The Application of Game Mechanics to a Virtual Learning Environment (VLE)

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With a handful of ribbons, I can conquer all of Europe

Napoleon (Unverified)

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Thank you all.

Abstract

The use of Virtual Learning Environments (VLE) within schools and universities is both widespread and increasing, however problems of low learner participation in these systems persist. This lack of participation is surprising given the potential shown by systems providing analogous services outside of the academic world, loosely connected under the banner of Web 2.0. In contrast to many e-learning systems, videogames are known to be both highly engaging and motivating to people from all walks of life.

This paper examines how the mechanics of games are employed in motivational ways, both within games and beyond. The effects on participation produced by the integration of game mechanics within a VLE system are investigated using two versions of a custom built VLE (York Assembly), one with integrated game mechanics, and a two group, between subjects experiment conducted with 107 participants taking a single module at York University, over 8 weeks in the summer term of 2009. The student experience is also compared using a combination of questionnaires and interviews.

The experiment shows that game mechanics can have a positive impact on student participation within VLE systems, but the results also suggest deeper problems of participation which cannot be addressed by game mechanics. Discussion of which aspects worked (and which did not), and recommendations for further study are also presented.

Contents

(1) Introduction

The use of Virtual Learning Environments (VLEs), defined here as *a virtual web-based service to support the teaching process* (see Section 2.5.2 for more), is seemingly ubiquitous, particularly within higher education with the majority of academic institutions using some form of this technology [Dale and Lane 2007, Weller 2006]. However despite these high levels of uptake, and indeed the general levels of hype which surrounds this technology [Catherall 2004], student participation within these systems is often low [Dale and Lane 2007, Hramiak 2007, Schroeder and Greenbowe 2009], and the student experience often unsatisfactory [Greener 2007].

In contrast to these at best mixed results for VLE participation, is the high levels of participation in web based systems offering related services outside of the academic world, loosely connected under the dubious banner of Web 2.0 (see section 2.4.2), where collective effort has created an encyclopaedia beyond the scope of anything previously possible in Wikipedia, and students are so engaged in the social network Facebook [Jones and Soltren 2005], that this usage can in some cases become pathological [Ryan 2008]. University of Maryland lecturer Kent Norman describes this phenomenon eloquently;

> *Before class starts, I often scan through the screens to see if the students are logging into the classroom network and the electronic learning management system that I use called "Hypercourseware". The majority of students will have a browser window open to a Facebook page. Many will continue keep that window open, even during lectures and class discussions. [Norman et al 2009]*

Moreover, the levels of engagement produced by videogames is also clearly at very high levels [Malone 1981, Littleton 2006], and indeed videogame usage also has the potential to become an addiction [Hauge and Gentile 2003]. This power which videogames seemingly have to motivate play, is one which is often employed by organisations in contexts beyond the world of gaming itself. Common examples such as Microsoft making a game out of bug testing Windows Vista [Edery and Mollick 2009], the U.S. Army using games as recruitment tools [Nieborg 2004] and Google using games to motivate people to label images [Robertson et al 2009], are all indicative of the motivational power of games, a power often viewed with jealous eyes.

In light of this apparent commonality in engaging qualities exhibited by both Web 2.0 services and videogames, this paper will examine an aspect of games, *Game Mechanics* (defined here as *feedback loops of player interaction*, see section 2.2.2), which it will be argued are not only central to how games motivate play, but are also a key factor behind the engaging qualities of Web 2.0 services, services which motivate contributions to virtual communities. However the central purpose of this examination is to show how game mechanics could be employed within the context of a VLE, to improve levels of participation within these systems.

Participation however, is not an entirely straightforward concept. In particular there is a sense in which someone who does not *contribute* to an activity, can still participate in that activity, if they are *engaged* with it, such as someone at a business meeting who is attentive and thoughtful, but does not say a word. This person has the state of mind of being *engaged* with the activity, without the visible outward signs of what we might commonly call participation, but perhaps more accurately call *contribution* [Zefrank 2008]. The interplay between these two aspects of participation, *engagement* and *contribution*, is clearly blurred, and this paper will not delve too deeply into the bottomless pit of this abstract world (we have other pits to explore!), however it is useful to operationalise the nature of participation into these two (admittedly indistinct) concepts. In particular, in terms of a virtual community of the kind seen in Web 2.0 services, and indeed an aspect of the nature of a VLE (See section 2.5.2), although engagement is valuable in own right, it is the *engaged contributors* who create real value to these services.

In terms of the videogames this paper will now examine, engagement is normally the highest priority, with the contributions of players often relegated to the sidelines of modding[1] communities, except in the case of games which share as many characteristics with virtual communities as they do with other games, such as World of Warcraft [16]. It should be noted that the primary interest in this paper is with computer based games, however the discussion widens at points to consider games in a more general sense. The use of the term videogames is intended to clarify where the context of the debate is in question. However for the sake of brevity, this paper will use the term *games* to mean games of the computer and video variety.

