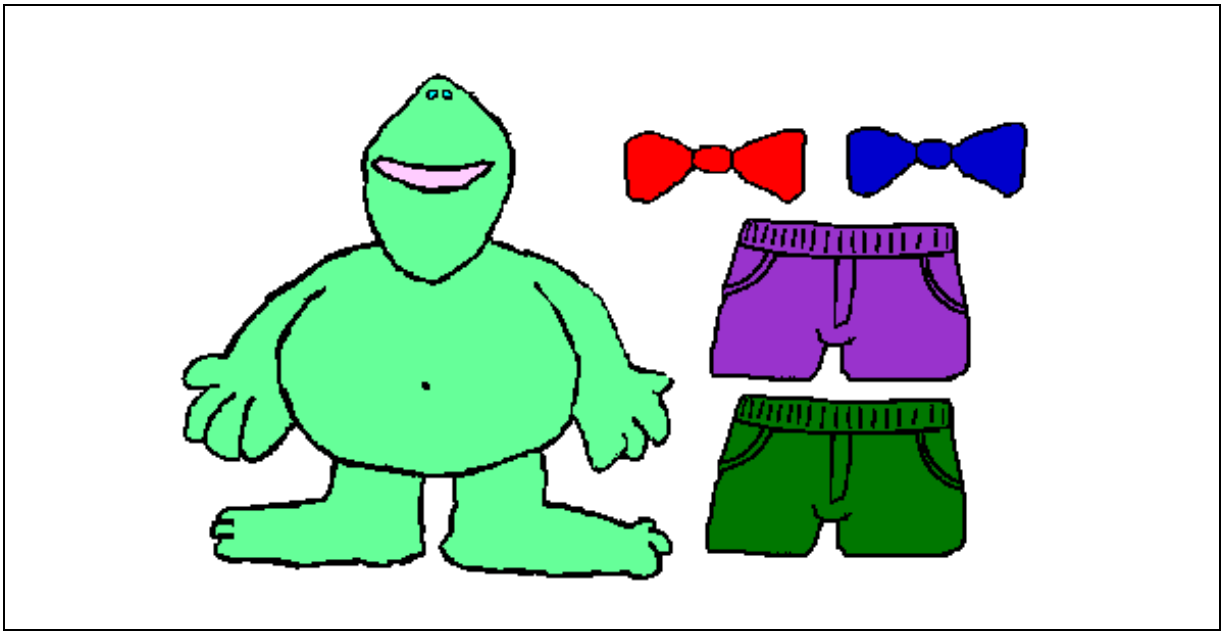

Figure 7.2 Example of the planning task

Analysis

The children received scores on two factors, goal attainment, how much of the task the child completed successfully and solution strategy, the sophistication of strategy used to execute the task. The goal attainment score involved a one to five scoring scheme shown in table 7. 3 below.

Score:	Description:
1	These children ignore the problem and simply dress the monsters.
2	Children given this score did not attain the problem goal or only did so with assistance from the experimenter.
3	These children achieved the goal but did so with encouragement from the experimenter.
4	These children made an error but detected it and corrected it themselves.
5	These children achieved the goal without error and without assistance.

Table 7.3 the scoring scheme for goal attainment in the planning task.

The solution strategy score was more complex. The sequence in which the monsters were dressed was noted by the experimenter. From these apparent strategies could be identified and appropriate scores given. When the patterns involved variability e.g. R G B G R B and O R O R R O, we would accept the variability of a three item factor but not of a two.

Once the strategies had been coded the score for a particular child was calculated using the following equation:

$$\frac{\text{actual number made in strategy}}{\text{total number possible}} \times \text{strategy score}$$

This equation was used to reflect the variability among the children's performance, but did not depend on the child's completion of the task, as this is scored by the goal attainment measure. For the individual scores see table 7.4.

Score:	Description:
0	Totally random and didn't stop when they had dressed all the monsters.
1	Random selection of items but they stopped when they thought they had all the combinations.
2	Emerging strategy. Any strategy used (either alternating[4] or constant[5]) for between 25% and 75% of the monsters[6] , for at least one of the factors.
3	Continual strategy. Any strategy used (either alternating or constant) for over 75% of the monsters, for at least **one** of the factors.
4	Continual strategy. Any strategy used (either alternating or constant) for over 75% of the monsters, for at least **two** of the factors.

Table 7.4 the different possible scores for solution strategy in the planning task.

The children completed five different trials from these. A mean score for both goal attainment and solution strategy was obtained.

7.1.5 Development of Narrative

In order to follow the progress of children's narrative understanding a story re-telling task has been carried out. There are two reasons for this: firstly, children's abilities to summarise the gist of a story are at least some indicator of their abilities both to comprehend and produce narratives. Secondly, our previous research has shown this to correlate with children's abilities to collaborate effectively (Flynn et al., 1998).

A suitable children's story was chosen for the narrative understanding task. Two books were chosen 'Winnie the Witch' by Korky Paul and Valerie Thomas for Year 2 and 'Farmer Duck' by Martin Waddell and Helen Oxenbury for the Reception class. The stories were recorded onto a cassette tape. Children listened to the story through headphones in groups of four. When the story had finished each child was taken individually to a quiet place by the experimenter and asked to retell the story. Each account was recorded. Both Albany school's Year 2 class and Reception class have completed this exercise. Another Year 2 and Reception class (at present uninvolved in the project) have also taken part in this task in order to provide some comparison data.

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[4] An alternating strategy involves the children alternating all the colours, e.g. blue top, red top, green top, blue top, red top, green top.

[5] A constant strategy involves using a particular item continually, e.g., the red top, until it has exhausted all the possible combinations.

[6] The 25% and 75% should refer to actual number of monsters completed, not to the maximum number of monsters possible. This also includes monsters that the child may duplicate and leave even if they are rejected later.

The same books were translated into Swedish and an equivalent exercise was carried out at Rågsvedsskolan. There will not be any control data collected in Sweden. It will probably be necessary for the stories from Rågsved school to be coded in Swedish, as information may be lost in translation.

