

## **MSc in e-Learning – Introduction to Digital Game-Based Learning – Synoptic Essay Austin Tate – 11<sup>th</sup> April 2012**

### **Aims on the Course**

My studies have been given focus and structure by concentrating on a wide range of mainly space-themed games throughout the semester. These are of intrinsic interest to me, and the serious games examples are of professional interest. I want to explore the ways in which simulations and game like immersive experiences can be effectively utilised in community training situations for the general public and for professionals concerned with emergency situations and resilience.

### **Background as a Game Player**

I would characterise myself as someone interested in those types of games, and indeed literature, art and movies, which imagine a future technological setting. From an early age I have read science fiction such as the E.C. Elliott's "Kemlo" series of books. I like the creatively imagined worlds in novels like Larry Niven's "RingWorld". The detailed realisation of Pandora, its geography, flora and fauna by James Cameron (2009) for the film "Avatar" is a good example of the detailed imagination and background hard science that goes into the creation of an imaginary "other world". For me this detail and level of potential immersion in the film or its associated media and games is very appealing.

I have used collaborative social computer systems since the early days of MUD/MOOs and have used virtual worlds like Second Life in my professional work. But my use is mostly for collaborative meetings. Except for joining in emergency response training exercises in virtual worlds, I tend not to use them in a game fashion. So I have been exploring such uses alongside my classmates.

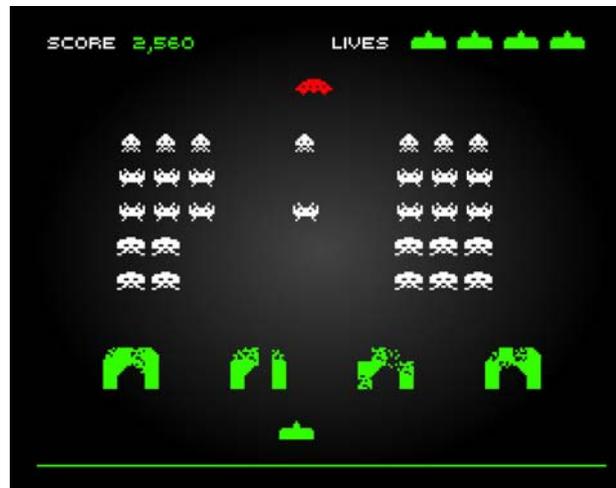
I find the social element in games is most engaging for me. Games which allow for content extension hold my interest more, and this can involve creating the environments and craft used in such games. That's what appeals to me about Flight Simulator and Second Life for example. I will spend more time creating things than actually "playing" with them. A nice snapshot of the result is usually my reward.

### **Space-Themed Games for Learning**

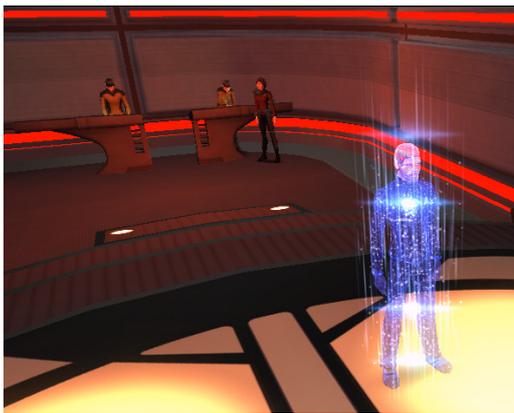
Space-themed games are popular and range from the very earliest console games with simple graphics such as Space Invaders and even non-graphical "in the mind" space adventures such as Spacewar (Brand, 1972), to modern immersive multi-player games such as Eve Online, Star Trek On-line, Entropia Universe, and the latest environments such as Star Wars: The Old Republic.

Space agencies such as NASA and the ESA have recognised the potential of space-themed games to act as a basis for awareness of their activities, and educational engagement with a variety of age groups and learner levels. They focus on topics which can be broadly

categorised as STEM education: Science, Technology, Engineering and Maths. Throughout the course, I have been exploring the genre and the educational usage.



