

# Consolarium

## PEDAGOGY / INSTRUCTION

### Games and Learning

Exploring how computer games can impact and enhance learning in classrooms.



### Summary

The value of games for teaching and learning is increasingly recognized, however serious game development costs, teachers' limited confidence in using games, and lack of convincing, concrete examples have all contributed to the slow adoption of games for learning in schools. Rather than focus on "serious games", Consolarium aims to inspire Scottish teachers and empower children by using everyday gaming technologies often already in the hands of Scottish children; off-the-shelf games that quickly engage and can act as a contextual hub and around which multiple learning events can be designed.

### Location

The Consolarium is based in Scotland and is the Scottish Centre for Games and Learning.

### Aims

The Consolarium's stated aims are to:

- Explore the range of game technologies available, and determine their applicability in school-aged learning and teaching
- Provide a place where teachers are given hands-on access to game technologies
- Provide opportunities for teachers and educators to engage in the debate about the place of game technology in their class, school, or local authority
- Develop relationships with academic and industry partners to extend and refine effective and innovative practice with computer games

### Description

The project began in 2006 and grew out of recognition of the value of games for teaching and learning in schools which had been reflected in publications by the British Educational Communications and Technology Agency (BECTA), Futurelab, and The Entertainment and Leisure Publishers Association (ELSPA). The Consolarium demonstrated recognition at a national level that new ways needed to be found to support learning for children who have grown up in a technology rich world, including embedding games-based learning into the school curriculum.

The Consolarium intends, through its work, to influence Scottish education to engage learners in practical, engaging, accessible, and cost-effective ways using everyday gaming technologies. These gaming technologies such as game consoles, handheld gaming devices, and commercial off-the-shelf computer games are often already in the hands of Scottish children.

Game design has now been embedded directly in the new "Scottish Curriculum for Excellence" and its learning outcomes. The Scottish Curriculum for excellence identifies the purposes of early years and school-aged education. Its aims are described as "improve the learning, attainment and achievement of children and young people in Scotland. It is also about ensuring that pupils achieve on a broad front, not just in terms of examinations. It is important to ensure that children and young people are acquiring the full range of skills and abilities relevant to growing, living, and working in the contemporary world."

Derek Robertson, the Consolarium Director described his approach to engaging teachers as "hands-on." When people get to try the stuff it's incredible, within 10 minutes people who arrived in their suits, and were very formal are sitting on the floor giggling and laughing, their barriers down and all formality gone. It's important to switch people on, after that everyone gets it. In getting their hands on the devices and games their preconceptions are disabused and they begin to see the challenge, demand, and enjoyment in many of these games" (Robertson, D, 2009).

The Consolarium has a comprehensive collection of gaming resources including Nintendo Wii, Sony Playstation, Nintendo DS, Eye Toy, and Dance Mats and has successfully integrated a number of games into Scottish Classrooms including:

- *Dr. Kawashima's Brain Training* to improve learners' mental arithmetic
- *Phoenix Wright*, *Ace Attorney* and *Myst* to assist learners' literacy
- Eye Toy and dance mats to support pre-school age learning
- Professor Leyton and the Curious Village to help with learners' writing and presentation skills
- Nintendogs and Guitar Hero for cross-curricular projects

The impact of use of the games has been evaluated by the Consolarium and forthcoming work will examine how enabling children to design their own games for common devices like the Nintendo DS, and using professional industry tools can assist learning.

### Scale

- The scale is national with almost all of Scotland's 32 local authorities engaging with the Consolarium
- Note that Scotland's population is approximately 5.1 million (estimated to be 5.194 million in June 2009) with 676,740 school children in public education in 2009. In 2008, there were 2153 publicly funded primary schools and 376 secondary schools.

### Staffing

The Consolarium has a full-time staff of two.

### Cost

2 staff salaries plus project, accommodation, and technology costs.

### Price

Consolarium usually funds pilot projects with schools although at times, schools provide matching funds. All kits that go out to the schools are on a loan basis and schools buy their own kit if they wish to continue with projects following the pilot.