Analysis

The stories will be scored in terms of structural units (that outline the plot), idea units (elements in the story but not central to the plot) and irrelevant information.

The structural statements are those which refer to the plot and without which the story would not have made sense. Idea units are elements that were in the story but not essential to the plot. Irrelevant statements, such as repetition or elements that were not in the story were dismissed. Thus three scores were produced: total number of structural statements, number of idea elements and a total score for summarising ability, which combined the structural and idea elements. The scoring will be checked for inter-rater reliability. This is the extent to which two or more observers obtain the same results when measuring the same behaviour

7.2 Conclusions

It was important, not only for KidStory, but for one of the partner schools, to determine the effects of the project on children's learning and development. In addition to school activities (described in chapter 5 of this report) researchers visited the schools in order to conduct assessment tests.

The whole class was evaluated for baseline measures of general ability and story re-telling. In the UK control group comparisons data was taken. Smaller target groups (with 6-8 children) have been observed doing school activities and carried out additional referential communication and planning tasks at the beginning and end of the school year. These tasks have been previously correlated with ability to collaborate (Flynn et al., 1998). Smaller groups were used due to the time consuming nature of carrying out these tasks. Table 7.5 details when the measures were taken in each school.

Analyses of these results are still ongoing. This should be finished early into year 2 and will be used to determine which measures should be carried out in years 2 and 3.

7.3 References

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Table 7.5 Measures of educational effectiveness - Data collection completed at the end of KidStory Year 1

TASKS	**Groups of children**	**DATA COLLECTED (No. data sets)**		
		UK		Sweden
		January 1999	**July 1999**	**March 1999**
Baseline Assessments	5-year-olds (KidStory)	28	28	17
	7-year-olds (KidStory)			30
Story Retelling	5-year-olds (KidStory)	28	28	10
	5-year-olds (Control)	28	28	
	7-year-olds (KidStory)	28	28	12
	7-year-olds (Control)	28	28	
Speaking and Listening	KidStory target group	6	6	
	Control group	4	4	

Planning	KidStory target group Control group	6 4	6 4	
TOTAL		**160**	**160**	

8. Conclusions and recommendations from Year 1 Evaluation

During the first year of the KidStory project we have been working closely with almost 100 children in two very different educational cultures. In over 40 visits to these schools, data was collected using a variety of methods including; observations, participatory design artefacts, child and adult journals, measures of children's cognitive skills and abilities. Our evaluations examined outcomes of the school activities in terms of input into technology design, changes in adult and child design partners and children's learning.

As anticipated, the experience of working within the schools was different in each culture. This meant that some activities had to be modified "on the ground". As a result our methodology had to be adapted to take into account the situational circumstances, requirements and constraints. In addition, researchers had to learn how to use different research methodologies and how to work in new circumstances. In this case, technology developers found themselves working within school contexts and educational researchers and teachers were involved in designing the technologies they would later use in the classroom. Both of these situations are relatively novel and evidence of personal adaptations was seen in the changes recorded in the reflections of adult researchers, described in chapter 4.

The technology developed during the first year of the KidStory project was applicable for use in primary education and has features that support story creation. The teachers were extremely enthusiastic about the KidStory project and became more involved in the activities as the year progressed. In both schools the teachers initiated some activities of their own, including setting up a 'pen-pal' exchange between the two schools and teacher exchange visits are planned for year 2. Teacher and child interviews, conducted at the end of each year by impartial reviewers, will be used to monitor their views of the KidStory project.

The incorporation of KidPad into the daily timetable of class activities at the UK school demonstrates its potential for integration into the school curriculum. This is extremely positive as it is very unusual for new technologies to be adopted into the school curriculum so readily. It is considered that the KidStory design process, including teachers and children directly in the design of their own technology, contributed to this success. One teacher from the UK commented at the end of the year that if the children had been using KidPad for a whole year she would expect to see definite improvements in their creative writing. In years 2 and 3 we will be focusing on the stories created by children and envisage that this will involve the development of story characterisation descriptions.

We have seen that child and adult design partners *were* instrumental in providing design ideas for technology development. Many of these were implemented during the first year and received positive feedback from the schools. However, the feedback loop into WP1 and back

for further evaluation in the schools was criticised as being too slow. The feedback loop involves many of the different strands of evaluation described in this report. In chapter 2 the feedback loop commented on is used to give information to technology developers about children's design ideas. This information comes from school activities including participatory design sessions. Chapter 3 describes the children's use of journals to give design ideas or highlight aspects of the technology they had difficulties with. Chapter 6 describes how the project has observed how children use the technology. Findings from all of these evaluations should be fed back to input into technical development. In order to tighten the feedback loop we need to streamline all of these activities and their analyses.

As well as keeping the technical development team in touch with technology use in the classroom, this loop is important maintaining the children's ideas as design partners. When the children saw feedback of design changes to the technology they were extremely proud and enthusiastic. In years 2 and 3 we plan a more structured approach to technology feedback providing frequent iterations. This will ensure that technology development keeps up to date with activities in the schools and demonstrate to the children the value of their role as design partners in the project.

The research methods highlighted important aspects of how the children try to work together to create stories both with and without technology. Consistent observations were made of difficulty in using the mouse, drawing and colouring in KidPad. It was noted that the children needed time to get used to the technology before they would even try to use it effectively or for a purpose (such as creating a story). The children became familiar with the technology from demonstrations, individual tuition, exploration and practice. This process of familiarisation needs to be repeated when new features are introduced to the technology. It is recommended that focused evaluations be conducted to examine specific aspects of how the children use the new technologies developed. For example, automatic tracking of mouse input combined with video analysis of children working together will allow us to conduct a detailed assessment of children's collaborative behaviour.

