Can enquiry skills in a virtual world demonstrate informal learning and can this be captured to personalise the next learning steps?

Learning with new and emerging technologies and learner mobility, transition and institutional co-operation

Developing an enquiry-led curriculum and personalising learning by using a virtual world to study student interaction and enquiry techniques

Funding for this project began in March 2008.

Steve Bunce

Secondary Consultant for ICT and for Behaviour and Attendance

Northumberland Local Authority, Pont House, Hepscott Park
Morpeth
Northumberland
NE61 6NF
Tel: 01670 533557
Email:
steve.bunce@northumberland.gov.uk

Anna Reid

Knowledge Transfer Partnership Associate

Newcastle University and Bedlingtonshire Community High School
Palace Road
Bedlington
Northumberland
NE22 7DS
Tel: 01670 822625 extension 336
Email: anna.reid@northumberland.gov.uk

Contents

Acknowledgement

Becta research grants 2008/09

Becta awarded research grants to a wide range of organisations and across sectors. The grant programme aims to:

- build knowledge and understanding against key research questions relating to the DfES Harnessing Technology strategy
- support the technology for learning research field by promoting the development of models, methods, tools and modes of thought
- develop research capacity by supporting the work of those new to the field.

Copyright for this report resides with Newcastle University and Northumberland Local Authority. For reuse permission please contact anna.reid@newcastle.ac.uk or steve.bunce@northumberland.gov.uk

Introduction and context

In her foreword to the Department for Education and Skills document 'Harnessing Technology: Transforming Learning and Children's Services', Ruth Kelly encourages the imaginitive use of ICT 'to engage more learners in the excitement of learning' (2005, p3). Findings from this research study in the federated schools of Bedlingtonshire Community High School and West Sleekburn Middle School between March 2008 and March 2009 provide evidence that the innovative use of ICT can provide such an outcome.

Bedlingtonshire Community High School and West Sleekburn Middle School are situated in an area of significant socio-economic deprivation. The middle school is currently in special measures and the engagement of the pupils in some of their lessons is very low. In a Knowledge Transfer Partnership with Newcastle University, the schools are developing a new curriculum which is based around developing enquiry to re-engage the pupils and develop higher order thinking skills.

To study the development of the enquiry skills we created a new environment in Teen Second Life. Here the pupils worked in a virtual learning environment on an island. Within this world, they carried out enquiry-based tasks similar to work carried out in the classroom. This research study compares the differences and similarities in the development of enquiry skills particularly in relation to pupil interaction and independent learning.

Key messages for schools

- It is possible to demonstrate enquiry skills in a virtual world
- The virtual world of Teen Second Life allows increased student interaction

- Students appreciate and respond to the less formal learning environment of Teen Second Life
- Learning in-world can foster independence
- An e-learning approach which requires technical knowledge and support beyond the scope of the ICT support department in school can lead to effective collaboration with external agencies

Definition of enquiry and its assessment

The enquiry based learning model which provides the framework for this research study is based on sixteen habits of mind (Costa and Kallick, 2000) as well as metacognitive skills and knowledge. This model has been developed in collaboration with teachers and pupils in the federated schools of Bedlingtonshire Community High School and West Sleekburn Middle School since January 2008.

Habits of Mind (Costa and Kallick, 2000) are persisting, thinking and communicating with clarity and precision, managing impulsivity, gathering data through all senses, listening with understanding and empathy, creating, imagining, innovating ,thinking flexibly, responding with wonderment and awe, thinking about thinking (metacognition), taking responsible risks, striving for accuracy, finding humour, questioning and posing problems, thinking interdependently, applying past knowledge to new situations, remaining open to continuous learning. They are on display in classrooms and pupils have copies.

Metacognitive skills and knowledge include; knowledge of self, knowledge of disposition, knowledge of strategies and tools, knowledge of problems and outcomes, and the skills of planning, monitoring and refining.

The enquiry model includes a 'cycle' of learning from an initiation stage where pupils are given a stimulus to be developed through questioning. Pupils then refine questions so that they have one main focus they wish to investigate. Subsequent stages involve planning, monitoring, refining, evaluating and presenting.

The enquiry model of learning is also supported by a number of tools: 8Qs, diamond ranking, inference square, odd one out, target board, mapping which teachers and pupils have been using since January 2008.