1 A slang expression often used to describe the modification of videogames to other purposes

(2) Literature Review

This literature review explores the nature of games (Section 2.1) before examining the elements which comprise them (Section 2.2) including a detailed look at game mechanics in particular (Section 2.2.2). These definitions facilitate an exploration of the motivational power of games, and how this power is tied up within game mechanics (Section 2.3). This initial work is then used to consider how the mechanics of games can be employed in contexts beyond gaming itself (Section 2.4), beginning with consideration of how a game mechanic could even exist outside of a game, before examining how game mechanics are employed in Web 2.0 services. The review concludes with a look game mechanics in a VLE (Section 2.5), considering why game mechanics are a suitable fit for e-learning software, what a VLE actually is, and the problems and possibilities of applying game mechanics in that particular context.

(2.1) What Are Games?

In order to investigate the mechanics of games, this project must first take a step back to explore what is meant when we describe something as a game, before examining how it might come to have mechanics. This discussion is an inevitably abstract one, however it is not the intention of the author to pursue the nature of games beyond the frame of reference, which hopefully this section will provide.

Clearly the range of phenomena which could be described as games is so vast that any definition will either struggle with borderline cases or be vague beyond real meaning. Indeed, Wittgenstein famously used the concept of game as a exemplar case of the undefinable [Juul 2005], suggesting that games are a family with no one feature common to all, and that attempts to define the concept are futile. This guidance has not prevented many academics and game designers from attempting to do just that [Juul 2005, Salem and Zimmerman 2004, Crawford 2002, Koster 2004] and while this paper will not follow suit, some discussion surrounding this issue is necessary to provide background to later work.

The most natural starting point would seem to be the relationship between games and play, a discussion most appropriate in English, since many other languages including French and Spanish make no such distinction [Gonzalo 1999]. The language problem is heightened by the notion that games are played, hence the use of the phrase gameplay. In addition, the two main threads of John Huizinga classic definition of play; as a "*free standing activity quite consciously outside of 'ordinary' life*", are also true of games, creating a further difficultly in distinction. These components could perhaps neatly describe play as being an *autotelic* activity (literally a self-goal), and existing within the *magic circle*.

In addition to both games and play being intrinsically rewarding activities, the concept of the (somewhat mythical) magic circle is a central concern for many would be definers of games. Salem and Zimmerman describe it as "*the border between the game and the real*

world, a finite space with limitless possibilities", for example the magic circle of a football match is the playing field within the timeframe of 90 minutes. However the *limitless possibilities* of this definition conceals the crucial difference between play and games, the nature of the rules.

Whilst even children's play may have (often subtle) rules, the difference with game rules is that in free-play, rules do not determine the outcome of the activity, or put more plainly, the rules of games determine both the winners and losers [Vikhagen 2001]. This outcome produced by the rules leads Juul [2005] to suggest that games should be viewed as *half real*, existing within the fictional world of the magic circle, but defined by rules which create the reality of a *variable and quantifiable outcome* which players are *emotionally attached to* (winners and losers). Game rules restrict the possibilities of play in a manner which Juul suggests is illogical, but goes on to argue that it is precisely these rules that make gameplay more meaningful than free play [Juul 2005].

The additional reality provided by a quantifiable outcome is only one aspect of why rules are so central to the nature of games, in that the rules create both the goals of the game, and the challenge of achieving them, by limiting actions to a small subset of what might otherwise be possible during play. Crawford [2002] (who defines games in terms of a series of dichotomies, see Figure 1) contends that the distinguishing features of games are goals and conflict.

Figure 1: From toys to games, adapted from Crawford 2002

The requirements that games have both *goals* and *conflict* presents a problem for Crawford's definition with the apparent exclusion of titles which would generally be thought of as games. The Sims [13] (and by implication its relations; SimCity [10], SimEtc.) despite being generally considered to be one of the highest selling games of all time [Walker 2002], is described by both Crawford (and the games creator Will Wright [Wright 2007]) as a '*software toy*'. These *simulation* games have no overriding goal for players to reach for, rather the open-ended gameplay allows players to strive for their own '*emergent quantifiable goals*' [Salem and Zimmerman 2004], or as Juul [2005] suggests, they do not describe some possible outcomes as better than others. Likewise Solitaire, despite being the game which seemingly everybody has played, clearly has no obvious conflict, and is therefore considered a puzzle by Crawford's definition.