Over the year there were a number of changes in the types of entries children made in their journals. Changes in children's input to their journals over the year may have been the result of adaptations to the school activities as researchers, teachers and children became more familiar with the KidStory approach. With such a large number of journals collected and analysed over the first year it is difficult to comment on individual developments. It is recommended that in the following years of the project detailed analyses are made with a fewer sample of children (i.e. a target group within the existing class group).

We feel that, at the end of the first year, we have come a considerable way towards achieving our goals. Collaborative storytelling technologies *have* been successfully introduced into the school environments and children and teachers *have* worked as equal design partners alongside the research team. Further refinements to the evaluation methods applied will allow us to look in more depth at what is going on in the classroom. At the end of year 2 we expect to have more specific information about how the technology supports collaborative

story telling in the classroom. Examination of results from the different research approaches taken should also inform us of the impact of the KidStory project in each of our participating schools.

9. Appendices

Appendix 1

Table 1.1 Overview of data collection and analysis methods used in KidStory

Evaluation Areas	**Data collected**	**Analysis**
Changes in technology	Researcher journals Participatory design artefacts Contextual inquiry charts	Coding and Frequency Analysis Artefact Analysis Frequency Analysis
Changes in design partners	Researcher journals Children's journals Contextual inquiry charts Participatory design artefacts Teacher Interviews	Coding and Frequency Analysis Coding and Frequency Analysis Frequency Analysis Artefact Analysis Independent coding and analysis
Schools Integration and outcomes	Researcher observations Teacher comments Children's journals Contextual Inquiry charts	Coding and Frequency Analysis Frequency Analysis
Impact of KidStory technology	Contextual Inquiry charts Video recording Children's stories	Frequency Analysis Coding of collaborative behaviour
Educational effectiveness (UK only)	Measures of general ability: · Teacher Assessments · Standard Assessment Tests Measures of cognitive skill: · Problem Solving Task · Speaking & Listening Task Understanding of narrative: · Story Re-telling Task	Ongoing data collection and analysis. Year 1 baselines to be monitored in subsequent years and compared with control groups from the same school not participating in the KidStory project

Appendix 2

Table 2.1: Summary of KIDPAD Design Suggestions as Reflected in the KidStory Journals of Child Researchers, Year 1

JOURNALS			Children's KIDPAD Design Suggestions
YEAR 1	Autumn	Spring	UK and Sweden-- Year 1
23	0	23	Pre-drawn shapes/objects (e.g. triangles, eyes)
18	3	15	more colours
16	2	14	sound to tell stories
14	7	7	easier tools to draw with
11	1	10	fill space with colour (e.g. paint bucket)
11	1	10	draw straight lines
10	5	5	Animation
10	0	10	additional media (TV, video, photos)
9	0	9	letter/number icon
8	0	8	stamps (e.g. KidPix)
7	0	7	Eraser
6	0	6	green crayon
6	0	6	different input devices besides mouse
6	2	4	Internet/email-call someone
5	2	3	different crayon widths
5	2	3	Games
5	0	5	an "undo" button
4	2	2	portable computer (walks or flies with you)
4	0	4	a help button/person
3	2	1	easier way to move around screen
3	0	3	Dictionary
2	0	2	Glitter
2	2	0	wants to talk to the computer not write
2	0	2	the computer to talk to the child
2	0	2	easier to save
2	0	2	Clock

2	0	2	spell checker
2	0	2	trash can
1	0	1	surprise colour
1	0	1	more than 2 mice
1	1	0	easier way to move objects
1	1	0	secrets you can hide using zooming
1	1	0	magic wand should produce treasure/surprises
1	0	1	speech bubble
1	0	1	screen saver
1	0	1	rewind (backwards through links)
1	0	1	record to play back stories
1	0	1	make pictures invisible/reappear
1	1	0	mix colour
209	35	174	Total Children’s KidPad Design Suggestions

Table 2.2 Summary of KLUMP Design Suggestions as Reflected in the KidStory Journals of Child Researchers, Year 1

JOURNALS			Children's KLUMP Design Suggestions
YEAR 1	Autumn	Spring	UK and Sweden-- Year 1
3	1	2	change shape of Klump
3	1	2	look inside of Klump
2	2	0	different input devices besides mouse (light pen)
1	1	0	frames for Klump
1	1	0	draw with Klump shape
1	1	0	more colours
1	0	1	screen design needs to be improved
1	1	0	digital sound from microphone
13	8	5	Total Children’s Klump Design Suggestions

Table 2.3: Summary of KidPad Design Suggestions as Reflected in the KidStory Journals of Adult Researchers, Year 1

JOURNALS			Adults' KidPad Design Suggestions
YEAR 1	Autumn	Spring	UK and Sweden-- Year 1
6	4	2	Multiple input devices
5	1	4	Program should run faster
5	0	5	Combine crayons, mixing colours
4	4	0	Easier to delete/erase
3	0	3	other input devices besides mouse
3	0	3	more colours
3	0	3	tools that don't clump /get stuck on each other
2	0	2	Screen refresher
2	0	2	turn alive tool
2	0	2	Letters/text
2	0	2	Templates for zooming
2	0	2	Sound
2	0	2	Playback
1	1	0	Larger drawing pad
1	1	0	Easier to use magic wand
1	0	1	more control over zooming
1	0	1	Ability to make straight lines
1	0	1	Function keys to define and use hyperlinks
1	0	1	Thumbnails when saving
1	0	1	Version of MID using Java
1	0	1	Eraser
1	0	1	load a picture without having to save the current picture
1	0	1	fix Ctrl-Q (when you haven't drawn anything)
1	0	1	Home key should be more exact
1	0	1	Multiple tool boxes
1	0	1	x-ray box
1	0	1	ways to create secrets
1	0	1	tool "factory"

1	0	1	Individualised tool boxes
1	0	1	undo feature
1	0	1	Insert a story
1	0	1	Library (e.g. Of shapes, textures)
1	0	1	Video
1	0	1	Levels of complexity for tool boxes
62	11	51	Total Adults' KidPad Design Suggestions

