SPY QUEST

WHITE PAPER

EDUCATION – UK

Written by **Ollie Bray**, Senior Policy Advisor & Consultant for Scottish Government & National Advisor for Emerging Technologies in Learning.

Spy Quest in Education - UK

Executive Summary

‘Spy Quest’, is a simple online immersive interactive game for children that was originally designed to be played within hotels, cruise ships and holiday parks worldwide. The game is constructed around sound learning principles and as a result it has now been adapted, trialed and used with great success in the education sector.

This document outlines:

- The wider education context including social, economic and global drivers for education change
- Why computer games are gaining popularity in education including links to emerging research and international commentary
- The Learning and Teaching principles behind Spy Quest in Education including the use of immersive storyline and real-time problem solving
- How Spy Quest can link to a variety of curriculum areas
- How Spy Quest can be used to develop a range of transferable skills including problem solving, working with others, working efficiently and dealing with challenge
- Opportunities for assessment and celebrating wider achievement

Spy Quest in Education - UK

"Now what we are talking about here is computer games not just as games, but as a whole new learning form or platform of learning and one that has quite literally, unlimited learning potential."

- Lord David Puttnam

1.0 Introduction and Background

'Spy Quest', is a safe and secure online interactive game for children that was originally designed to be played within hotels, cruise ships and holiday parks worldwide. Recent interest from the education sector has led to the game being deployed in schools as a context for learning and social interaction.

The game is suited and can be adapted to a variety of age groups including adults and has been used successfully in both the primary and secondary setting.

The Spy Quest game issues players with missions that they complete by finding and solving clues in the grounds and inside the school or local community. The stories behind the games are unique and can be tailored to specific venues.

The game subscribes to sound pedagogical principles including games based learning using the notion of suspended disbelief and there are also a number of opportunities for assessment and to celebrate achievement. Most importantly, the game is great fun and provides an enjoyable and motivating learning experience while developing a range of transferable skills, including teamwork, organization and leadership (these transferable skills are listed in more detail in section seven).

This white paper outlines the role, emerging potential and education values of using Spy Quest in schools and education establishments.

2.0 Wider Education Context

Every economically developed country in the world is currently going through education reform[1]. There are a number of reasons for this but it is largely because most of the worlds developed education systems date from the 19th century, are industrialised in nature and are focused on teaching then assessing the rote learning of facts. While the language varies from country to country most governments have now realized that their education systems need to continue to evolve and be modernised.

There are a number of drivers for this which include:

2.1 Economic Drivers

The way society and the economy functions has changed hugely since the first introduction of compulsory education. The global economy now requires people with more diverse skills, not solely based on knowledge acquired during formal education[2].

2.2 Global Drivers

With the increasing power of technology, there has been an exponential expansion of both knowledge and information. There is cheap, rapid intercontinental communication combined with fast travel to anywhere in the world is making more demands on more people and adding to the stress of 21st Century living.

The requirements of a future economy are bound to be different from those of the 19th Century. Our current education system has its roots in the needs of an industrial society where basic numeracy and literacy was provided for a workforce comprised of a large proportion of workers doing repetitive manual

---

[1] Sir Ken Robinson - TED California (2010) - http://www.youtube.com/watch?v=r9LelXa3U_I

[2] Hill, R (2011), The impact of technology on learning, teaching and efficiencies, Scottish Government - http://goo.gl/2aGTi

work. The pedagogy was predicated on the teacher providing students with knowledge, mostly through the medium of text. We are now in an age of transition to very different requirements for most of the population. Repetitive manual work and, for that matter, repetitive clerical work carried out by a large number of people is no longer available. There is a much greater need for very diverse skills in many parts of the economy. We therefore need to develop education systems that provide the foundation to students so they are able and motivated to acquire those skills in post school education and training[3].

2.3 Social Considerations

Living in this fast changing world brings many pressures but also provides opportunities for enriching life. The education system must assist students to cope with the pressures and take advantage of any opportunities[4].

At the very heart of the dealing with the above, teachers have the challenging job to making sure that they prepare learners for a world of uncertainty and surprise. In the 21st century new technology allows people to move closer to the margins of what is possible and at those margins things can also fail spectacularly as we have seen often already this century: volcanic ash clouds, deep ocean oil well leaks and a banking collapse[5].

