Roamer Activity Design

by Sue Redfearn

Synopsis

To design an activity using Roamer to aid number recognition, with a view to stimulating its use in whole class and group work, thus supporting a range of Early Learning Goals in the Foundation Stage**.**

Introduction

I work as a Teaching Assistant in the Reception Class of a rural First School in Dorset with a hundred pupils on roll.

While browsing on the South West Grid for Learning after completion of a homework task for this ICT module, I came across an article entitled "Getting the Roamers out of the cupboard" on the MAPE web site. This is an inspirational article written by Sally Smith, the ICT coordinator at Phoenix Infant and Nursery School, Gedling, Nottingham. It describes her reluctance to use Roamer and "how many of the staff never took the Roamers from the boxes." MAPE. http://www.mape.org.uk [26th January 2005]. The article then catalogues how she began to invent games, have fun and use Roamer to help children with their learning.

I then read my schools' long term plan for ICT skills for each year group, which clearly states that children in Reception should be able to use Roamer to program forward/backward, left/right commands and clear them. However, in the three years I have been working with Reception in this setting, Roamer has not emerged from the cupboard. Having identified where there is a

definite need for some ICT input, I resolved to rescue Roamer and get him into the classroom!

Chapter One - How will I use Roamer?

To resolve to get Roamer in the classroom is one thing when you are the teacher but quite another when you are the assistant! I decided to take Roamer home to play and to think of a strategy. I managed to unearth Roamer and some batteries, but no instruction booklet. A search on the web revealed Valiant Technology Ltd. the company which manufactures Roamer, thus enabling me to download a useful booklet entitled "Using Roamer with the under 5's" (1998).

A good starting point is to look at the learning objectives when using Roamer in the early years. These can be summarised as:

- To control the device purposefully by turning on and off.
- To understand forward and backward and to enter these commands.
- To understand left and right and enter these commands.
- To use the CM (clear memory) and Go commands.
- To sequence a series of commands in order.
- To understand that control is an important aspect in everyday life.

These learning objectives are in line with the long term ICT plan for Reception.

In order to command Roamer to move in any direction and thereby fulfil the learning objectives, children must be able to recognise numerals 1-9. Two boys I work with (A and J) are struggling with this particular Early Learning Goal (ELG) and have poor number recognition. (The ELG's establish expectations for most children to reach by the end of the Foundation Stage. (DfES,2003,p.26)) As a Teaching Assistant I am unlikely to be have the opportunity to introduce Roamer to the whole class, but if I can somehow use Roamer to help these boys achieve this ELG, then Roamer may just stay out of that cupboard!

According to the Valiant Technology web site, Valiant Technology Ltd. http://www.valiant-technology.com [1st February 2005] Roamer is particularly useful for the Early Years because:

- It can help lay a foundation of mathematical thinking, from simple number recognition, to addition and subtraction through to problem solving.
- It helps children verbalise.
- Children do not need fine motor skills or the ability to write.
- It can be used for whole class or small group work.
- It is ideal for the development of communication and social skills.
- It moves in real space allowing children to utilise their powerful "body geometry".

- It is designed to express no sex or culture bias and can be tailored to specific needs.
- It is fun - motivating children to think, experience and learn.

In addition to problems with number recognition A and J both have poor fine motor skills, and poor concentration. The points listed suggest that Roamer would be a most appropriate resource for helping A and J achieve this ELG.
Briggs and Pritchard (2002, p.41) confirm that "the motivation that is generated serves to keep children on task and working hard and this bodes well for learning." "Children learn more when they are actively engaged in their own learning," (Marlowe and Page,1998,p.34) and the active learning approach facilitated by Roamer can provide a new opportunity for A and J to grasp the concept of number recognition. Indeed, the use of a floor robot is "a very useful means of introducing children to a range of mathematical concepts" (Briggs and Pritchard, 2002,p.40).
In summary, my objectives are:

- To design an activity using Roamer to help A and J with number recognition and to make an assessment of its impact.
- To 'stimulate' the use of Roamer for whole class or group work in order to fulfil the requirements of our ICT planning.
- To suggest how Roamer could support other Early Learning Goals in the Foundation Stage.