*Space Invaders* circa 1978 – [http://en.wikipedia.org/wiki/Space\\_Invaders](http://en.wikipedia.org/wiki/Space_Invaders)



*Star Trek On-line* circa 2008 – Cryptic/Perfect World – <http://www.startrekonline.com/>



*Entropia Universe* circa 2012 – Mindark – <http://www.entropiauniverse.com/>

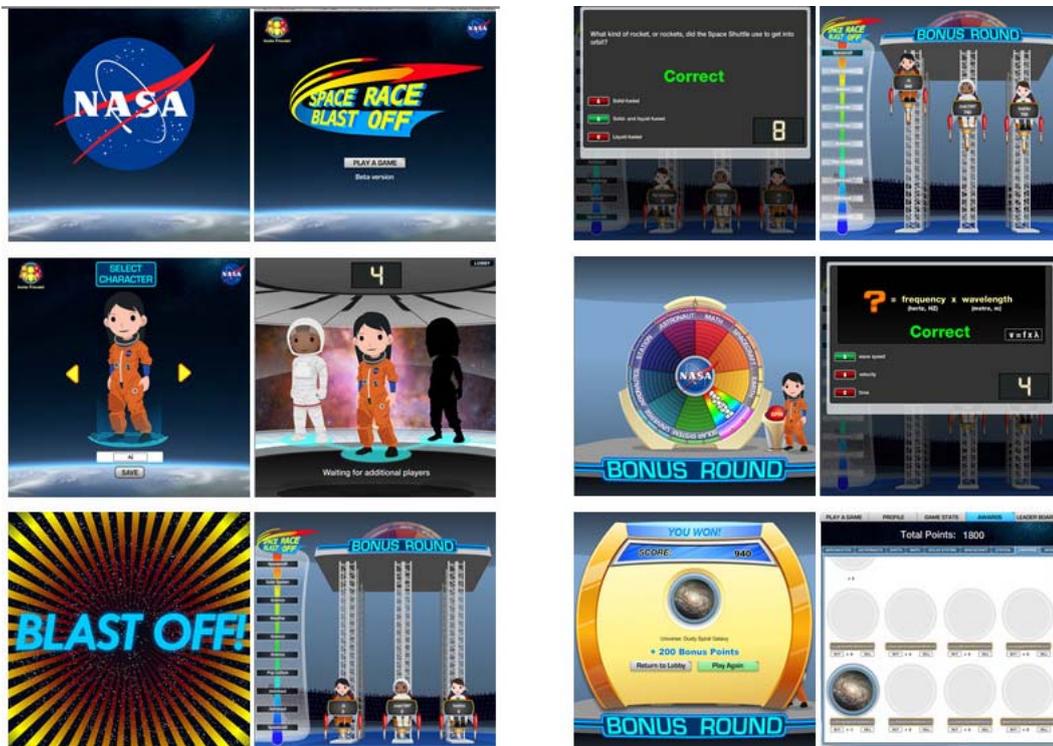
My IDGBL blog indicates the wide variety of space-themed games I explored during the course. These games ranged from simple quizzes for school age children, through realistic and mathematically demanding space flight and orbital simulators, MMORPG environments, to educational virtual worlds created by or for the main space agencies. One of these is NASA's MoonWorld, which I chose for my IDGBL course game review.

Fantasy themes, especially when "neat toys" are involved, also engage my interest, and some role play areas with a Lord of the Rings or Avatar Movie theme are therefore of interest, and the basis chosen for my IDGBL course game design. It was not surprising that I also found aspects of World of Warcraft, a game which was new to me, interesting. Strangely, given my interests, that was my first MMORPG game experience. Perhaps because of the time and commitment such RPGs demand, I had not engaged with any example on more than a demonstration basis previously. I will return to the consequent time demands, level of immersion, and potential over indulgence later in this essay.

My studies on the course brought me in contact with a number of fine examples of NASA's educational games, so that is where I will begin this summary of my explorations.