These exclusions are indicative of a problem with defining games from perspective of the game designer, as both goals and conflict are highly subjective in regard to players. Most single player videogames involve a 'conflict' with an artificial agent, which may be considered by new players to be actively in conflict with them, but after a time, this conflict

becomes reduced to an appreciation of the algorithmic processes at work, and the game becomes a puzzle. Likewise a game can still be played with as a toy, if the player ceases to care about the goals of the game.

The process by which games naturally fade away from player consciousness is elegantly discussed by Koster [2004]. Koster's definition of games as "*iconified representations of human experience that we can practice with and learn patterns from*" is important because it emphasises that games are about learning, and more specifically pattern recognition. Games are essentially exercises for our brains and do not last forever, once the pattern is grokked[2], the game is discarded. This definition suggests that games are not radically different from other activities, as most aspects of our lives can be reduced to puzzles. However the importance of games is that they provide a safe and abstracted space (magic circle) and a simplified formal system (rules), which allow us to see the patterns our brains are hardwired to seek [Koster 2004].

(2.2) The Mechanics of Games

Given the elusive nature of games, this section will investigate the elements which comprise them, in an attempt to bring some much needed structure. Two common frameworks are examined; The MDA [Hunicke et al 2004] and Rapid Analysis Methods [Järvinen 2007], finishing with a brief look at the player of games. The discussion then narrows to examine the nature of game mechanics in particular, as a framework for their application beyond the world of games.

(2.2.1) Elements of Games

The widely cited MDA Framework [Hunicke et al 2004] presents a formal structure for the understanding of games by separating them into three constituent parts; Mechanics, Dynamics and Aesthetics. Mechanics (discussed in detail in the next section) are defined as the possible actions and behaviours afforded to the player within the game context. Dynamics are defined as the run time behaviour of the mechanics, in response to player inputs over time, but perhaps less formally refer to the dynamic behaviours on the part of both the system and the player, created by the game rules. The perhaps confusingly named Aesthetics is defined as all the elements that make a game fun, and is further divided into different categories of fun[3], including fantasy, discovery and challenge. Figure 2 shows the interplay between these components, from both the player and game designer perspective.

2 - Grokking is a profound form of understanding coined by Robert Heinlein in the novel *Stranger in a Strange Land* [Koster 2004], and often used in relation to videogames

3 - The MDA actually suggests 8 types of fun, although (perhaps in expectation of ridicule) the list is not intended to be complete

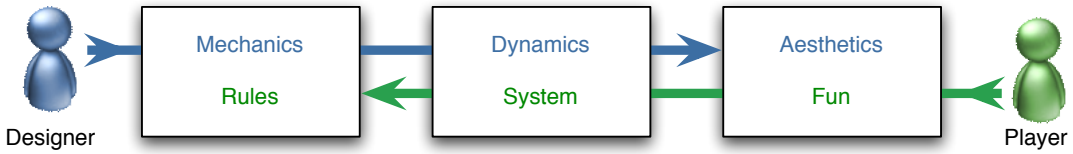

Figure 2: The MDA Framework, adapted from MDA [Hunicke et al 2004]

A less formal description of the interplay between these components would be that the underlying mechanics (rules) create dynamics (behaviour) which in turn creates aesthetics (fun). Using a poker example, the mechanic of betting creates emergent dynamic behaviour such as bluffing, or judging the amount to bet, which in turn creates a fun experience for the player, which in this case would be the challenge of trying to win, and the discovery of the reveal.

However the MDA model is primarily a model intended for those who create and analyse games, and as such, the model struggles to cope with player centred issues. An example of this issue is in regard to the *implicit* rules of game, defined by Salem and Zimmerman [2004] as implied unwritten rules (often social in nature) which players bring to the game, a common example being notions of fair play versus cheating. Whilst these implicit rules will have a basis within the mechanics of the game, as it is only through an exploration of the mechanics that these rules may develop, their status as rules of the games despite being consciously as opposed to mechanically created, is a difficult fit in the MDA model.

An alternative framework is offered by Järvinen [2007], who identifies nine elements of games (shown in Table 1), suggesting that a game must have three basic elements; *Components*, an *Environment* and a least one *Mechanic*.

Element	Description
Components	The resources for play (e.g. tokens or points)
Environment	The space for play (e.g. boards, grids, mazes)
Mechanics	The possible actions afforded to the player
Ruleset	Constraints and goals
Information	What the player needs to know, and what the game system stores
Theme	Subject matter of the game, often metaphorical (optional)
Interface	Virtual access to the game mechanics (optional, but not for videogames)
Players	Those who play, their motivations, goals and abilities
Contexts	When and where gaming takes place

Table 1: Method for identifying and analysing game elements [Järvinen 2007]

Järvinen suggests that from the relationship between the three core elements, emerge both the *ruleset* and *information*, with *players* then playing within *contexts*. The utility of this framework is that it clearly defines the make up of games, and although the explanation of the relationship between these elements is vague, given the complexity of these relationships, is a credible attempt. The problem with defining the relationship between game elements is that many of these elements, for example rules and mechanics, are what Järvinen terms *compound elements,* in that they do not exist per say, rather they are embodied within other more concrete game elements such as points and the game environment. An example would be rules of the game embedded within the physics of the game environment. Figure 3 shows a representation of this relationship.

