Games in Education: Serious Games

Interviews with experts
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These interviews were intended to inform the Futurelab literature review on serious games, available from [www.futurelab.org.uk/projects/games-in-education](http://www.futurelab.org.uk/projects/games-in-education).

The interviewees were selected to give an overview of the serious games sector from diverse perspectives: the academic, games developers, instructional developers, commissioners and trainers (see the table on the next page for an overview). A semi-structured interview schedule was used for each sector. All the interviewees were asked:

- How would you define serious games?
- When are serious games useful?
- What are serious games useful for?
- What serious games have you been involved in?
- What do you see the challenges of using serious games as?

The discussion with academics also addressed:

- How would you describe the underlying pedagogy within these games?
- Can you describe games that you have been involved with – development or use - (including Second Life) and your impressions?

The discussions with commissioners and developers included:

- What was the commissioning process?
- Who will use the serious game once made?
- What will they be learning?
- How will you know that they were useful?
- What time scale are you operating with?
### Table 1. Interviewees on serious games

<table>
<thead>
<tr>
<th>Name</th>
<th>Area</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Academics</strong></td>
<td></td>
</tr>
<tr>
<td>Dr Diane Carr</td>
<td>Lecturer in games and education, and uses Second Life to lecture in.</td>
</tr>
<tr>
<td>Dr Simon Egenfeldt-Nielsen</td>
<td>Has researched serious games extensively and developed <em>Global Conflict: Palestine</em>, which was awarded the BETT 2010 prize for best game.</td>
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<tr>
<td>Dr Ian Dunwell</td>
<td>Serious Games Institute member specialising in health serious games with an interest in alternative interfaces.</td>
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<tr>
<td>Prof Richard Bartle</td>
<td>Lectures in games and game design and develops MUDs (<a href="#">multi-user dungeons</a>) and worked on massively multiplayer online systems.</td>
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<tr>
<td><strong>Developers</strong></td>
<td></td>
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<tr>
<td>Mary Matthews, TruSim (Blitz Game Studios learning branch)</td>
<td>Develops serious games including Triage Trainer.</td>
</tr>
<tr>
<td>Hannah Rowlands, Red Redemption</td>
<td>Developer of <em>Climate Challenge</em> for BBC and <em>Operation Climate Control</em> for DEFRA.</td>
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<td><strong>Commissioners and users of serious games as training tools</strong></td>
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<tr>
<td>Peter Stidwill, Parliamentary Education services</td>
<td>Parliamentary Education Services commissioned the successful game <em>MP for a Week</em>, and are in the process of developing <em>Time Chamber</em>.</td>
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<tr>
<td>John Hoggard, Lecturer in Defence Simulation</td>
<td>Teaches military to use serious games, and works to create them on Virtual BattleSpace platform.</td>
</tr>
</tbody>
</table>

### Acknowledgements

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# Contents

<table>
<thead>
<tr>
<th>Page</th>
<th>Author(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>05</td>
<td>Dr Diane Carr</td>
</tr>
<tr>
<td>08</td>
<td>Dr Simon Egenfeldt-Nielsen</td>
</tr>
<tr>
<td>12</td>
<td>Dr Ian Dunwell</td>
</tr>
<tr>
<td>19</td>
<td>Prof Richard Bartle</td>
</tr>
<tr>
<td>23</td>
<td>John Hoggard, Lecturer in Defence Simulation</td>
</tr>
<tr>
<td>30</td>
<td>Hannah Rowlands, Red Redemption</td>
</tr>
<tr>
<td>38</td>
<td>Mary Matthews, TruSim</td>
</tr>
<tr>
<td>42</td>
<td>Peter Stidwill, Parliamentary Education services</td>
</tr>
</tbody>
</table>
Dr Diane Carr

Lecturer in Media and Cultural Studies,
Institute of Education, University of London.
These comments are a combination of a transcript from an online meeting in Second Life and the 2010 book chapter “Learning, Teaching and Ambiguity in Virtual Worlds” written by Dr Carr and colleagues.

How would you define serious games?
Dr Carr would not use the term ‘serious games’ although she appreciates that other people may find it useful.

Are virtual worlds serious games?
It depends. If games by definition have goals, rules, and winning or losing outcomes – then a virtual world such as Second Life is not a game. On the other hand, some SL residents describe it as a game because it supports fantasy and identity play. It is certainly possible to make and play games (or to build and use simulations) in virtual worlds such as Second Life. And, of course, some of these simulations might be ‘serious’ in that they are made for education and training.

Pedagogies within virtual worlds
Lots of different approaches to pedagogy might be relevant to Second Life, and it’s not clear that any of these are intrinsically ‘better’ than any other. It would depend on the class. Dr Carr used Second Life for the MA in Media, Culture and Communications and the MA in ICT and Education. The sessions are generally discussion orientated, and often the topic under discussion is ‘virtual worlds’ or ‘online communities’. Thus the students will be considering notions of privacy, consent, avatars, self-presentation and online identity, while they were themselves in-world, as avatars. This could be confusing for participants – but not necessarily in a negative sense. This is summarised in the book chapter:

“The pedagogy that is emerging from this work may best be understood in terms of managing the ambiguity that virtual worlds bring, rather than necessarily removing it. As the research described in this paper makes clear, the object of study (a virtual world) is constructed and enacted in different ways according to the setting in which it is encountered, and the interests of the user. This cannot be avoided. It can, however, be worked with pedagogically. For instance, this variability or ambiguity renders roles, teaching designs and practices unfamiliar or visible, and thus it may be used to draw attention to issues of pedagogic importance.”
In addition to making aspects of pedagogy 'visible' to the students, the platform was useful as a social support, especially for distance learners. Because of students' positive feedback, Second Life sessions have now been incorporated into several of the MA modules.
Dr Simon Egenfeldt-Nielsen

CEO of Serious Games interactive. Developer of more than ten computer games, including Global Conflict (www.globalconflicts.eu) and Playing History (www.playinghistory.eu). Assistant Professor affiliated to the Centre for Computer Games Research at the IT-University of Copenhagen.
How would you define serious games?
Serious games are those developed for serious purposes rather than off the shelf games and those developed just to have fun. We usually define it as games that go beyond entertainment, this is a broad definition and from this perspective can include satirical, political, advertising, etc.

Games introduce a different way of learning as playing is different from watching a film, listening to lectures, and reading. In Global Conflict, for example, you are actually exploring. Playing can make people engage with, and immerse themselves in, situations or environments or conflicts that otherwise they would have no access to.

When are serious games useful?
Again this was felt to be a broad question; it depends on how you map the topic, context and genre. If the focus was from a simulation perspective then such games would provide a safe environment allowing varying approaches to be tried. Another approach is when games model practice, in this situation games make it possible to repeat and train that would be tedious in other circumstances. There are so many opportunities and potential to use games, that answering almost limits their use.

Specifically within the school system games have the advantage of bringing in those children outside of the educational system; they can address different learning styles, and help children with special educational needs. However, it is a supplementary tool, so it could be used to motivate children to do extra curricula activity as well as to support other methods of teaching.

For Aarhus University Dr Egenfeldt-Nielsen is conducting a survey to try and clarify usage in schools in Denmark, Norway, USA, United Kingdom, Finland and Portugal. This is to determine what games are being used, in what subjects, and for what age pupils. What is interesting so far is the discrepancy between the number of teachers that say they use games in the previous surveys and the number of examples found so far. This could be due to the definition of games. Teachers may consider flash games used for a few minutes on a website without an associated lesson plan as an example of games being used in school. (Note that this applies to English speaking curricula, in Denmark few educational Dutch flash games.)
However, when asked for the specific games the results so far show that the games are simple and refer to drill and practice games. Not the more complex games from PlayGen, Caspian Learning and the like. The most frequently mentioned commercial game is found in the US. DimensionM. These are short mathematical games based in a game like world and are popular in terms of sheer numbers piloting it.