The framework for enquiry is based on a model of formative self-assessment by the pupils against metacognitive skills and knowledge using the habits of mind (Costa and Kallick, 2000) as a language for learning. Indeed, it is intended that by developing pupils' awareness of and proficiency in these skills, they will 'engage in the excitement of learning' (DfES, 2005) and become better at it.

The self-assessment framework takes the form of a module created using Real Assess software. It requires pupils to identify and gather evidence of examples of habits of mind (Costa and Kallick, 2000) and metacognitive skills and knowledge

during enquiry based learning tasks. Evidence is in the form of photographs, video, or a voice recording. It is then uploaded into a personal digital portfolio which can be shared with teachers and other pupils.

Aims

This research study has three main questions;

- Is it possible to demonstrate enquiry skills in a virtual world?
- Does learning in a virtual world increase pupil interaction?
- Can we make recommendations for further study into this aspect of learning and teaching?

The Knowledge Transfer Partnership with Newcastle University is centered on developing a new enquiry based curriculum to re-engage pupils and develop higher order thinking skills. The Harnessing Technology Review 2008 concerns the role of technology and its impact on education. Both projects involve raising achievements and improving skills. It is suggested that it is possible to increase pupil engagement and interest in enquiry based learning and its assessment by adopting an innovative, virtual world approach.

Habits of Mind (Costa and Kallick, 2000) and metacognitive skills and knowledge are tools for the self-assessment of enquiry based learning tasks which essentially take place informally: in social interactions in the classroom. If it is possible to demonstrate enquiry skills in a virtual world, it is then necessary to find out the extent to which they increase pupil interaction since this will not only allow time to gather evidence of habits of mind and metacognitive skills and knowledge for the self-assessment framework, it will also create greater opportunities for pupils to become better at each skill.

Inevitably, there must be scope for recommendations concerning further work, whether they include warnings of the pitfalls involved or actual suggestions as to how we might progress with this research study. Findings and areas for development will be identified at the end of this report.

Participants

The research study involved eight pupils who were in Year 8 at West Sleekburn Middle School in March 2008. They are now in Year 9. The sample size appears to be very small however it represents more than ten percent of the year group. It includes four male and four female pupils from across the ability range. The involvement of parents was encouraged however only two pupils did this.

Participants' experience of Teen Second Life

Participants' experience of Teen Second Life involved four main stages;

- Induction and orientation
- Enquiry 1
- Enquiry 2
- Enquiry 3

For their induction stage, pupils travelled to Middlesbrough City Learning Centre for a day's in-world orientation. This involved creating, personalising and manoeuvring an avatar around Smart Island. Pupils were taught how to communicate with each other using the 'chat' facility. They also quickly learned how to use instant messaging in-world. Their first enquiry based learning task was set up as a competition in two groups to build the tallest tower within a set period of time. This was designed to develop knowledge and skills of the Teen Second Life software whilst encouraging the use of enquiry skills. Two teachers and a member of staff from Middlesbrough City Learning Centre were on hand all day to assist with any questions or difficulties.

Enquiry 1 was designed to re-familiarise pupils with Smart Island. One teacher had clearance to be present on Smart Island to lead the learning but also to monitor interactions. Instructions were kept to an absolute minimum and pupils were required to make meaning amongst themselves. Essentially, pupils were given the freedom to discover the island on their own: deciding on their individual interests and pursuing them before presenting their findings to the rest of the group. This enquiry was conducted by pupils in their own homes and interactions were exclusively in-world.

Enquiry 2 involved the use of giant hoardings posted around Smart Island. Hoardings contained scientific questions about the heart which the pupils were required to answer by undergoing a research process which they managed themselves. This involved asking each other questions using either the chat facility or instant messaging, or by surfing the web using an internet search engine. Like the first enquiry, this was conducted by pupils in their own homes and interactions were exclusively in-world.

Enquiry 3 was led by one of the pupils who had been briefed in advance. He was asked to travel around the island and find an object which interested him. The remaining pupils were then charged with pooling their prior knowledge of the lead pupil before visiting the island themselves in an attempt to discover what the mystery object was. When answering questions from his peers, the lead pupil was authorised to use only 'yes' or 'no' to encourage the remaining pupils to be specific about their questioning skills.