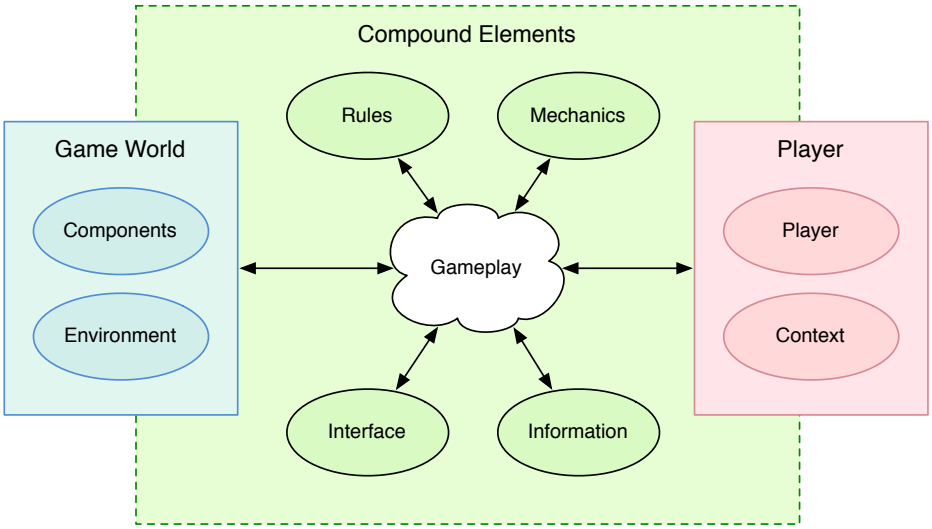

Figure 3: A representation of Järvinen's [2007] game elements

The player element in Järvinen's ontology of games is dealt with by an exploration of player *ability sets*, followed by a taxonomy of player *emotions*. Whilst these aspects are clearly relevant to the player experience of games, the ontology neglects to deal with what should be the defining aspect of the player element, that of the player motivations behind play.

The USE (User, System, Experience) model of the player experience of games [Cowley et al 2006, Cowley et al 2008] does address the different motivations for play through the use of a taxonomy of player types within the *user* segment of the model. This classification of player types is a common approach to looking at games [Yee 2007, Bornstein 2007, Weber and Shaw 2008, Bartle 1996] and the USE model effectively utilises the classification presented in the Demographic Game Design (DGD) of Bateman and Boon [2005]. The DGD has two dimensions, including both a distinction between *Hardcore* players (the game-literate individuals, who buy and play a lot of games) and *Casual* players (those with little knowledge of game conventions, who play few games, but may play them a lot) and a four segment classification of player types (see Table 2), individuals being mapped across the two dimensions with obvious variation across types.

Player Type	Description
Conqueror	Competitive goal oriented players, play to beat the game or opponents
Manager	Logistical players, play for strategical or tactical challenge
Wanderer	Fun orientated players, play for (often undemanding) enjoyment
Participant	Socially orientated players, who enjoy social or fantasy play

Table 2: The four player types presented in DGD, adapted from [Bateman 2005]

As Cowley et al [2008] note, the DGD is based on a relatively small number of survey respondents (400 if the DGD brochure is to be believed [International Hobo 2004]) although it does utilise the Myers-Briggs Personality Type Indicators (MBTI) topology which at least provides the DGD with a solid platform. Analysis of these personality types is far beyond the scope of this project, suffice to say that it is useful to consider the players of games in light of these types, and the different motivations for play which they indicate.

(2.2.2) Game Mechanics

Given the difficultly defining what a game is, defining a game's mechanics would seem likely to suffer the same fate. However if we accept the imperfections of formal definition, the utility of having a language to discuss mechanics will be invaluable for later discussions.

The meaning of game mechanics is often clouded even within game designer circles, as Cook [2006] quips, "*these mysterious whirring clicking mechanisms that deliver to the player pleasure and thrills*". The result of this muddied language of game designers and developers, coupled with the multi-meaning colloquial usage by many game players (who tend to view games as black box systems, confusing interface, rules and mechanics [Fabricatore]) is that we have a term that is at best imprecise and at worst unusable. However in recent years there has been far greater interest in the term from commentators and academics, many of whom have attempted to define the term more precisely, both for the purposes of academic study, and to provide a framework for discussion.