Chapter Two - Constructing the Activity

Number can be understood in three different ways - as defining a thing's position in a series, (its ordinal nature) as a quantity, (its cardinal nature) and as a symbol (number recognition).

(Hudson,1998, p.11)

An activity combining all these elements will form a good basis for understanding number.
This year we have used the "Number Zoo" to introduce the concept of number to the children. Each number from 0-10 is given a different identity in the form of an animal. There is a story about each of the characters, (e.g. Naughty Nine is an elephant who squirts water at everyone, until his talents are put to good use watering flowers.) and each story is followed by an activity and a worksheet incorporating counting, sequencing and forming the number. (See appendix 1.) Since A and J are familiar with the Number Zoo it would make sense to incorporate using it within the Roamer activity.

Each of the Number Zoo characters has been photocopied, coloured by the children, stuck onto an A4 piece of paper and then laminated. Each A4 Number Zoo character is a Roamer "step" in length. These will be a used as a resource for the activity. By placing them from 0-10 in a vertical line on the floor there is no requirement for the child to estimate distance. (If Roamer is placed alongside 0 to start, the child will have to press 1 for Roamer to travel to 1, 2 in order for Roamer to travel to 2 etc.)

Since we will be working with the "Number Zoo", Roamer can be "customised" to become a ZooKeeper. He has been given eyes, a nose and mouth and a small plastic box so he can carry items to and from his animals.

A totally unstructured child-centred approach should not be taken when using floor robots. Teachers must have clear objectives for the learning that they would like to take place.

<div align="right">(Briggs and Pritchard, 2002, p.41)</div>

In Chapter One I listed the learning objectives when using Roamer. Since number recognition is a prerequisite for achieving all these, I intend that Roamer will function at a very basic level for this task. Hence the learning objectives are:

- To be able to count to a chosen number up to 10. (ordinal)
- To be able to identify a chosen number up to 10. (recognition)
- To be able to count reliably up to 10 objects. (cardinal)
- To control Roamer purposefully by turning on and off.
- To understand forwards and backwards and to enter these commands.
- To use the Go command.

The cancel memory button (CM) needs to be pressed twice to clear Roamers memory. If this is missed or only done once Roamer will not "forget" and will continue to do what has been previously programmed. This can cause confusion in small children, and since programming Roamer is not a learning objective, the adult will be responsible for the CM command, though the children will be told what is happening.
The activity will proceed as follows:

- The Number Zoo is laid out on the floor in a vertical line in sequence from 0-10.
- The children are introduced to Roamer and shown the on/off switch, the CM command, the forward and backward controls and the GO command. They are shown the number buttons on Roamer and told that if they press for example "Amazing 8" Roamer will stop adjacent to that character. A child is asked to switch Roamer on and he is positioned adjacent to 0.
- Roamers box is filled with items he will be giving to the animals when he visits them. (These will usually be multi-link wrapped in bright paper to make "snacks" but if the children decide they would like to take something else, this will be fine as long as it fits in his box!)
- The adult presses the CM control twice, (explaining that pressing this button tells Roamer to forget anything else he may have been asked to do) and asks a child to send Roamer to a chosen number.
- The child is asked which direction Roamer will have to travel and to press the appropriate button.

- The child is then asked to press the correct number button. (If they have problems identifying the number they are asked to go and look at the number and then come back to see if they can find the correct number button.)
- The child is asked to press the GO command.
- As Roamer passes each character the children are asked to say the number. (If they send Roamer to Amazing 8 they will count to 8 on the way.)
- When Roamer stops, the child is asked to take the appropriate number of snacks from Roamer's box and give them to the character. (e.g. Amazing 8 will have 8 snacks.)
- The child is asked to repeat the process and send Roamer backwards the correct number of places to the beginning, counting backwards as he goes.