Table 2.4: Summary of KLUMP Design Suggestions as Reflected in the KidStory Journals of *Adult Researchers,* Year 1

JOURNALS			**Adults' KLUMP Design Suggestions**
YEAR 1	**Autumn**	**Spring**	**UK and Sweden-- Year 1**
2	0	2	Change shape klump
2	0	2	pull apart klump
1	0	1	blue cursor sometimes gets stuck
1	0	1	Improved sound capabilities
1	0	1	freeze form of klump
1	0	1	library of shapes, colour, patterns
1	0	1	sound input
1	0	1	video tools
1	0	1	save shapes
1	0	1	move objects
1	0	1	give objects' behaviours
13	0	13	Total Adults' Klump Design Suggestions

Table 2.5: Portion of a Contextual Inquiry Diagram

	RAW DATA:			**DATA**	**ANALYSIS:**
Time	**Quotes**	**Activities**	**Activity Patterns**	**Roles**	**Design Ideas**
0932	F: No, you're only erasing all the time. Lena, stop!		Struggling for Ownership	Leader	***Make ownership options***
	L: [To Carina:] Can you help me, I'm trying to draw a circle. F: I know how to!	Asks Carina to help her	Seeks help	Learner	***Help option***
0935	L: Hello, I want to move it here! F: Get the red instead!	L. is taking the mouse from F, puts the tools back again by help of the box	Struggling for control of input device	Leader	***Multiple input devices***
	F: But! F: There! F: Now you really have to stop!	L. takes the hand, takes the yellow crayon, draws a curve	Drawing	Artist	
0945	L: Not a head! F: What do you want, then? L: A sun!	F. takes the mouse, rubs everything away	Struggling for control of input device	Leader	***Multiple input devices***

Table 2.7: Summary of Activity Patterns as Reflected in Contextual Inquiry Sessions of KidStory Project, Year 1

CI	Contextual Inquiry ACTIVITY PATTERNS
Year 1	UK and Sweden School Sessions-- Year 1
147	Drawing
98	Struggling for control of input device
42	Erasing
39	Storytelling
35	Writing
34	Trying out features
26	Sharing control of input device
23	Difficulty selecting tools
21	Offers help
20	Seeks ownership
19	Seeks help
14	Practical co-operation
10	Linking/Zooming
9	Difficulty with drawing
8	Difficulty with linking (wand)
5	Difficulty with erasing
550	Total Activity Patterns

Table 2.8: Summary of Roles as Reflected in Contextual Inquiry Sessions of KidStory Project, Year 1

CI	Contextual Inquiry ROLES
Year 1	UK and Sweden School Sessions-- Year 1
170	Artist
97	Leader
60	Frustrated user
41	Partner
39	Storyteller
34	Writer
34	Explorer
24	Bored user
21	Helper
21	Learner
18	Owner
559	Total Roles

Table 2.9 Contextual Inquiry of two 7-year old Children using KidDive, Rågsvedsskolan, May 1999

RAW DATA:			DATA ANALYSIS:		
Time	**Quotes**	**Activities**	**Activity Patterns**	**Roles**	**Design Ideas**
11.42	K: Wow! R: Do it now! K. Oh, then this! This one! Oh, he, he!	K. Cycling through colours	Enjoys changing colours.	Explorer	More tools to change with the appearance of the Klump.
11.43	R: How to make it sticky?	K. trying to make the shape stay.			
	R: You can't do this?			Technology Tester	Develop ability to make shape freeze.

Table 2.10 Contextual Inquiry of two 7-year old Children using KidPad, Rågsvedsskolan, April 1999

RAW DATA:			DATA ANALYSIS:		
Time	**Quotes**	**Activities**	**Activity Patterns**	**Roles**	**Design Ideas**
11.54	N: Let us make it fully blue, takes long time to fill it. J: let me. N: What are you doing?	N. Takes the mouse, goes on with the roof, seems to be satisfied, asks about a tool to fill all the roof with colour. J. tries for a moment	Wants to fill colour.	Technology Tester	Develop a tool that can fill an area with colour.

Table 2.11 Contextual Inquiry of two 7-year old Children using KidPad, Rågsvedsskolan, April 1999

RAW DATA:			DATA ANALYSIS:		
Time	**Quotes**	**Activities**	**Activity Patterns**	**Roles**	**Design Ideas**
9.45		M takes the mouse and the red crayon. She can't draw. Adult shows her that she has to keep the mouse button down.	Child has difficulty, adult helps	Learner	Create a help system that demonstrates features to a new user. More intuitive input device

Table 2.12 Summary of Design Suggestions as Reflected in Contextual Inquiry Sessions, Year 1

CI	Contextual Inquiry Design Suggestions
Year 1	**UK and Sweden School Sessions-- Year 1**
141	Multiple input devices
37	Help options
28	Easier to select tools
19	Ways to fill colour
17	Ownership options
13	Easier to erase
12	Easier to link (wand)
7	More colours
4	Easier to draw
4	Letter (swedish "a")
2	Draw straight lines
2	Stamps
1	Undo button
1	Sound
288	Total Design Suggestions

Appendix 3

These codes were derived from analysis of adult and child journals and are used for analysis on changes in design partners in chapters 3 and 4.