### NASA's Space Race Blast Off Quiz

To engage younger children in science activities in a fun and graphically colourful environment, NASA created a web-based game to test knowledge of science, maths and technology for younger children. The questions are in a range of categories and levels.



*Space Race Blast Off – Facebook App – <http://apps.facebook.com/spacerace>*

Space Race Blast Off is a good example of simple Q&A in a mildly competitive environment, which seeks to open up interests, give anecdotal information, and engender an excitement for the science and technology being covered. Rewards for various levels of achievement are built into the game design, and high scoring players get interesting rewards as more probing questions are revealed to them progressively.

### NASA Moonbase Alpha

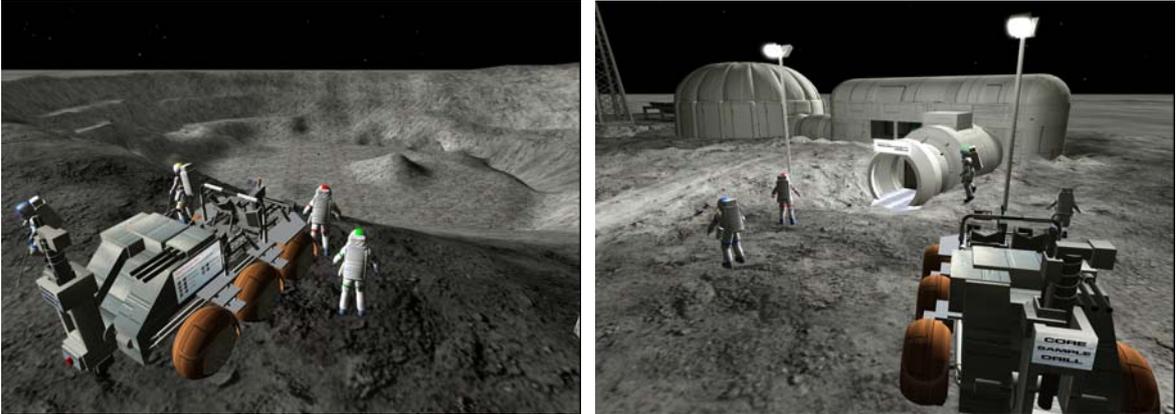
“Moonbase Alpha” was created for NASA's Immersive Education programme and provides a game scenario with 20 minutes of play set on a hypothetical lunar outpost in a 3D setting. This is a proof of concept to show NASA content – lunar architecture in this case – to produce a fun game and inspire interest in STEM. This is a serious simulation depicting real equipment and resource usage is accurately modelled. The game has a social element involving team preparation, role specific activity during the Moon EVA, and post mission de-briefing.



NASA Moonbase Alpha Typical Mission – <http://www.nasa.gov/moonbasealpha>

## MoonWorld - Virtual Fieldwork for Planetary Geology

MoonWorld (Ruberg et al., 2009) in Second Life – <http://moonworld.cet.edu/> – is a space-themed virtual field trip style game encouraging the study of rocks and geology. It provides a lunar simulation in a 3D virtual environment. The instructional goals include using evidence gathering and analysis to understand how impact craters form and how their spatial relations with other landforms can be interpreted in terms of the stratigraphy and history (Reese, 2008).



*Moon Mission – Team Pythagoras – Timocharis Crater – 24<sup>th</sup> January 2012*



*Debbie Denise Reese (developer and educator) leading a training mission for Austin Tate*

A great deal was learned by me early on in the IDGBL course by exploring the game (Tate, 2011), and interacting with the developers. My explorations also involved leading an expedition of fellow course members into MoonWorld, and reflecting on the application of the Gee (2007) learning principles afterwards. The participants felt that most of the Gee principles applied to MoonWorld, the exception being those concerned with cultural learning. The players represent themselves, but in an imagined astronaut “projective identity”, a positive learning principle identified by Gee (2007, Chapter 3, pp. 54-55). MoonWorld provides a superb example of the use of scaffolding via introductory tasks, gradual introduction of the tools required for the tasks, and confirmation of evidence of the proper operation of the articles (Wood et al., 1976; Bruner, 2012).

