

# Games Based Situated Learning: games-ED Whole Class Games and Learning Outcomes.

 Author: Paul Ladley (pladley@games-ed.co.uk)
 Tel: 0161-427-8684
 www.games-ed.co.uk

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# 1 Summary

Games Based Learning (GBL) is gaining a lot of interest and admirers. This paper considers the latest findings of research into GBL, in particular the viability of using GBL in the education setting (primary through to university).

GBL, if it is to succeed, needs to be more than a bit of fun that motivates students and needs to be underpinned with learning theory. Measuring outcomes such as fun, engagement, and motivation generates buy-in, to a certain degree, but it provides no guiding principles for designers and educators (teachers/ lecturers). Situated Learning provides such a theoretical underpinning, and while some have argued that game simulation stretches the original basis of Situated Learning, the consensus is in favour of viewing GBL from such a perspective. Games Based Situated Learning (GBSL) moves away from the pure "apprentice model" of learning but it still stays true to the key tenets with little modification, as shown below:

- Information must be given in authentic simulated context.
- o Learning must take place within social interaction and collaboration.

games-ED products have been developed from GBSL perspective. The products are simulations that are played collaboratively in the classroom with support and scaffolding from the educators. games-ED products are judged against the theory. General GBSL principles are laid out. A GBSL model is put forward that asserts that learners benefit from learning from doing AND learning from being. A games-ED pedagogy shows how the products can be used to anchor a series of lessons / activities. It is through a blended approach that benefits and learning outcomes can be maximised. The paper shows that games-ED delivers significant benefits and learning outcomes. games-ED is checked against the Relevance, Embedding, Transfer, Adaption, Immersion and Naturalisation (RETAIN) Model, which was developed to: 1) Support game development, and 2) Assess how well educational games contain and incorporate academic content.

GBL can succeed, but If educators are to take a leap of faith, then developers need to meet them halfway. Developers cannot expect decades of good teaching practice to be thrown away. GBSL needs to support the evolution of teaching and not require a revolution. games-ED achieves this aim.

# 2 Situated Learning

Situated learning / cognition considers how knowledge is acquired in the context of authentic activity, defined as the common activity of experts or 'community of practice'. Brown, Collins and Duguid (1989) first expounded the theory in their article: 'Situated cognition and the culture of learning'. These authors also expressed a deep indebtedness to Jean Lave, whose work has been instrumental in providing the research base for the theory.

Situated cognition considers that "representations are not at the center of the mind, but rather emerge from the interaction of the mental processes with the environment', Clancey (1991). This notion overturned previous theories that explained the human mind as a biological computer. Knowledge is not the sum of what is currently held inside a person's head, but the real-time formulation of understanding combining what was previously known with new experiences. Brown, Collins and Duguid (1989) state that 'A concept will continually evolve with each new occasion of use, because new situations, negotiations, and activities inevitably recast it in a new, more densely textured form. So a concept, like the meaning of a word, is always under construction'

A critical aspect of the situated learning model is the notion of the apprentice observing the 'community of practice'. Over time, the inexperienced novice moves from the periphery of community to the centre where they participate as experts. This process of

# **Games Based Situated Learning**



enculturation occurs by means of involvement in authentic activity (real world / simulated as opposed to analogous activity) and interactions with experts.

The theory has moved away from the rigid apprentice model, and has been reconstituted as a classroom learning theory. A situated learning experience has four major premises guiding the development of classroom activities (Anderson, Reder, and Simon 1996; Wilson 1993): (1) learning is grounded in the actions of everyday situations; (2) knowledge is acquired situationally and transfers only to similar situations; (3) learning is the result of a social process encompassing ways of thinking, perceiving, problem solving, and interacting in addition to declarative and procedural knowledge; and (4) learning is not separated from the world of action but exists in robust, complex, social environments made up of actors, actions, and situations.

These four premises differentiate situated learning from other experiential forms of acquiring knowledge. In situated learning, students learn content through activities rather than acquiring information in discrete packages organized by instructors. Content is inherent in the doing of the task and not separated from the noise, confusion, and group interactions prevalent in real work environments. Learning is dilemma driven rather than content driven. Situations are presented that challenge the intellectual and psychomotor skills learners will apply at home, in the community, or the workplace (Lankard 1995).