Table 3.1. Codes used to categorise journal entries

Collaboration:	Working jointly with others in the pursuit of a common goal.
Self:	Experiences related to the individual.
Peer:	Experiences related to others, specifically adult-to-adult collaboration or kid-to-kid collaboration.
Intergenerational	Experiences related to others, specifically adult-to-kid collaboration or kid-to-adult collaboration.
Positive Experience	A collaboration experience that is optimistic or upbeat.
Negative Experience	A collaboration experience that is pessimistic or problematic.
Learning Experience	A collaboration experience that results in the gain of new knowledge or improved skills.
Call for Change	An experience that involves a request for change in current kinds or levels of collaboration.
Other	Third-party reference, a description of an experience of someone else.
Communication	Exchanging information or opinions with others.
Self	Experiences related to the individual.
Peer	Experiences related to others, specifically adult-to-adult communication or kid-to-kid communication.
Intergenerational	Experiences related to others, specifically adult-to-kid communication or kid-to-adult communication.
Positive Experience	A communication experience that is optimistic or upbeat.
Negative Experience	A communication experience that is pessimistic or problematic.
Learning Experience	A communication experience that results in the gain of new knowledge or improved skills.
Call for Change	An experience that involves a request for change in current kinds or levels of communication.
Storyteller	Telling a tale, chronicling or relating a narrative.
Self	Experiences related to the individual.
Peer	Experiences related to others, specifically adult-to-adult exchanges or kid-to-kid exchanges.
Intergenerational	Experiences related to others, specifically adult-to-kid exchanges or kid-to-adult exchanges.

Demonstration	Reflecting a demonstration of storytelling.
Strength	Reflecting a strong point or asset related to storytelling.
Difficulty	Reflecting a weak point or impediment related to storytelling.
Learning	Reflecting new knowledge or skills related to storytelling.
Call for Change	An experience that involves a request for change in current kinds or levels of storytelling.
Other	Third-party reference, a description of an experience of someone else.
Inventor	"Thinking up" or creating something for the first time.
Self	Experiences related to the individual.
Peer	Experiences related to others, specifically adult-to-adult exchanges or kid-to-kid exchanges.
Intergenerational	Experiences related to others, specifically adult-to-kid exchanges or kid-to-adult exchanges.
Demonstration	Reflecting a demonstration of inventing.
Strength	Reflecting a strong point or asset related to inventing.
Difficulty	Reflecting a weak point or impediment related to inventing.
Learning	Reflecting new knowledge or skills related to inventing.
Call for Change	An experience that involves a request for change in current kinds or levels of invention.
Technology Use	Recognising that there is a problem with the technology, but not suggesting a fix that problem.
Self	Experiences related to the individual.
Peer	Experiences related to others, specifically adult-to-adult exchanges or kid-to-kid exchanges.
Intergenerational	Experiences related to others, specifically adult-to-kid exchanges or kid-to-adult exchanges.
Positive Experience	Technology use that is optimistic or upbeat.
Negative Experience	Technology use that is pessimistic or problematic.
Learning Experience	Technology use that results in the gain of new knowledge or improved skills.
Technology Development	Recognising that there is a problem with the technology and suggesting a to fix that problem.
Brainstorm	To give feedback or suggest new ideas in reference to technology development.
Design Suggestions	Related to specific elements of design.
Design Philosophy	Related to overall philosophy of design.

Process	To give feedback or suggest new ideas related to the process of technology development.
Implementation	To give feedback or suggest new ideas related to the implementing of technology in the schools.
Learning Experience	Technology development that results in the gain of new knowledge or improved skills.
Cultural Differences	Variation of group members, related to experiences of individuals dealing with others who are unlike or dissimilar to themselves.
Geography	Coming from different countries.
Discipline	Coming from different fields of study.
Age	Being of different ages.
Peer	Experiences related to others, specifically adult-to-adult exchanges or kid-to-kid exchanges.
Intergenerational	Experiences related to others, specifically adult-to-kid exchanges or kid-to-adult exchanges.
Other	Third-party reference, a description of an experience of someone else.
Understanding Expectations	Awareness and appreciation of what is expected of oneself and/or others.
Self	Experiences related to the individual.
Peer	Experiences related to others, specifically adult-to-adult exchanges or kid-to-kid exchanges.
Intergenerational	Experiences related to others, specifically adult-to-kid exchanges or kid-to-adult exchanges.
Other	Third-party reference, a description of an experience of someone else.
Evaluation	Appraisal of the various evaluation components of the project.
Process	Related to procedures and methods of evaluation.
Philosophy	Related to overall philosophy of evaluation.
Suggestions	Related to giving ideas and/or feedback regarding evaluation.
Conclusions	Related to deductions drawn from the evaluation process.
Technology	Related to the evaluation of the technology.
Infusion Design	Reflections in how technology is merged with or brought into the classroom environment.
Ability	Reflections related to the aptitude or capability of the children.
Content	Reflections related to the specific activities in the schools.
Effort	Reflections related to the amount of effort needed for the infusion of technology into schools.

Social	Reflections related to the group experiences in the schools.
Philosophy	Reflections related to the philosophy of infusion design.
Storytelling, Personal	Reflections about Storytelling activities, individually-created.
Storytelling, Collaborative	Reflections about Storytelling activities, collaboratively-created.
Inventing, Personal	Reflections about Invention activities, individually-created.
Inventing, Collaborative	Reflections about Invention activities, individually-created.
Concerns	Ideas related to any anxieties or worries experienced throughout the project.
Time	Concerns regarding allocating enough time to complete tasks.
Gender Differences	Concerns regarding the male-female interactions.
Noise	Concerns related to the level of sound in the classroom environment.

Table 3.2 Summary of Changes in Design Partners as Reflected in the KidStory Journals of Child Researchers, Year 1

Collaboration	**YEAR 1 TOTAL**	***Autumn***	**UK**	**Sweden**		***Spring***	**UK**	**Sweden**
Self, Positive	7	7	7	0		0	0	0
Self, Negative	4	1	1	0		3	2	1
Peer, Positive	1	1	1	0		0	0	0
Peer, Negative	2	2	2	0		0	0	0
Storytelling	**YEAR 1 TOTAL**	***Autumn***	**UK**	**Sweden**		***Spring***	**UK**	**Sweden**
Self, Demo	408	208	123	85		200	116	84
Inventing	**YEAR 1 TOTAL**	***Autumn***	**UK**	**Sweden**		***Spring***	**UK**	**Sweden**
Self, Demo	177	13	8	5		164	100	64
Tech Use	**YEAR 1 TOTAL**	***Autumn***	**UK**	**Sweden**		***Spring***	**UK**	**Sweden**
Self, Positive	60	26	24	2		34	27	7
Self, Negative	84	38	22	16		46	44	2
Tech Development	**YEAR 1 TOTAL**	***Autumn***	**UK**	**Sweden**		***Spring***	**UK**	**Sweden**
Brainstorm, Design	50	10	8	2		40	27	13
Suggestions								