The activity is kept to a 15-20 minute session with A and J and a maximum of two other children. This allows for each child to have at least one turn at pressing the buttons while maintaining the interest of the rest of the group. Once the children are familiar with the activity, if the learning objectives are achieved, it will be completed with no adult intervention. All the group are expected to join in with counting forwards and backwards.

Chapter Three - Assessing the Activity - Were the Learning Objectives Achieved?

In order to make an assessment of the impact of the activity I designed an observation sheet. These were completed during the sessions and examples are included in appendix 2.

Control

Both A and J were quick to learn the "control' objectives. They turned Roamer on and off correctly in each session. They understood forwards, backwards and Go and entered the commands successfully. On one occasion A entered a forward command instead of a backward command. He was immediately able to say what had gone wrong. Towards the end of the sessions the boys "took over" the CM command and used it correctly. Occasional mistakes were made by both boys, and indeed others working in the group with the sequencing of commands. On each occasion A and J worked with the others in the group to solve the problem. Any errors were well tolerated by all group members, and they encouraged each other to try again. In essence A and J were able to program Roamer to function at the basic level required.
Understanding Number

Ordinal

From the first session both boys had no problems counting forwards from 0-10. Counting backwards was more problematic. In the early sessions counting from 5-0 was confident, but from 10-5 very shaky. This did improve as sessions progressed, interestingly in line with an improvement in number recognition. This appeared to be because the boys used the number line as a visual clue. By the last session both could count competently backwards from 10-0 when looking at the number line. When I tested them without any visual clues their backwards counting was less confident, but much improved from the first session.

Cardinal

The boys enjoyed 'feeding' the animals and were competent at counting out the snack showing a good understanding of the cardinal nature of number. In one of the later sessions A gave 'Snappy Six'; seven snacks. I asked him to check. He immediately realised his mistakes and with no prompting remarked, "we need to take one away!" This indicated that A is beginning to "develop mathematical ideas and methods to solve practical problems," (DfES, 2003,p.35) and is therefore progressing towards this ELG.

Number Recognition

As predicted this was the part of the activity the boys found most challenging. Both had good recognition of numbers 0-4, and had no problem with the fact that the 'Feathery Four' character is drawn in the 4 format, whereas the Roamer button has four written as 4.

Both had problems recognising numbers 5-10. When this happened I asked them to find the number in the Number Zoo. They did this by crawling on all fours along the line saying each number as they passed, until they reached the chosen number. They then traced the number with their finger, crawled back along the line and identified the number on Roamer. On each occasion they then pressed the correct number button. Once they had identified the number, both A and J had no problem pressing the correct button to send Roamer back again. They loved being able to move physically along the line! This would seem to confirm that "to learn, a student has to be mentally and often physically active." (http://www.pgce.soton.ac.uk [1st February 2005]
By session 10 both A and J could consistently recognise numbers 0-10. A was also again able to demonstrate his developing mathematical ability. He had sent Roamer successfully to number 4, but when asked to send him back again he pressed the forwards button instead of the backwards button, and Roamer progressed to number 8. I asked A what he needed to do to send Roamer back to the beginning he replied, "I need to send him back 8 places." I asked how he knew and he said, "because Roamer is next to number 8." A had used number recognition and logic to solve the problem.

Summary

The observations and assessments confirm that both A and J have achieved the learning objectives for this activity. They are able to turn Roamer on and off, to send Roamer forwards and backwards and use the Go command. Both boys have moved beyond this in that they can use the CM command effectively and thereby program Roamer at a basic level. A and J are able to identify and count to any number up to 10, and are able to count reliably up to 10 objects. A has also demonstrated that he is beginning to develop mathematical ideas and methods to solve practical problems.