The description of game mechanics as verbs is a common approach [Zagal et al 2005, Järvinen 2007], and a rather concealing one from a structural point of view. However the use of verbs does suggest the essential nature of game mechanics, in that a game's mechanics are what the player can *do* in the game, such as running, jumping or shooting, and as such should be regarded as the essential building blocks of games [Fabricatore]. Most commentators also agree that game mechanics are atomic in nature [Lundgren and Bjork 2003, Fabricatore], that a game mechanic is a single interactive possibility. However these atomic mechanics are also chainable in sequences for example *shooting* whilst *jumping*, and are often performed repeatedly within the context of a game, particularly in the case of mechanic central to a game, often termed *Core Mechanics* [Salem and Zimmerman 2004], such as *shooting* in a first person shooter game (FPS). As noted by Järvinen [2007] a game may only have one mechanic, with most puzzle style games falling

into this category, however in many cases games will have a variety of mechanics, built up within a hierarchy of player progression through the game [Salem and Zimmerman 2004]. This hierarchy may introduce new mechanics over time, such as the ability to fly planes after spending most of the time driving cars in Grand Theft Auto IV [8], or supplement core mechanics with *Modifier* mechanics [Järvinen 2007], such as the introduction of a sniper rifle with telescopic sight, building on the mechanic of shooting.

A central debate surrounding the definition of game mechanics is in relation to the relationship they have with the rule system of games. Lundgren and Bjork [2003] define game mechanics firmly within the rule system, "*A game mechanic is simply any part of the rule system of a game that covers one, and only one, possible kind of interaction that takes place during the game*". Whilst this definition does provide an appropriate emphasis to the atomic nature of individual game mechanics, the amalgamation of mechanics and rules is a little imprecise [Sicart 2008]. Likewise, Cook's definition; "*Game mechanics are rule based systems / simulations that facilitate and encourage a user to explore and learn the properties of their possibility space through the use of feedback mechanisms.*" also considers the mechanics and rule system to be inseparable, or rather the rules of the game are considered a constituent part of the makeup of game mechanics (see Figure 3). This definition does however suggest the crucial role provided by feedback [Sicart 2008], in fact mechanics are viewed by Cook as a feedback loop.

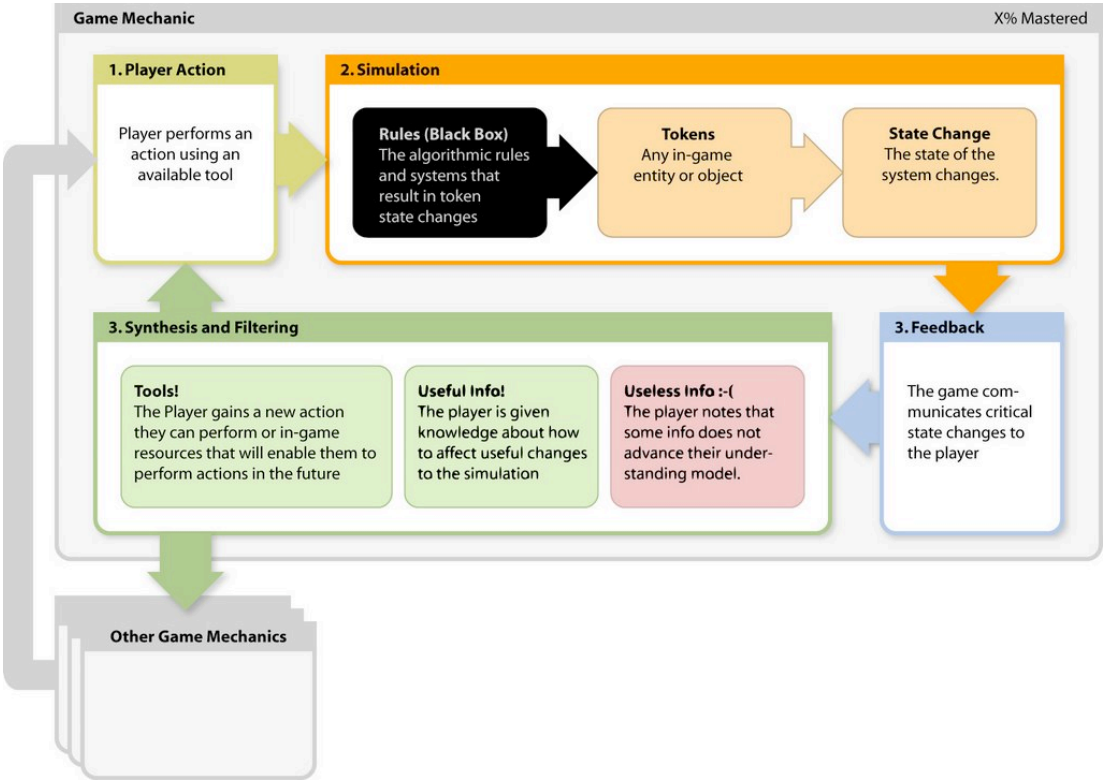

Figure 4: The Game Mechanic Feedback Loop [Copyright Cook 2006]