Table 3.3 Codes reflecting changes in children as learners identified in the KidStory Journals of the children, Year 1

Storytelling	Telling a tale, chronicling or relating a narrative.
No structure	Narrative which shows a lack of any kind of structure (beginning, middle, end- character, plot).
Incomplete structure	Narrative which shows partial structure (beginning, middle, end- character, plot).
Complete structure	Narrative which shows full structure (beginning, middle, end).
character, plot)	
Communication	Exchanging information or opinions with others.
Recording	Communication that reflects the writing down of an event.
Suggesting	Communication that offers a suggestion for change.
Reflecting	Communication that contains personal opinions or feelings.
Problem Solving	Identifying problems and forming solutions.
Pre-identification	Showing a lack of understanding that a problem exists or providing a nonsense solution.
Problem identification	Showing an understanding that a problem exists, but not providing a potential solution.
Problem solution	Showing an understanding that a problem exists and providing a commonplace solution.
Invention	Showing an understanding that a problem exists and providing a creative, novel solution.

Table 3.4 Summary of Changes in Learners Reflected in the KidStory Journals of Children in Sweden and England, Year 1

Child as Learner, Year 1						
	AUTUMN			SPRING		
	Total	UK	Sweden	Total	UK	Sweden
Storytelling						
No Structure	103	54	49	47	38	9
Incomplete Structure	49	23	26	41	25	16
Complete Structure	4	3	1	62	5	57
	AUTUMN			SPRING		
	Total	UK	Sweden	Total	UK	Sweden
Problem Solving						
Pre-Identification	5	4	1	8	3	5
Problem Identification	22	10	12	29	26	3
Problem Solution	4	2	2	67	20	47
Invention	13	8	5	166	102	64
	AUTUMN			SPRING		
	Total	UK	Sweden	Total	UK	Sweden
Communication						
Recording	41	27	14	11	5	6
Suggesting	29	16	13	98	83	15
Reflecting	44	41	3	51	43	8

Appendix 4

Table 4.2 Summary of Changes in Design Partners by General Codes as Reflected in the KidStory Journals of *Adult Researchers,* Year 1

CODES	**YEAR**	***Autumn***	ER	PC	T	TR		***Spring***	ER	PC	T	TR
Collaboration	**790**	412	228	65	46	73		378	154	100	22	102
Communication	**67**	44	30	6	1	7		23	11	5	3	4
Storyteller	**82**	62	36	12	4	10		20	8	3	6	3
Inventor	**66**	30	18	5	3	4		36	16	1	13	6
Tech Use	**90**	37	20	5	6	6		53	24	1	4	24
Tech Development	**141**	41	3	10	0	28		100	8	59	0	33
Cultural Differences	**103**	82	44	13	5	20		21	11	6	2	2
Evaluation	**58**	32	11	9	1	11		26	8	16	0	2
Understand Expectations	**63**	45	26	7	5	7		18	11	2	2	3
Infusion Design	**150**	118	71	15	13	19		40	23	5	8	4
Concerns	**67**	42	20	11	0	11		25	12	3	1	9
TOTAL	**1677**	**945**	**507**	**158**	**84**	**196**		**740**	**286**	**201**	**61**	**192**

Table 4.3 Summary of Adult reflections on collaboration sub-codes, Year 1

Collaboration	**YEAR**	***Autumn***	ER	PC	T	TR		***Spring***	ER	PC	T	TR
Self, Positive	132	56	33	9	7	7		76	33	13	8	22
Self, Negative	52	13	8	1	1	3		39	14	8	1	16
Self, Learning	18	17	12	2	2	1		1				1
Self, Call for change	6	2	2					4	2	1		1
Peer, Positive	129	65	37	11	4	13		64	31	14	3	16
Peer, Positive, School	33	23	12	9		2		10	9	1		
Peer, Positive, Other	8	4	3	1				4		2		2
Peer, Negative	115	62	29	4	2	27		53	10	20		23
Peer, Negative, School	24	15	11	2		2		9	7	2		
Peer, Learning	2	2	1	1				0				
Peer, Call for change	83	18	11	4	1	2		65	20	32	1	12
Intergen., Positive	78	54	30	10	11	3		24	14	4	4	2
Intergen., Positive, Other	5	3	3					2		1		1
Intergen., Negative	85	66	33	11	10	12		19	11	1	3	4
Intergen., Negative, Other	1	1				1		0				
Intergen., Learning	13	8	1		7			5	2	1	1	1
Intergen., Call for change	6	3	2		1			3	1		1	1
Total	790	412	228	65	46	73		378	154	100	22	102

Table 4.4 Summary of Adult reflections on communication sub-codes, Year 1

Communication	**YEAR**	***Autumn***	ER	PC	T	TR		***Spring***	ER	PC	T	TR
Self, Positive	3	2	2					1	1			
Self, Negative	9	7	6			1		2	2			
Self, Learning	2	1	1					1				1
Self, Call for change	1	0						1	1			
Peer, Positive	9	6	4	2				3	1	1	1	
Peer, Negative	18	17	11	2		4		1	1			
Peer, Negative, School	1	1	1					0				
Peer, Negative, Leadership	3	1	1					2	2			
Peer, Call for change	12	4	1	1		2		8	2	4		2
Intergen., Positive	2	0						2			1	1
Intergen., Negative	7	5	3	1	1			2	1		1	
Total	67	44	30	6	1	7		23	11	5	3	4