'Chat' transcripts were used during the data collection and analysis stage and screen dumps have been used to visually represent of main activities in-world.

For the purposes of this research study, pupils were asked to reflect on their use of the habits of mind (Costa and Kallick, 2000) and metacognitive skills and knowledge, as well as the way they interacted and worked independently. They did not use the assessment framework for enquiry and digital portfolios.

How experience affected interaction and enquiry techniques

Although pupils were asked to reflect on their use of the habits of mind (Costa and Kallick, 2000) and metacognitive skills and knowledge, during and after their enquiries, they also completed a short questionnaire designed to formalise their experiences of Teen Second Life in relation to interaction and enquiry.

The questionnaire contained twelve questions. The first four questions required a simple 'yes' or 'no' answer. The remaining eight questions were given in the form of a Lichert scale. Pupils were asked to circle the statement which best represented their opinions:

1   Had you heard of Second Life prior to our visit to Middlesbrough City Learning Centre?
2   Had you been on it?
3   Had you heard of Teen Second Life prior to our visit to Middlesbrough City Learning Centre?
4   Had you been on it?
5   The KTP project has helped me to become a more independent learner.
6   The Teen Second Life project has helped me to become a more independent learner.
7   I enjoy working in a school environment.
8   I enjoy working in Teen Second Life.
9   I prefer working in Teen Second Life.
10   I used enquiry skills (habits of mind and metacognitive skills and knowledge) in school.
11   I used enquiry skills (habits of mind and metacognitive skills and knowledge) in Teen Second Life.
12   I can see how we can collect evidence to show we have used enquiry skills in Teen Second Life.

Pupil responses show that:

- Two pupils had heard of either Second Life or Teen Second Life prior to our induction and orientation visit to Middlesbrough City Learning Centre

- One pupil had been into either of the worlds (Teen Second Life)
- All pupils enjoyed working in the in-world environment of Teen Second Life
- All pupils preferred working in the in-world environment of Teen Second Life to the school environment
- Most students stated that they had used enquiry skills in-world
- Most pupils stated that the in-world learning environment of Teen Second Life has helped them to become more independent learners