**The underlying pedagogy of games**

Briefly game mechanics have already been used in the classroom. In the Danish classroom you get stars for good work as a motivation and scores, these can be found even in simple web page games to introduce challenge.

**Challenges**

Teachers need something more tangible than: “trust me, you’ll learn something”. Those in the game industry have not taken this into consideration when designing games. The tools for assessment do not have to be innovative, as the learning gained has to be clearly visible to the teacher – as in multiple choice tests. However, in-game assessment is hard to do elegantly without destroying the game element. In Playing History in order to progress you need to be able to treat patients, which requires picking up information, this demonstrates learning. In addition to tracking the number of questions correctly answered teachers can see the time their pupils played, their choices at checkpoints, and use open ended questions at the end.

Moreover, teachers need to understand the new pedagogy that arises from using serious games. They need to find time to read the manual, play the game etc. It is insufficient to be told that games are motivating and engaging and relate to the curriculum – they will be used only if in the long run it saves work. And when working with older students, 12 and upwards, then they have to face the requests of parents demanding results.

As an example of the lack of teacher enthusiasm the London Grid co-ordinator was keen to use Global Conflict in the 2000 London secondary schools he supported. The board agreed and in February he tried to find pilot schools. Not one volunteered. To investigate if it is the complexity that is an issue Serious Games Interactive is starting work with a publisher to create short conceivable games appropriate to 5-7 year olds in a virtual world to learn languages.
It may be the lack of game play may have nothing to do with the game or teacher. Games that are closely related to the core curriculum, have a short episode length, are geared towards a suitable age, and are liked by teachers when presented, such as Playing History, have not been taken up. Similarly, in presentations teachers really like the Global Conflict game, there is assessment incorporated, a teacher manual, and strong pedagogy. Yet, despite the competitive pricing, it does not translate into teaching practice. This may explain why games originally designed for children are now marketed for adults, for example, Making History by Muzzy Lane was initially designed for children. Although it still has the potential for classroom use it is mainly used in non-formal educational settings.

This implies that game usage is not a research issue. Perhaps we need to investigate how games are channelled and marketed? Would a cost benefit analysis be more appropriate for determining usage? Information technology is still a challenge; thus no matter how many pilots, or artificial set ups, or experimental work is done as those involved are outliers you cannot build a sound praxis.
Dr Ian Dunwell

Postdoctoral researcher at the Serious Games Institute, lead on the area of games for health.
Ian is a postdoctoral researcher at the Serious Games Institute, currently leading the area of games for health. His research interests lie primarily in the application of an understanding of cognitive processes within virtual environments as a means for providing optimised, evaluated, and effective learning experiences. Previous work has included the use and evaluation of a wide range of novel HCI interface technologies, including the NeuroSky and Emotiv headsets, eyetracking, and most recently Near Infrared-Spectroscopy (NIRS) in collaboration with the Department of Computing, Imperial College London. He has also completed an Erasmus placement at Fraunhofer IPA, Stuttgart, developing an architecture linking real-world service robotics to virtual worlds.

In the domain of serious games, he has consulted with a number of leading serious game companies including Blitz Games and PlayGen to design and develop evaluation strategies for serious games such as Patient Rescue, Ward Off Infection, i-Seed and Parent Know-How, and worked extensively with games aimed at reaching difficult demographics as well as changing the affect and motivation of learners. He has also worked in an advisory role with Warwick University Digital Lab in the development of a game tackling Childhood Obesity, and with Coventry University Faculty of Health and Life Sciences developing and evaluating a game enabling parents to communicate difficult topics to their children effectively. European-funded project involvement has included defining the overarching pedagogic design for four serious games within the European-Union funded e-Vita (European Life Experiences) project, and preliminary design work towards the repurposing of medical learning objects within the mEducator consortium. He is currently leading the SGI contribution to ALICE, a €2.2m EU-funded project developing next-generation adaptive learning environments.

The following is an edited version of a Skype interview held on 7th June 2010.
Definition

The broad stroke definition for serious games is entertainment or leisure games used for non-entertainment purposes. However, inside the Serious Games Institute offices they often use the 2005 Mike Zyda definition: “Serious game: a mental contest, played with a computer in accordance with specific rules, that uses entertainment to further government or corporate training, education, health, public policy, and strategic communication objectives”.

America’s Army is the most cited example of a serious game. It is popular not only because of the construction, but the excellent choice in target matter, audience, and context. The way these factors aligned before they started developing the game made sense. It is more difficult to design for areas less immediately suited to gaming,, although interestingly there appears to be a shift from fidelity in simulations to a more game like environment in serious games. In effect, replacing realism with gameplay – and fun – can improve learning outcomes particularly where intrinsic motivation on the part of the learner is critical. However, we also see serious games that rely on extrinsic motivation as part of training courses.

When are serious games useful?

Games are seen as good at motivating and engaging rather than purely for a transfer of knowledge. If you push a lot of facts at the learner, it goes against the fun component. Games will be most effective when used in blended learning conditions to stimulate interest rather than being the only teaching approach. Relating games to, for example, Bloom’s taxonomy of learning objectives, they are useful for teaching areas such as the application of knowledge, affect, and motivation, which are areas that cannot easily be tackled by presenting, speaking, or reading (more traditional forms of instruction. For example, changing the attitude and motivation of a child to a topic such as healthy eating is often better achieved by engaging and intriguing them with a game, and embedding the learning process within, rather than bombarding them with nutritional facts.
Game elements can be effective as they reinforce the experiential learning cycle when applied within a virtual world. The issues are around how can we recreate something with a virtual environment that matches real life? If we take a simulation that did follow “real life” and put in scores and other game feedback this will alter the feedback, which means it is no longer “real”. A simple example of this cycle would be a real child who touches the stove in the kitchen; consequently she burns her hand and immediately from this sensation knows in future not to touch the stove. In the online environment the avatar burning her hand has no immediate sensory impact on the child, but, if placed into the context of a game scenario, there is transfer as the child does not wish their avatar to become injured. Crucially, implementing ‘game’ elements within a virtual world can make the experience more meaningful and goal-driven, with a positive impact on learning transfer.

Serious games are also useful to raise awareness of existing knowledge and motivate players to change behaviour. For example, games such as Ward Off Infection, developed by Selex SI to improve infection control on hospital wards, has game elements and thus is not a pure simulation, but rather it raises awareness within the nurses and doctors around their behaviour in an area recognised as requiring changes in behaviour, rather than increases in knowledge.

Finally, games can be useful to instigate conversations and build communities: for example, the SGI are involved in developing games that help parents communicate with their children around their sexual health. Serious games such as Code of Everand, and MMO developed by the Department for Transport, have thriving online communities.

**Pedagogy**

A critical component of a successful serious game is the tailoring of the underlying pedagogy to match the learners, context, and technology available. Initially, many serious games followed a behaviourist model; the game sought to mimic the real-world situation or objective and reward the learner for taking the correct action. However, as was shown with games such as MathBlaster!, which tried to teach children numeracy by shooting balloons with the right numbers, and subsequently resulted in a cohort of children with excellent balloon shooting skills but little improvement in mathematical ability, the danger is if a player approaches a serious game as a leisure game they will try to beat the game - and this means circumnavigating and avoiding learning objectives at every opportunity.
Recent leisure games have moved away from a linear model, to a sandbox structure. This ties in with the state of art gaming and learning theory. Pedagogies can no longer be so prescriptive as they require the learner to give context and purpose. Pedagogies supporting situated, exploratory, and experiential learning rather than more rigid and linear experiences are gaining prominence.