To be able to address these unexpected and surprising problems children need ingenuity, imagination and agility. Globally there is also a focus on the development of key competencies for the 21st century including ICT Skills, Language Skills and an understanding of International Citizenship. Games Based Learning methodology through solutions such as Spy Quest and other

[3] Hill, R (2011), The impact of technology on learning, teaching and efficiencies, Scottish Government - http://goo.gl/2aGTi

[4] As above.

[5] http://www.heppell.net/pisa

engaging approaches to teaching and learning give us the opportunity to develop these skills.

3.0 Computer Games in Education

"Computer games are the most powerful learning tool of our age."

- Professor Henry James, MIT

Research is beginning to suggest that computer games can help to stimulate a successful learning environment and provide motivational learning contexts that suit many learners.

Computer games encourage self-reliance and self-determination in terms of a learner's ability to make progress within a demanding but incrementally staged environment. They help learners to appreciate that the skills necessary for success in games such as problem solving and critical thinking can have relevance in other curricular areas and other social contexts such as study or work. They also create an implicit and explicit understanding that as a learner on our own we can be good but as a learner in a connected team we can be much better.[6]

In recent years computer Games Based Learning, or playful learning has started too gain more cohesion in classrooms as a powerful learning and teaching methodology. The 2011 Horizon Report, which seeks to identify emerging trends in future teaching and learning, recognised Games Based Learning as a future trend that was within three years of adoption by the teaching community.[7] Scotland is currently considered by many countries to lead the way in the use of computer games in the classroom[8]. There are a number of reasons for this that include the Scottish Governments investment in the Consolarium[9] initiative, which looks to specifically support, and study the impact of computer game technology in schools. As a result of their work in partnership with Futurelab UK there is now strong research to support the impact that games can and do have a positive impact in the classroom[10].

---

[6] www.ltscotland.org.uk/usingglowandict/gamesbasedlearning/about/aboutgamebasedlearning
[7] http://wp.nmc.org/horizon2011/
[8] www.scribd.com/doc/49490777/State-of-Games-Based-Learning-in-the-UK-presentation
[9] www.ltscotland.org.uk/usingglowandict/gamesbasedlearning/consolarium
[10] http://www2.futurelab.org.uk/projects/console-games

Scotland also has a well-established computer game industry and strong digital culture that has developed a number of successful projects and businesses including Spy Quest.

3.1 Why are games so powerful in education?

Computer games have impact in education and on learning for a number of reasons including:

- Games are a form of **fun**. That gives us **enjoyment and pleasure**.
- Games are a form of **play**. That gives us **intense and passionate involvement**.
- Games have **representation and story**. That gives us **emotion**.
- Games have **conflict/challenge/opposition**. That gives us **adrenaline**.
- Games have **rules**. That gives us **structure**.
- Games have **interaction**. That gives us **social groups**.
- Games have **win states**. That gives us **ego gratification**.
- Games are **adaptive**. That gives us **flow**.
- Games have **outcomes and feedback**. That gives us **learning**.
- Games are **interactive**. That gives us **doing**.
- Games have **problem solving**. That sparks our **creativity**.
- Games have **goals**. That gives us **motivation**.

(source: Robertson, 2006[11])

As well as the above list over recent years computer games have offered an increasingly **more personalized experience** for learners. Advances in software and artificial intelligence allow a game to challenge a player just enough to keep them interested in game play, develop a desire to practice and try again in the result of failure. Good games are designed in a **competitive but non-threatening** way and this is a particular aspect of game design has a real place when setting up a modern learning environment.

[11] http://hotmilkydrink.typepad.com/my_weblog/2006/12/consolarium_at

For many people, young people is particular, games are also of real cultural relevance. They have never gown up without the Internet and many have been immersed in digital culture all of their lives. Games present a **common language** for children that allows them to **collaborate** in real-time across language barriers and time zones to **build friendships and communities** that are normally limited by geographical location.

Spy Quest is an emerging computer simulation game that conforms to the above principles of game design within a local and therefore personalized context. This is one of the reasons why it has such powerful potential in schools and classrooms.