However, it is necessary to state that not all of the eight pupils involved in the research study completed the questionnaire. The sample size for this is seven.
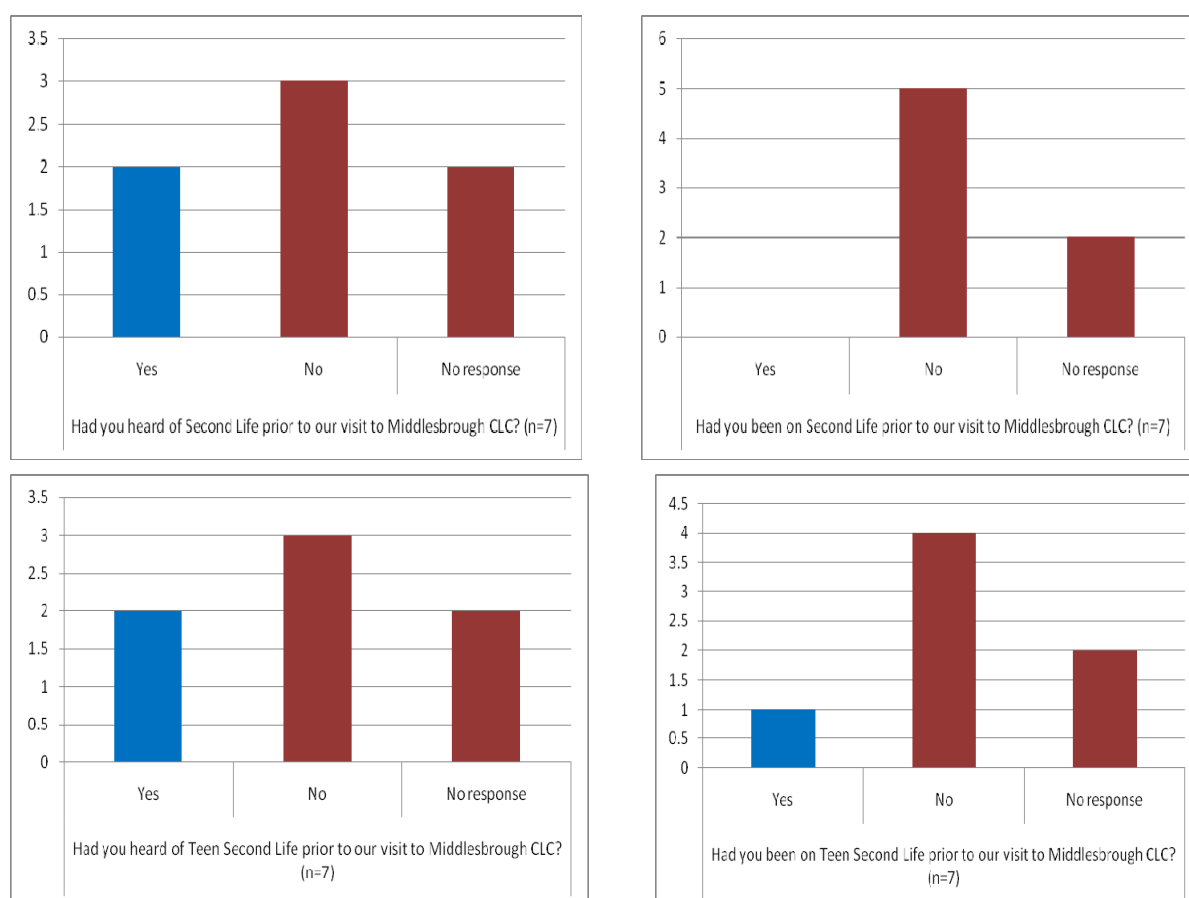
Figure 1: Pupils who had heard of or been on either Second Life or Teen Second Life prior to the visit to Middlesbrough City Learning Centre (n=7)
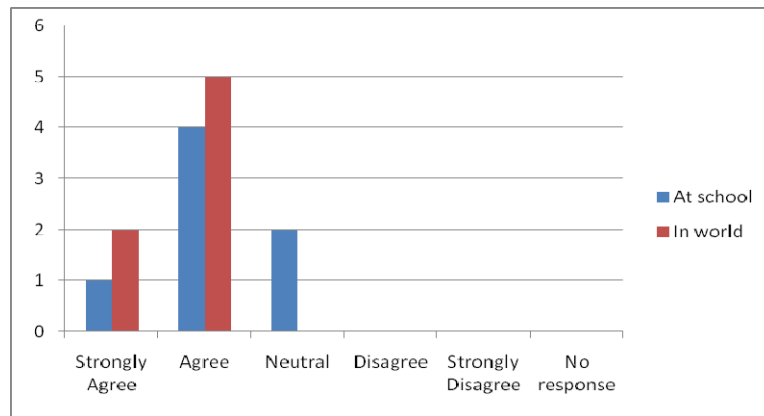
Figure 2: All pupils enjoyed working in the in-world environment of Teen Second Life (n=7)
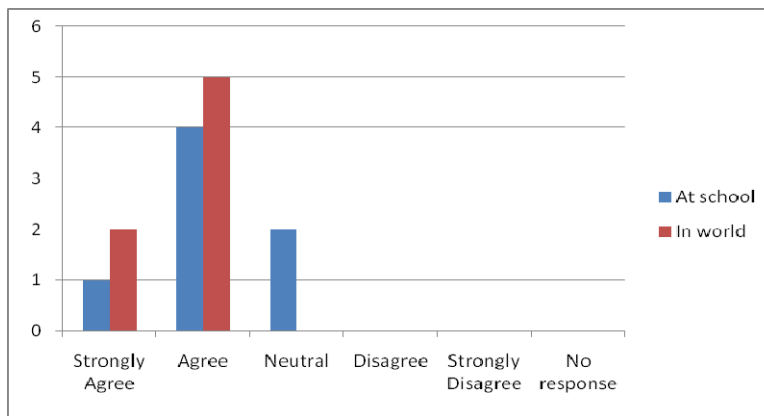