With respect to actual game elements, what is good or bad, depends (as stated) on the learners, their context, and pedagogic approach. But an exploration of the mechanisms used by games to engage students could be incorporated into formal education. For example, leader boards, scores and winning or losing scenarios. Traditional education dismisses these, but trials have showed that students do not worry about overall rankings, but look at the micro scale –how they are doing compared to their friends? It should be noted that there is a competitive side to activities outside education too, with many children using social networking tools with embedded games such as Facebook, or online rankings for games such as Guitar Hero via PSN or XBox Live.

As a final point when it comes to designing games it is – by and large - better for the game designer to lead (as they want to make games). This is not to say the learning instructor has no role, but it is often more important that the game is engaging rather than focusing on the pedagogy and losing the game element. Given the importance of participatory design and user study in creating effective learning environments, engaging these users through gameplay and creating a user base for study is critical. At TruSim, a division of Blitz Games Studio, for example, a leading UK game development company is developing serious games to enable both learning and fun – game companies have to balance this tension.

**Assessment of the effectiveness of serious games**

Initially, popularity can be determined through the number of subscribers or users – which is a key metric in leisure games. Yet researchers wish to determine the separate issue of learning transfer and behavioural outcome rather than uptake.

Generally SGI’s role is in evaluation throughout the design, development, and implementation process – which is a crucial role in terms of both instructional and game design. It is good for a game designer to have another perspective, although that does not always guarantee success. Research comes in to provide the essential balance between game design and pedagogy.
This follows on from the concept that post-hoc evaluation is of little value to a serious game developer: development ought to be a participatory design approach from the beginning, engaging, involving, and analysing users throughout the development cycle. Yet it remains crucial that this participation is equally well-analysed and reflected upon: learners may know what they want from a serious game, but will seldom be considering it from both a gameplay and instructional perspective. For example, with ward infection, infection control nurses were consulted resulting in a very instructional game – as the informants had clear views on how it should be taught. The net result of such emphasis was limited uptake on hospital wards, and subsequent difficulty providing an effective study identifying the efficacy of learning transfer.

Empirically-driven, quantitative research has high value in a domain in which a lack of such studies is repeatedly cited as one of the major drawbacks when attempting a prescriptive serious game design. We’ve conducted control trials for Triage Trainer comparing it to tabletop exercises, and also seen studies such as that of Re-Mission which seek to compare a serious game to a leisure alternative. Defining the control for a serious game remains challenging, since they're often part of a blended learning solution rather than an alternative to an existing instructional method or technique.

The future of gaming

There will, ultimately, be a shift from the desktop PC interface, as little as ten years ago devices such as the Wii-mote were restricted to research labs and well beyond affordability for general consumers, yet now can cheaply be bought. For over ten years researchers have been measuring skin response, there is progress in eye tracking, and the neuro interface is just round the corner. (Though that has limitations, currently the commercial product Emotiv needs short wet hair [although NeuroSky headsets do not] and difficulties relating to providing accurate measures of phenomena such as inattention exist). Until a game has been created, it is hard to appreciate or assess the potential of these interfaces.
Challenges

Firstly there is the design. If games are to be used in the classroom then teachers need to be involved – which often implies the game must be defined in terms of curriculum objectives rather than broader learning outcomes. It would be fair to say inflexibility in this curriculum, and a view that IT – and serious game - use is restricted to a small niche of subjects, is a barrier to entry. We’re increasingly seeing broader potential for serious games, for example, in our Roma Nova project, although set in Ancient Rome, the game need not only teach history – literacy, numeracy, and science can all become compelling as part of a virtual world or serious game.

A second challenge is assessment. There needs to be a strong idea about how you are going to get material across and measure how it’s assessed. As discussed there is a tension between developing a good game and learning results (instructional objectives). Ideally the game designer should lead; with a participatory design approach to check if game play is appropriate, supplemented by rigorous evaluation of efficacy through empirical study, and feedback into an ongoing design process.

A third challenge for the researcher is that the majority of budget is on the game, so evaluation takes second place. Without user involvement in the design the game will not work, and if they are not involved until the end they chances are the final version of the game will be limited in terms of efficacy.
Prof Richard Bartle

Senior Lecturer and visiting Professor of computer game design, University of Essex
How would you define serious games?

The default definition for serious games is that they are used for teaching and training as opposed to other non-entertaining reasons. Serious games could be viewed like textbooks. They may be interesting and you may choose to play, but you do it with a purpose. Games generally need not necessarily be entertaining; for example, in modern Greece farms are inherited by a lottery between the children in order that it remains a viable size – this is a game, but it’s not fun.

Games have different affordances to novels, text books, films, lectures etc; the difference is the magic circle. One of the prerequisites for a game, including a serious one, is that the players moderate their behaviour with respect to a set of rules; as if all restrict their behaviour then they communally gain something which would not happen otherwise. Thus all players need to pretend to be cowboys to create an engaging story telling experience, this would not happen if one decided to be a space man. In serious games where all players agree rules the benefit is predominantly that they learn something/get educated/become culturally aware. That is not how exams or essays work – which are current metrics for checking learning.

You must be able to lose a game for it to be a game, but you need not necessarily be able win. And the enjoyment of a game may not be within the game itself; playing noughts and crosses with young children might not be fun in terms of game content – but seeing how the child behaves could be enjoyable.

What are serious games useful for?

All games that contain facts teach you those facts. Facts are the easiest things to get across in games. This may not be flagged as the point of the game but would be an important side effect. This kind of knowledge could easily be tested for after the game. From games he has learnt the names of all European countries, about ancient China, the wars in Sweden and forty streets in London. At the opposite end games can improve and provide an opportunity to practice higher order thinking, as expounded by Prof James Gee’s research group at the University of Wisconsin. The interactivity and replayability allows players to plan moves, counter moves, strategies, create alliances, co-operate, assimilating and weigh evidence from various sources. Through successful play these skills could be demonstrated.
The difficulty is teaching skills expected from schools, like multiplying matrices. This could be taught in a game – but it would probably be more effective to teach it as currently taught. You need a subject whereby you can take advantage of games ability to provide a safe context that cannot be replicated in real life. This occurred when 12 year old Hans Jørgen Olsen feigned his death in order to stop an elk from attacking him – a technique he learnt in level 30 of World of Warcraft.07

Moreover you learn things from virtually all multi player games. You learn about who you are playing with, who’s reckless, over cautious, and this knowledge is harder to discover in other circumstances. It enables people to express selves and experiment in which they couldn’t normally. You also learn skills such as losing and when it is appropriate in your culture to do a victory dance or throw a tantrum.

**When are serious games useful?**

When it comes to the national curricula the higher order skills games encourage are not listed as they have no quantifiable outcomes. Without quantifiable outcomes they cannot be measured – and if they cannot be measured they are not included in the curricula. However, the advantage of games is that they inspire thinking, just as works of art inspire thought as you try and read the artists message. It is about more than good game play or bad game play. Through design a message is conveyed, usually philosophical. eg Peter Molyneux is well known for his “god games”, like Black and White and Fable – in his games gods controlling mortals and players can choose between good and evil. Players understand this and see the serious purpose of the designer. The trouble starts when the game commissioners decide the serious purposes – not the game designers.