David Stein puts forward that "situated learning uses cooperative and participative teaching methods as the means of acquiring knowledge. Knowledge is created or negotiated through the interactions of the learner with others and the environment. Subject matter emerges from the cues provided by the environment and from the dialogue among the learning community. The structure of the learning is implicit in the experience rather than in the subject matter structured by the instructor." For Stein, Situated Learning in the classroom integrates content, context, community, and participation.

To sum up, the main tenets of situated learning theory are:

- 1. Information must be given in a relevant context or setting.
- 2. Learning must take place within social interaction and collaboration.

# 3 Situated Learning and Simulation

### 3.1 Contradiction in Terms?

On the surface, Computer Based Situated Learning seems a contradiction in terms. 'Hummel (1993) maintained that 'instructional designers who apply situated learning theory by implementation in electronic media should realize that they take an important step away from this theory ... courseware becomes the learning environment and not the authentic situation' (p. 15) quoted from 'Critical Characteristics of Situated Learning: Implications for the Instructional Design of Multimedia' (Jan Herrington and Ron Oliver, 1995). But, the consensus has moved in favour of the feasibility of using computer methods to simulate authentic activity (Herrington and Oliver).

In fact, in some situations it is only possible to simulate - emergency situation. In terms of authentic activity, simulation maybe as close as it is possible to get to the real thing. It is not just emergency training where simulation provides the only option; for example, it is only through simulation that young people are going to experience many scenarios. Logistical and cost barriers exist, but time is a key problem. Game can compress time and can simulate events in a different time period.

A well designed simulation that has been modeled on expert knowledge, which offers collaborative learning in the form of blended delivery provides a powerful experience that does not merely engage the learner, a benefit in its own right, but anchors the learning



process by contexualising it with 'real' scenarios. Games based situated learning moves away from the pure "apprentice model" of learning but it still stays true to the key tenets with little modification, as shown below:

- 1. Information must be given in authentic simulated context.
- 2. Learning must take place within social interaction and collaboration.

### 3.2 Situated Learning and the implications for Interactive and learning design

Herrington and Oliver, who have written extensively on situated learning and multimedia, suggest that to marry up to the theory, programmes need to:

- Provide authentic context.
- Provide authentic activities.
- Embed expert performances and model processes.
- o Provide multiple roles and perspectives.
- Support collaborative construction of knowledge.
- Provide coaching and scaffolding.
- o Promote reflection to enable abstractions to be formed.
- o Promote articulation to enable tacit knowledge to be made explicit.
- o Provide for integrated assessment.

# 4 Games Based Situated Learning and games-ED

### 4.1 Games Based Learning (GBL)

There has been a lot of interest in the use of games in education. A recent teacher survey<sup>1</sup> shows that:

- o 35% of the sample of UK teachers have already used computer games in their teaching
- o 60% of teachers would consider using computer games in their teaching in the future.

In Scotland, Learning Teaching Scotland has promoted games in schools, including funding a games and learning centre for excellence.

"Almost 90% of teachers who used games stated they used games in their teaching "to engage students". Almost half of teachers used them because they "independently wanted to offer an alternate way of teaching". 31% were "inspired by other teachers", while 7% had the idea "suggested by students". The availability of consoles, publicity and articles has little impact on teachers using games." NFER Futurelab 2009 survey

Not everyone, though, is entirely convinced. A report from Becta (2010) provides a cautionary analysis of GBL. It states, "although some teachers are positive about the potential of games for learning, in particular to improve motivation and engagement, there are a number of challenges to introducing games in formal educational settings." The following table outline the issues and puts forward some responses based purpose built GBL rather than commercial games, which have so far tended to be the focus of research.

<sup>&</sup>lt;sup>1</sup> The research included a self-completion survey of over 1,600 practicing classroom teachers in English state primary and secondary schools (with questions designed by Futurelab and conducted by the National Foundation for Educational Research [NFER] through its February 2009 Teacher Omnibus), 10 interviews with teachers involved in using games in school, and interviews with 10 small groups of children with experience of game-based learning.



