Games and e-learning

Learning from games

What do existing games teach us?

How can games accelerate learning?

Affordable 3D simulations and games

Conclusion

By Donald Clark

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Learning from games

Motivate, accelerate and reinforce learning

When it comes to games and learning this paper argues that we can have the best of both worlds. The two are not mutually exclusive. In fact, with the right design and tools, they can be mutually supportive.

Here's ten things that games have to offer learners?

Motivation

Learner-centricity

Personalisation

Incremental learning

Contextualisation

Rich media mix

Safe failure

Immediate feedback

Lots of practice and reinforcement

Lots of collaboration

This is a dream list for anyone involved in education and training as they are the traditional weak points of most traditional classroom and page-turning e-learning. The classroom supports not one of these features of learning, yet the psychology of motivation and learning tells us that these are the primary features of successful learning. It's not that games are an option in learning. If they can deliver these ten things they're a necessity. We'd be fools not to use their intrinsic strengths to strengthen, motivate and accelerate learning.

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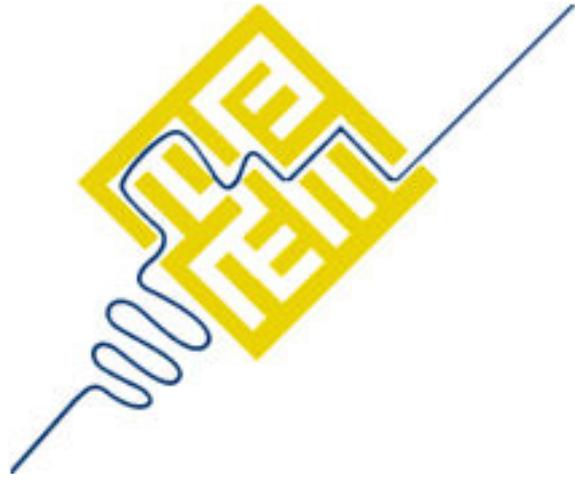
Violent and solitary?

Games have become a huge, global, cultural phenomenon. They rival film, TV and print in terms of their media status. Yet those brought up with radio, film, TV and books, are suspicious about their cultural worth. Parents worry that games have a deleterious effect on children in terms of violence, social isolation, obesity and low education achievement. Games have become a useful target on which to tag many social ills.

The truth is that many of these images are caricatures. Games are not all violent. Game playing is essentially a social phenomenon, and games are rarely mindless.

Like films, there are genres which are violent. In films, we have action, horror and war movies. However, the movies are largely made up of other genres such as comedy, teen movies, westerns, romance, thrillers, art house and so on. In games there are shoot-'em-ups and beat-'em-ups but there's also sims, driving games, RPGs, puzzle and so on.

In a fascinating social experiment hoodies and happyslappers were wooed into playing games by Edinburgh police. Thirty 13 to 14 year olds took part in the contest over five weeks in the local library, cutting youth-related crime by half. This was a nice reversal of the 'games incite violence' line. http://www.eurogamer.net/article.php?article_id=62504

The solitary gamer is another myth. Gamers often play in small groups with multiple handsets into the same console, in game shops with groups of friends and online with tens of thousands of other players. Gaming is massively social. Then surrounding gaming is a network of social sites, messenger with discussions, reviews and cheats. This is one of the world's richest areas of communication and collaboration.

To turn the argument on its head, the social nature of game playing is likely to be one of its primary educational strengths. Traditional education is weak on collaboration and social networking. In this world gamers play against each other, they also help each other, form groups in strategic games and, in general take part in rich social interaction.

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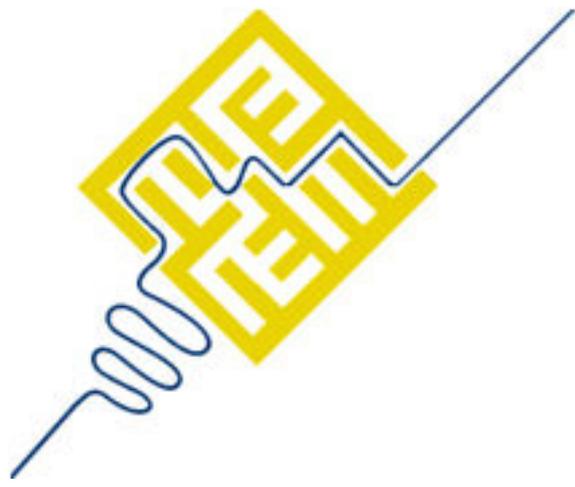
As games are an integral part of our culture, they will always be subject to some sort of criticism, but these worries are minor in comparison to their benefits. Johan Huizinga in *Homo Ludens* (1949), shows that play and games have played a central role across all cultures at all times in history. Every ancient culture played games and some, such as the Greeks, put it at the centre of their culture. Games in ancient Greece were, at times, the only means of confirming values among warring parties, as all hostilities were suspended during the games.

We should therefore be wary of objections based solely on a tiny selection of shoot 'em up games.

Games and simulations in training

Don't imagine that games are a new phenomenon in education and training. To take one example, the airline industry and the military have been pioneers in games and simulations in learning.

Physical flight simulators were used as far back as 1910, increased in use during World War I and accelerated massively during World War II. It was in 1948 that the first truly electronic, instrument base simulator was delivered to a commercial airline, Pan Am. In the 50s cameras were used to travel over models of the terrain surrounding airports but it was in the late 60s that hydraulics and digital computers came into play and throughout the 70s and 80s improvements in movement and visual displays continued towards the extremely sophisticated training simulators we see today.

This type of training is completely embedded in military and civil airline training with the FAA certifying different types of simulators on which pilots can rack-up training hours. Astonishing levels of realism have been achieved with full motion simulators. These mimic real sounds, atmospheric conditions, movement and emergencies.

The bottom line is that these simulators, although expensive, save time, money and lives. Time and time again, pilots and

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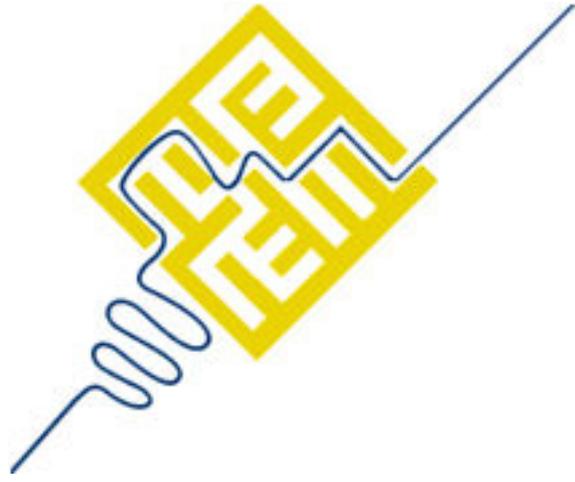
other flight crew have recorded their debt to simulator training when they have had to deal with real emergencies.

Flight simulators are now part of the games industry. Computer games such as Microsoft's Flight Simulator, Pilotwings, FlightGear and Flight Unlimited proved to be incredibly popular consumer games. One of them, X-plane has even been certified by the FAA for training.