Hunicke et al, in the MDA framework previously discussed, do partially distinguish between the game mechanics and the rule system, defining mechanics as the '*design counterpart'* of the rule system, "*the various actions, behaviours and control mechanisms afforded to the player within a game context*". This definition does indicate a relationship between rules and mechanics, in that mechanics are viewed as a construct of the rule system, a manifestation of the rules of the game which players may interact with.

Sicart's [2008] comprehensive review of game mechanics definitions does suggest a further definition "*Methods invoked by an agent to interact with the game world, as constrained by the game rules*". This definition whilst surely precise, does seem to lack meaning beyond the functional and formal. In particular the use of the term 'methods' to describe game interactions does not sit with the idea that games are about fun, but more critically, it does not account for the role of feedback, even though Sicart himself points out the importance. However this definition clearly defines the structural position of mechanics in reference to both the rules and the game world.

For the purposes of this project, an amalgamation of some of these definitions will be employed, hopefully bringing some of the positive aspects already identified. Thus game mechanics are defined as;

Atomic rule-based feedback loops of player interaction with the game world

To take an example; the mechanic of *jumping* with Mario in Super Mario Bros [11] is *rule-based*, in that the rules (such as Mario may jump a certain height, and the positive and negative consequences of passing through different game components) create the possibilities of interaction. In particular, for Mario jumping to be considered a **game** mechanic, it must be based within the constraints of the game rules, since without these rules the interaction would not form part of a game, and could only be described as a toy mechanic (assuming the interaction is fun) such as a mechanical Mario figure that can flip when you press a button. The mechanics of a toy can indeed be fun (as making Mario bounce up and down can be) but it is the challenge provided by the rules system which make the mechanic part of a game.

Mechanics are also *player* interaction in that the player provides the input to the loop (such as pressing a button), and receives the output in the form of game feedback (such as hearing the sound when Mario *collects* a coin). The interaction is with the *game world* since the player actions are intended to influence both the environment and components of the game (which in Mario games mostly consist of platforms, coins and enemies). Furthermore, the mechanic is *atomic* in that it references a single instance of interaction which may be performed in isolation, as well as being linked with other mechanics (such a mid-air spin). Critically, the mechanic itself is viewed as a *feedback loop* because from a player perspective, without the feedback of seeing Mario jump, the mechanic does not exist, and without the loop and the player understanding it facilitates, the chaining of different mechanics which is so central to games would not be possible.

The difficulty with this and any other technical definition of game mechanics, is that from a player, and indeed a practical perspective, it is difficult if not impossible to consider the mechanics of games without relation to the multitude of other elements which comprise them, such as the rules, the environment, or even the theme, so much so that mechanics seem to fade away the more you struggle to pin them down. Koster [2004] uses the example of a *theme* change (to use Järvinen's terminology) to Tetris [12] to a mass-murder game, where the dropping blocks are modified to become people in contorted shapes, requiring you to fit them efficiently into a gas chamber, suggesting that even though the mechanics remain the same, the gameplay is radically changed. Whilst from a technical standpoint this is clearly true, as the mathematical structure for the game mechanics would remain identical. However if the mechanic is viewed as a loop of *player* interaction, then the mechanic **is** radically altered since the meaning attached to the interaction is wildly different. This problem is far beyond the scope of this project to examine, suffice to say that game mechanics are not easily distinguished from the nature of games themselves, or indeed the people that play them.

(2.3) Games as Motivators

This section discusses factors contributing to the motivational power of games and the relationship of that power to game mechanics, in order to potentially harness that power in other areas. Csíkszentmihályi's conception of flow is used to describe the main factors at work (Section 2.3.2), before moving to examine a factor beyond Csíkszentmihályi's purposes, that of the nature of the reward system in games, and the link between those rewards and game mechanics (Section 2.3.3). To begin with however, some discussion surrounding the nature of motivation is required to provide background.

(2.3.1) The Nature of Motivation

Motivation is literally being moved to do something, however there are both different types and different strengths. Personal motivation can be produced from either intrinsic or extrinsic motivating factors [Deci and Ryan 2000]. Where as intrinsic motivation drives people to action purely on the basis of the inherent satisfaction produced by a given activity, the classic example being hobbies, extrinsic motivation is driven by factors external to the activity itself such as rewards or punishment, a notorious example being money.