Issue	Response (Consideration of Purpose Built GBL)
The lack of integration of most games with the	<ul> <li>Purpose built GBL should link to the curriculum and assessment framework.</li> </ul>
current curriculum and assessment framework.	<ul> <li>Annual upgrades can keep them up-to-date.</li> </ul>
Time constraints.	<ul> <li>Games can be designed to fit into standard lesson times.</li> </ul>
	<ul> <li>Save routines can allow the game play to spill over into a follow-on lesson.</li> </ul>
Technical and logistical issues (cost, licensing,	• Education games needn't be the all singing dancing, gimmick-laden counterparts
limitations of school computers, technical	of commercial games that require the latest graphic cards.
support).	• Adobe Flash based games can be written without the need to install plug-in and
	can be quite small in file size provided they are not stuffed with audio and video.
Lack of teacher skills.	o GBL programs do not need to be overly complicated. Commercial games are
	complex because need to keep interest over months (to offer value for money)
	not hours.
	<ul> <li>Contextual help can be embedded into the game.</li> </ul>
Not all learners engage with games and many	• Purpose built GBL should easily demonstrate link between games and learning.
do not see a link between games and learning.	Additional activities should re-enforce the message.
Teacher and parent concerns over the content	• This really is a problem associated with commercial games rather than purpose
of some games (e-safety).	built GBL.

Others provide a warning for would be games based learning developers. "The act of placing educational content inside a game does not guarantee that it will succeed in achieving a fun, motivating experience; meeting educational goals; or being a commercial success." Glenda A. Gunter, Robert F. Kenny and Erik H. Vick (2007)

While GBL may not work in every situation, the potential gains are significant and expansive. Traci Sitzmann & Katherine Ely (2010) in performing a meta analysis of 65 studies and data from 6,476 trainees comparing post-training outcomes for simulation game and comparison groups, discovered that "overall, declarative knowledge was 11% higher for trainees taught with simulation games than a comparison group; procedural knowledge was 14% higher; retention was 9% higher; and self-efficacy was 20% higher.

"The emergence of Games Based Learning is offering the learning and teaching communities new opportunities to reach and motivate hard-to engage learner groups, support differentiated and personalised learning, address vocational and training-based course materials and provide new tools for teaching basic and key skills, science and maths education." JISC Games Based Learning

### The future is here:

"The category of game-based learning that is still two to three years away for schools, but one that has tremendous potential to transform education, includes open-ended, challenge-based, truly collaborative games...These games [develop generic skills and] lend themselves to curricular content, requiring students to discover and construct knowledge in order to solve problems. They are challenging to design well, but the results can be transformative." Horizon Report, 2010.

The remainder of this paper will concentrate on games-ED, which achieves the goals set out in the Horizon Report, and they are being used in the classroom now. Specifically, the paper will consider how the underpinning <u>Games Based Situated Learning model</u> and <u>pedagogy</u> delivers dramatic <u>learning benefits and outcomes</u>.



## 4.2 Games Based Situated Learning - Games-ED

### 4.2.1 Introduction

games-ED current products <sup>2</sup> can be described as resource management games. They are played in classroom environment on a single computer by the whole class. The games narrative is structured around a relevant context such as a community – they are situated. The class is spit into sub-teams that have to collaborate to achieve common goals such as improving the community.

The games have been used in schools, college and universities and are built on tried and tested adult learning products <sup>3</sup>.

### 4.2.2 Using the Game in a Lesson

The game plays over a number of rounds (simulated years). The rounds are sub-divided into three phases. The rounds progressively speed up, as the learners get to grips with the task at hand. In a one hour run of the game: round one would be allocated 25 minutes, round two would be allocated 15 minutes and round three would be completed in 10 minutes. This would leave 10 minutes for further reflection and contingency.



The class is divided into sub-teams. In the example of the games-ED product Sustainaville <sup>4</sup>, the teams are: Local Authority; Education, Learning & Skills; Health; Third Sector; Housing; Utilities; Transport and Enterprise Partnership. Each sub-team is presented with a mission outlining their objectives. Ultimately, the sub-teams work as one team with one score.

It is important to note that the game based lesson sits within a <u>games based learning pedagogy</u>. In essence, pre work, taught material, follow on exercises and assessment wrap around the game based lesson. As Francis note (2006), games need to sit within broader games based pedagogy in order that a game might be effectively used in classroom contexts <sup>5</sup>.