Serious games are only one way to teach. To be effective they have to be seen as part of a wider programme that could include: sage on the stage, film, text book, discussion, and homework. Students must have a choice of how to learn.

**Challenges**

If serious games people are right you learn skills and behaviours from games that cause you to behave differently, that is, they inculcate you into behaving in a way which was not natural before. However, the problem is that argument can be used to ban violent games as they may turn people into axe murderers.08. Except playing such games does not have this effect. It does not transfer despite their expertise and desire to kill orcs and the like. Game playing is not a life lesson and claims for the impact of games need to be considered in this light.


08. There is a discussion of this on Terra Nova: http://terranova.blogs.com/terranova/2005/06/contradictions_.html
Secondly, in practice all the work on serious games is happening because of research funding. This is not available for other game research. It is analogous to film studies in the 1930s. Initially films were considered low-brow so there was no funding in the UK (although in the USA the commercial possibilities swept aside these objections – resulting in the expansion of Hollywood). But documentaries in the war showed it had a noble and educational use so they were funded and researched. Currently games generally are considered low-brow so there is no public funding for research on games for fun. However, there is an evolutionary pressure to make serious games as they have a clear purpose – like documentaries, hence they have funding. This is not to say the researchers comprise their attitude towards games – there is a genuine interest in serious games, but the funding limits the focus.
John Hoggard

Operational Analysis, Modelling and Simulation Group Staff
Lecturer and advisor on using models and simulations in a military environment, University of Cranfield.
The students at the University (which is a wholly postgraduate university and hence research-intensive) include: new Sandhurst Officer Cadets, high ranking military, all newly qualified majors (circa 400 a year), MoD civil servants and administrators. The courses and lectures given range from 20 minute overviews, 40 minute to half day taster sessions, lectures within other courses, and a full one year (5 years part time) MSc where the week long modules can be taken as part of the course or standalone options. The lecturers have to be able to teach how any application the military might use is used. Thus the lecturers need to have sight of every military application they have used, are using, or considering using.

**How would you define serious games?**

The accepted definition within the military is that a serious game is the use of any game or application which was originally designed for entertainment and is subsequently used for non-entertainment purposes. For example, Virtual Battlespace 1 (based on the Computer game Operation Flashpoint) was reprogrammed for a military context. They do not replace training in the real world, but improve performance when the activities are actually performed.

The UK Ministry of Defence do not like the term serious game because of the word “game”, they prefer “low cost simulations based on commercial off the shelf technology”.

**The history and current use of serious digital games in the army**

Bohemia Interactive, initially a two person company, created Operation Flashpoint, a first person shooter in 2001. This was used by some US and Australian army staff but when asking the developers if adaptations could be made it was determined they were breaking the licensing agreement as were using it commercially. Thus they commissioned the then four people in the game development company to adapt it for the military and Virtual Battlespace09 was the result. The next game to be produced by Bohemia Interactive, which now had 15 staff, was Armed Assault in 2006. This was converted into Virtual Battlespace 2 (VBS2) for 2008 and has been in use ever since.

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09. A “virtual battlefield” often refers to a more generalisation of exactly that - virtual battlefields, synthetic representations of the battlefield, or a subset of it.
A British Army Major, who had investigated the use of Operation Flashpoint during his MSc at the Defence Academy (formerly RMCS), saw the utility of VBS2 (and knowing it was already in use and funded by, the United States Marine Corp [USMC] and Australian Defence Force [ADF], was in a unique position to purchase an Enterprise (“Gold”) License for VBS2, utilising [at the time] unspent MOD funding. It should be noted that VBS2 is only one example of a serious game, within the military; however, it is probably the most widely known and utilised at the moment.

Historically, like the first attempt to do this, Marine Doom, VBS2 can be used as a part task trainer (PPT). It is (obviously) not real; there are no bullets, explosions, no being covered in mud. But VBS2 allows young men who have just joined the military who are not used to taking or giving orders to learn in a safe classroom environment. They can practice how to use their real radios, to go through squad drill practice, to get used to how to move through buildings or streets, to learn key words, how to respond clearly and concisely, and learn to read a map. Once their officer, who knows the training need, has worked with them in the classroom and is satisfied they can go, for example, out to Salisbury Plain and perform the tasks in the real world. This is more efficient then starting from scratch in the real world learning in poor weather and with other exercises going on around. Note that VBS2 is not as “Visually appealing” as many more modern commercial first person shooters and it has deliberately reduced physics in some areas. For example, if a 100 pound IED was set off in VBS2 there would be bodies falling over and they would be covered in blood. In reality there would be blood and limbs everywhere (as there are in some of the more graphic modern computer games). The lesson is about getting to that point, not the consequences; hence there is no need for that level of fidelity.

Already in use in the UK is the Joint Combat Virtual Operational Environment (JCOVE), originally used for teaching recruits how to drive in convoy. The controls are steering wheels and brake pads from a standard game kit. This is not straightforward as the vehicles have larger turning circles, are broader with different braking and accelerating distances, a certain distance needs to be kept in case of Improvised Explosive Devices (IEDs), there is a restricted view in some of the vehicles. Furthermore, because the terrain can be an accurate representation of where they will be driving the soldiers learn the layout of the place, and can identify alternative routes if something happens to the convoy’s intended path.
The REME School (Royal Electrical and Mechanical Engineers) have adapted it so that they can plan how to repair armoured vehicles in workshops. Again there are constraints that would take ages to explain otherwise; for example having to account for the space if a vehicle needs to be towed in, as well as its physical size.

The navy are also interested and are beginning to use VBS2. They negotiated with Bohemia Interactive who have modelled their new Type 45 Destroyer, HMS Daring, with an accurate representation of the deck plates, and some internal cabin space, etc using the CAD drawings as a start point. This allows them to acclimatise before boarding, practice boarding controls, how to deal with aerial or terrorist attacks etc.

Another advantage of using games is the kit. The navy have started giving junior officers portable play stations with their training regime on it. Thus they can do refresher courses whenever and wherever. The benefit of this is that:

i) sailor looks after kit as it’s a PSP,
ii) he agrees to do training or he loses PSP (which he can use for other games),
iii) can interact with others on ship using his PSP, and
iv) training becomes more flexible and repeatable as it can be done outside of the classroom (i.e. while at sea).

Future applications are in progress, the Australian Defence Force have used VBS2 to create Aircrewm an Virtual Reality Simulator (AVRS) LoadMaster, which takes the basic in-game helicopter simulation and adapts it so that pilots and crew can learn to fly helicopters with underslung loads – which changes the dynamics. With a physical mock up of the cabin and virtual reality goggles the players can learn how to instruct the pilot how best to position the helicopter in order to detach loads.

As well as training such games can be used for debriefing. In the US the Joint Training Counter-Improvised Explosive Device Operations Integration Center (JTCOIC) use VBS2 to “close the loop”. They take incidents from Afghanistan and by combining all the slightly different perspectives from the officer reports they create a video of events through the game. This is then also released as a VBS2 playable scenario, often within a week and used by soldiers in their debriefing as an alternative to the traditional PowerPoint approach.
VBS2 is also used by a commercial company called Lasershot for what is often referred to as "Judgmental Training". This takes VBS2 but projects it in an almost 360 degree wraparound with soldiers in the middle with modified full size weaponry, so a truly immersive environment. The soldiers can see the actual situations. For example, a scenario plays out and a woman comes towards them in a full burqa, the exercise controller decides if a real woman distressed trying to get help for child or man in suicide vest. So when does soldier make a decision to pull trigger? Is it when there is no response to a warning shot? Not only can they discuss any issues but because it is in a game engine they can react differently by going through the scenario and testing whether they should have fired if the warning shot had been ignored, or if a vehicle accelerated if they should have fired into cabin. This trialling is useful for new soldiers who may never have been in this situation before, and the first time you come across a human bomber you could freeze.