Another reason why Spy Quest is so powerful in education is because it is founded on sound pedagogical principles, these are discussed in the next section.

4.0 Pedagogical Principles

As previously discussed, one of the main reasons that Spy Quest is successful in education is because it combines technology with good game design and sound pedagogical principles.

Some of these principles are detailed below:

4.1 Active Learning

Research tells us that children learn by doing, thinking, exploring, through quality interaction, intervention and relationships, founded on children's interests and abilities across a variety of contexts[12].

Active learning is the process by which learning engages and challenges children and young people's thinking using real-life and imaginary situations[13]. It takes full advantage of the opportunities for learning presented by spontaneous play, planned play, purposeful play, investigating, exploring, events, life experiences and focused learning and teaching.

Active learning has long been an established approach in early years settings. But all areas of the curriculum, at all stages, can be enriched and developed through an active approach. Active learning does not mean energetic learning instead the 'active' part of the learning results from cognitive-stimulation as a result of engaging and challenging activities.

Spy Quest has active learning at its core, which its what makes it such a powerful context for learning within an immersive storyline.

---

[12] Kirschner P.A., Sweller, J., and Clark, R.E. (2006) Why minimal guidance during instruction does not work: an analysis of the failure of constructivist, discovery, problem-based, experiential, and inquiry-based teaching. Educational Psychologist 41 (2) 75–86

[13] ltscotland.org.uk/learningteachingandassessment/approaches/activelearning/about/what

4.2 The Storyline Approach to Learning

Storyline approach is used to describe the learning and teaching methodology where learners are part of a story with unfolding characters, settings and events. As the narrative unfolds it provides a structure and flow to link different aspects of the curriculum.

A key feature of the approach is the positive way in which it depends on and builds on pupils' existing experience and knowledge. Also significant is the degree of pupil involvement, both imaginatively and in practical problem solving. The Storyline method poses problems and asks questions of pupils rather than giving them answers to questions they have never asked.

Another modern feature of storyline approach often used by educators is the inclusion of 'critical incidents'. A critical incident involves the story suddenly changing direction and learners having to adapt and react with a twist in the plot.

Spy Quest Games are a great example of how technology and games based learning can be used to support storyline learning.

The difference between contextual hubs (see below) and the storyline methodology is the order in which learners engage with the work. Storyline requires learners to progress through the story in order and each section of the story is based on the preceding one.

4.3 Contextual Hub for Learning

Contextual hubs are a common term used to describe a game based learning methodology where the game is used as a context and stimulus for other learning activities.

Contextual hubs are sometimes described as types of thematic learning tasks. While this is true in part, contextual hub learning activities normally involve recurring game play throughout the unit of work and the learners often adopt roles as the characters of the game to create a more immersive and contextual experience.

Spy Quest can be used successfully as a contextual hub for learning and section 5.0 outlines how Spy Quest can be linked to difference aspects of the curriculum

4.4 Suspended Disbelief

Suspended disbelief is used to describe the situation where children get so infused in a story or tale that they start to suspend their judgment concerning the implausibility of the narrative. They give way to their imagination and let themselves become immersed the story, believing that aspects of it may be true.

Both storyline approach and contextual hubs for learning rely on the notion of suspended disbelief to provide a hook for learners and to help create an engaging and motivating learning environment.

Spy Quest uses aspects of suspended disbelief to provide real-time spy simulation for children within a local context. In its most successful deployments Spy Quest has built on the blend of suspended disbelief by combining the real world and the virtual game world where people adopt the characters mentioned within the game to give additional clues and advice to players.

4.5 Unlocking progressive achievements

The ability to unlock progressive achievements is an important part of games based learning and emerging assessment methodology. This ability to 'level up' provides a hook for learners to continue to progress through the game and its associated learning objectives[14]. It breaks tasks down into small achievable chunks rather than providing one large overall target that may be intimidating or difficult to comprehend for some children.