There has been speculation that the 9/11 pilots used Microsoft Flight Simulator to practise their missions. Indeed, Microsoft delayed the launch of their newer versions of the simulator, removed the twin towers and released a modification that allowed users to remove them from previous versions of the game.
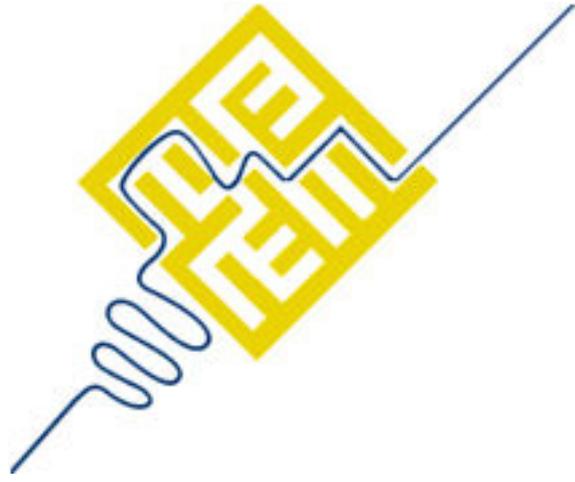
What do existing games teach us?

Do we learn when playing computer games? Of course we do. Games are hard and the skills needed to complete games include; IT skills, literacy, numeracy, hand-eye co-ordination, strategy skills, cognitive skills and lots more. This should be enough to satisfy even the most sceptical of educationalists.

In terms of knowledge and skills, users learn from games on three levels:

ᵥ Basic skills
ᵥ Contemporary tacit skills
ᵥ Subject-specific knowledge and skills

Basic skills

Basic skills have become a huge area of concern in education and training, yet games are rich in this type of learning:

ᵥ Literacy
ᵥ Numeracy
ᵥ Communication
ᵥ IT
ᵥ Hand/eye co-ordination
ᵥ

In **literacy**, most gamers learn to read large amounts of instructions and text feedback in games. Their keyboard skills will be enhanced, even up to the level of touch typing.

A raging debate has taken place around texting, messenger and literacy, with many claiming that it is destroying literacy with its shortcuts.

So, is texting responsible for all of this poor spelling and literacy? NO. In a study by Coventry University, Mrs Beverly Plester and Dr Clare Wood took 11 year olds and asked them

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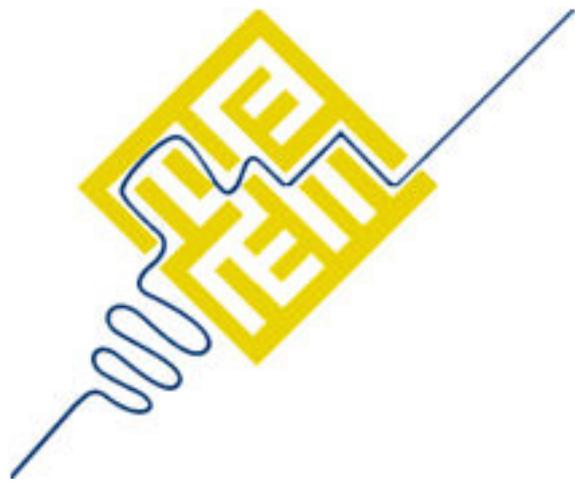
to translate from text to English and vice versa, then put them through standards tests in spelling, reading and writing. The concluded that, "the use of text message abbreviations is linked *positively* with literacy achievements".

Regular texters are strong in literacy. The results showed that far from impairing spelling, reading and writing; texting correlates well with strong performance in the use of the English language. In fact, regular texters were strong readers and writers. It is thought that texting may increase their awareness of phonetics, which leads to better spelling, reading and writing. This is in line with the research that shows phonics as being far more effective in teaching literacy.

Numeracy is also required to understand the many forms of scoring. There is often a strong sense of sense of number, addition, subtraction, measure, approximation and variables in games as many games have sophisticated scoring and rating systems.

Communication skills come through the many forms of verbal and electronic social communications that surround games. An astonishing amount of continuous communication takes place in multiplayer games as the game progresses. This is normally in a dialogue box but may also be outside the game using messenger.

Many children will learn their IT skills, not at school, but through game playing. They will become confident and competent in using many different types of interfaces; will be fearless in exploring new software environments and experts at troubleshooting when things go wrong. On top of this they will learn how to search for websites, buy games online, look for cheat sites and use a whole panoply of other web services to aid their gaming.

Hand/eye co-ordination is a clear benefit of game playing. Remarkable realtime games allow anyone to drive cars, steer ships and fly aeroplanes. Professor Daphne Bavelier of the University of Rochester showed that players

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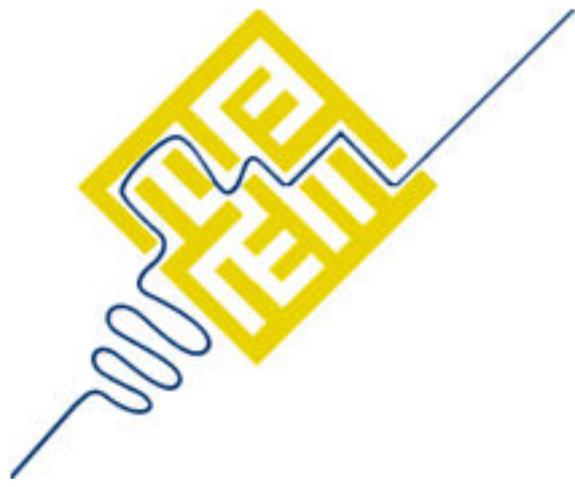
who regularly play Grand Theft Auto and Super Mario Carts (several times a week) easily outperformed non-game players by up to 30% in tests of visual ability.

Games grab attention and have the ability to really engage, an important issue in learning. Without attention little learning can take place. "Although video-game playing may seem to be rather mindless, it is capable of radically altering visual attentional processing," said Professor Bavelier. Jeremy Wolfe of the Visual Attention lab at Harvard University has applied these findings to real-life situations such as driving or paying attention in airport security jobs.

Contemporary tacit skills

To raise the ante somewhat, let's look at the contemporary skills that employers have been crying out for in potential employees – tacit skills around decision making, problem solving, team work and so on.

These skills have been difficult to teach in schools, colleges and universities which are largely focussed on knowledge with text based-assessment. More complex business, planning and social skills are notoriously difficult to teach.

Everything Bad Is Good for You

In '*Everything Bad Is Good for You',* Steven Johnson poses a fascinating question. Could all this angst over kids playing computer games, spending hours on the internet, watching TV and listening to their iPODS, be good for them?

It's commonly believed that mass media have distracted and dumbed-down educational achievement. "In fact, the exact opposite is happening: the culture is getting more intellectually demanding, not less," says Johnson.

His 'Sleeper Curve', an idea borrowed from Woody Allen, is a long-term concept that sees popular culture, not as dumbing-down, but driving-up abilities. He argues that most media have become smarter more complex and cognitively challenging, demanding better skills from their consumers.