Games are not restricted to VBS2. Breakaway games have produced serious games with military applications. In a "Force more powerful" you play an individual trying to overthrow your government internally. It can be used to teach insurgents about secret newsletters, hidden propaganda, radio reports or train the military how to recognise insurgents, through recognising these techniques. They also created m$sb™, the Modeling and Simulation Builder for Everyone. This is a 3D tool that allows the creation using real data of virtual cities and landscapes. This can be used for practicing situation awareness, optimised use of unmanned aerial vehicles, and to get a better understanding of battle field. Such games allow Military Commanders to practice utilising C2 (command and control) to become use to the information being sent in by unmanned aircraft and expensive AWAC and ASTOR aircraft. They need training to recognise what is important and if they have never been presented with information in that format they cannot be expected to see the big picture. It allows them practicing and assessing information that allows them to react to any decision the enemy makes.

In addition to their use as a training tool and debriefing purposes these serious games, or simulations, can be used to desensitise people who have post traumatic stress. If they have seen colleagues die, or been injured themselves, scenarios can reconstructed in a synthetic environment. Those involved are then allowed to replay the incidence as themselves or as god (floating eye). From this they can appreciate there was nothing they could do, and it helps them to get over the trauma.

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10. The designers describe the game as a simulation game that teaches the strategy of nonviolent conflict. A dozen scenarios, inspired by recent history, include conflicts against dictators, occupiers, colonizers and corrupt regimes, as well as struggles to secure the political and human rights of ethnic and racial minorities and women. It is a unique collaboration of experts on nonviolent conflict working with veteran game designers: www.afmpgame.com

11. For a longer description see: www.army.mil/-news/2010/04/19/37572-army-technology-comes-to-life-at-ict/
As an aside Tetris was discussed. The skills required in its purist form, that is arranging in the most efficient order a rapid unstoppable stream of shapes is similar to the skills needed by a logistic officer loading cargo into ship. He has to pack, for example, in real time jeeps, trucks, tanks arriving in possibly random orders into containers so that no space is wasted and they can easily be unloaded. He needs to be able to visualise the shape of gaps and arrange accordingly, as in 3D Tetris.

The gaming element
Reflection and mediation by others are the key teaching tools when using serious games in the military. The high score tables were kept, but are not used by the players. The lecturers do not compare how many people you shot, how many rounds of ammunition you fired, how much friendly fire was shot. Instead they use it to debrief, to discuss who did what, to zoom in on the protagonists. How it is used is down to the training officer.

Note that the statistics are useful, they can use the Distributed Interactive Simulation (DIS) protocol and/or the High Level Architecture (HLA) protocol to capture information like the number of times played, how many rounds were used, how many times did the soldiers detect others or be detected, how many successful shots. This data can then be analysed in much the same way as any data from a “proper” [traditional] Military training simulation, using dedicated applications or as something as simple as Excel. Furthermore, by plugging in “proper AI” it can be used for visualisation, for example looking for unusual behaviour in a crowded market place. VBS2 can also be used to visualise the analysis of more traditional Operational Analysis (OA) studies, the application being used simply as a “pretty front-end” with the actual work being done by other specialised tools (i.e. how many challengers are needed to overcome soviet T80s? or what mixture of light and heavy forces are required to defeat Taliban insurgency). With this additional information and the light touch of experts they can create or model the doctrine, tactics, crowds, and let the game play out while capturing the data. VBS2 provides a 3D representation with the other applications doing the clever stuff. The assessment is multilayered; it can be used for teaching, reviewing the number of radio calls, counting frequency, would it work if it was a real radio network? You can use the data collected by the trainer, or output the battle to another application to possibly further analyse the data.
Challenges
The challenges in the military are similar to other circumstances. They need enlightened people to see the potential. They have to overcome the physical barriers, having the kit and licenses. They need to overcome the perceptions of the press, the local Swindon reporter called JCOVE using “glorified computer games to train military”. There are also the perceptions of (some) senior military officers, who want things done as they always did, and the perception of their colleagues who do not understand and therefore fear the use of “serious games”.

For further information see:

- http://en.wikipedia.org/wiki/Marine_Doom
- http://en.wikipedia.org/wiki/America%27s_Army
- www.arcade-history.com/?n=bradley-trainer&page=detail&id=330
- www.mosbe.com
- www.aforcemorepowerful.org/game/index.php
- http://vbs2.com/whitepaper
Hannah Rowlands

Science Advisor for Red Redemption. As a graduate of an Environmental Change and Management Masters Degree, Hannah works alongside game designers to ensure that Red Redemption’s games include accurate and relevant scientific content on climate change.
How would you define serious games?

The word “serious” is off-putting to a lot of people, particularly in the more ‘casual serious games’ market in which Red Redemption resides. There have been many discussions to find an alternative, and one commonly agreed term is ‘social impact games’, which certainly embodies the games that Red Redemption produces, though it might not be an exact synonym for serious games.

A serious, or social impact game, is one that is based on real-world content. Or, if not real world content, then the game aims to tell the player something useful about the real world. Sometimes games are quite literal, but games can be more abstract but still try to convey real world messages (e.g. Code of Everand). Players learn things when playing entertainment games, but these skills are not necessarily applicable to the real world in any way. Red Redemption aims to make games which get across something real and useful to the player.

When and what are serious games useful for?

Red Redemption has been focused around a casual gaming context, not just for school age children but also for young professionals too, and has recently been crossing into the mainstream market rather than sticking with purely serious games. Serious games allow players to learn about something in a fun way. A mistake that some serious games make is that they’re simply not fun, and in that case the player doesn’t get much out of them at all.

There are certainly clear reasons games are particularly relevant mediums for teaching things about climate change as an issue. Climate change is a big scary subject and it’s pretty overwhelming for people. They hear a lot of conflicting information in the press, and they feel pretty powerless to do anything about it.

In a game, a disaster is fun. Orchestrating a disaster can be a release and quite cathartic. In the real world, if you think of disasters happening it’s absolutely dreadful. In a game, they can be quite fun you can let out all this fear into a game, and it’s a healthy way to face your fear.
Also, in a game you can play out a worst case scenario in a low-risk environment. It’s not real, and yet it can show you, if you were to imagine it in the real world, it can tell you what the stakes are. It’s important because people might think “oh a few degrees warmer that doesn’t sound like too big a deal”, but in a game you can really explore that and the implications of that data – “oh actually that’s quite serious”, without it happening in reality.

Red Redemption is careful not to preach at people in their games, which has been a problem with climate change communication rather than a problem with serious games. The approach Red Redemption has taken is to say, “OK there’s this big problem, here’s a huge range of possible solutions, find out for yourself which one you think is the best option. Which ones work and which ones don’t and what you’re willing to negotiate to find your solution”. This approach can be very empowering in itself, and it allows people to challenge the received wisdom and piece together the random pieces of information they received in the general media. This is quite a powerful approach in terms of a learning tool, because the player does it in their own pace and in their own way.

Interactivity is also important. In a game, you decide the solution, you are the solution, you’re a part of it. That’s the difference between a game and a movie. In a movie you’re watching someone else achieve the goal, but in the game you’re the hero – you’re the one that’s saving or destroying.