All this has been achieved in 10 sessions over a 2 week period, and yet the boys have been struggling with these concepts for many months. I would agree therefore with Briggs and Pritchard (2002,p.9) when they say that "Enabling children to see something happen, either by their own doing - as a result of programming, or as a dynamic demonstration - will support the formation of mental images which will in turn, assist in the process of coming to understand a particular phenomenon." They also say that, "Sometimes the most striking feature of this work is the sheer excitement and fun that it generates." (2002,p.41) This is certainly true with A and J, and this served to keep them on task and focussed.

The use of programmable toys is a very good example of children working in an environment which calls for a logical approach, and which will also provide rapid feedback.

(Briggs and Pritchard, 2002, p.9)

I can confirm that the aspect of rapid feedback was particularly helpful to A and J in that it encouraged them to try again, and not worry about making mistakes. They were able to learn through the concept of "what happens if ?"

The ability to take responsibility for one's actions, to take risks and see what happens, to experiment and find out for oneself, are all crucial elements for effective learning. A robot such as Roamer can help to provide that flexibility, and thus enrich children's mathematical understanding.

(Hoyles and Sutherland, 1989p.3)

Throughout the activity A and J were encouraged to collaborate with each other, and with other group members. They did this to good effect particularly when the sequencing commands for Roamer had gone wrong. The group celebrated their successes and demonstrated tolerance when things went wrong. These findings are in line with those of Gill Piper, "Using a robot is helpful in developing social skills as children work together to solve programming problems, and even in developing a greater tolerance for errors or mistakes." (2001, p.29)

Conclusion

A general research finding is that the involvement of the teacher in planning, structuring and organising ICT based activities can make a significant difference to learning outcomes for children.

(Wegerif and Dawes, 2004, p.1)

The activity I designed for A and J using Roamer has proven this, and thereby I have fulfilled the first of my objectives for this assignment. (To design an activity using Roamer to help A and J with number recognition, and to make an assessment of its impact.)

The mobility of the programmable robots allows the children to involve themselves in ways which would not otherwise be possible. The unique relationship they build up with the robot makes the learning experience very personal and meaningful to the child and this can often provide insights into how that child is thinking. Carefully selecting activities of this nature will support teacher assessment not only of ICT capability, but many other areas of the curriculum as well.

(**http://curriculum.becta.org.uk** [11 th February 2005])

This assertion is supported by evidence that this assignment has provided and detailed in Chapter 3. This cross-curricular use allows for Roamer to support many of the ELG's for the Foundation stage and thereby a second assignment objective is achieved. (To suggest how Roamer could support other ELG's in the Foundation Stage.)

The final assignment objective was to stimulate the use of Roamer for whole class or further group work in order to fulfil the requirements of our ICT planning. In fact Roamer now 'lives' in our classroom and not at the back of a dark cupboard! I use him regularly for group activities, which I design pretty much on a daily basis to fulfil the learning objective of the lesson. This in itself illustrates the adaptability of Roamer. These group activities have been observed by the Head, the ICT coordinator, and by other teaching assistants, who have been drawn by the infectious sheer enjoyment of the children. As a result, Roamer is being used by more teaching assistants, not only to fulfil the requirements of the ICT curriculum, but also as a `tool' for learning across the curriculum.

Unfortunately Roamer has not been used by the Reception teacher on a whole class basis, though there is recognition of the impact it has made, particularly on A and J's learning. In my opinion this is a function of the fact that ICT is not used as an integral part of teaching in this classroom. Stephenson acknowledges that this does happen when he asserts that "there are those who view control ICT applications as exclusive and specific, failing to recognise the breadth of opportunity that it offers in assisting and enhancing the intellectual development of the learner as a whole." (Stephenson, 1997,p.51) So although at the time of writing, I have not managed to prompt the use of Roamer by the teacher, it is being used regularly by myself and by other teaching assistants in the school as a direct result of my work for this assignment.

