"**Anyone who makes a distinction between games and education doesn't know the first thing about either one"**

McLuhan cited in Kelly (2003)

by Enda Lydon

Introduction

The aim of the project is to investigate the possibilities of working with simulation/games in a primary classroom. I designed simulation exercises to aid my teaching and the learning of my pupils. I used a simulation package called Stagecast. This program gave me the facility to produce interactive simulations for use in my classroom. Over the course of this online module we discussed such topics as online learning in education, digital video enquiry, online learning environments and digital games research. We also kept an electronic learning journal to document our learning and our thoughts as we developed our computer applications artefact. I introduced a discussion forum on Stagecast with the rest of my class and I will also include some of these at the relevant places in the paper.

What is my concern?

I am primary school teacher teaching from junior Infants to third class, age 4 to 8, all in the same classroom. Figure one documents some of my concerns which I wrote in my learning journal.

I have beeen investigating the use of games in a multiclass situation. I am concerned that I am not using the short amount of time that I have with my children in the most constructive way. I feel that using games could encourage the children to learn or progress at a topic that I have chosen at their own rate.In my experience with other software it is a real hit or miss situation. They are broad and deal with as many

different learners and learning contexts as possible. They tend to be broad in subject base as well. I want the teacher to have control over the design. The teacher becomes part of the multimedia experience whilst the children learn independently. With this the child can perform exercises that reinforce what has been achieved in class, or teach new cocepts or it could act as a prelesson activity

Figure 1 showing a passage from my Learning Journal of 1st of December 2003

What am I going to do about it?

I am interested in exploring the design, development, implementation an evaluation of computer software in classrooms in such a way that computer usage becomes a more efficient way of learning. Figure 2 from my learning journal shows my interests in the field of technological exploration.

I wanted to look at using some sort of technology in the class where the teacher could design, but not need the technical expertise. Thus the teacher could have a real input into the learning of the children. This experience could be structured rather than just a kind of 'by the way'. In my experience teachers pick CD ROMS that deal with general topics rather than the specific. With this technology I hope to be able to develop quick games or simulations that will have a relavency to what we are doing in the classs at the time.

Figure 2 showing a passage from my Learning Journal of 25th of November 2003

Last year I developed two animations to aid the explanation of Tens and Units using a package called Flash animation. I found it to be very useful and I have used it since where it has always got a favourable reaction from the children. However, as Figure 1 shows, my fear is that if the technology is too technical then teachers would be slow to adopt it within their teaching

As can be seen from my learning journal in Figure 3 I also believe that teachers are using computers inefficiently.

I havejust had a lecture by Margaret Farren on Action Research. One of the guest speakers, Mairéad Ryan, a teacher who completed her Masters in 2002, talked about something we knew in college as death by a thousand worksheets or death by a thousand text books. This wotuld generally be the theory that if you stick to text books you might not actually be taking the children from the level that they are at. Take my class of Senior Infants. I have some very able children, some weak children and children who come from a disadvantaged background who would not attend school on a regular basis. There is no way that I can just teach to the same book in this case. There are safeguards to text books though, why recreate the wheel. New text books have become discovery orientated. Parents also like to see how theirchiuld is getting on. Books act as a record for child, parent, teacher, inspector and next years teacher.

The second problem is the quality of learning. Piaget talked about the difference in experimental work and the work that takes you into hypothetical situations. What Im saying is that i see CD ROMs in the same way, death by a thousand CD ROMS. The same as books apply. When the teacher designs, the teacher can guide the children on to the next step from where he or she is. I don't believe that if you put childen in front of a computer that they will pick up the relevence. In many ways I wonder about the reasons teachers use computers in their class.

Figure 3 showing a passage from my Learning Journal of 3rd of December 2003

The learning journal discussion then led us to the work of Van Manen. Van Manen (2003) talks about the uniqueness of the individual. According to Van Manen we must treat each person differently. Figure 4 shows how one contributor to my discussion forum found the concept of uniqueness imperative in education.

You guys adapt to the changing needs of the children in your class, in a living way, which is very different from static content. You might find Max Van Manens book Researching Lived Experience, - he makes this very point - and comes up with the theory of the unique. This is the idea of meeting every child at their level - as the only logical basis for education. This is what happens when you design simulations with the children in your class in mind rather than what needs to be covered in text books, or as an aid to it

Figure 4 showing a passage from one contributor to the Stagecast discussion forum of 4th of December 2003

There are several reasons why teachers misuse computers but none more important than fear of technology, Bates (1995: p243)

Figure 5 shows the factors discouraging use of ICT in Primary Schools as outlined by NAPCD (2001).

Learning theories underpinning the use of simulations

Learning is a complex issue that is very hard to define or explain in which Lawton and Gordon (1993: p P111) describes as a 'permanent change of knowledge skills or attitudes'. The Computer Supported Collaborative Learning project (CSCL, 2002) reports that the learning theories of behaviourism, cognitive and constructivism can be found within the development of technology.

Teachers	%
Lack of equipment/resources	27
Lack of training/ confidence	22
Lack of time to examine software	21
Difficulty with working in groups of more than 3	9
Fear of equipment malfunction	8

Figure 5: Factors discouraging the use of ICT: primary schools. The National Policy Advisory and Development Committee (NPADC)

Behaviourism is where learning is "the passive acquisition or absorption of an established (and often rigidly defined) body of information". CSCL (2002). This was furthered by the cognovits theories of Piaget and Gagne who concentrate on the conditions of learning. The constructivist theories of Bruner and Vygotsky then emphasised the role of the learner interacting with objects and events around them. In last years module we studied the multiple intelligence theories of Gardner and its connection with IT, a moddle of which can be seen in Figure 6.