The other issue with serious games and how effective they are is to do with trust. When playing a regular game you don’t necessarily care whether what’s in the game is true or meaningful as long as the game is fun. If, as a game designer, you’re saying to the player “you can learn something from this” then instilled in that is an element of trust. It needs to be accurate information and an truthful depiction of the issue.

The problem with a lot of serious games is that games developed by academics, who really know their subject, tend to be too content-heavy and not fun enough, and the ones just made by game designers don’t tend to be realistic enough. One strength of Red Redemption is their capacity to bridge that gap, with a team of game developers and Hannah as a full time science advisor, working with the design team at every step of the way to make sure that the information in the game is accurate, whilst retaining the crucial element of fun. Interplay is interesting, the game designers can match really exciting gameplay features from other games with the right bits of scientific information and it works really well.
What serious games have you been involved in?

Red Redemption have made two games, and are currently developing a third which is due for release in summer 2010. The first, Climate Challenge, was funded by BBC’s Science and Nature website, and is an online sandbox-style strategy game, in which the player takes on the role of leader of Europe for 100 years, and has to implement decisions to decrease carbon emissions (see case study for further details). At the time, Hannah was completing her Masters in Environmental Science and contributed quite heavily to the science of the game.

Subsequently, Red Redemption developed Operation Climate Control which was funded by Defra’s Climate Challenge fund. It is a multiplayer climate change game aimed at KS3 and KS4 children to be played in the classroom, which tried to address the notion that in real life, tackling climate change will take both co-operative and competitive solutions. In Operation Climate Control players can play with or against other people, but a desirable goal can only be reached if everyone participates. The team wasn’t so satisfied with Operation Climate Control, as they underestimated the time it would take to create, and as a result weren’t convinced that the game was fun enough. However, it was an interesting learning experience, in that it made it easier to determine what it was about Climate Challenge that made it fun, and these elements could be employed in future games.

Red Redemption are currently working on a much larger and more ambitious game called Fate of the World. The concept is based on similar game mechanics to Climate Challenge, but the player is the leader of the entire world (as opposed to just Europe) for 200 years. Technically, it has been a challenging job to build the underlying model to make the game hold together. The timescale for the development of this game will total two years, but with the intention that Fate of the World will be a commercial game, to be sold largely on the mainstream market. This is a new, and ambitious, business venture, to explore the potential for social impact games in the commercial market, based on the success of Red Redemption’s games. Such a large number of people played Climate Challenge that if even a fraction of them were interested in buying Fate of the World, the model will be a success.
What lessons have you learned from the two previous games?

Trying to find the balance between fun and accurate is very difficult. Having made two previous games the team is getting better at finding that balance. That’s the real key with a serious game, and is particularly relevant with Fate of the World, because on the one hand since it’s a commercial game it ought to be fun before it is serious, but on the other if it’s not realistic, accurate and full of information then it won’t teach people about the major issues.

The commercial nature of Fate of the World also affords the team a certain amount of freedom, and is a fundamentally different approach to game development compared with the standard commissioning process, where external funding organisations are relied upon. The standard commissioning model is hard, as the money is often only just enough to cover the cost of the game, and developers are quite restricted in what they make. Even the BBC, who were great to work with, had quite a strict editorial policy about what could go in the game.

However, because Fate of the World is supported by various sponsors and investors, Red Redemption have found that maintaining their ethical stance has been a new challenge. Communicating climate change is coupled with ethical responsibilities that have implications for such a commercial model. For example, some investors had to be turned away because they were felt to represent or endorse certain messages that were incongruous with Red Redemption’s values. Though turning potential investors away may seem ludicrous, it would have been hypocritical to accept a company’s money if they also invested in a car company. Trying to move into the commercial space while maintaining socially and ethically positive values has been a challenge.

Fate of the World is a single player game, but if it’s successful then one intention is to make a multiplayer version at some point in the future, where 12 players take on different regions around the world to solve climate change together.

The immediate intention is to encourage players to interact with each other by linking the game to social networking tools and forums. With Climate Challenge it became clear that after playing the game people would talk about it on Facebook and compare scores – suddenly there was an element of competition so they’d go back and play it again, or they’d find interesting things to talk about within the game. Social activity can add a lot to the learning experience, a lot of learning is about how you reflect on it.
Who commissioned the projects - and how?
Climate Challenge was funded by the BBC Science and Nature website, but its origins were not typical, in that Red Redemption did not bid competitively for the project. Instead, it came about through being in the right place at the right time and knowing the right people. Serendipitously, this has paved the way for all their projects since.

Operation Climate Control was supported by DEFRA, who were holding an open bid called the Climate Challenge Fund. Their approach was to say "we need to communicate about climate change, give us your ideas for how to do it" and gave people money to carry out their project ideas. There was a massive range of projects from all over England, small and large, including local community projects, some game projects like ours, and some based on the internet. Red Redemption applied for some funds and were successful and so were able to develop the game. The scheme also involved meetings which brought all the project partners together, which provided useful networking opportunities.

How do you know if a game has been successful?
With Operation Climate Control the team carried out a small survey, but the budget for the project could not stretch to anything larger scale. Some of the feedback given to DEFRA was that it would be useful to have some budget set aside to assess the game’s outcomes after its launch.

However, as part of Hannah’s Masters course in Environmental Science, she carried out a research project investigating the effectiveness of serious games as a communication tool, using Climate Challenge as a case study. This meant that Red Redemption were able to carry out in depth assessment of the game’s impact, and found that there was evidence that the game changed players’ attitudes towards climate change. The project has given Hannah a greater understanding of how to carry out such research in the future, a role she hopes to continue following the launch of other games, not just to improve the company’s productivity but also as a way of advocating serious games and providing hard evidence about their effectiveness for the wider field.

In Fate of the World, the game records all the decisions made by the player and this data is available to the Red Redemption team, should they choose to evaluate it. It will be interesting to study the decisions people took, the options they discarded, how long they took to make decisions, and how their decisions changed over the course of the game.
How is gameplay organised?

The gameplay of Fate of the World was planned so that it takes a handful of hours to get from the start to the finish of the game, with the idea being that players could go back and play the game several times with differing scenarios. The scenarios are more guided than they were in Climate Challenge. The first scenario of the game is the ‘Apocalypse’ scenario, where players have to deliberately make things as bad as they possibly can – massive population growth, huge amounts of emissions etc. Players get it out of their system and make it as dreadful as possible, and see the ramifications of their decisions on the decline of the planet. Gradually, throughout subsequent scenarios, the player begins to try and improve things: to get the emissions down and deal with climate change. The message that Red Redemption are trying to get across is “any old idiot can ruin the world, that’s easy! What the world really needs is someone really skilled, perhaps someone like you!”

It’s a really interesting way round of doing things – destroying the world first and gradually working your way towards saving the world. It works on a number of levels. Saving the world should be the hardest thing you can do so it wouldn’t make any sense to have that goal right at the outset of the game – it would be too hard and challenging and it would turn people off. It’s much easier to ruin the world.

Also, because destroying the world is easy, it means players will use that as a test bed for exploring the game, getting to know how it works and its controls. This means that by the time they get to the other scenarios, they are comfortable with the game mechanics and can focus just on the decisions they make and the rewards they get.