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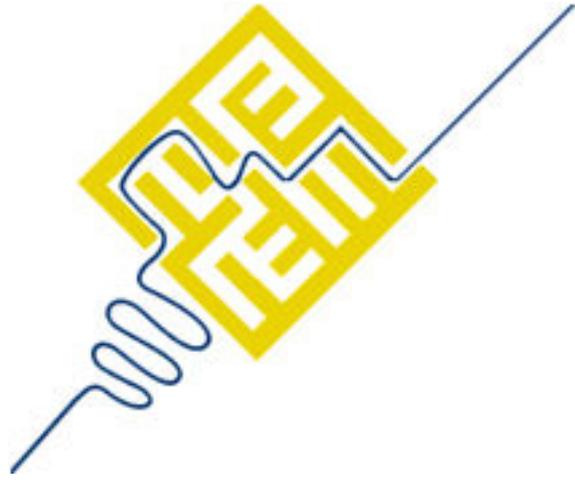
What an interesting idea. This stuff may be making us smarter!

His evidence comes from steadily rising IQ scores in developed nations. Rising at an annual rate of 0.31 points since 1993, in the 1990s, accelerating up to 0.36 points, these rises and accelerations correlate well with the rise of popular media.

He then argues that these every more complex media, especially games and the internet, but also mobile phones and other consumer devices and services, teach our children vital skills in understanding complex systems (systems analysis), probability, spatial geometry, and strategic thinking. Try playing any newly released computer game and you'll get the point.

He also draws upon television with their multi-layered narratives in 24 or The Sopranos, claiming they have made us all sophisticated media consumers. We have improved our skills in coping with threaded narratives way beyond those we possessed in the early days of film and television. In '24'. in just one hour episode we cope with the lives of 21 characters, each with a defined "story arc", as well as nine primary narrative threads, each drawing upon events and information revealed in earlier episodes. He asks us to take off our rose-tinted glasses when we think of TV. The simple, single storylines of Starsky and Hutch would be unimaginable in contemporary drama.

Reality TV is also praised in having taken key elements from games, and put the viewer into the position of examining the psychology of human interaction in unpredictable environments. We are now active participants and social observers of psychology, leadership and human interactions.

Actually, by relying too much on TV, he relies on passive, lean-back media. Stronger evidence actually comes from games, the internet and other lean-forward media and devices. This is where the true cognitive acceleration takes place. It's the internet, games console, email, messenger, texting generation that are seeing the true accelerated benefits of technology.

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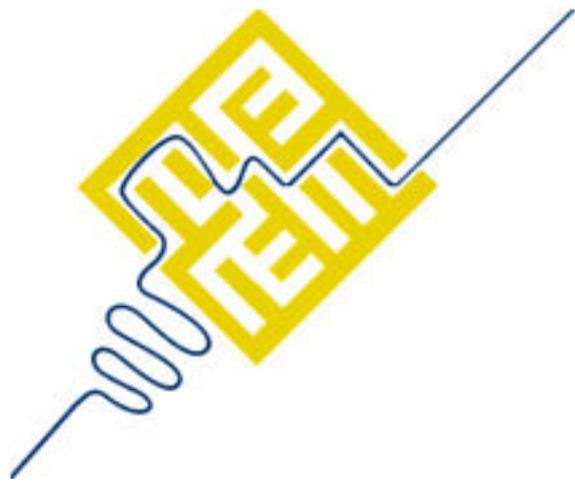
This book puts forward the idea that e-learning in a very wide sense is already at work on the minds of our children. As digital natives to our digital immigrants, they are benefiting from technology driven improvement without having to try too hard. The future of learning may well be in the hand of a fruitful combination of technology, entertainment and learning.

Subject-specific knowledge and skills

Specialist subject knowledge and skills can also be taught through games. Two common areas are history and business. History has been popular as it plays to the thirst for war games, but more sophisticated civilisation games have also been developed.

History is now well served by games such as:

ν   Age of Empires
ν   Age of Mythology
ν   Carnivores: Ice Age
ν   Caesar III
ν   Civilisation
ν   Austerlitz: Napoleon's Greatest Victory
ν   Close Combat 4: The Battle of the Bulge
ν   Close Combat III: The Russian Front
ν   Close Combat, A Bridge Too Far
ν   Close Combat: Invasion Normandy
ν   Medieval Total War
ν   Rome Total War
ν   Pharaoh
ν   Viking Invasion
ν

Some of these games are remarkably complex. Age of Empires makes you build empires by creating the right economic structures. You don't just learn facts about the Greeks, Romans and Egyptians, you build their empires. Age of Empires II spans a thousand years, from the fall of Rome through the Middle Ages in which players lead one of 18 civilisations into greatness. Each civilisation has unique attributes, buildings and technologies, as well as a unique combat unit based on its historical counterpart. Caesar III

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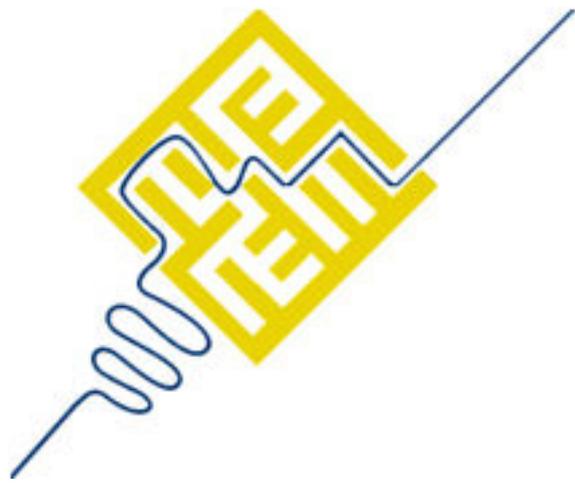
immerses you in a city simulation set in the Roman Empire. Players place buildings on previously empty terrain and construct a city. These buildings come to life, and the city begins to evolve. As the city grows, it encounters various problems that must be overcome. Then there are the campaign and battle games.

In Entrepreneur, Capitalism II, Constructor, Hollywood Mogul, Factory Mogul, Railway Tycoon, Mall Tycoon, Airline Tycoon and Theme Hospital, players engage in business simulations. Start a new business and make decisions on office space, employees, research, manufacturing and marketing. Sell your products then eventually sell shares of your company in an IPO. Or take the role of a real estate developer in a race to build up and manage resources, properties, environments, and human interaction, while trying to outperform and destroy rival development firms. Design, build, and manage your very own shopping mall. Conduct marketing campaigns to attract new shoppers, organise fashion shows, and research the latest products to drive your shoppers crazy! You can even design, maintain and manage a hi-tech hospital facility, making the most of limited resources and turning cures into cash.

In simulations such as Theme Park, Sim City and The Sims, you learn to build a business, plan a city and manage a family. This is the sort of learner-centric, emergent learning that pedagogic theorists have often encouraged but rarely achieved using traditional education and training methods of delivery.