[14] Jesse Schell at TEDxPittsburgh (2010) - http://www.youtube.com/watch?v=0tg55pdNMxw

5.0 Curriculum Links

As well as being a worthwhile activity in its own right it is also possible to engage young people in learning activities associated with the themes of the Spy Quest Game. These themes might include spies, spying , intelligence, crime, espionage, code breaking, history etc.

Best deployments of the game in education combine the Spy Quest technology, with creative teachers making use of both a storyline and a contextual hub approach to learning. By using this methodology, classroom practitioners are able to link the recurring themes of Spy Quest to a variety of aspects of the curriculum.

A number of ideas for possible curriculum links have been listed below. These ideas are applicable to a variety of ages and stages:

5.1 Literacy

English Language:

- Learners keeping a diary of their progress through the game
- Learners writing a game 'walk through' for other players
- Imaginative writing tasks linked to the game plot and story
- Character studies based on the imaginary characters or real characters that learners meet as they progress through the game
- Factual writing based on writing up top secret missions for spy agency
- Construction and script writing of the story for learners own Spy Quest game
- Links to spy texts including James Bond, Alex Rider and the Spy Quest Stories

Literacy Across Learning:

- Critical observation skills, non-verbal communication skills and listening skills are emphasized throughout all Spy Quest Games

- Development of speaking skills through oral presentations and de-briefing from missions
- Spy Quest games encourage reading and the development of digital literacy through engaging on-line and off-line text
- Learners develop communication, team-working and self-organisation skills through the dialogue needed to solve puzzles and complete the missions (see section 6.0)

Modern Foreign Languages:

- Playing Spy Quest in a different language (it is currently available in over 20 different languages) this makes it an ideal tool to encourage international collaboration between partnership schools.
- Playing Spy Quest in a different place to re-enforce different settings and cultures
- Opportunities to learn key phrases from languages where missions may or may not take place.

5.2 Numeracy

Mathematics

- Many of the code breaking activities in Spy Quest involve mathematical and other cognitive problem solving skills
- Opportunity for learners re-enforce other key mathematical skills including time, co-ordinates, direction, distance, scale and orientation linked to mission or mission write up

5.3 Health and Wellbeing

Physical Education

- All Spy Quest missions are linked to time. Depending on the mission and where learners have to collect clues from they can be very physically demanding. Timed missions also helps develop punctuality and time keeping.

- Spy Quest supports outdoor learning through a blend of indoor and outdoor problem solving activities
- Opportunities to develop personal fitness though training and discussions on appropriate spy fitness and recovery levels

Personal Social and Health Education (PSHE)

- Though facilitated discussion there are opportunities for learners to discuss the core skills required to play and succeed in the game as having important discussions about team strengths and weaknesses.
- Learners link skills required to do well in the game to other areas of employment and their own aspirations for the future
- Opportunities to link and study other aspects of PSHE including drug and alcohol education
- Learners practice study skills in particular exercises related to memory recall and how to remember facts
- Opportunities to discuss perception, motivation and personal interactions – all key aspects of psychology

5.4 Science

Biology

- Opportunities for discussions and project work on biometrics including face and iris geometry
- Opportunities to link to health and the importance of a spy keeping healthy including smoking, drugs, alcohol and fitness

Chemistry

- Opportunities for discussions and project work on forensics including finger printing and other chemical used to investigate a crime scene
- Opportunities for discussions and project work on the chemical characteristics and applications of a range of modern materials, including ‘smart’ materials.

Physics

- Opportunities for discussion and project work on electromagnetic spectrum - how different wavelengths have different uses in night vision, body imaging, bugs and CCTV.
- Opportunities for discussion and project work on Radio Frequency Identification (RFID) and other gadget used by spies

5.5 Social Subjects

Geography

- All Spy Quest Missions are linked to location which make them ideal to study different places
- Opportunities for learners to develop map work and map reading skills on different scale maps and to develop other geographical skills such as field sketching and drawing sketch maps.