### **ESA – Europa – Online Game technology for Space Education and System Analysis**

ESA has also been developing educational games. Mindark's Entropia Universe team worked with ESA on a learning environment situated in a simulation of a base on Europa, a moon of Jupiter (Mindark, 2009).

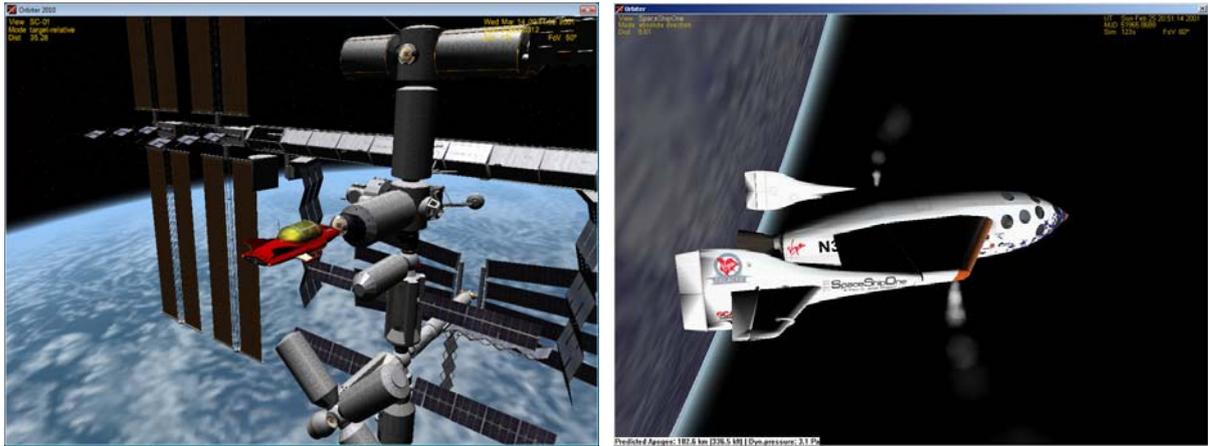
The study was performed to assess options for ESA to use online game technology in the areas of outreach, promotion, education and collaborative engineering. The ESA Final Report (2010) noted the potential use of many of the learning principles we have been exploring on the course. Situated and social elements of learning are stressed.



*Screenshots from ESA's Europa Project using Entropia Universe*

## UCL Orbiter

“Orbiter – Space Flight Simulator” created at UCL is a realistic simulation, using real world physics to provide an educationally informative environment for flying spacecraft near the Earth and beyond. Mission planning, along with realistic take-off loads, fuel weights, take off timing and trajectories have to be planned in the advanced modes. But Orbiter can also be used in “fun” mode with lots of assisted flight control.



*Screenshots from UCL's Orbiter – Supercar Docked at ISS and SpaceShipOne*

Orbiter is perhaps the single space-themed game used during my studies which most directly aims to teach maths and related topics. It is a difficult game to use unless you address fundamental constraints on space flight. I found that frequent reference to the manual was required to perform even basic operations such as point of view selection, camera movement and basic space craft operations. This was in spite of the fact that I had used Orbiter before, and even developed a spacecraft for it a decade ago. In terms of some of the other games used here, it is poorly scaffolded, and introduces its full complexity right away even to a user dropping into a demonstration scenario. It is also a solitary game, unless you become part of the development community, an aspect of games appeal and educational usage which should not be ignored.