Grey gamers

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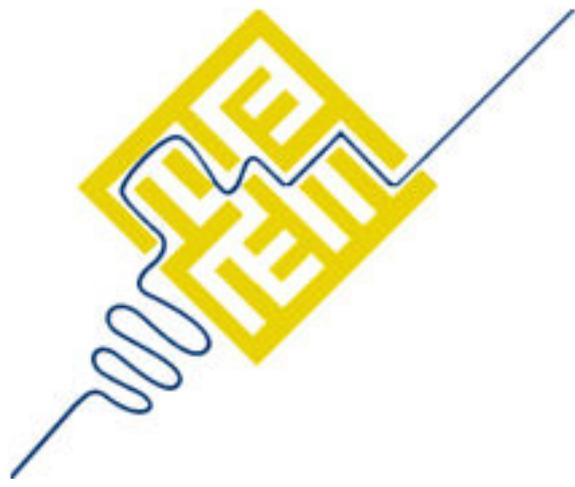
In educational terms games are also proving useful for older learners. The growth of 'grey gamers', backed up with recent neuroscience research, has led Nintendo to release 'brain training' games for the elderly. It's a package of workouts designed to reduce your brain age. This is big business with a hefty £2 million advertising campaign in the likes of Saga magazine. The research comes from Ryuta Kawashima, a professor of neuroscience at Tohoku University, showing that games, in particular reading and mathematics games, have a positive effect on delaying dementia.
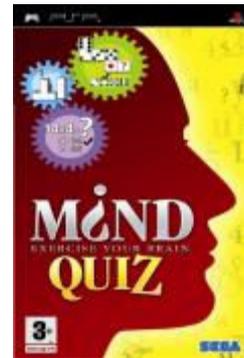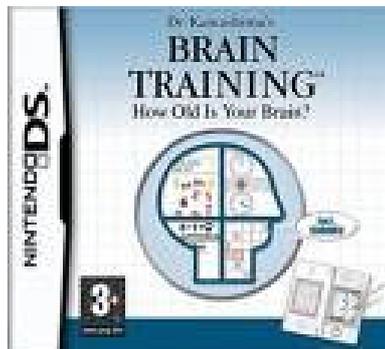
Brain Age is fun software that helps you flex your mental muscles. You take some simple tests on your first day to establish your Brain Age. Then, with just a few minutes practice a day you attempt to lower your Brain Age.

This software is groundbreaking as a global publishing success in education and points towards other initiatives at all ages in learning.

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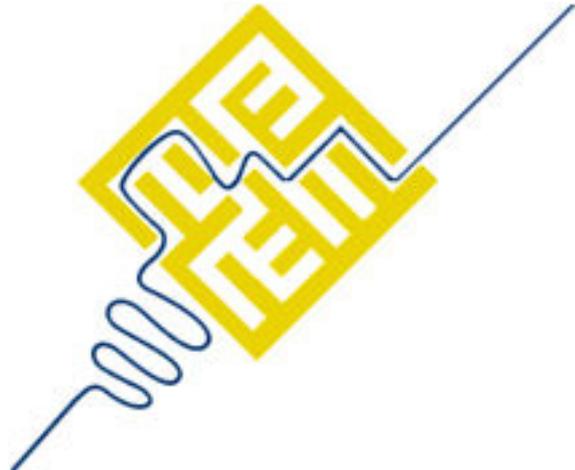
How can games accelerate learning?

Wasted youth - it's official!

Imagine a study in any walk of business or life that shows people simply waiting for 50-60% of their time for something to happen. That's exactly what two researchers have found in both the US and UK. American anthropologist Philip Jackson, showed that children in school spent **50% of their time waiting**. When Roland Meighan took a stopwatch into a primary school to conduct the same research with his students, he found they spent as much as **60% of their time waiting for something to happen**.

Much of the time, most of the kids are simply waiting to go into school, waiting or wandering about in corridors, sitting waiting on lessons to start, waiting on the teacher to check their work or waiting as they had finished their work. And why does the entire population of kids have to stand up ate the end of every hour and move classroom? What a massive waste of productive time, as well as providing ideal opportunities for bullying. Why don't the relatively tiny number of teachers move?

http://www.timesonline.co.uk/article/0,,2099-2240330.html

Games and online learning surely point to a future where less time is wasted in classrooms and corridors.

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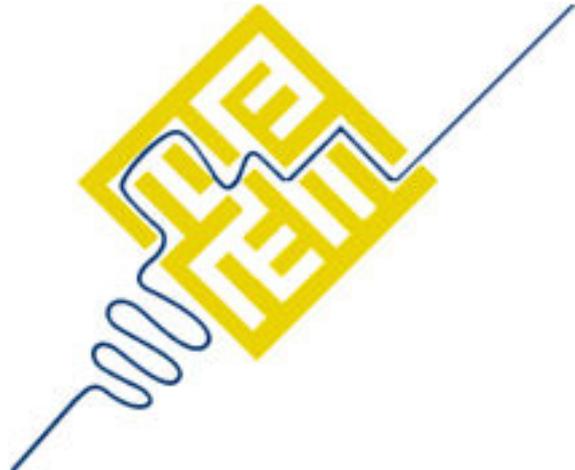
Holidays - forget it!
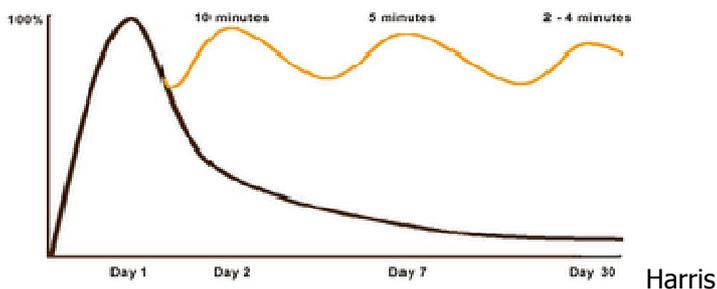
Harris Cooper, a psychologist at the University of Missouri, researched how much children forget over the long summer break. The long summer break, along with other holiday patterns are largely hangovers from an agricultural age when harvests had to be gathered.

We know enough about memory to predict that a long period in which there is no reinforcement will lead to decay in what is known. Now we have some research that quantifies that decay.

The results were staggering. Children typically forgot between 1 and 3 months of schooling during the summer break. The two areas that suffered most were numeracy and spelling, two primary educational targets. This massive drop in productivity shows that we should spread learning more evenly across the year. These are just some of the ills of traditional classroom learning.

No Instructors!

There is one astounding fact about games that should make educators scream 'eureka!' There's no instructor. Children and adults of all ages learn how to play some of the most sophisticated simulators ever seen, and pick up spectacular skills, without any up front instruction.

Neither do they use the interactive tutorials, often provided at the front end of games. This is a pedagogic mystery. No teacher, no guidance, just pure learning. If we can replicate this in education and training we will have solved many of the problems that plague this world; reliance on expensive teachers, indifference, dropout rates and poor learning. This

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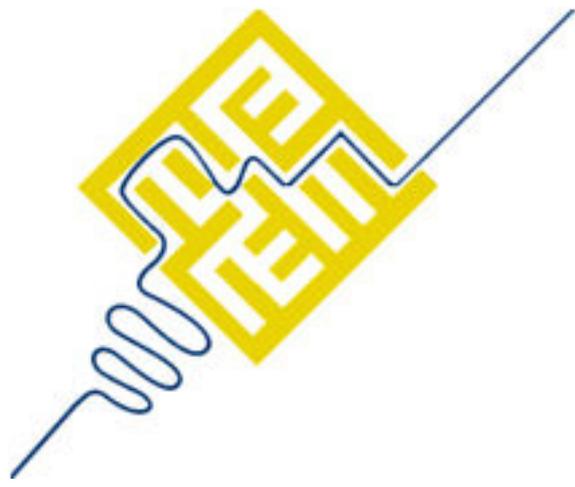
is not to say that teachers would thus be made redundant, maybe it simply allows them to add value in facilitation, mentoring and guiding, a role many still long for.