To conclude, I believe that it is important for **both** teachers **and** teaching assistants to organise control ICT experiences in the classroom, and so enable children to benefit from all that this way of working can offer. Perhaps we should even do as Stephenson suggests and "take advantage of the large unpaid workforce of parent and volunteer assistants to support the application of control ICT in the same way that they have assisted reading in the past." (1997, p.51)

Appendix 1 - The Number Zoo

Greedy Zero is a gorilla who has only just come to the zoo. There are no other gorillas but he is not lonely because he lives with a large family of chimpanzees.

All day long the chimpanzees are busy chasing each other and playing games. They climb up the trees and swing from the branches. They even use sticks to try and catch insects. But Greedy Zero never joins in. He likes just to sit all day and do nothing. 'Come and play,.' shout the chimpanzees but Greedy Zero always says 'I'm too tired.'

There is only one time of the day when Greedy Zero becomes lively and that's feeding time. As soon as the zoo keeper brings the buckets of bananas, Greedy Zero jumps up and rushes to grab as many as possible. Then he hides under a tree and eats and eats and eats. That's why he has such a big, round tummy. When he has finished eating, he throws the empty banana skins on the ground. Then he rubs round and round his tummy with his hand and says 'That feels better! My tummy isn't empty any more.'

One day, Greedy Zero took so many bananas from the buckets, there was hardly anything left for the chimpanzees. Most of them only had one banana each and the youngest chimpanzee had nothing at all. 'It's not fair,' she wailed, and the other chimpanzees agreed. They all started to jump up and down and shouted 'It's not fair! It's not fair!'

Greedy Zero was much too greedy to share so he scampered away with his arms full of bananas. The chimpanzees chased after him. He knew they would soon catch him up, so he stopped and hid all the bananas in a hole under the roots of a tree. Then he ran on and on until the chimpanzees caught him. 'You must share the bananas,' said the chimpanzees, but Greedy Zero waved his empty hands and said, 'But look, I have no bananas at all.' The chimpanzees were angry and showed their teeth at him. Then they rushed back to tell the zoo keeper.

Greedy Zero smiled because he was rather pleased with himself for tricking the chimpanzees. The thought of all those bananas made his mouth water. 'Mmmm what a feast!' he said as he went back to find the tree.

Greedy Zero searched and searched but he could not find the hole under the roots of a tree. He had been so busy running away from the chimpanzees that he had forgotten exactly which tree he had used. He searched and searched and searched but still he could not find the hole. 'Oh dear,' he cried, `now I have no bananas for dinner. What shall I do?' Poor Greedy Zero had been so greedy that he ended up having zero bananas!

The following sheets will open up in a separate window for you to print.

Name _____

Colour the gorillas holding 0 bananas
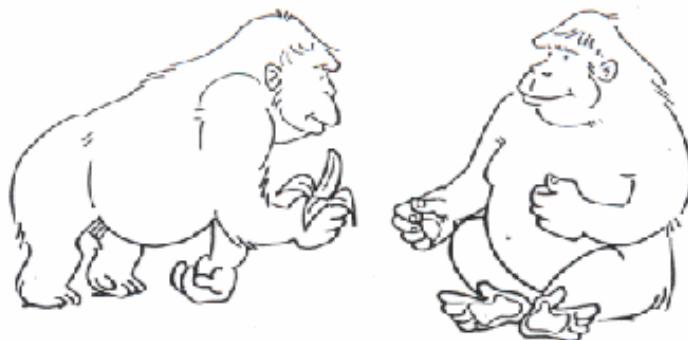
Appendix 2 - Observation sheets

The following tables show the results from a series of observation sheets filled in during the lessons.