History

- All Spy Quest missions are linked within a historical or contemporary setting which make them ideal as a context to explore other aspects of history or related history
- All Spy Quest codes are linked to historical codes and code breaking. For example, Cipher Codes that are used extensively in Spy Quest were developed by the Germans in the Second World War
- Opportunities for discussion and project work on the history of spies and why they are important to national security

Politics (Modern Studies)

- Opportunities for discussion and project work on the legality of spying, particularly within the international context

5.6 Technology

ICT

- Opportunities for project work and discussion on a number of topics directly related to ICT including imaging, communication technologies, computer visualisation, data mining and encryption.
- Opportunities for project work and discussion on technologies used for surveillance and counter-surveillance, such as Intelligent CCTV.
- Opportunities for project work and discussion on the application of new technologies and its wider issues, such as the balance between security and personal privacy.

Business Education

- Opportunities for project work and discussion around travel and travel documentation

Craft Design and Technology (CDT)

- Opportunities for design and construction work around spy gadgets and modifications to existing consumer products.
- Opportunities for discussions around miniaturization and future technology such as 3D printing

5.7 Expressive Arts

Drama

- Opportunities to do work around role-play and scenario planning. Linked to PSHE and literacy to help children develop language for a variety of situations.
- Opportunities to look as disguises and discuss the use of body language and voice in different situations

Art and Graphic Communication

- Opportunities to look at and discuss forgery and schematic planning.

6.0 Extended Project Work

Linked to the pedagogical principles (section 4.0) and the possible curriculum links (section 5.0) for Spy Quest in education. It is possible to also consider using Spy Quest as part of a large school or community-learning project.

Spy Quests deployment in this area might include:

6.1 Thematic Learning Project

The use of Spy Quest as the focus of a large piece or unit of work (perhaps 4 - 6 weeks). The most successful projects in this area will use a story line approach to learning and the game as a contextual hub to link too other areas of the curriculum. Thematic learning projects work best when they capitalize on the interest of the learners and students have joint ownership of at least some of the sub-topic themes.

6.2 Primary to Secondary School Transition

The use of Spy Quest as a primary to secondary transition project where the game is used to help learners find out about their new school, their new surroundings and the new people they are likely to come into contact with. As the students explore the game they are in fact exploring the new school in a playful and engaging way. In addition, as long as the game is deployed in the right way the social benefit of grouping children who may not know each other very well is also hugely worthwhile. In doing this learners have to work together towards a key purpose which gives them an opportunity for conversation but also shared success.

6.3 Extended Transition for Children with Social and Emotional Needs

Linked to 6.3 (above), an experience like Spy Quest at the transition phase of education will be particularly engaging and relevant for children who may normally struggle with this phase of their education.

6.4 Residential Education

Spy Quest has good potential for residential education to help young people work together and explore a new area with a degree of structure and purpose.

6.5 International Education

Similarly, Spy Quest can also deployed in an international context to help groups of young people find out more about their surroundings. The playing for Spy Quest in a different language can also add an extra dimension here. Fostering opportunities for international education is important as it helps young people understand some of the global drivers that are a fundamental part of a 21st century education.

7.0 Opportunities to develop core interpersonal skills

As well as the direct curriculum links detailed in Section 5.0 at the heart of the Spy Quest philosophy is the ability to use the game to develop a wide range of important transferable skills. In modern society transferable skills are as important as academic qualifications. A recent UK survey[15] of 500 Company Directors identified a 'top 10' skills and qualities rated the following as being the most important for graduates to possess:

- Honesty and integrity
- Basic literacy skills
- Basic oral communication skills (e.g. telephone skills)
- Reliability
- Being hardworking and having a good work ethic
- Numeracy skills
- A positive 'can do' attitude
- Punctuality
- The ability to meet deadlines
- Team working and co-operation skills

Spy Quest has been designed to develop a range of transferable skills, some of which are listed below.

7.1 Motivation

Spy Quest is motivating for children as it links suspended disbelief with real world problem solving with the competitive but non-threatening world of a computer game.

[15] www.canterbury.ac.uk/support/careers-and-student-development/employability/employability-what-do-employers-want

7.2 Communication

Spy Quest encourages learners to communicate using verbal and non-verbal communication skills. There are opportunities to consolidate these skills back in the classroom through follow up work.

7.3 Planning

Linked to good communication and discussion planning is needed to complete all Spy Quest Missions. Some missions are only achievable if the team of plans and collaborates correctly. Teams develop punctuality through timed missions as well as learning about the important of meeting deadlines.