Successful games have much to do with the clever use of technology, better computers, consoles, processors and memory. PC manufactures, Sony, Nintendo, Microsoft and Sega have all contributed to this remarkable technological achievement. But the real criterion for success in games is 'design'. Good games design has pushed this industry into one of the most important creative industries in the world.

For insights into the sophistication of design, read Trigger Happy: Videogames and the Entertainment Revolution (2000) by Steven Poole, or Joystick Nation: How Videogames Ate Our Quarters, Won Our Hearts, and Rewired Our Minds (1997) by J C Herz. Both show how computer games have become serious cultural activities. They also focus on gameplay and the principles that underlie good games design outlining the genres along with the vital ingredients of perspective, characterisation, feedback, immersion, graphics and playability.

Educators certainly have a lot to learn from the games industry. Even if most games are not in themselves suitable, there's a wealth of techniques that instructional designers can pick up from the games industry that would result in dramatic improvements in motivation, learning and sustainability.

36 learning principles from games

What Video Games Have to Teach Us About Learning and Literacy (2003) by James Paul Gee of the University of Wisconsin starts with, "I want to talk about video games-- yes, even violent video games - and say some positive things about them." He then goes on to tease out 36 different learning principles which he validates by reference to cognitive research to show that games support an incredible array of useful skills.

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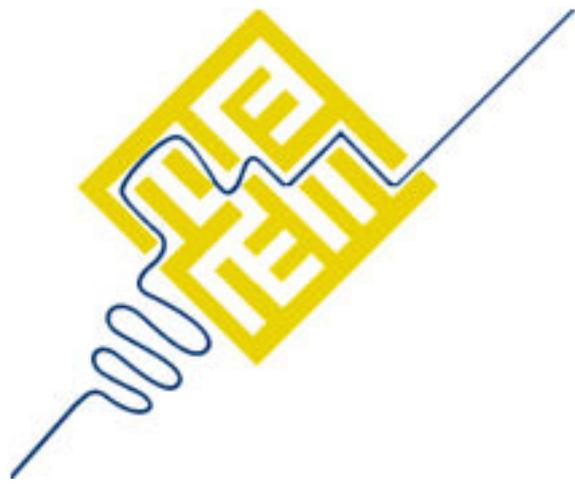
To take just one example, when people play games, he claims, they are learning a sophisticated form of visual literacy. Some, like Gunther Kress, Professor of Education at the Institute of Education, University of London go further. In *Literacy In New Media Age (Literacies)* (2003) he claims that the book has now been displaced by the screen and that images rather than text have become the communication medium of the age. This, he argues, has profound consequences for literacy.

Whatever your moral views on this, Gee's focus on the development of cognitive skills is refreshing. Sophisticated strategic skills and problem-solving have long been the aim of educators, and there are many other useful skills, he sees, being picked up by gamers.

Gee does something that most commentators on 'games and learning' miss. He asks a simple question. What do games really have to teach us about learning? In other words 'learning' comes first, games second.

He teases out 36 learning principles, the mechanisms by which players learn in the context of computer games.

	Principle	Learning
1	Active, Critical Learning Principle	Learner-driven, massively participative
2	Design Principle	Design seen as important aspect of learning experience
3	Semiotic Principle	Understanding complex environments and inter-relationships
4	Semiotic Domains Principle	Collaborative learning
5	Metalevel Thinking About Semiotic Domains Principle	Learning about relationships between worlds
6	"Psychosocial Moratorium" Principle	Learners take risks, learn by failure and have an accelerated learning experience
7	Committed Learning Principle	Massive motivational commitment through virtual identities and participation in a complete world
8	Identity Principle	Virtual identities are important as a projected self. This promotes self-awareness and self-esteem

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9	Self-Knowledge Principle	Players learn how to learn through learning strategies that work for them
10	Amplification Of Input Principle	Massive amounts of feedback, failure and rewards, often in realtime
11	Achievement Principle	Intrinsic goals with satisfying achievements and rewards
12	Practice Principle	Success is through massive practice and application
13	Ongoing Learning Principle	Learning is continuous with new skills needed as one progresses
14	"Regime Of Competence" Principle	Learners are stretched, but not too far – failure is finely tuned so that goals are always within their reach
15	Probing Principle	The learner has to learn by constantly probing - try things out, test them and try again
16	Multiple Routes Principle	Lots of choices and alternatives strengthens autonomy and decision making
17	Situated Meaning Principle	Performance in meaningful and contextualised – not abstract
18	Text Principle	Reading and understanding contextualised text
19	Intertextual Principle	Different genres of text are recognised and understood
20	Multimodal Principle	Learning is not just through txt and images but entire worlds of subtle, mixed-media
21	"Material Intelligence" Principle	Learning is put to the test by interaction with other people, places and things
22	Intuitive Knowledge Principle	Serious tacit knowledge is required to complete games
23	Subset Principle	Step-by-step learning
24	Incremental Principle	From simple to complex cases and scenarios
25	Concentrated Sample Principle	Basic skills are emphasised early with repeated practice so that future success can be achieved
26	Bottom-Up Basic Skills Principle	Basic skills are not learnt in isolation but in the context of the problem and world
27	Explicit Information On-Demand Just-In-Time Principle	Learning is supported at all times JIT
28	Discovery Principle	Telling is kept to a minimum, forcing the learner to explore and discover
29	Transfer Principle	Massive and geared application of learnt skills to problems
30	Cultural Models About The World Principle	Learners have to think about the 'cultural' conflicts in the games
31	Cultural Models About Learning Principle	Exposes learners to new models of learning

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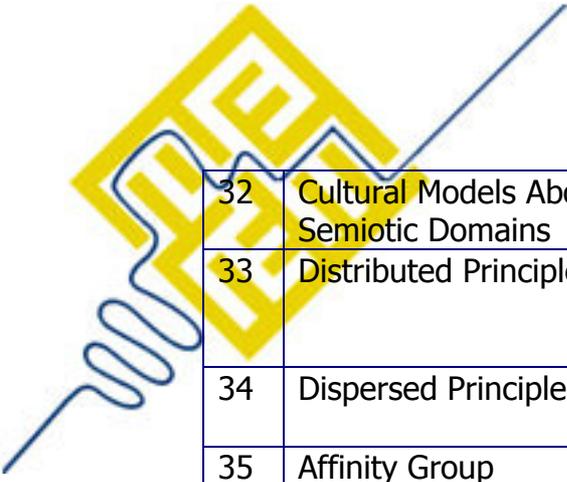
32	Cultural Models About Semiotic Domains	Exposure to different worlds
33	Distributed Principle	Learning is not confined to knowledge gathering, it is distributed across the learner and the many facets of the world he operates in
34	Dispersed Principle	Massively collaborative with friends and many the learner will not know
35	Affinity Group Principle	Collaboration is skills-based, not age, race or gender-based
36	Insider Principle	Learner is more than a learner but a participant, teacher and producer

One can take away a lot from this book. It is convincing on the basic idea that games are, for the reasons stated above, strong learning experiences. A much more rewarding read comes from taking these learning principles and applying them to new learning experiences outside of the traditional games genres of shoot 'em up, sports sims, driving sims etc.

In practice, applying games to learning is not easy, however there are tools and content from companies like Caspian Learning that have combined learning and games design in their ThinkingWorlds software. They use Gee's principles to good effect by building learning structure into the game, rather than just adding the occasional puzzle or question. By making the game objectives congruent with the learning objectives, one can do wonderful things.