### Leading Practice

The Consolarium has acted at a national scale to influence and encourage change in teaching and learning through adoption of computer-based games. It makes clear the connections between game-based learning and Scotland's new Curriculum for Excellence thereby providing teachers with models for the use of games. Through its projects and the facilities, it encourages and gives confidence to teachers in the use of games for learning through direct experience.

The Consolarium makes the direct links to the Curriculum for Excellence the aim of successful learners, confident individuals, responsible citizens, and effective contributors as follows:

[www.ltscotland.org.uk/ICTineducation/gamesbasedlearning/aboutgbl/gamesandcfe.asp](http://www.ltscotland.org.uk/ICTineducation/gamesbasedlearning/aboutgbl/gamesandcfe.asp)

### Successful Learners

To develop successful learners, the Consolarium argues that computer games can:

- Act as a powerful motivational context.
- Provide powerful contexts for challenging and demanding problem solving.
- Implicitly develop the science model of enquiry in terms of developing learners' ability to observe hypothesis, test, evaluate, conclude, and refine ideas.
- Allow other curricular areas to be explored, enriched, and excited by using the context within the game or by using the game as a context to jump into the more traditional curriculum.
- Provide contexts in which meta-cognitive awareness and development are essential for success. This means that the player must ponder about their thinking and understand they are a complex individual who can develop an awareness of how they think and learn and in so doing become an equal partner with the 'more informed teacher' in terms of the learning relationship.

### Confident Individuals

To develop confident individuals, the Consolarium argues that computer games can:

- Allow learners to engage with resources, cultural artifacts, and worlds that have meaning for them.
- Allow collaborative communities to be established in which learners can play and learn together through the connected nature of modern game consoles and handheld devices.
- Help to create contexts in which formative assessment can flourish.
- Allow learners to personalize much of the graphical interface and their online collaborative personas.
- Foster and encourage learners' self-esteem and self-determination.

### Responsible Citizens

To develop responsible citizens the Consolarium argues that computer games can:

- Help establish communities in which learners develop a sense of ownership and belonging.
- Engage learners with complex worlds that require them to look at the wider facts and issues before they make informed choices.

## Effective Contributors

To develop effective contributors, the Consolarium argues that computer games can:

- Encourage and develop attitudes and skills in enterprise through simulated environments and collaborative contexts.
- Develop self-reliance and self-determination in terms of a learner's ability to make progress within a demanding but incrementally staged environment.
- Encourage 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.
- 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.

The Consolarium has made contributions to understanding the value of games for learning, through controlled trials that consider the benefits of games in the classroom from the point-of-view of learning and learner self-perception.

An example of the Consolarium's work in this area is the paper by David Miller and Derek Robertson entitled "Using Dr. Kawashima's brain training in primary classrooms: a randomized controlled study. A summary for the BBC." Further details of the study are provided below.

## Impact

The Consolarium has been effective in changing the culture in schools and increasing acceptance in the use of teaching and learning. When the Consolarium was first established, seven of Scotland's 32 local authorities registered their interest. Today 30 of the 32 local authorities have a relationship with the Consolarium. Derek Robertson reflects that the Consolarium has "changed the discourse on the place of games in learning. It's no longer should we use games, it's how do we use games?"

An increasing number of projects have been implemented independently of the Consolarium; for example recently a teacher, inspired by the Consolarium's examples, and with the support of her Information and Communication Technology (ICT) officer very successfully integrated Moshi Monster into her classroom practice. Another teacher took Guitar Hero in classrooms to another level by using it to support children making the transition from Primary to Secondary school (the teacher was still supported by Consolarium in the loan of the kit). That teacher won the UK Innovative Teachers Forum Award for that work.

Consolarium's randomized controlled study of Dr. Kawashima's Brain Training, an off-the-shelf game played on a game console, shows statistically significant improvements in computation (accuracy and speed of processing) and self-perceptions when children used the game over a ten-week treatment period.