### 4.2.3 Phases of the Game Rounds (Plan > Do > Review)

Each round has three phases based on plan > do > review. The 3-stage plan > do > review is closely related to the 3-stage do > review > plan, as put forward in experiential learning. As Neil notes (2010), "The difference is that in experiential learning, experience (do) is often used as the initial stage, rather than planning (plan) which is often the initial stage for management and business. However, the cycle is continuous in both cases, so the designation of a fixed starting point is rather arbitrary. "

The following description of the phases again uses the example of Sustainaville:

### PLAN:

- Investigate the main graphic, which shows a virtual community with problems such as air and water pollution, congestion, poor housing, unemployment, poor health and rising waste.
- Investigate report screen that help learners to make decisions. The reports show cause and effect and will enable the learner to see the impact their decisions.
- o Learners consider cross linkages with other sub-teams and understand that they can achieve more if they work together.

### DO:

o Having looked at their reports and developed a plan, the sub-teams can invest their budgets by making purchase decisions.

<sup>&</sup>lt;sup>2</sup> As of November 2010

<sup>&</sup>lt;sup>3</sup> games-ED products and approach are based on learning simulations that have been used in over 450 workshops for adult audiences.

<sup>&</sup>lt;sup>4</sup> Sustainaville is a games-ED product looking at sustainable development.

<sup>&</sup>lt;sup>5</sup> It is worth noting that Russell Francis worked with MIT to develop his research. The game that they used was called Revolution and while it had been developed for education; it was a rewrite of a commercial game. This approach has benefits in terms of cost, but it means that the design cannot start from first principles.



- Negotiate with other teams and choose win-wins to create a sustainable community.
- After all the budget decisions have been made, the sub-teams present their decisions to the whole group explaining what they have bought and why.
- The purchases are input into the game by the teacher.

### **REVIEW**:

- $\circ$   $\quad$  The round is updated to the next year.
- o The learners consider the impact of their decisions (improvements made to the community):
  - The main graphic changes: wind turbines, less pollution, recycling facilities and more housing.
  - The sub-team reports change.
- The score shows how the teams have performed as a whole group. The educator gives feedback on their performance <sup>6</sup>, and the learners can reflect on the decisions they have made.

The learners now need to plan what they want to achieve in round 2.

### 4.3 Key Principles of games-ED in the Learning Environment

- Create a sense of realism (as opposed to fantasy):
  - Provide relevant context that draws the learners into an authentic experience / scenario, so they become part of the learning as opposed to passive recipients.
- Deliver engaging interaction by means of authentic activities (not just playing for the sake of it).
  - Game playing can be a springboard for skills and knowledge, but better still game playing can be the development and practice of skills and knowledge.
- Group level game play where the goal is collaborative problem solving (as opposed to single player games):
  - The learning is inclusive and the game easy to understand, to ensure that everyone participates.
- Provide an anchor for multiple learning conversations:
  - These conversations not the technological interactions should account for the majority the lesson.
  - o Dialogue and articulation of knowledge occurs amongst learners (sub-teams), at the class level and can be educator-led.
  - The educator provides a crucial role, rather like the conductor in an orchestra, keeping the process flowing and providing scaffolding and stimulus as and when required.
- The technology and design needs to be appropriate:
  - The use of a single computer makes the games appropriate for all teaching situations.
  - o Round-based play allows for natural break points to enable group and reflective learning.
  - The teacher uses the computer so that the learning flows and the game doesn't become an exercise in ICT skills.
  - The interface, game play and technology need to play second fiddle to the learning. Time spent moving around an interface or world, might add to the contextualisation, but it can also reduce the amount of time spent actually learning. One of the key problem of commercial games is they can take too long to get into.
- The game needs to work in a learning continuum:
  - Games need to be integrated into the curriculum.
  - o Game play and scores need to feed into an assessment model.
  - The games need to inspire follow on activities / exercises and encourage reflection.

<sup>&</sup>lt;sup>6</sup> games-ED products have built in mechanism to support performance review / understanding of the underlying algorithm (artificial intelligence). The report and score element are clickable. Once clicked a pop-up describes the element and how the its current value has been calculated.

#### 4.4 Marrying up to the Theory

games-ED approach is based around simulations of realistic scenarios, they are played collaboratively and support multiple conversations. Educators are crucial to mediate the flow and legitimacy of the learning. And the products generate scores and reports to support reflective learning.