This list may not be to everyone's liking, as it sometimes descends into academic rhetoric around semiotic theory, however, there are groups of principles that are useful.
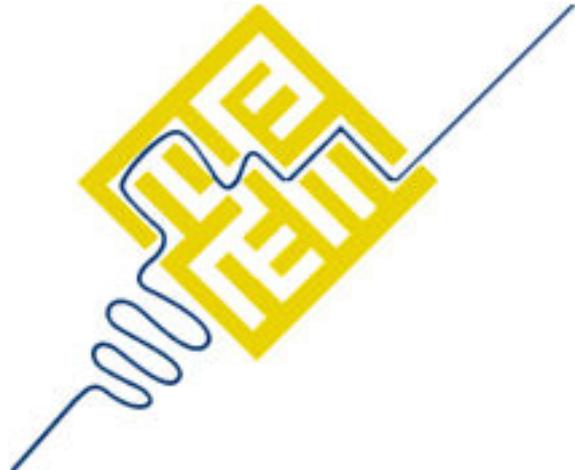
Ten pedagogic reasons for games in learning

Let's go back to the ten things that games have to offer learners?

Motivation

Learner-centricity

Personalisation

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Incremental learning

Contextualisation

Rich media mix

Safe failure

Immediate feedback

Lots of practice and reinforcement

Lots of collaboration

Motivation

There is a motivational crisis in education and training with massive disengagement from learning in schools and the workplace. Yet, games clearly motivate and games designers know a lot about motivation and sustaining interest in games, they have to, or the games won't sell. There is, therefore, real mileage in taking the motivational components in game design and using them in learning.

The techniques typically involve good marketing, level based design, keeping players interested through achievable goals, good feedback and high quality production values. Motivation comes through good gameplay design and high levels of interaction.

Learner-centricity

Games are possibly the most interactive of all online experiences. They are massively interactive and rarely take control away from the learner. Unlike traditional e-learning which gives some control, largely menu choices, page turning and questions answering, games put the whole experience in your hands. Well designed games enable us to transform the learning process from a passive experience into an active learner driven experience.

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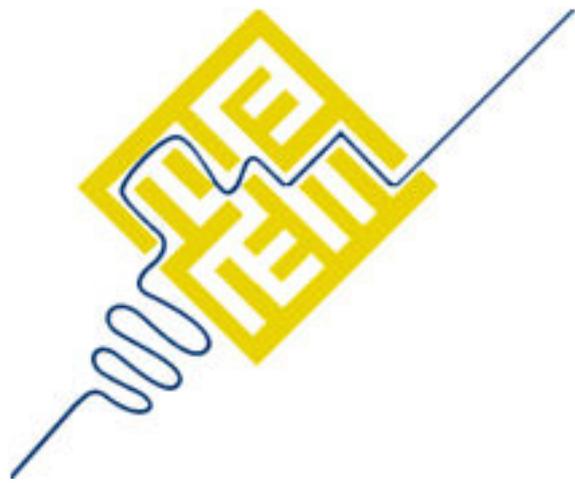
Personalisation

The use of avatars representing you the learner is a strong form of personalisation, as is the customisation and manipulation of 'you as avatar'. Beyond this, games often regard you the player as reaching certain states or goals. This sense of personal progress and achievement is handled well in games. Games often allow the user to earn rewards and tailor their avatar, environment or experience. This starts to deliver a "user designed" experience as well as achieving yet further engagement.

Incremental learning

The playability of a game centres around its ability to exploit the players need to push beyond their current ability to the next achievable state of expertise. Good games are always pulling you onwards to the next task, upwards to the next level. Players like to live on the edge of success and failure. For cognitive scientists this is called the 'regime of competence' principle.

Most games have an overarching narrative or goal along with levels and sub-goals. These are sometimes missions to be completed, zones to be conquered, stages to be completed. They tend, like learning content, to up the stakes in expected baseline skills, level by level.

This technique is so common in successful games that one would say it is part of the games designer's standard toolkit. The sub-goals seem attainable in a game that most players know may take weeks, even months to complete, making the game more digestible. On completion of a level, the gameplayer also feels a real sense of achievement.

Contextualisation

Games tend to create a world in which learning takes place. This can be useful in terms of encoding and recall. We know that contextual cues help on recall so that learning how to do something at work or in the context in which it will actually

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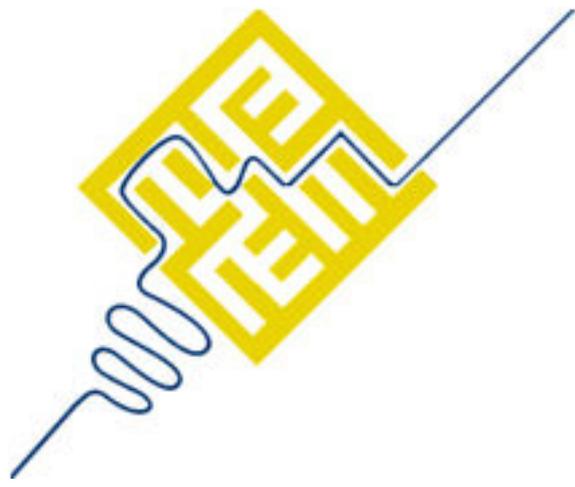
be applied is good for transfer. Be it an airport, hospital or medieval village, games can give you this context.

Rich media mix

The use of 3D avatars, environments, objects and audio, give games a real edge over other flat media. It is this that makes their contextual worlds seem relevant. The whole experience is one in which the player/learner can move, explore and learn without the dullness of print on a screen. Furthermore, games get the users to do something with this media other than just "watch" it. Multimedia is useful if we are trying to appeal to different learning styles, however it is what you get the learners to do with this media that makes the real difference. Games deliver challenges or tasks to the user and therefore just "watching" is not an option.

Safe failure

Ultimately the user must keep winning in incremental steps and get the positive feedback. They must also fail. Catastrophic failure is also a strong feature of games design i.e. dying or getting thrown out of a level back to the beginning. Instructional designers are fine on simple 'answers to questions' feedback, but often ignore the more important 'critical failure and success feedback'.

Immediate feedback

Interactive e-learning, like games, relies on giving the user feedback. In games this is relentless. Feedback in real-time, games is in real-time. Even in simulations it is frequent. Games designers know that feedback motivates and stimulates action, even when it is negative. The balance between risk and reward (feedback) is what makes games stick. You must both win and lose.

There are several types of feedback:

ν Incremental
ν Level completion

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ν Overall progress

ν
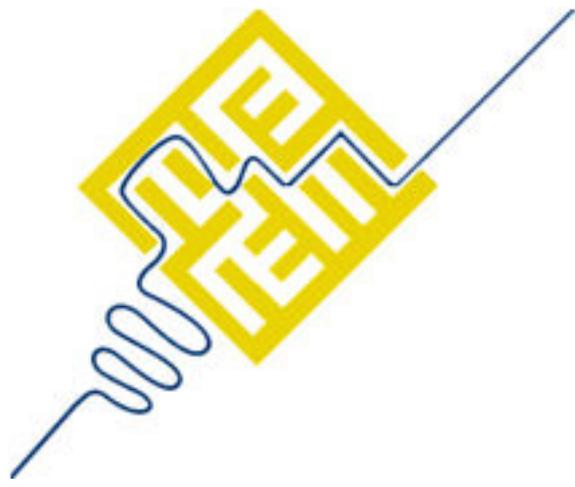
Incremental feedback refers to those tiny steps one takes when progressing in a game, whether it be shooting and seeing the explosion or trying out something in a simulation. The feedback in games is rich and matches or exceeds that of the input. Something happens when you cause it to happen. Feedback is your reward or punishment. But even when it's a punishment it's a reaction to your action. The same principle applies in learning.