From a gameplay point of view, not having bad climate change is a very negative goal to have, a much more positive goal is needed. So instead the game asks: “in 2200 how do you want the world to be? Do you want it to be a disaster zone or do you want it to be a leafy utopia?” The goal is what you want the world to be like, and climate change is the thing that’s getting in the way of achieving your goal. If it was just about solving climate change, then the end of the game is like “oh, nothing happened” and it would be a big letdown. It makes the happy world a rewarding goal rather than a disappointing one.
What sort of assessment do you incorporate?

The feedback in any game is really important. In both Climate Challenge and Fate of the World, a player makes decisions by choosing policies to implement. The policies are organised around a number of areas, displayed as a bank of cards, and include information about the likely consequences of their implementation. A player can play all the policies they like but if they don’t know what’s happening it’s meaningless. In Fate of the World, behind the cards now there is a spinning globe, and the globe will change depending on what decisions the player makes. There are graphics which represent deforestation, ice cap melt and sea level rise, so players can literally see the impact of their decisions immediately on the globe. Population growth is also depicted by night time city lights, so there is some really good visual feedback. When impacts or world events, such as storms or floods, happen, little images pop up on the globe and players can go in and see what’s going on. It’s very interactive, more so than Climate Challenge. Feedback should be immediate, and should encourage the player to carry on playing.

Have you encountered any wider issues that should be considered?

One mistake people sometimes make is to assume that because it’s a game, children or young people will automatically want to play it, which is not the case. Similarly, many people try to compare a serious game that was made with a £20,000 grant with an off-the-shelf entertainment game that was made with a several million pound budget and criticise the quality of the serious game – but it shouldn’t be a surprise! Red Redemption have raised over £800,000 to make Fate of the World, which will be one of the biggest budget serious games to date.

It’s very exciting and there’s a lot of potential there. There’s no reason that children should have to sit and learn from textbooks forever. They don’t use textbooks in everyday life, so why shouldn’t they learn using games? There are significant barriers to the use of serious games in formal education. One problem with teachers, which will get easier with time, is that many of them simply don’t play games. When younger teachers come through the system who have grown up with computer games and they will ´get it´.
Mary Matthews

Strategy and Business Development Director for Blitz Games Studios. Mary focuses on diversifying the company’s business through Serious Games, cross media projects and digital distribution.
Background
Mary got into the field of serious games during her time at Advantage West Midlands, the RDA for the area. She was responsible for the strategy for the digital media sector, and came across the emerging serious games movement in the US where America’s Army was one of the first successful serious game used by the US military initially for recruitment and then for training exercises. She spotted an opportunity for the regional games industry to tap into this market. The games industry is traditionally very volatile and cyclical and this was potentially an opportunity for companies to exploit the skills and technologies they already had within a different sector.

As part of AWM Mary talked to regional stakeholders and it was clear that there was emerging interest in serious games in the area, what was needed was a centre around which to congregate, to develop the business and academic knowledge needed for a robust serious games industry in the UK. The outcome of this was the Serious Games Institute (SGI) at Coventry, which was founded in 2007. As part of this work Mary was in regular contact with Blitz Games Studios, who were also looking to diversify with serious games, and it was through these conversations that Mary came to work for TruSim, the serious games division of Blitz Games Studios.

How would define serious games?
A serious game that is the same as any other entertainment game, but has a defined purpose and is designed for that defined purpose. It is a very vague definition but it includes not only games that are designed for learning purposes, but also games that are designed for fitness or attitudinal change (for example). Any game that has a purpose other than for pure entertainment.

Players do not always need to know they’re learning. This completely depends on the context in which they’re playing, and it depends what and who the game is for. If the game is commissioned by an organisation which wishes to ensure that its staff are trained in a particular area, then the players need to know what they’re learning and why. In any game, the players have to understand what their goal and objective is, so that they can work towards that goal. In an entertainment game the player knows that they’ve got to solve that puzzle, open that door, kill that boss. The difference with serious games is how far those objectives are defined as being ones that players need to absorb or complete as ‘learning’. There are cases for some serious games where the absorption of learning does not have to be overtly flagged as such, but the player still recognises that this is a valuable experience – this is often referred to as ‘learning by stealth’.
When and what do you think serious games are useful for?

This can be looked at from the designed learning perspective, which consists of three key areas. The first area is in decision making – games are very good at tracking and testing decisions and outcomes. The second is team-based training where people collaborate or compete, and the outcomes of the teamwork are very clear. The final area is attitudinal or behavioural change, which is harder to measure but a well understood route. To change behaviour you first have to change attitude and one way to change attitude is to demonstrate the impact of your choices and actions. Games are very good at putting the player in a scenario where they can do this. These three areas cover a multiplicity of subjects and sectors.

One emerging area of focus is the development of games which can change people’s mindset in a collaborative way, so as to promote pressure for change. Some successful examples of this include Peacemaker and the UN’s Food Force. The aim is not only to alter the player’s individual attitude; it is now possible to see how groups of people working collaboratively can begin to shift bigger agendas and mindsets. There are already games about climate change on social networks like Facebook and I expect this to be a growing field.

Serious games are effective at transferring both skills and knowledge, but it is important to look at what is achievable by way of other learning methodologies, and evaluating how a game might either complement or score over and above that. Games shouldn’t be used for their own sake. Reading a book or having a discussion can often be a more valuable learning experience for certain areas. Engagement or motivation is not the only reason to use games: yes you can engage people and encourage them to acquire knowledge by using games if the target audience is disaffected or disengaged in some way. Where games really score is where you can’t do something in real life – where you can’t rehearse a skill because it’s too expensive or too dangerous.

TruSim’s game Triage Trainer, in which medical trainees must work through casualties and perform triage protocol checks at the scene of a major incident, is particularly effective in this way because such incidents happen very rarely, and to set up realistic mock-up training exercises in town centres is expensive and logistically difficult. A game was developed to overcome these difficulties, and experimental trials suggest that using a game in this context is a more effective learning tool than other alternatives.
Any issues in serious games that need to be addressed by the field?

One key issue within serious games is that of how players are rewarded, and how to ensure that these rewards are fit for purpose in three ways: for the objective of the game, for the player and for the commissioner.

Some serious games focus on reproducing reality, and rewards therefore replicate the kind of incentive you might get in real life, for example the player might get to the top of a leader board, make lots of money, or get job satisfaction. These are all good and worthwhile, but there hasn’t been enough thinking about how to abstract some areas and how to reward people in a more ‘game-like’ manner. It’s almost a nervousness around making sure the learning objective is well embedded and reproduced – some developers feel more comfortable reproducing something that’s close to life rather than something that’s very abstract because they know they have a better handle on whether it’s something that will give the right result.

Equally, commissioners tend to want to be able to look at the outcomes, to see that the player has improved over a number of plays, so that they can say their learning goals have been achieved. In actual gameplay, the immediate feedback a player receives in a game (unlock a door, kill a baddie) is not as measurable as the after-action review-type feedback, but is important in encouraging the player to keep on playing, and therefore keep on improving and learning. These two types of reward are potentially dissociable: the reward to the player which is purely about immersion and flow within the game, and the reward for attaining the designed educational goal, which is often more measurable and explicit.

This is not a problem as such. This industry just needs to think about doing it better. If this is an industry that is to grow beyond quite specialised applications into something that is really mainstream then it has got to take the best of the games industry and try to meld it much more closely than we have to date.
Peter Stidwill

Senior Web Producer for the Parliamentary Education Service. Parliament’s Education Service works to support young people in developing their understanding of Parliament and democracy.
Define serious games?

A serious game is one that exists not just for pure entertainment purposes but that has been created to facilitate some kind of learning. It’s difficult because pretty much all games involve some kind of learning, which is one of the reasons they’re fun, but this learning is only equipping you with skills to complete the game, rather than skills or knowledge which you can transfer to work, education or life in general.