The remainder of this section uses Herrington & Oliver ideas (describe earlier) as a design checklist

#### 4.4.1 **Authentic Context**

The Interface maps to the situation where the authentic activity would normally take place. In addition, the learning should be complex and sufficiently large in scope to provide realism when problem solving. Learners construct their understanding within this context.

Within games-ED, learners are presented with a dynamic screen that shows the virtual community changing. The game play itself maps to the real world as learners play the role of decision makers (sub-teams in the overall game).

#### 4.4.2 **Authentic Activities**

Along with an authentic context, the programme should enable learners to participate as though they are the experts. It is through simulated authentic activity that the learner becomes immersed in the process of learning.

In games-ED learners are assigned objectives. They have to develop strategy, deal with incidents, make decisions on how to use resources and negotiate with other sub-teams. These authentic activities and context interplay to produce a rich learning environment.

#### 4.4.3 Modelling of Processes and Expert performance

At the core of games-ED products sits the algorithm. It is the algorithm that fires out numbers in response to delegates' decisions. Purchases in the game alter parameters, which in turn alter other parameters. The algorithm 7 and the interface / activities that surrounds it represent the model of the reality. The algorithm is developed with the aid of desk research and interaction with subject matter experts.

#### 4.4.4 Multiple roles and perspectives

A situated learning environment provides the learner with the opportunity to investigate multiple roles and perspectives. Roles and perspectives are brought to the fore by the placing of delegates with sub-teams. Each sub-team has its own report (perspective), but at the same time the whole group is scored collectively (big picture). These sub-teams need to work together to achieve the overall goal (a constructed understanding). It is this pluralism of thought that the learners need to balance to gain a fuller understanding.

Russell Francis (2006), observes similar benefits with a multiplayer game Revolution, the game requires players to take on the roles of carpenters, seamstresses, lawyers, blacksmiths, and field slaves). One player, "Ruth, a 13 year old Caucasian American girl playing Hannah (a virtual house slave), argued that the political dispute over taxation 'didn't really concern us because we wouldn't be getting freedom anyway - whether we fought or not because we were still going to be slaves'. However, she added. 'I've read that Britain would say that if slaves would join them they would give them freedom. And so I could see why they would, that's what concerns them really'."











<sup>&</sup>lt;sup>7</sup> The algorithm is the artificial intelligence that makes the game work and appear "real".





### 4.4.5 Collaboration

From the perspective of the situated learning theory, the decision to run the games-ED as a whole class exercise rather than as standalone software makes sense and adds real value to the experience of learning. The sub-teams need to work together as one team and it is those that do so, that go on to post high scores. Result: learners highlight team working and collaboration on feedback forms.



It is worth noting that this shared experience and the ability to play the game from a different perspective (sub-team) has meant adult learners <sup>8</sup> have voluntarily chosen to do the workshop on more than one occasion. Repeat viewing not only embeds the learning further, but also validates the learning approach.

Game collaboration can have wider benefits. "Social interactions and relationships were seen by some of the interviewed teachers as having been positively enhanced by game-based learning activities in the classroom." Ben Williamson, Futurelab 2009

### 4.4.6 Reflection

A situated learning environment should allow learners to reflect upon a much broader base of knowledge to solve problems. The game anchors the discussion, but the delegates are encouraged to share experiences and knowledge. At the end of the session and after each round <sup>9</sup>, the class is asked to think about the experience from different points of view. The learners are encouraged to build abstractions. Follow-on exercises, either completed as homework or in the next class, allow the learners to further consolidate their understanding and reflect o what they have learned. Follow-on exercises are discussed further in the section on <u>games-ED Pedagogy</u>.

### 4.4.7 Articulation

Dialogue and articulation of knowledge occurs amongst learners (sub-teams), at the class level and can be educator-led. These conversations, not the technological interactions, should account for the majority the lesson. In a workshop, the educator's role is to encourage debate. A key question, as the learners' decisions are keyed into the simulation is, "so what were you thinking when you made those choices?" The group can be encouraged with, "so what do the rest of you think about that?"

The learners often go through a process of transformation and feel able to participate in a way they could not have dreamed of before. This is in part because of the inclusive nature of the exercise, but also because democratising nature of the game - games have a leveling effect: prior knowledge is only partially useful and game format may allow previously disengaged or under performing students to succeed.