Strong feedback should also be provided for completion of a stage or level. In both learning and games the overall goal is important, but it's the intermediate goals that keep you going. Strong praise or rewards for level completion is essential.

Overall progress in games is often couched in a league table and the ability to save progress, bookmark and view your progress against others is certainly critical in games. These features are also common in e-learning where the user wants to be able to save progress and see where they are in the overall experience.

Lots of practice and reinforcement

Games are played and replayed, sometimes for weeks and months. Their motivational pull makes it likely that the player will return for more. This is rarely the case in traditional training and education.

Learning how to play a game is therefore a lesson in that most basic of principles in learning theory – reinforcement. By failing and getting put back to the start, games players not only learn quickly how to overcome failure, they get plenty of chances to reinforce their learning. This is often lacking in education and training, where the learning experience is a simple short-term memory experience without the reinforced push into long-term memory. Using a range of different challenges and tasks on the same subject matter within games enables us to avoid a major pitfall of
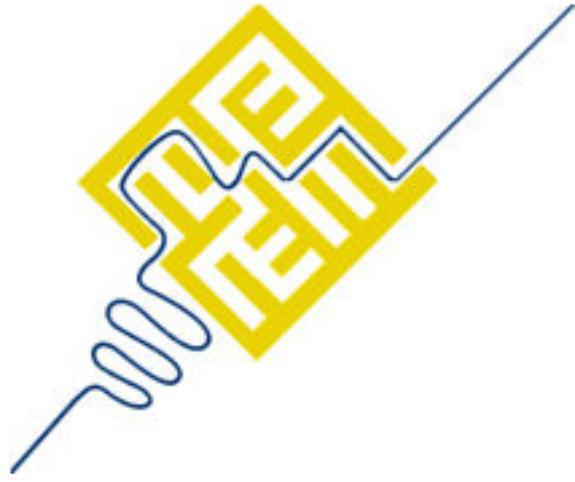
standard e-learning – "assuming transfer of knowledge has been achieved".

Standard e-learning often only gets the learner to carry out one task on a piece of knowledge, i.e an MCQ test. However by reinforcing this with other similar level cognitive challenges we are more likely to retain and be able to transfer this knowledge to different scenarios.

Lots of collaboration

It often comes as a surprise to those who see gamers as loners to discover that their online communities are among the largest and most vibrant on the web. Game sites invariably have discussion groups, and gamers engage in rich dialogue about the games, and related strategies and cheats.

From a learning point of view, they show that communities work when they have similar people with similar interests and goals. Completion of games, or the game, is the goal - and gamers genuinely seek to learn and teach each other to reach these goals. Communities need common goals. This is what stimulates mutual support.

Communities of practice in education and training are often sparse and can lack vibrancy, even when moderated. Game communities abhor the idea of e-tutors and moderators, yet have scale and are full of life and activity.

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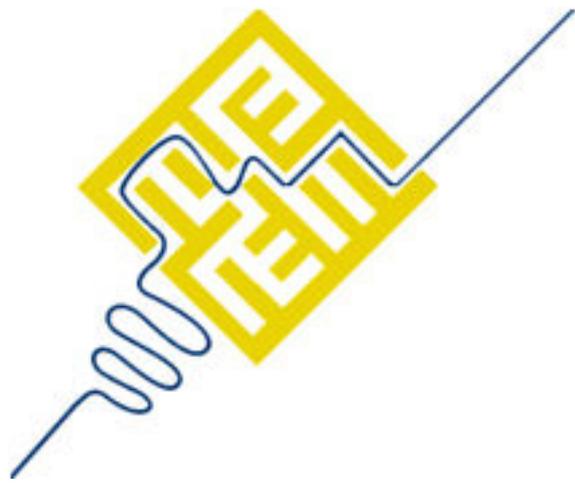
Affordable 3D simulations and games

Games are not the only solution to educational problems, but they do have a role to play where motivation is low. They are more appropriate than many would imagine for a wider range of learning tasks than many would imagine.

It is clear that children and young adults have a taste for games and play that tends to get blunted as one gets older, but even with this older audience, computer game playing is not unusual. Adults retain their competitive streak.

Fortunately we now have the tools to create 3D simulations and games cheaply and effectively. Complete 3D environments are now available for many environments.
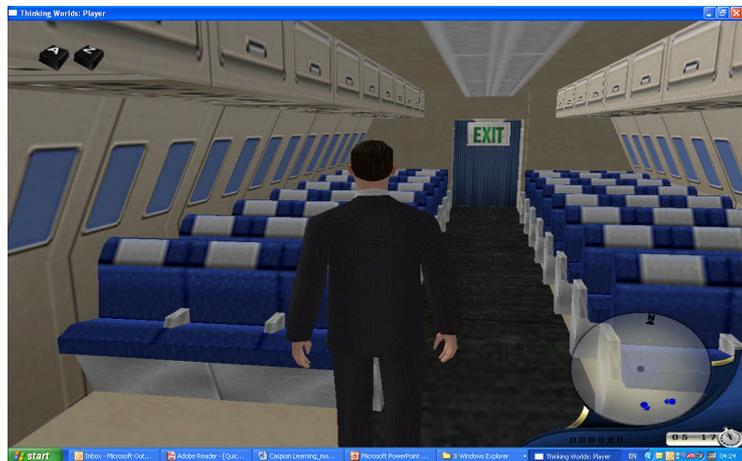

These include; offices, retail outlets, manufacturing plants airports and the insides of aircraft.

All of this is now feasible on a standard PC. The excitement of real-time simulations can be used in almost any training programme at a relatively low cost.

The avatars (characters) within these worlds are easy to change with appropriate uniforms and colours. In this case characters already exist for dozens of different types of staff, as many different types of customer you can imagine.

You can play the role of any member of staff and encounter other members of your team in the training exercise.

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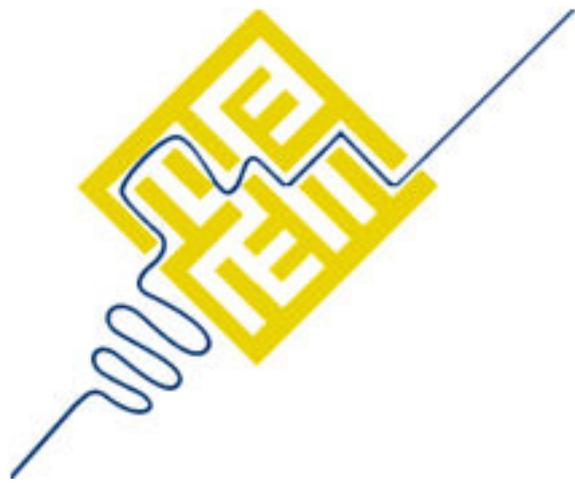
For example, an entire airport can be simulated so that training on check-in, security and other tasks can be contextualised.