## Second Life – Virtual Worlds for Space-themed and Fantasy Role Playing Games

Second Life is a general purpose virtual worlds platform based on the same principles as MMOs. Its regions can be themed in many ways (Voyager, 2011). It has been used for a very wide variety of different role playing games for professional and recreational uses. Users may have a variety of avatars all managed within the same account and sharing an inventory of resources. Examples of my own Second Life avatars are shown along with links to my MSc studies of Avatar Identity and Projective Identities (Gee, 2007)



*Personal Avatars in Second Life – Avatar Identity and Projective Identity Studies*

<http://atate.org/ai/ai/> and <http://atate.org/ai/pi/>

### **Second Life – Avatar-themed Role Play Games**

I have had a “Na’vi” avatar in Second Life for some time, but for this course, I revisited Pandora to explore the community and social aspects which I wanted to explore more seriously during my IDGBL studies. I joined a clan and was initiated into its training programme. Quite different to the wandering solo character I had up to that time.

Kane (2005) and his reference to Sutton-Smith's (1997) “rhetorics” struck some chords with this experience. He describes the ancient and modern visions of learning with a description of an ancient “at the feet of masters” style with initiation, rites of passage, formal training, etc. This is a style of learning where the individual chooses to conform and join in voluntarily to get the social bonds and sense of belonging that can lead to enlightenment.



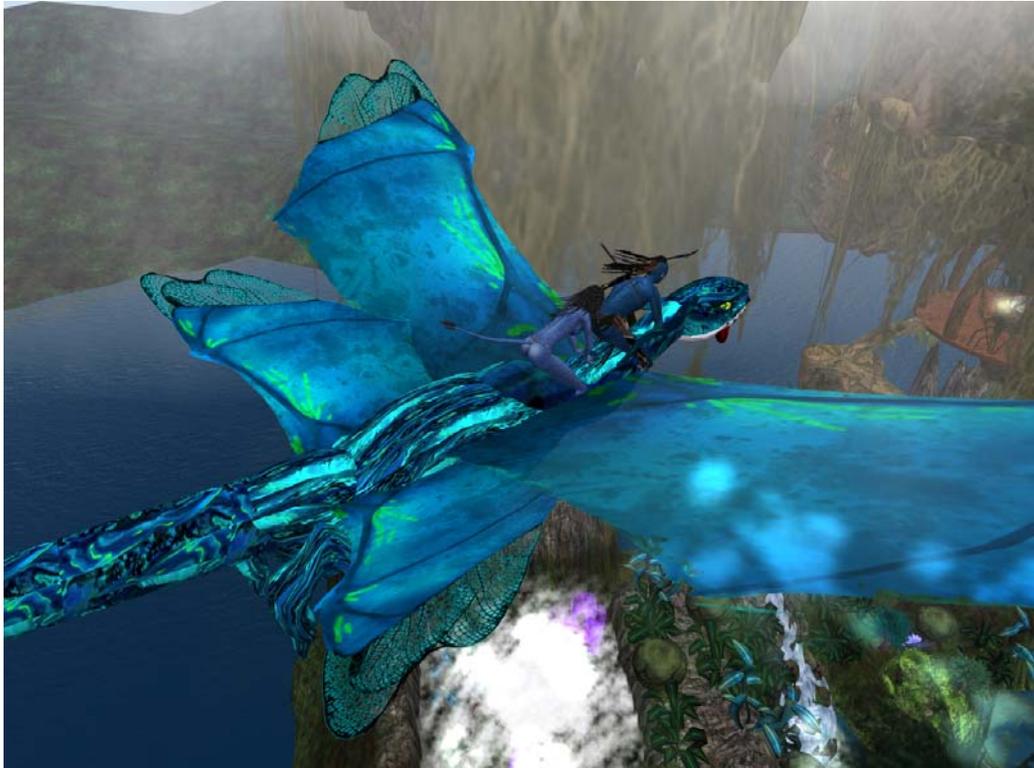
*Pandora – Na'vi Role Play Areas*



*Na'vi Omatikaya Clan - Ai'tswayon joins the Path of Learning*

Na'vi people challenge themselves in various ways. One ritualistic challenge (as in Kane, 2005) taken by mature Na'vi males and females when they have attained sufficient skill is to climb the dangerous route into the floating mountains and to ascend to the platform where the unbonded ikran roost. Once a Na'vi is bonded with an ikran that bond is for life. The challenge requires agility, navigation, daring and environmental knowledge to complete. There are

dangers, and failure can lead to social embarrassment and longer retraining periods. This is an example of the sort of training experience given to young natives in many cultures to learn necessary skills amongst their peoples, for personal well being, and for the good of the society.