2/2/05	A		J	
	3	9	3	9
Able to count to chosen number (ordinal)	✓	✓	✓	✓
Able to identify number (recognition)	✓	✗	✓	✗
Able to count correct number of multi-link into tray (cardinal)	✓	✗	✓	✗
Able to understand forwards and backwards and enter these commands	✓	✓	✓	✓
Able to turn Roamer on and off and use GO command	✓	✓	✓	✓
Comments Adult used CM command and instructed on the sequencing of commands				

4/2/05	A		J	
	4	8	4	8
Able to count to chosen number (ordinal)	✓	✓	✓	✓
Able to identify number (recognition)	✓	✗	✓	✗
Able to count correct number of multi-link into tray (cardinal)	✓	✓	✓	✗
Able to understand forwards and backwards and enter these commands	✓	✓	✓	✓
Able to turn Roamer on and off and use GO command	✓	✓	✓	✓
Comments Adult gave CM command and some adult guidance in sequencing commands				

7/2/05	A		J	
	9	5	9	5
Able to count to chosen number (ordinal)	. ✓	. ✓	. ✓	. ✓
Able to identify number (recognition)	✗	✓	✗	✓
Able to count correct number of multi-link into tray (cardinal)	✓	✓	✓	✗
Able to understand forwards and backwards and enter these commands	✓	✓	✓	✓
Able to turn Roamer on and off and use GO command	✓	✓	✓	✓
	Sent R forwards instead of back. Able to work out which number to press to send R back.			

Comments
Another child counted 7 sweets out for 6 - A said "we need to take 1 away"

8/2/05	A		J	
	4	7	6	9
Able to count to chosen number (ordinal)	✓	✓	✓	✗
Able to identify number (recognition)	✓	✓	✗	✓
Able to count correct number of multi-link into tray (cardinal)	✓	✓	✓	✓
Able to understand forwards and backwards and enter these commands	✓	✓	✓	✓
Able to turn Roamer on and off and use GO command	✓	✓	✓	✓

Comments
Excellent. Well done A! A told me all the number symbols on his board.

10/2/05	A		J	
	4	7	6	9
Able to count to chosen number (ordinal)	✓	✓	✓	✓
Able to identify number (recognition)	✓	✓	✓	✓
Able to count correct number of multi-link into tray (cardinal)	✓	✓	✓	✓
Able to understand forwards and backwards and enter these commands	✓	✓	✓	✓
Able to turn Roamer on and off and use GO command	✓	✓	✓	✓

Comments
Excellent both boys - played number lotto after Roamer session A & J recognised all numbers 0-10.

Bibliography

Briggs, M. and Pritchard, A. (2002) *Using ICT in Primary Mathematics Teaching.* Learning Matters Ltd. Exeter.

DfES, (2003) *Foundation Stage Profile Handbook.* Qualifications and Curriculum Authority, London.

Hoyles, C. and Sutherland, R. (1989) *LOGO Mathematics in the Classroom.* Routledge, London.

Hudson, K. (1998) *Using Roamer with the Under 5's.* Valiant Technology Ltd. Marlowe, B. A. and Page, M. L. (1998) *Creating and Sustaining the Constructivist Classroom*. Corwin Press. California.

Piper, J. (2001) *ICT Across the Curriculum.* Discovering Roamer. Interactive. Vol 5, p.29.

Stephenson, P. (1997) *Childrens Learning Using Control Information Technology in McFarlane, A. (eds) Information Technology and Authentic Learning*. Routledge, London.

Becta (2205) *Programmable Robots in a Story*[online] Available from http://curriculumbecta.org.uk/docserver.php?docid=382 (Accessed 11th February 2005]

Piper, G (2000) *The Use of Roamer as a Constructivist Tool in Early Learning.* [online] Available from http://www.pgce.soton.ac.uk/ict/roamer (Accessed 1st February 2005]

Smith, S (1997) *Getting Roamers Out of the Cupboard,* Microscope 50. [online] Available from http://mape.org.uk/curriculum/earlyyears/roamer [Accessed 26 th January 2005]

Valiant Technology Ltd. (2004) *Using Roamer in the Early Years*. [online] Available from http://www.valiant-technology.com/useful/roamer/earlyyears [Accessed 1st February 2005]