### 4.4.8 Coaching and scaffolding



'Many designers of interactive multimedia believe their programs should be self-contained ... Situated learning sees the teacher's role in coaching – observing students, offering hints and reminders, providing feedback, scaffolding and fading, modeling, and so on – as integral to the learning situation' (Herrington and Ron Oliver, 1995).

The role of the educator in games-ED is crucial. As previously stated, the teacher acts rather like the conductor in a orchestra, keeping the process flowing and providing scaffolding and stimulus as and when required. The educator plays the role of the expert, as described in <u>traditional situated learning</u>. To enable the educator to do so, the software supports them. Contextual help is provided, by clicking on screen elements, to enable the educator to discover what makes up the particular element and its current value in the game.

<sup>&</sup>lt;sup>8</sup> games-ED products and approach are based on simulations that have been used in over 450 workshops for adult audiences.

<sup>&</sup>lt;sup>9</sup> Round based play allows the game to be focussed on learning, as it creates natural break points for reflection.



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### 4.4.9 Integrated assessment

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Rather than considering the assessment as an add-on to the course, it should be integrated into learning itself. Integration should not merely be a case of placing multiple choice questions within the learning sequence, instead the learning and assessment is one and the same thing, creating an authentic experience.

Within games-ED the score is a highly motivating device. The decisions that the delegates make are fed into the algorithm and the score is fired out each round as the team endeavors to make the community a better place (in the case of Sustainaville).

The in-game reports can be exported for analysis by the educator and to provide the basis for follow-on reflective / extension work. The reports are aligned to the curriculum, so that they can provide part of the evidence base for broader assessment.

## 5 games-ED Learning Model



divesity, culture and so on.

### **Reflection, Support and Testing:**

- o Learners need to able to reflect and make tacit knowledge explicit. They need to be able to build abstractions.
- o Educators (experts) need to guide and nudge learners as and when required.
- o Assessment should be built into the programe to provide immediate feedback, but also to stimulate further learning.

It is through the interaction of the different aspects of the Games Based Situated Learning Model utilised within games-ED products that wide ranging benefits and outcomes are generated.





# 6 games-ED Pedagogy

The following diagram shows the flexibility of the games based situated learning model when embedded into a educational environment. The game is wrapped around with additional learning activities to form a blended approach.

Traci Sitzmann & Katherine Ely (2010). Identified that serious games need to be implemented in a blended learning environment; those studies that included a mix of training before and after the game activities produced better results when compared to the

games used as standalone training applications. While the study was a meta analysis of other research of mainly undergraduate and post graduates <sup>10</sup>, it seems reasonable to assume that the same is true for all ages.

Matching games-ED products to pedagogic principles (written in bold below) outlines by Becta (2010):

- Inclusion and access:
  - Everyone participates.
  - Only one computer is required.
- Learner engagement:
  - Game based anchor.
- Effective learning:
  - o Learning by doing.
  - o Learning by being.
  - o Active involvement by educators.
- Assessment to support learning:
  - Integrated assessment.
- Robust summative assessment
  - o In game and post game reporting.
- Innovative approaches
  - o Game based simulation.
  - o Group play in sub-teams.
- Ease of use
  - $\circ$  Simple interface and game play.
  - Context sensitive help for educators.
  - Educator packs.
- Match to the curriculum
  - Subject knowledge.
  - o Personal, Learning and Thinking Skills.
  - Cross-curriculum Dimensions.

### Lesson 1: Topic Introduction (Optional)

Opening quiz / exercise (to test initial understanding)

A traditional taught presentation and exercise can be delivered as an initial lesson in advance of the games based learning. The purpose is to introduce the topic.



### Lesson 2: The Game

<u>Three rounds</u> of the game structured around <u>plan > do ></u> <u>review cycle</u>. The game is played at a whole class level, with everyone having equal copportunity to participate. Reflections take place during the rounds and at the end of the game.



### Lesson 3: Follow-on Activities (Optional)

A follow on lesson allows for further reflection. These activities are designed to the needs of different age groups but could include: audit the school / neighbourhood, design a town, create a multimedia diary, develop a presentation, write a perspective piece etc. These activities could be homework.



The game generates a report, which can be used as a basis to examine how the class has performed. It can also provide the base material for the learners to write a report on their experiences. Observational criteria are also provided to judge generic skills.

Together these reports and tools can then be used to inform future learning needs.