*After the ceremony Ai'tswayon (Ai Fly) and his ikran Ai'tsyal (Ai Wing) fly over Pandora*

### **Fantasy Role Play – World of Warcraft**



World of Warcraft is a prototypical example of a role playing game with a fantasy theme and a vaguely medieval flavour. It is strongly quest and objectives based. I quickly identified (Gee, 2007, pp. 53-54) with my character “Aithun” and took some pride in his appearance (Warburton, 2008), fixing the patches in his initial set of clothes as soon as possible, and choosing colours and garb which in some cases offered less protection than less appealing colours for tabards and cloaks. I found that I was motivated by specific objectives, such as gaining a Grizzly Bear companion – from seeing the introductory movie. I wanted to travel far and wide via multiple modes of transport – on land with a ram mount (appropriate to the dwarf race), by air on a gryphon and ‘copters, by ship over seas, and underground on trams.

World of Warcraft has all the key elements of engaging games identified by Malone (1981) as being intrinsic motivators: challenge, fantasy and curiosity.

I can see that very many of the learning principles Gee identifies apply very strongly indeed in World of Warcraft, and the game gives an educator very many ideas for how to employ those principles in a game-oriented experience. But I am less positive about the use of World of Warcraft itself for education directly. Second Life (and the open source OpenSimulator) are more flexible platforms in which to base an educational game orientated experience. However, World of Warcraft as Gee (2007) notes is a fantastic example employing really well designed scaffold activities and engaging experiences at both an individual and community level.



*Travel in World of Warcraft via Mounts and Ships*

One of the main features of World of Warcraft is its social dimension, and this was explored on the IDGBL course both in world with a number of collective quests and travels, and via use of external social media.

World of Warcraft is a game that demands a lot of time, and is very immersive (Murray, 1998). As I played, I could detect early signs of over use, similar to when I get engrossed in Sony's Gran Turismo car race game on the PlayStation... each iteration of that has absorbed a lot of my time until I "complete" it. I frequently joke that when the next version comes out I will have to retire to allow the time it demands. My wife thinks its not a joke at all. This encouraged me to use the opportunity of the IDGBL course to study a little of what others have found with game immersion and the early stages of addictive behaviours.



*IDGBL Party in World of Warcraft*

## **Game Engagement, Immersion, Flow, Obsession and Addiction**

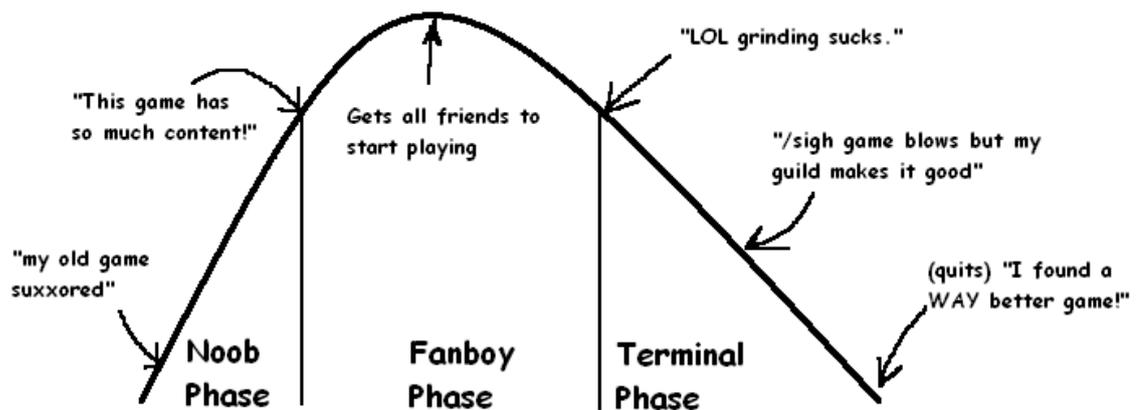
We hope that we can engage learners in a game-like educational experience to have beneficial learning outcomes. We know that some people can be deeply immersed in a game (Murray, 1998, Chapter 4) and can even experience the time-bending state of “flow” as they play (Csikszentmihalyi, 1991; Wikipedia, 2012). But what if it all becomes too much as reality is lost, and the virtual takes over (Jewels, 2002). Studies by Chou and Ting (2003) suggest that consumers who have experienced flow are more likely to become addicted.