Table 4.5 Summary of Adult reflections on storyteller sub-codes, Year 1

Storyteller	**YEAR**	***Autumn***	ER	PC	T	TR		***Spring***	ER	PC	T	TR
Self, Learning	2	0						2		1		1
Peer, Strength	4	4	2	2				0				
Peer, Difficulty	1	1				1		0				
Intergen., Demo	3	2	2					1				1
Intergen., Strength	36	27	16	9	2			9	4	1	3	1
Intergen., Strength, Other	1	1	1					0				
Intergen., Difficulty	28	23	11	1	2	9		5	3	1	1	
Intergen., Difficulty, Other	1	1	1					0				
Intergen., Learning	2	1	1					1			1	
Intergen., Call for change	4	2	2					2	1		1	
Total	82	62	36	12	4	10		20	8	3	6	3

Table 4.6 Summary of Adult reflections on inventor sub-codes, Year 1

Inventor	**YEAR**	***Autumn***	ER	PC	T	TR		***Spring***	ER	PC	T	TR
Self, Demonstration	3	0						3				3
Self, Strength	2	2	1	1				0				
Self, Difficulty	1	1			1			0				
Self, Call for change	1	1		1				0				
Peer, Strength	3	2	1	1				1				1
Peer, Difficulty	1	1				1		0				
Peer, Call for change	5	3	2	1				2	2			
Intergen., Demo	3	2	2					1	1			
Intergen., Strength	27	9	7	1	1			18	11		6	1
Intergen., Difficulty	17	9	5		1	3		8	2		6	
Intergen., Learning	3	0						3		1	1	1
Total	66	30	18	5	3	4		36	16	1	13	6

Table 4.7 Summary of Adult reflections on technical use sub-codes, Year 1

Technology Use	**YEAR**	***Autumn***	ER	PC	T	TR		***Spring***	ER	PC	T	TR
Self, Positive	7	2			1	1		5	2			3
Self, Negative	13	7	5			2		6	1		1	4
Self, Learning	3	3	2	1				0				
Peer, Positive	5	0						5	2	1		2
Peer, Negative	1	0						1				1
Intergen., Positive	23	8	5	1	1	1		15	7		2	6
Intergen., Negative	31	15	7	2	4	2		16	8		1	7
Intergen., Learning	7	2	1	1				5	4			1
TOTAL	90	37	20	5	6	6		53	24	1	4	24

Table 4.8 Summary of Adult reflections on technical development sub-codes, Year 1

Technical Development	**YEAR**	***Autumn***	ER	PC	T	TR		***Spring***	ER	PC	T	TR
Brainstorm, Design Suggestions.	67	18	2	2		14		49		37		12
Brainstorm, Philosophy	42	11	1	5		5		31	2	16		13
Brainstorm, Process	11	8		2		6		3		2		1
Implementation	14	1				1		13	6	4		3
Learning Experience	7	3		1		2		4				4
TOTAL	141	41	3	10	0	28		100	8	59	0	33

Table 4.9 Summary of Adult reflections on cultural differences sub-codes, Year 1

Cultural Differences	**YEAR**	***Autumn***	ER	PC	T	TR		***Spring***	ER	PC	T	TR
Geography, Peer	21	12	9	1		2		9	4	5		
Geography, Intergen.	23	16	7	2	3	4		7	4	1	2	
Discipline, Peer	5	5	3	1		1		0				
Age, Intergen.	51	46	25	8	2	11		5	3			2
Age, Intergen., Other	3	3		1		2		0				
TOTAL	103	82	44	13	5	20		21	11	6	2	2

Table 4.10 Summary of Adult reflections on evaluation sub-codes, Year 1

Evaluation	**YEAR**	***Autumn***	ER	PC	T	TR		***Spring***	ER	PC	T	TR
Process, Philosophy	49	26	9	7	1	9		23	5	16		2
Process, Suggestions	9	6	2	2		2		3	3			
TOTAL	58	32	11	9	1	11		26	8	16	0	2

Table 4.11 Summary of Adult reflections on understanding expectations sub-codes, Year 1

Expectations	**YEAR**	***Autumn***	ER	PC	T	TR		***Spring***	ER	PC	T	TR
Self	44	31	17	6	2	6		13	7	2	1	3
Peer	7	5	3	1	1			2	2			
Intergen.	12	9	6		2	1		3	2		1	
TOTAL	63	45	26	7	5	7		18	11	2	2	3

Table 4.12 Summary of Adult reflections on infusion design sub-codes, Year 1

Infusion Design	**YEAR**	***Autumn***	ER	PC	T	TR		***Spring***	ER	PC	T	TR
Philosophy	11	4	2	1	1			7	3	2	1	1
Ability	34	27	14	4	6	3		7	5		2	
Content	32	28	17	2	1	8		4	3			1
Effort	24	16	10	4		2		8	7		1	
Social	57	43	28	4	5	6		14	5	3	4	2
TOTAL	158	118	71	15	13	19		40	23	5	8	4

Table 4.13 Summary on concerns sub-codes, Year 1

Concerns	**YEAR**	***Autumn***	ER	PC	T	TR		***Spring***	ER	PC	T	TR
Time	53	30	15	7		8		23	11	3		9
Gender Differences	3	3		2		1		0				
Noise	11	9	5	2		2		2	1		1	
TOTAL	67	42	20	11	0	11		25	12	3	1	9