<sup>&</sup>lt;sup>10</sup> Learners were undergraduate students in 77% of samples, graduate students in 12% of samples, employees in 5% of samples and military personnel in 6% of samples.



# 7 Benefits and Learning Outcomes

## 7.1 Educational

- Development of subject-specific knowledge
- Engaging, motivational and fun.
  - $\circ$   $\;$  They are not passive and allow learners to explore the situation.
  - $\circ$   $\$  It is seen as fun it's not proper work. Motivates learners including the reluctant.
- $\circ$  Challenging: Enabling learners to think in new ways.
- o Inclusive everyone can participate and succeed, so improves self-esteem.
- o Learning games appeal to different learning styles. Learners remember what they see, here, do AND become part of.
- Supports multiple learning conversations within sub-team, between sub-teams, group level (team level), and with the educators.
- o Provides perspective allow people to see the world from a different viewpoint.
- o Accelerated learning of complex subjects and cause and effect.
- o Supports summative and formative assessment.

## 7.2 Wider

- o Improved social interactions group game play can provide an opportunity to work with new people on a fun task.
- Provides social / generic skills such as listening, communication, negotiation, problem solving, strategic thinking, joined up thinking, and decision-making.
- Encourages collaboration and team working, potentially across subject areas.
- Provides personal, learning and thinking skills (PLTS).
- Develop student teacher rapport
  - Ben Williamson, Futurelab 2009, notes that "rather than seeing games as a 'fun' incentive for learning, they viewed games as an integral part of many young people's lives that it is the teacher's duty to understand and to engage with in the classroom".
- o Connects learning to the wider world. Supports <u>Cross-Curriculum Dimensions</u>.
- o Improves self-esteem by providing a different way to succeed.

### 7.2.1 games-ED supports Personal Learning and Thinking Skills and Cross-curriculum Dimensions:

Per	Personal Learning and Thinking Skills Cross-curriculum Dimensions			
0	Independent enquirers: Research and problem solving skills are developed and refined. Pupils play different roles and need to understand other perspectives to succeed.	0	Global Dimension and Sustainable development: our Sustainaville learning game directly looks at this dimension. Healthy Lifestyles: YP First and Sustainaville consider	
0	effect. They work with others to see the big picture and make connections.	0	<b>Community Participation:</b> games-ED shows how participation underpins sustainable communities.	
0	<b>Reflective learners:</b> games-ED supports reflective learning when analysing results and during extension work. The game provides a basis for formative assessment	0	Creativity & Critical Thinking: see PLTS. Enterprise: games-ED provides an understanding of the economy including how skills & education underpin growth.	
0	<b>Team workers:</b> the learning games are structured around sub-teams, collaboration is key to success in the learning game.	0	Identity & Cultural Diversity: We are still working on this dimension. Technology and Media: games-ED sometimes deals with	
0	Self-managers: We are still working on this. Effective participants: the learning games provide a broader world view (see CCD). They develop communication & negotiation skills.		contentious subjects, which are discussed in the media. We are still working on this dimension	



## 7.3 games-ED and the RETAIN Model

The Relevance, Embedding, Transfer, Adaption, Immersion and Naturalisation (RETAIN) Model was developed by Glenda A. Gunter; Robert F. Kenny and Erik H. Vick (2007) to:

1) Support game development, and

2) Assess how well educational games contain and incorporate academic content.

The following table considers game-ED from the perspective of the RETAIN model:

Element	Description	Games-ED Narrative / Level <sup>11</sup>	Weighting	Total Score
Relevance	<ul> <li>i) Presenting materials in a way relevant to learners, their needs, and their learning styles, and</li> <li>ii) Ensuring the instructional units are relevant to one another so that the elements link together and build upon previous work.</li> </ul>	<ul> <li>The games are developed with an educational focus and support teacher involvement.</li> <li>The learners have sub-team missions and are judged with a collective score.</li> <li>The games support <u>cross-curriculum dimensions</u> and are set in a situated context (virtual community).</li> <li>The games can be played by different age groups through the provision of different in game and tailored activities.</li> <li>The games are motivational and encourage reluctant learners.</li> </ul>	1	3
Embedding	Assessing how closely the academic content is coupled with the fantasy/story content where fantasy refers to the narrative structure, storylines, player experience, dramatic structure, fictive elements, etc.	<ul> <li>Level - 3</li> <li>The games and related activities are linked to the curriculum.</li> <li>The game places learners in roles and provides perspective on the virtual and ultimately real world.</li> <li>Learn by being allows learners to develop a wider understanding and beliefs.</li> <li>The games narrative and score also keeps the learners interest.</li> <li>Level = 3</li> </ul>	3	9
Transfer	How the player can use previous knowledge and apply it in other areas.	<ul> <li>The educator is actively involved in the learning process and can offer scaffolding and inspiration.</li> <li>The graphics and game play are designed to develop / support multiple learning styles.</li> <li>The game develops personal, learning and thinking skills, which can be used in other contexts.</li> <li>The round structure with their plan &gt; do &gt; review phases builds knowledge during the lesson.</li> <li>Articulation of decision-making at the end of each round and at the end of the game enables tacit knowledge to become explicit.</li> <li>Group level play enables knowledge to shared amongst the learners.</li> <li>Level = 3</li> </ul>	5	15
Adaption	A change in behaviour as a consequence of transfer.	<ul> <li>Utilises prior knowledge and support.</li> <li>Multiple perspectives and drivers are embedded into the game play and build "realistic" decision-making environment.</li> <li>Feedback is provided within the context of the <u>plan &gt;</u> <u>do &gt; review phases</u> and challenges understanding and develops new ways of thinking.</li> <li><u>Games Bases Situated Learning</u> is a constructivist learning approach that creates a shared learning experience.</li> </ul>	4	12

<sup>11</sup> Each of these aspects can be divided into four levels: 0, 1, 2 and 3. Level 0 means the game design does not meet that aspect, while Level 3 indicates there is a strong correlation between the game and that necessary aspect.

<sup>12</sup> The final aspect of the rubric is the weighting of each aspect. Gunter and colleagues have ordered the aspects by importance. From least to most important, they are: Relevance, Immersion, Embedding, Adaption, Transfer and Naturalisation.

# **Games Based Situated Learning**



Element	Description	Games-ED Narrative / Level <sup>11</sup>	Weighting	Total Score
		<ul> <li>The game sits within a <u>larger lesson structure</u> that can develop initial knowledge and / or take the learning further.</li> <li>Level = 3</li> </ul>		
Immersion	The player intellectually investing in the context of the game.	<ul> <li>The graphics and game play immerse the learners in the experience but do not distract from the learning process.</li> <li>The learners have to play a role and work with others to deliver mutual goals.</li> <li>Considers subjects from a wide viewpoint linking to cross-curriculum dimensions enabling beliefs to be created.</li> <li>Level = 3</li> </ul>	2	6
Naturalisation	The development of habitual and spontaneous use of information derived within the game.	<ul> <li>Develops learning styles, visual processing and speed of cognitive responses.</li> <li>The games are built round cause and effect. The narrative is structured around multiple perspectives and competing drivers. The learners need to assimilate this information and make decisions.</li> <li>The round structure with their plan &gt; do &gt; review phases enables the learners to develop the skills through a process of repetition.</li> <li>The <u>Games Based Situated Learning Model</u> accelerates the learning process by enabling players to learn by doing AND learn by being. Learners become efficient users of knowledge and can use it in other situations.</li> </ul>	6	18

# 8 Conclusion

Games Based Learning is gaining a lot of interest and admirers. It can provide significant benefits and generate dramatic learning outcomes, particularly in the context of a blended deliver approach. Games Based Situated Learner places a theoretical rigour to the learning approach. It provides guidance for developers and suggests how to get the most out of the products in educational settings.

Much of the criticism of Games Based Learning, and there is some, is levelled a commercial games that have been used "as is" or have been slightly modified. Purpose built games should not suffer from flaws such as being more about fun than understanding and not linking to the curriculum, but developers need to think seriously about the logistical issues of educational usage. Games need to modified / designed to work in classroom both in terms of content, in terms of time and technology. Are those fancy 3D graphics and soundtrack necessary? Do they add to the learning? Will they run on school computers? If the game is a standalone game, then it will require a trip to the IT suite. And if does, can we truly say that games are being used in the classroom.

If educators are to take a leap of faith, then developers need to meet them halfway. Developers cannot expect decades of good teaching practice to be thrown away. Games Based Situated Learning needs to support the evolution of teaching and not require a revolution.



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