Vijay Nagaswami (2001) in “The Hindu” observed:

“Most human beings pass through periods in their lives, when they feel compelled to engage in some apparently mindless activity that, for the time being, seems to provide some relief from the prevailing chaos in their lives. This could be something as simple as spending hours in front of the television set. Or going on uncontrollable buying sprees just to feel and smell the newness of the product. Or getting into a series of dead-end relationships. Or going on eating binges. Or playing computer games, uncaring of unattended work piling up. Or playing snooker every evening at the club regardless of

the family's legitimate demand for more attention. In other words, binging on anything potentially destructive to the body or the soul. Fortunately for many of us, after a period of this compulsive indulgence, we pull ourselves back to the mainstream and get on with our lives, until the next compulsion hits us.”

### Vicious Lifecycle of MMORPG Addiction



*MMORPG Addiction Figure from Blog by Jon Radoff (2011)*

But Jon Rodoff (2011) in his blog thinks the figure above, arising from experience in World of Warcraft and other games, illustrates that MMORPGs, as currently designed, have built-in mechanisms that result in player burnout. However, obsessive tendencies in some of our learners may be activated. It is important for educators using game experiences in their courses to watch out for over use and the sinking of too much time into some elements of the experience.

### **Gee Learning Principles, Scaffolding and Takeaway Lessons**

Throughout the course I sought to be mindful of the 36 learning principles identified by Gee (2007) as being factors that could be utilised from effective game experiences to be used more broadly in education. As a way to better understand the application of the principles, and how they applied in the various games I experienced during the IDGBL course, I created a survey in Google Forms at <http://atate.org/mscel/gbl/gee-36-survey.html> to be used to rate how well each game used the principles. Initially I used this to get feedback from participants in the MoonWorld mission and modified it to become an element of my Moon Bloom game design feedback and evaluation proposals. But mid course I made a more general version I could use for personal review of a number of other game experiences. This let me refine my own ideas of the principles themselves, and critically consider where they were used and which categories were applied well. This was a useful mechanism to keep them at the forefront of my mind as we explored a range of games.

During the course, I grew to appreciate more the value of Gee's principles as I reflected upon them in this way, and a strong "take-away" for me in the IDGBL course is this set of principles and how they might apply to my professional interests in scenario-based training.

Scaffolding in World of Warcraft gradually introduces an increasing challenging environment, and there are always quests to take on while social interactions naturally occur. The experience of using really well scaffolded activities in several games such as World of Warcraft and NASA's MoonWorld, and the negative experience in this respect in Orbiter, allowed me to employ some of these principles in my own game design for Moon Bloom. This was a positive reinforcing exercise that will be good reminder of these principles in learning and simulation environments I am involved in for the future.

### **Acknowledgements**

Thanks to Debbie Denise Reese at CET for spending so much time with me in NASA's MoonWorld. Thanks to Joachim Fuchs of ESA who led their Europa study with Mindark. I previously worked with Joachim on the ESA Optimum-AIV Planner for Ariane rocket launchers. The support and enthusiasm of follow course members and other role playing gamers in the communities I have experienced is also very much appreciated. Very many thanks indeed to Hamish Macleod, our tutor on IDGBL course, for his probing questions, enthusiasm and help with those tough Orcs.



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