Figure 3: All pupils preferred working in the in-world environment of Teen Second Life compared to the school environment (n=7)
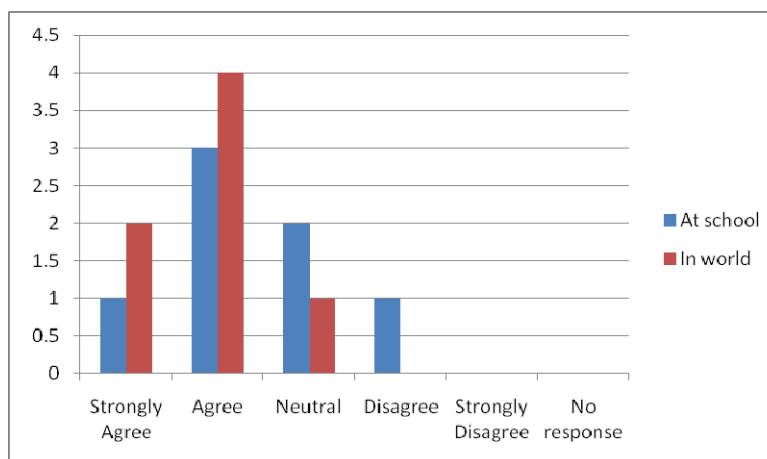

Figure 4: Most students stated that they had used enquiry skills in-world (n=7)
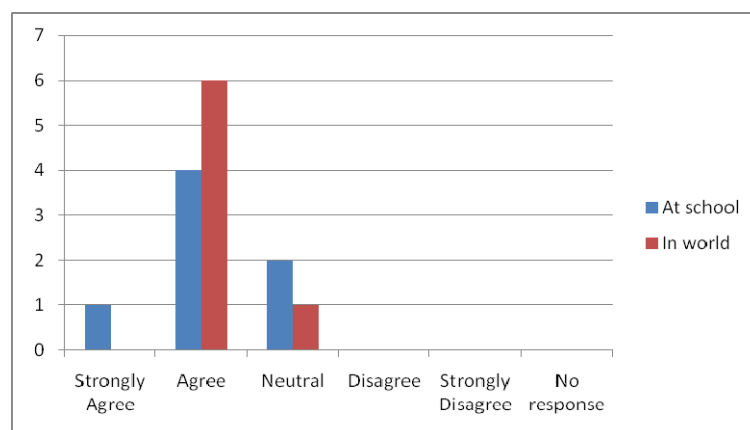
Figure 5: Most pupils stated that the in-world learning environment of Teen Second Life has helped them to become more independent learners (n=7)

An analysis of the qualitative data reveals further insights into these initial findings. For example, pupils gave a number of reasons for their lack of previous knowledge of either Teen Second Life or Second Life ranging from lack of personal interest to preconceptions that it cost money (they didn't have) to register. Reasons for preferring to work in Teen Second Life included;

"It's a different way of communicating with others and learning in a virtual world environment used the habits of mind and metacognitive skills."
(Laura)

"You get to work on a computer and control a virtual person."
(Liam)

"It is something I like doing and I like using the PC."
(Carly)

Laura's comment (above) highlights that pupils could recognise that they has used enquiry skills in-world. Indeed, she takes the next step and identifies examples of how she might collect evidence and upload it to her digital self-assessment portfolio;

 "We could use the website that allows you to upload images, videos, vice recordings, etc. to see what parts of the assessment framework we need to work on."
(Laura)

In addition, much of the in-world 'chat' contains examples of pupils asking each other questions, particularly when they have asked a teacher, only to be given no response! Enquiry 2 contains one final example of the pupils working independently. It appeared that the pupils' avatars had ceased to function in-world. They were not communicating or travelling around. After a short time, it became apparent that the pupils had arranged at school to conduct their enquiry using the instant messaging function which did not include the teacher facilitating the in-world activity. She was

most surprised at the end of the session when the pupils could answer all of the questions from the hoardings with apparent signs of doing no work!

Finally, most pupils mentioned the collaborative work with Middlesbrough City Learning Centre as a major factor in their success. Indeed, the Centre Assistant Manager made all the necessary administrative arrangements for the research study to take place, and took a lead in the induction and orientation day. This must be recognised here.

The down side

It is clear that there are many advantages to exploring the virtual world as an environment for enquiry based learning however there are also a number of potential barriers to progress;

- Technical issues
- Connectivity issues
- Staff training issues
- Learner issues

Technical issues involve the period of installing and testing the software. Registering pupils on Teen Second Life took longer than planned. It was also necessary to obtain Criminal Records Bureau clearance for the project researchers. Teen Second Life is developed for the use of teenagers. The involvement of adults in this world must be thoroughly checked out. This takes time and should be built into project planning in the future.