The debate in the psychology literature surrounding these two types of motivation, and indeed the different sub-types, and the different results they can produce has been going on for 60 years without resolution [Cameron and Pierce 1994]. Starting with the radical behaviourism exemplified by B.F. Skinner's contention that all motivation is extrinsic, to the commonly held modern viewpoint exemplified by Deci and Ryan [2000], that intrinsic motivation is innate in humans (as seen in the curiosity of children), and whilst it may decrease over time as adults become more involved in activities they would not choose to

be doing, is still the most powerful form of motivation, producing highly valued outcomes such as creativity and vitality [Deci and Ryan 2000].

(2.3.2) Flow

A principal factor in why games are such effective motivators is in relation to Csíkszentmihályi's phenomenology of *flow*, which (good) videogames are widely considered to produce in players [Cowley et al 2008, Prensky 2002, McGinnis et al 2008]. The flow state is described by Csíkszentmihályi [1990] as "*a state of optimal experience, whereby a person is so engaged in activity that self-consciousness disappears, time becomes distorted, and people engage in complex, goal-directed activity not for external rewards, but for simply the exhilaration of doing*", and is more commonly known as being in the zone, or the groove.

Much of the literature discussing flow reference the eight (or in some cases nine) elements of the flow experience discussed by Csíkszentmihályi [Cowley et al 2008, Sweetser and Wyeth 2005, Jenova 2007]. However the distinction between contributing factors to the flow state, and the nature of the experience itself is often vague. Two of these elements would seem to actually be conditions produced by the flow state; a distorted sense of time and self. The remaining six elements could all be considered contributing factors to a flow experience, however three of these six; that the activity is intrinsically rewarding, a sense of control over actions, and full concentration, would all seem to both contribute to the flow state, and at least be heightened by, if not actually produced by this mythical state. Figure 5 illustrates the eight elements with their (possible) relationship to the flow state. For the purposes of this project, the three elements identified as contributing ones will be discussed in more detail, leaving the rest for other researchers!

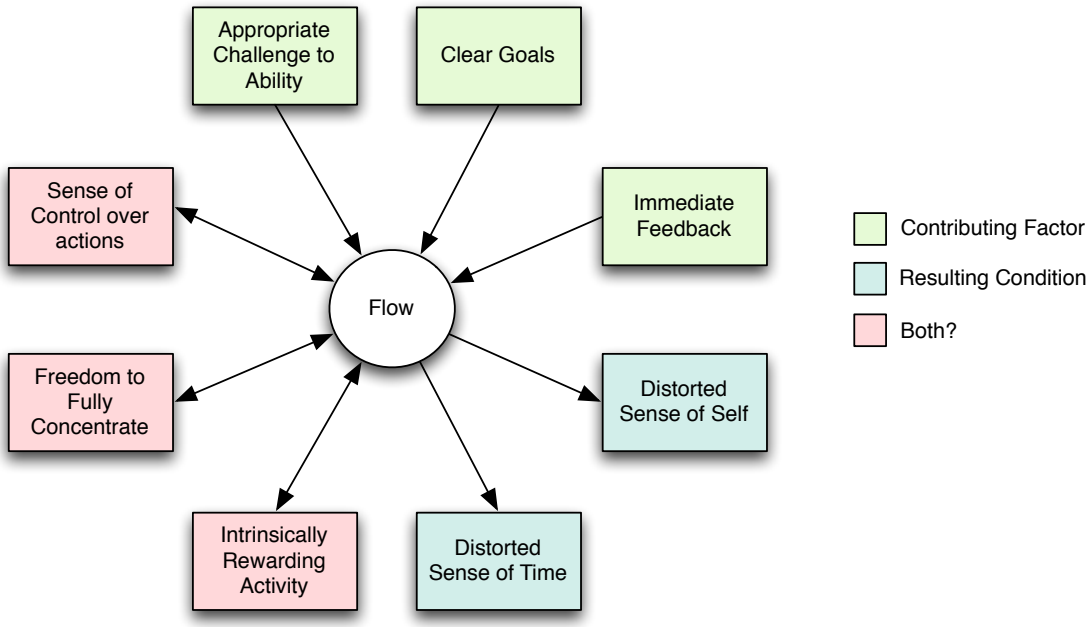

Figure 5: The eight elements of a flow experience

Challenge Vs. Ability

The level of challenge provided by an activity is a key factor in an individual's motivation to engage with that activity. Too easy and people will get bored, too difficult and people may give up, rather the appropriate balance of challenge to skill (termed the Flow Channel by Csíkszentmihályi) is the most effective motivator. Typically videogames will modify the difficulty level as a player progresses through the game, using either adaptive difficulty levels such as the increasing speed in Tetris, or the user initiated difficulty settings seen in countless games with Easy/Difficult modes. However as Falstein [2005] notes, ideally games should proceed in irregular waves through the flow channel, occasionally pushing players beyond their skill levels to encourage learning, such as a particularly difficult level boss, and occasionally providing opportunity for reflection and practice, such as the use of bonus levels or mini-games, or a side-path from the primary game arch containing lots of easy accomplishments. These waves of adaptive difficulty are often tightly integrated within the hierarchy of game mechanics, where mechanics are introduced individually and given time to be mastered, in preference to introducing multiple new mechanics simultaneously [Falstein 2005].