32 schools, 4 local authorities, and 634 P6 children participated in the trial. The trial's experimental group, used the Nintendo for half an hour a day, 5 days a week and played Dr. Kawashima's brain training, which was compared with a control group, where teachers were asked not to change their normal routine. The data collected included pre and post measures of computation (accuracy and speed). In addition, other data were collected including children's previous performance against national standards (5-14 levels) and their use of computers at home.

The results showed that the mean gain of the experimental group in terms of accuracy was 50 percent greater than that of the control group, a statistically significant difference, with less competent children improving more than counterparts. The speed of processing improved in both groups, however the gain for the experimental group, was more than twice that of the control group.

Additional benefits were observed which included:

- Improvements noticed in children's academic work: tables, basic computation, and writing
- Truancy and lateness had dramatically improved in some classes (the Nintendo's were used at the start of the school day)
- Children keen to take responsibility for the management aspects (collection, distribution, charging, etc.)
- Improvements in interpersonal relationships (children taking a supportive interest in the performance of peers)
- Children believed that they were 'smarter' as a result of using the game

In their paper, Miller and Robertson conclude: "We believe that the value of this Randomized Control Trial is that it supplies us with objective data, and provides a realistic picture of the results we might expect to see across the primary school population in Scotland" (Miller and Robertson, 2008a).

## Technology

- **Network**  
Online games require connectivity, others may use local wireless connectivity
- **Hardware**  
Games consoles and interfaces, as well as personal computers
- **Software/Applications**  
Off the shelf games
- **Media**  
NA

## Conclusion

The Consolarium has provided evidence that the use of off-the-shelf games in schools can have a statistically positive impact on learner attainment. In addition, the use of games can increase learner confidence and improve their self perception.

The Consolarium's experience reflects the view that adoption of technology in education can happen in relatively traditional classroom settings but is dependent on changing attitudes and culture.

A relatively small organization, with central support, can begin to make significant changes in culture. The Consolarium has been successful in engaging teachers in changing their practice through providing direct experience. It is now contributing to systemic change through the adoption of games as part of Scotland's new Curriculum for Excellence and development of Scotland's teacher training.

While there remain detractors of the use of technology for learning in this way, the Consolarium is helping to move games for learning from an activity to be found only in isolated cases to a mainstream learning activity throughout a country.

## Similar and Related Projects

Leigh City Technology College's use of games for learning (England).

Read the Education Best Practices Whitepaper and other case studies at:

[www.cisco.com/web/strategy/docs/education/CiscoEdBestPracticesWhitePaper-D2\\_V1.pdf](http://www.cisco.com/web/strategy/docs/education/CiscoEdBestPracticesWhitePaper-D2_V1.pdf)

## Sources

**Games Based Learning, 2007**, Learning and Teaching website:

[www.ltscotland.org.uk/ICTineducation/gamesbasedlearning/aboutgbl/gamesandcfe.asp](http://www.ltscotland.org.uk/ICTineducation/gamesbasedlearning/aboutgbl/gamesandcfe.asp)

**Robertson and Miller, 2008**, Using a games console in the primary classroom:

Effects of 'Brain Training' programme on computation and self-esteem, British Journal of Educational Technology (2008)

**Robertson and Miller B, 2008**, Using Dr Kawashima's brain training in primary classrooms: a randomized controlled study.

**Robertson, D, 2009**, Interview with Derek Robertson

[www.scotland.gov.uk/Topics/Statistics/Browse/Population-Migration/ScotPopMigTrend](http://www.scotland.gov.uk/Topics/Statistics/Browse/Population-Migration/ScotPopMigTrend) viewed in July 2010 was used as the source for population statistics, and school population figures were taken from:

[www.scotland.gov.uk/Topics/Statistics/Browse/School-Education/TrendPupilNumbers](http://www.scotland.gov.uk/Topics/Statistics/Browse/School-Education/TrendPupilNumbers)



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