This type of simulation is not just 3D environments populated by characters, it has specific 'learning episodes' designed for easy authoring, so that learning is the aim, not just scoring in a game.
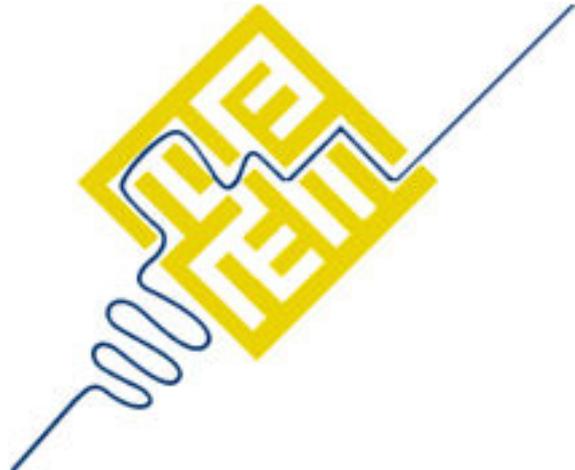
Existing worlds and avatars also include:

Healthcare

Hospital – waiting room, corridors, labs etc.

Respiration – inside lungs

Bloodstream

Vets

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Pharmaceutical plant

Manufacturing

Factory

Warehouse

Oil and gas plant

Oil platform

Oil and gas

Oil rig

Oil plant

Retail

Shopping mall

Shop

Warehouse

Automotive

Car showroom
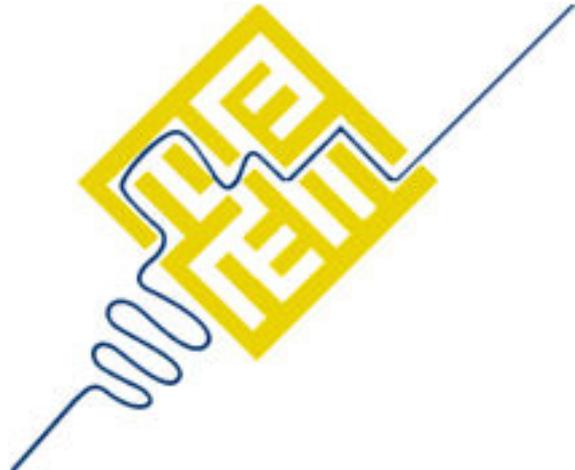
Airlines

Airport large

Airport small

Airport security

Airport check-in

Inside aircraft

Education

School – classroom, corridors, laboratory

Government

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EU buildings in Brussels

Houses of Parliament

Town hall

UK street with houses, gas station

IT training

Inside a PC

Sports

Swimming pools

Running track

Gymnasium

Religion

Church

Mosque

Synagogue

Globe theatre

Miscellaneous

Spacestation
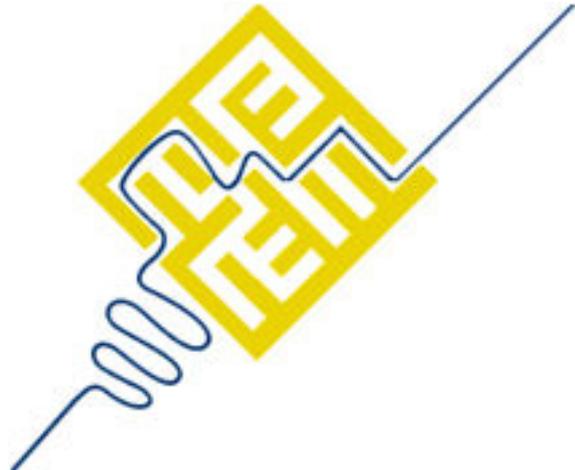
Virtual solar system

Villages in India

Avatars

Range of ages

Range of races

Range of customers

Manual workers

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Office workers

Uniformed workers

ThinkingWorlds

The 'ThinkingWorlds' software makes the learner think through problems, apply their skills and perform as they would be expected to perform in the real world. Excellent data is gathered on performance which can be passed back to an LMS. It has the ability to dramatically improve learner motivation whilst accurately matching the type of game challenge with the learning goals sought.
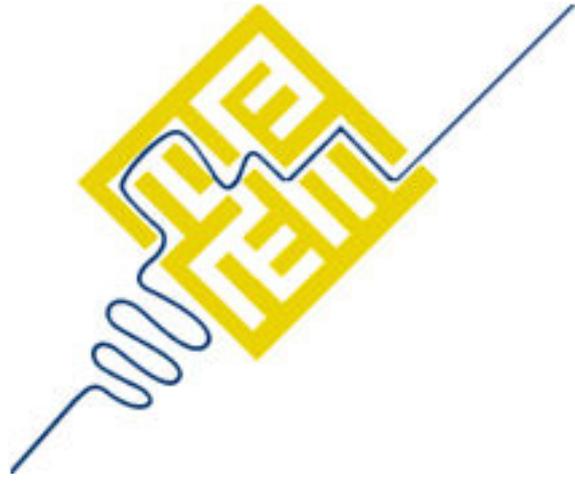
Conclusion

New technology, e-learning and games rightly lie at the heart of discussions in government. The debate is now open. The point remains, however, that the vast majority of people in education and training do not play games, have not read the books that stimulate the debate, and many have an in-built aversion to this type of innovation. It will take time for this innovation to become mainstream.

Many teachers feel threatened by games and the games culture. They don't engage with what they see as a geekish, male culture. They see games as undercutting traditional educational values, promoting anti-social or solitary behaviour. Educators need to learn from the games industry and cherry pick the components that will help them motivate, deliver and sustain learning. The difficulty lies not in the new idea, but in escaping the old ones. Fortunately a small but growing number of passionate and innovative practitioners are starting to recognise this and are seeking to push these ideas forward and are showing the resultant benefits.

Far from being morally dubious and educationally barren, if we can extract the strengths of games while discarding their weaknesses, games may turn out a generation with better IQs, better cognitive skills, more attuned to technology with a more enlightened learner-centric attitude towards learning than any previous generation.

There are several pedagogic features that are strong in games, yet weak in traditional education and training. If we can isolate and apply these through e-learning, significant pedagogic progress will have been made.

Lastly. We now have the tools, ready made environments, avatars and design templates to make games production feasible at a reasonable cost. Sure the cost of designing a game from scratch is expensive, but the reuse of 3D worlds, avatars and designs results in huge savings. The reward is motivated learners and rich learning experiences.

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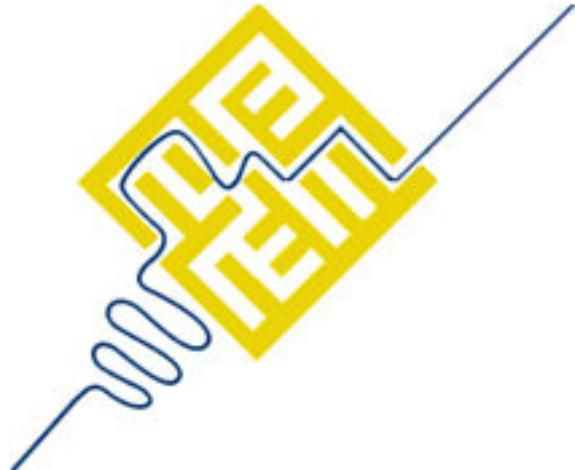
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