Issues related to connectivity include internet e-safety and parental consent. In addition to the clearance required from the owners of Teen Second Life, it is vital that any parental concerns are dealt with from the very beginning of and then throughout the project. A drop in session for parents after school was an ideal way to quash any fears and give reassurances where necessary. Furthermore, one parent kept in touch with the lead researcher during the course of the project. Not only did this provide the advice and support needed by the parent, it also gave another insight into the research study.

Parental concerns related mostly to connectivity rather than e-safety. A major finding relates to the speed of pupils' home computers and size of memory and graphics cards. On a number of occasions, some pupils either could not join in an in-world enquiry or their presence was sporadic because their home PC could not cope with the requirements of the Teen Second Life program. This was particularly frustrating for one pupil who left the research study.

There are also issues related to teachers and pupils. It might be argued that one reason for the success of this research study is its novelty: most students had not heard of or been on either Second Life or Teen Second Life. It was new to them and

therefore held their interest. This same issue might prevent a number of teachers from being involved in similar work in the future. Indeed, the project researchers found that there were significant gaps in their knowledge and understanding of in-world functionality and behaviour. This was relieved by the enquiry based learning approach both my teachers and pupils: they were all learning together, with each other and from each other.

In-world enquiry based learning: relevance to the Harnessing Technology Strategy

The Harnessing Technology Strategy has five high-level outcomes;

- Technology-confident, effective providers
- Engaged and empowered learners
- Confident system leadership and innovation
- Enabling infrastructure and processes
- Improved personalised learning experiences

In terms of this research study, working collaboratively with Middlesbrough City Learning Centre enabled the inclusion of an effective provider of training and support on the Teen Second Life software. In addition, pupils had access to a state of the art technology-confident learning environment on their induction and orientation day.

Evidence is provided within this report of how learners have identified their use of enquiry skills as well as their ability to recognise that they are able to work independently on enquiry based learning tasks in-world. With this in mind, they are developing as engaged and empowered learners.

The small scale of the innovative research study does not provide sufficient evidence of confident system leadership or an enabling infrastructure and processes, however there is scope at Bedlingtonshire Community High School for this to be developed.

By far the most significant impact of this research study is in terms of the improved personalised learning experiences it offered the pupils who took part.

How schools can use the virtual world to enhance interaction and the use of enquiry skills: ideas for further research and development.

This small scale research study shows that the virtual world of Teen Second Life can increase interaction and the use of enquiry techniques. Ideas for further research and development include;

- The use of this world to **enhance** interaction and enquiry skills, building on the suggestions of the pupil, Laura

- Developing the scope of this research study to include more pupils and school staff. The pupils have clearly enjoyed this experience. It would be a shame to let it come to an end
- Researching the impact of enquiry based learning on disposition: attitudes to learning
- Developing Smart Island to include a community designed and created by the pupils to reflect the needs and wants of their real world community
- Developing the potential of the pupils involved in this study as researchers who create their own hypotheses in-world and investigate them
- Including in-world collaborative home learning tasks in departmental lesson planning and schemes of work
- Developing professional development opportunities, leadership capacity and school culture by creating and participating in in-world training tasks
- Building on the pupil ownership of Smart Island and using it as a forum for their 'voice'
- Developing the collaborative partnership with Middlesbrough City Learning Centre with a research study focus

Final acknowledgements

Final acknowledgements must go to Mark Mullis at Middlesbrough City Learning Centre and each of the pupils involved in the research study. Mark made sure that all pupils and staff involved in the research study had appropriate access to Smart Island. The pupils took part in the study in their own time, at home, often late into the evening. This must be commended here.

References

Becta (2008) Harnessing Technology Review 2008, Coventry, Becta

Costa, A. and Callick, B. (2000) Habits of Mind: A Developmental Series, Alexandria, Association for Supervision and Curriuclum Development

DfES (2005) Harnessing Technology: Transforming Learning and Children's Services, Nottingham, DfES. Available online at www.dfes.gov.uk/publications/e-strategy