Serious games are difficult to define because it’s hard to see how far the definition stretches. Some teachers are using ‘off-the-shelf’ games to teach certain content, and in these cases the learning outcomes are far less explicit. These games weren’t designed to be educational, so are they serious games? Similarly, there are a number of games that have democratic game mechanics, such as games based on building civilisations and being the ruler of a world. Players can learn a lot about how large settlements of people are organised and governed, but the learning wouldn’t be explicit enough to be termed a serious game.

That doesn’t necessarily mean that a serious game is one where the player is explicitly aware that they are learning, or that the learning outcomes need to be overt. The distinction is often in the commissioning and design stage, where the aim of the game is to facilitate learning, rather than to provide entertainment. Though the player will be learning and understanding elements of the game throughout, often the learning is only formalised, and made useful, when somebody (parent, teacher) helps to conceptualise the content – perhaps by facilitating a discussion around key decisions or issues within the game.

Parliament and games – what games have been commissioned?

The remit for the Parliamentary Education Service is to produce content that informs, engages and empowers young people about parliament, covering issues such as the differences between parliament and government, how parliament works, how it affects everybody and how young people can participate in society as active citizens. The PES website aims to fulfil this remit by providing a range of resources for use in the classroom, such as games, videos, and lesson plans.
The first “serious” game commissioned by the PES was ‘MP for a week’. It took over a year to create and was quite ambitious. It is a multi-level game in which the player takes on the role of an MP and has to survive for a week, carrying out various tasks and activities. The game has a high level of replayability, since there are a number of different scenarios, characters and decisions for players to explore. Since the game is designed primarily for use in the classroom, a teachers’ area on the website, which includes a number of resources, was created to maximise flexibility of use and extend the learning opportunities from the game.

The success and internal support for MP for a Week has allowed the PES to plan a larger scale game, tentatively named ‘Time Chamber’. This game will be aimed more towards the casual gaming market, so will not necessarily be used in the classroom. The process for this new game has involved a much longer pre-build period of research, including brainstorming ideas, scoping the field, creating a design document, and user testing. The next stage for the game is the procurement process, that is, to ask companies to pitch for the project.

The planned content for Time Chamber is lawmaking and legislation. Players will consider the purpose of law, and why society needs laws. They will understand the big political picture in Britain, and players will gain an appreciation that politics and laws are a human social activity. More details about how the game will teach players this content will come out in the development process. It’s up to the developers to decide which way the game will go, with our approval.

**Commissioning process**

The commissioning process will differ from game to game and company to company, but with MP for a week the process can be summarised as:

- Identify a need and come up with an idea. Sometimes that idea is more formed than others. With MP for a week, the team had a fairly clear idea of how the game should work and what the narrative should be, but how the game should look and feel was left open. Such a definite steer from the team contributed significantly to the game’s success. However, giving too much of a steer runs the risk of restricting the game developer’s creative input. Coming up with an idea is more difficult in an area where others have tried to create similar products, though this hasn’t been a problem for Parliament games.
Write a brief, which strikes a balance between allowing game developers enough room to generate their own creative ideas, and including enough of a steer to ensure companies take the game down the correct route.

Companies pitch for the project. The PES has an established framework of companies who pitch competitively for the game.

Once the winning company has been awarded the project, negotiations about exact requirements begin. There aren’t masses of clauses in the contract and the process isn’t overly prescriptive, but this is the stage when ideas begin to be fleshed out in more detail.

User testing should be carried out as much as possible during the design stage, but this is difficult because it is time consuming, and inevitably results in a trade-off between other resources.

There’s a period of frequent consultation between commissioner and developer, to brainstorm further and specify the content and mechanics of the game. At this stage the developers will produce wireframes and artwork for the game.

Once the full specification has been agreed, the build begins. The PES encourages companies to share as much as possible throughout the build. Some companies aren’t keen on this method, as they prefer the ‘big reveal’ at the end. But a large amount of contact throughout the build made the team feel comfortable with the development of the product.

There ought to be a further stage of user testing and amends based on these sessions.

Finally, the game is released in alpha and then beta version, until it’s ready for a live launch.

One issue throughout the design process is striking the right balance between giving freedom to suppliers who are knowledgeable about gaming and ensuring that the content is accurate. The suppliers are often used to having a certain amount of artistic licence, and there are some elements of the games where that is permissible. However, there are some features of the game which need to be entirely accurate.

For MP for a Week, the timescale was about a year from inception to live on the website. We envisage Time Chamber to take two years, since it has already had one year of research and scoping work behind it before the commissioning process begins.
Issues with development and commissioning

One potential issue emerging in the field is that some companies are trying to develop frameworks and systems for the design and build of serious games which can be applied ubiquitously to a range of projects, as an alternative to building original systems and scenarios from scratch each time. For example you might visit the BETT show to showcase a new game you’ve developed, and be told by suppliers that you could have achieved what you spent a lot of time and money on if only you’d used their system.

This method would certainly be economical, but games would ultimately lose a lot of individuality and essentially be a replication of something else. Originality is what’s needed in this market, particularly when trying to engage young people who need to be stimulated in different ways. Cutting corners in such a way would seem tempting, but may not be the best option if the serious games field is to remain innovative.

Evaluation of success

It’s hard to determine if a game has achieved all of its aims. The PES has standard systems in place but there is general agreement across the industry that more work needs to be done in order to be able to answer this question fully. On the one hand, the team have access to detailed statistics about users, unique users, how long players have spent on a game and how far they progressed through the game. However, this only tells part of the story, as there is no way of knowing who is playing, where they’re playing and whether they’re learning, which is crucial. On the other hand, some detailed user testing sessions in two different schools has provided more useful data and qualitative feedback to indicate whether the game was successful in meeting its aims. However, this option is time consuming and expensive, so some data between the two extremes would be useful. The PES did consider commissioning an impact study, but since it’s still building its audience, this option wouldn’t currently provide value for money.

One problem that has emerged is schools having difficulty accessing the games due to blanket blocks on the system, i.e. because it’s got the word “game” in it. Many school systems are lagging behind teachers’ lesson ideas, and it was surprising that even Parliament sites can be blocked because of this. It’s a big barrier and one that is not necessarily anticipated. It will undoubtedly be made worse by the rise in social networking tools which are being incorporated into many applications.
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Futurelab is an independent not-for-profit organisation that is dedicated to transforming teaching and learning, making it more relevant and engaging to 21st century learners through the use of innovative practice and technology. We have a long track record of researching and demonstrating innovative uses of technology and aim to support systemic change in education – and we are uniquely placed to bring together those with an interest in improving education from the policy, industry, research and practice communities to do this. Futurelab cannot do this work on its own. We rely on funding and partners from across the education community – policy, practice, local government, research and industry - to realise the full potential of our ideas, and so continue to create systemic change in education to benefit all learners.

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- **Digital Inclusion** – How the design and use of digital technologies can promote educational equality
- **Teachers and Innovations** – Innovative practices and resources that enhance learning and teaching
- **Learning Spaces** – Creating transformed physical and virtual environments
- **Mobile Learning** – Learning on the move, with or without handheld technology
- **Learner Voice** – Listening and acting upon the voices of learners
- **Games and Learning** – Using games for learning, with or without gaming technology
- **Informal Learning** – Learning that occurs when, how and where the learner chooses, supported by digital technologies
- **Learning in Families** – Children, parents and the extended family learning with and from one another