Table 4.14 Interview schedule for teachers at Albany School

1. Perceptions and understanding of KidStory Project (KSP)
a) How long have you been involved with the KS project and in what capacity? How was the programme introduced to you? What were/are your initial feelings about the programme? b) What is your current view of KSP? Has your view changed over time? Why? Do views differ within the school about KSP? Do parents/governors know about it? How do they view it? c) Do you now feel you understand the project and the way it works?
2. Effects of the Project
Impact on staff a) To what extent has your practice been affected by KSP? Has it changed your day to day experience of teaching stories? b) How has KSP contributed to your professional development? What elements in particular have developed your understanding or expertise? Impact on pupils

a) What evidence do you have that KSP has had a positive effect upon the children's' learning generally? What evidence do you have that pupils' story writing and IT skills have been positively influenced by KSP ? b) What differences have you observed within the school since the introduction of the project ? Are there any concerns, which have emerged ? c) Has the project had a positive impact on any other aspect of pupil development ?
3. Implementation
a) What were the main implementation issues facing the school concerning KSP? What practical steps will be taken to overcome them? How effective has the communication about KSP been within your school ? b) To what extent have teachers worked together ? c) How effective is the level of external support for KSP? How successfully has this support been operated over difficult issues? How could support be improved?
4. Outcomes
a) What do you anticipate will be the main outcomes from the KSP over time? b) To what extent are some of these outcomes already evident?
5. Reflections and recommendations
a) What aspects of the KSP have been most successful and why? What positive features of the project are you now able to identify that were not immediately apparent at the start? b) What has been the least successful element of KSP and why? How could this be improved? What are the current barriers to further development? How could these be overcome? c) What recommendations would you have for the University when planning introduction of KSP to new schools? What needs do schools/teachers have in connection with KSP that are currently not being met? d) What advice would you give to other teachers and schools thinking about the KSP?

Appendix 5

Table 5.1. School activities February-July 1999

Activity plan	Objectives	Data collection
What is an inventor? Invention of the sandwich. Children invent their own sandwich (card, plasticine) Group sizes 2-4	Introduction of pupils' role as inventors in project	Video target group. Note taking on presentation and debrief (children comment on each others inventions)
Problem solving We provide the children with a problem and they must provide a solution.	Practical task Provide solutions in pairs. Presentation and debrief	Video target group (3 sets of pairs). Note taking
Group story* Class create story together with teacher using Kidpad. Debrief	Story telling exercise and use of technology	Note taking, video
Participatory design Taking the mouse apart and designing a new input device.	To provide design ideas for technology Work in groups. Presentation and debrief	Video target group and presentations. Photographs of models
Designing icons Lesson based discussion of use of icons in society. Children design their own icon for use in Kidpad.	To provide design ideas for technology Group work Presentation and debrief	Copies of design pictures Video target group
Feedback and completion Update on technology development – in response to schools feedback	Attitudes towards Kidstory.	Journals and directed questions

*Each pupil should have used KidPad before the start of this activity

Appendix 7

This appendix shows the baseline assessment record sheet used to record general ability levels and development of children participating in the KidStory project, described in chapter 7 of this report. This form was adapted from the Nottingham County Council Entry and Baseline Record sheets normally used to monitor children's progress at Albany School.

Table 7.1 Baseline Assessment Record

Numerical Record

Name/Participant Number	**Class**

Method of Scoring

A: 0 B: 1 C: 2 D: 3 E (Level 1): 4 F (Level 2): 5

SCORE SHEET TOTALS

Social Development					
	Interaction	Concentration	Motivation		
BL					BL
T1					T1
T2					T2
Physical Development					
	Fine Motor				
BL					BL
T1					T1
T2					T2
Literacy					
	Speaking	Listening	Reading	Writing	
BL					BL
T1					T1
T2					T2
Mathematics					
	Spatial Skills				
BL					BL
T1					T1
T2					T2

Comments

Pupil Progress Report

SECTION 1

Name	
Forename	Surname
School	**Date admitted**

SECTION 2

Gender	Female/Male	**Date of Birth**	

SECTION 3

Additional Comments	Language Stage

Entry and Baseline Assessment

	Baseline	Test 1	Test 2
Age			
Date of assessment			

Social Development			
A yet to be developed/be observed ***Interaction***			
B observes others rather than participating			
C usually chooses to work/play alone			
D engages in parallel activity with others			
E engages in co-operative activity with others; shares and takes turns			
A yet to be developed/be observed ***Concentration***			

B very short attention span			
C attention span limited with directed tasks			
D generally concentrates well with directed and non-directed tasks			
E consistently concentrates until activity concluded			
A yet to be developed/be observed ***Motivation***			
B always needs an adult to start on a task			
C selects own tasks; will engage on a favourite task or activity without an adult			
D actively engages in a variety of tasks without adult direction			
E asks many questions; interested in most tasks			

Literacy			
A yet to be developed/be observed ***En 1 Speaking***			
B uses a few basic words to communicate meaning			
C responds to questions from peers and adults; recounts an experience			
D initiates conversation; asks questions			
E makes up a story conveying simple meaning with a little detail			
F makes up a story with details; tells it to group (Level 1)			
A yet to be developed/be observed ***En 1 Listening***			
B responds to actions /stories/songs/rhymes			
C listens attentively to short stories			
D follows a two-step instruction			
E ask questions and responds to answer; takes simple messages			
F listens to stories; asks appropriate questions, follows more complex instructions (Level 1)			
A yet to be developed/be observed ***En 2 Reading***			
B shows some interest in books			
C handles books correctly; talks about pictures; recognises name			
D predicts word/phrase; recognises 5 letters			

E recognises at least two words; recognises 15 letters			
F reads portion of familiar text; recognises 26 letters by shape and sound (Level 1)			
A yet to be developed/be observed ***En 3 Writing***			
B uses pictures and/or marks to communicate			
C uses symbols and/or individual letters to communicate meaning			
D writes letter shapes			
E writes single words without model; writes own name			
F communicates meaning through simple words and phrases (Level 1)			

Physical Development			
A yet to be developed/be observed ***Fine Motor***			
B uses palm grasp			
C uses pincer grasp; handles small objects			
D uses small tools and equipment purposefully e.g. scissors			
E uses small tools and equipment with control			

Mathematics			
A yet to be developed/be observed ***Ma 3 Spatial Skills***			
B sorts square, rectangle , triangle, circle by shape			
C recognises and names square, rectangle, triangle, circle			
D understands words commonly used to describe simple properties of space, shape and position			
E uses everyday language to describe 2D and 3D properties and positions			
F uses everyday language to describe 2D and 3D properties and positions; measures and orders objects using direct comparison. (Level 1)			