Intelligence	Observed student behaviour	Roles in Multimedia projects
Linguistical Intelligence	Loves to read books and tell stories, good memory for names, dates and trivia; communicates well.	Gather and develop text for projects; provide narration; keep journal or group progress.
Logical mathematical	Excels in math; has strong problem solving skills; enjoys playing strategy games and working on logical puzzles	Design flow chart; write scripting and programming code; develop navigation routes
spatial	Needs a metal or physical picture to best understand things; draws figures that are advanced for age; doodles a lot	Create graphics animation, and other visual media for project; design layout.
Bodily Kinthesthetic	Excels in one or more sports; good fine motor skills; tendency to move around, touch things, gesture	Keyboard information, manipulat4e objects with mouse; operate multimedia equipment
Musical	Remembers melodies; recognises when music is off key; has a good singing voice; plays an instrument; hums a lot.	Identify work for content integration; create musical score for project; input audio/sound effects
Interpersonal	Enjoys socialising with peers; has leadership skills: has a good sense of empathy and concern for others.	Coordinate group efforts; help set group goals; help solve disputes.
intrapersonal	Has strong sense of self; confident; prefers working alone; has high self esteem; displays independence	Conduct independent research to share with team-mates; pilot test multimedia projects; lead multimedia presentations

Figure 6 Roles of multiple intelligence in the creation of multimedia projects. Ivers and Barron (1998) :p5.

As a class we then looked at theories of understanding proposed by Perkins and Unger (1999).They distinguish a difference between having knowledge and understanding. Following this we looked at constructivist learning environments (C.L.E.) proposed by Jonassen (1999) where problems are proposed and the learning is in the solving of the problem. We discussed how simulations can provide a C.L.E. through the creation of problems where children have to work out the answer for themselves.

The British Educational Communications and Technology Agency, BECTA, (2001) claim that computer games can provide intrinsically motivating medium in which the user can interact with his/her learning. Joyce (2002) et al and Kirriemuir (2002) document the market force and they believe that it is only a matter of time before simulations become common place in schools.

I believe strongly in the concepts of uniqueness and the theories of multiple intelligences I believe simulations can provide me with the necessary aids to teach to the individual in a multi class situation. I then decided to experiment with the use of simulations in my class using a programme called Stagecast.

Reasons for designing simulations

Multiplication is one of the hardest concepts in maths for primary school children. The first step in multiplication is repeated addition, 2+2+2=6. I wanted to create simulations that would use this theory as well as to motivate the children to learn multiplication fact but that would also help them to understand multiplication theory. Figure 7 shows the explanation of simulation 1 and 2

Each simulation is explained in detail in Appendix 1 which is my own instruction manual for playing the simulations that I produced. What follows is a brief explanation of Simulation 1 and 2

Simulation 1 Magic Puzzle

In this simulation the children have to pick up 8 points to gain access to the next level. They have to take their character (Winkie) around the stage to collect the points by drinking magic potion. Each magic potion they drink is worth 2 points. If they meet the evil trolls they loose two points and so they have to get more points by drinking more magic potion.

Simulation 2 Multiplication Puzzle

The children enter a different stage in which they have to use their knowledge of multiplication to gain access to the next level. They have to match multiplication tables

with the answer. Each time they hit a correct answer they gain 2 points. If they hit a wrong answer they may loose two points. To gain access to the next level they must collect at least 24 points. This stage could be reproduced to make endless levels of multiplication tables to reflect different abilities. The stages could be modified for any topic, addition, subtraction; identification of number, the list is endless.

Figure 7 explains simulations 1 and 2.

The third simulation involves a mathematical problem. Maths problems can often give children difficulty. They are often presented in words and children find it hard to transfer the words into numbers. The Department of education and Science (DES) (1999) states the importance of involving maths in the real world. With this in mind I decided to investigate if I could use simulations to help children solve problems by giving visual aids through a simulation. Figure 8 describes the simulation.

The children are asked to build two fields with only7 fences. A lot of experience of working with Stagecast would be needed at this point to manoeuvre the pieces about on the screen to answer the question. If the children right click on the fences they can make the fences turn to the left or to the right. The answer to this problem is that you use all seven fences but you put the two fields back to back using the one fence twice.
A problem like this one benefits from the children as they can see and manoeuvre the pieces around the stage

***Figure 8 explains Simulation 3*.**

The water cycle, like a lot of scientific concepts is hard to explain to children. The fourth simulation that I have produced shows how a teacher could use the animation graphics to explain the water cycle. Another possibility here is that you ask the children, following a

lesson on the water cycle, to produce a simulation to show their understanding of the cycle.

Design Issues

Following from last terms work on I was aware of some design issues which were again highlighted by Tony Kelly, Games Developer with Intel. One of these issues was the use of colour. To help with this aspect I asked an artist, Fiona Murphy, to have a look at the simulations. She gave me instruction on how to use contrasting colours especially sharp contrasts

Pupil Reaction.

The general reaction to the simulations was very favourable especially the multiplication games. In general the children enjoyed the interactivity of the packages. The children however did criticise the lack of sound. This is something that I intend to add in the future but was unable to do with this project due to time constraints.

Conclusion

In conclusion I have found Stagecast simulations to be a good aid in my teaching. It exposes the children to another medium in which some children will find most helpful. I developed four simulations which dealt with topics such as multiplication, maths problems and the water cycle, all of which can be problematic to teach. During my investigations I looked into the learning theories of behaviourism, cognitive, constructivism and Gardner's theories of multiple intelligence. I looked specifically at the efficient use of computers and I discussed their role in providing for the individual learning for understanding. I found Stagecast to be a most effective programme for teachers to design their own simulation games. In the future I plan to expand its use in my

class to investigate in more depth how effective simulation games can be in a multi class primary classroom.