7.4 Problem Solving

All Spy Quest missions involve problem solving. Problem solving is on two levels the first level is the solving the problem of how to deploy resources to gather clues and information. The second level is how to use the clues to crack a variety of codes within a set time frame.

7.5 Leadership

Spy Quest develops leadership at all levels and for young people to succeed in a mission they will need to demonstrate good leadership skills. Missions often work best if young people use honesty and integrity to self-elect a group leader to make the final decisions in the group.

7.6 Strategy

Linked to communication and planning Spy Quest missions require good dialogue and strategic planning between players if they are going to be successful.

7.7 Developing working relationships

Even spies fall out! But in order to progress to the high levels of the Spy Quest missions, particularly when groups are randomly selected, young people will need to learn to work together with a wide range of people in a variety of situations.

7.8 Coping with adversity

Spy Quest helps young people develop resilience and through game play and motivation they will learn to use the skills within the team to be adaptable and make the most of all situations.

7.9 Enhance Team Performance

As Spy Quest is so reliant on good teamwork learners quickly release that the only way to succeed is by working as a team.

7.10 Challenge the individuals within the team

Although the team element is core to Spy Quest the individual tasks that need to be performed can be very challenging to individuals.

7.11 Support and trust in colleagues

In order to complete the game learners will need to support other people in their team by giving them help, time and space to perform their individual tasks. Crucially, as learners will be expected to work independently on certain aspects of the problem solving they will need to develop trust in their peers to perform these task and to ask for help from the rest of the group if required.

7.12 Identifying other members strengths and attributes whilst examining personal strengths and weaknesses

Linked to supporting and trusting colleagues and good leadership Spy Quest requires learners to play to strengths and weaknesses of the team as well as getting learners to examine their own personal strengths and weaknesses. These skills can be further evaluated and examined through appropriate classroom follow up activity.

8.0 Opportunities for Assessment and Achievement

As well as being a fun and engaging learning experience Spy Quest also gives a number of opportunities for learner assessment and celebrating achievement

8.1 Summative Assessment Opportunities

Summative Assessment is the formal testing of what has been learned in order to produce marks or grades which may be used for reports of various types[16].

Spy Quest gives a number of opportunities for summative assessment including being able to record if learners have completed missions and the time taken to complete them. Scores and credit can also be given for the successful solving of problems.

8.2 Formative Assessment Opportunities

Formative Assessment is when the emphasis is on on-going assessments of a variety of different types are used to judge how best to help pupils learn further[17].

Spy Quest gives a variety of opportunities for formative assessment including questioning, focused discussion, structured review, reflective journals and peer assessment.

[16] www.highlandschools-virtualib.org.uk/ltt/whole_learner/summative
[17] www.highlandschools-virtualib.org.uk/ltt/whole_learner/summative

8.3 Celebrating Achievement

Linked to all Spy Quest Games is the notion of being able to celebrate achievement. All participants who successful complete Super Spy Missions are awarded a certificate and given credit for their work.

8.4 Learning from Failure

A key aspect to the learning involved in Spy Quest is that not all individuals and teams will succeed. Whenever a team fails at a Spy Quest mission a structured discussion needs to take place to help learners understand why they have not been able to succeed and an action plan needs to be developed for future missions.

9.0 Conclusions

Spy Quest has now been successfully deployed in a variety of education settings with wide ranging success. Participants have been motivated, developed a wide range of transferable skills and actively participated in the game simulations. Evaluations have always been nearly 100% positive.

As mentioned throughout this paper its success is founded by combining engaging technology, sound pedagogy and an immersive story, which captures the imagination of children and their teachers.

Through gameplay learners develop knowledge and understating of a variety of curriculum areas. Importantly, learners also develop a range of transferable skills to better equip themselves and prepare for future situations in school, at home and life. They also have great fun.

I began researching this some time ago. What we saw was intellectual engagement, absolutely, without exception. What we also saw was a hunger to engage in the process. People didn't just play, they engaged and reflected.

- Professor Stephen Heppell

(talking about Games Based Learning)

UK Version 3.0

Ollie Bray on behalf of Polybius Games Ltd

July 2011