Clear Goals

The provision of clear goals is also considered to be a contributing factor to a flow experience. The motivational power of challenging and specific goals is clearly strong given the countless studies (often regarding management or sales) showing the beneficial effects on performance, when compared to vague or easy ones [Locke and Latham 2002]. In games the goal may be a simple as to achieve a high score or to win the game, and a good game will quickly establish this overarching main goal, such as being informed straight away in The Legend of Zelda [15] that you need to rescue Zelda from the forces of evil. Indeed as Malone [1981] suggests, the very notion of *game* implies that there is an *object of the game.* However games will often provide a hierarchy of goals beneath this main objective.

At the lowest level of the goal hierarchy are goals which relate to the use of individual mechanics, such as using the *shoot* mechanic to despatch a minion. Further sub goals achieved with combinations of mechanics (often over time) will often be present, and indeed the game may permit players to make choices regarding which sub goals to peruse, such as choosing whether to build a science academy in Civilization [3], or to spend your resources building military units to conquer your neighbours[4], even though the main goal of world domination remains the same. This choice of goals provided to players is a additional motivational factor, since self-selected goals are generally considered to be have higher motivational benefits than imposed ones [Latham 2004], and perhaps this may be a contributing factor to why the games with no set goals discussed previously (The Sims) are so popular.

4 Civilization's creator, Sid Meier famously describes games as 'a series of interesting choices'

One common method of providing clear goals and showing progress toward them which games employ is by keeping score. Score keeping has been a part of games since their inception, from early arcade machines through to mobile games with worldwide leaderboards [Toups et al 2009]. Often the main goal of the game will be to achieve a high score, such as in Tetris. However score may also be provided as an additional motivating factor aside from the main goal of the game, as an indicator of the margin of victory. In Civilization the goal of the game is to dominate the world, but upon achieving this domination the game provides an additional point score to indicate just how well you played. This score creates a further goal beyond the already achieved domination, that of beating the high score, and can provide motivation for further play. However score keeping in games may also serve a second purpose at the mechanic level, that of providing immediate feedback to player action.

Immediate Feedback

Immediate feedback to actions, particularly in relation to progress towards a goal, is a key component of the flow state. Feedback allows us to know both how we are doing, and what still needs to be done, and if it is provided immediately, as opposed to forcing someone to wait, there is less possibility for distraction by thoughts outside of the activity in question.

Feedback in games takes many forms, from long and polished animation sequences to subtle audio cues, and other forms of *calm messaging* [Dyck et al 2002] used to convey information without being overly distracting. Feedback is also generally provided to every player action, be they wrong actions receiving negative feedback, such as losing a heart when colliding with an enemy, or the positive feedback such as the sound played when you collect an item.

At the mechanic level, score keeping may provide a form of immediate feedback to action, for example killing an enemy in World of Warcraft is rewarded with points in the form of character levelling, providing feedback that the interaction was successful. However it is the understanding which is developed through feedback loops within games which is central to the fun of games. Feedback such as seeing the animation of the Link's boomerang being thrown and colliding with the game environment in The Legend of Zelda: Phantom Hourglass [15], is key to the player's comprehension of the patterns in the game. Koster [2005] suggests that the fun in games is essentially the fun of learning patterns, and it is the feedback which facilitates this learning, providing the moments of delight in games (the ah hah moments!) when players not only grok a certain mechanic, but understand how it can be taken further, such as I can use that boomerang to knock down that enemy, and maybe even hit that switch.

(2.3.3) Rewards

The system of rewards found in games can indeed be seen as a form of feedback, perform a good interaction, or a certain number of good interactions and you receive a reward. However the reward system in games transcends feedback in that the reward will often

come to be the motive for the interaction itself. This section will explore the nature of the reward systems in games with an eye to the usage of such reward systems in other areas.

The Operant Conditioning of B.F. Skinner proposed that people behave the way they do as a result of conditioning to previous encounters with both reward and punishment (positive and negative reinforcers). Although his theory that all motivation is extrinsic has been largely discredited [Benabou and Tirole 2003, Deci and Ryan 2000], there remains truth in conditioning in that it is difficult if not impossible to separate the majority of human motivation away from reinforcing factors, as clearly people will tend to continue doing things which get rewarded, and stop doing things which are not. Videogames keenly exploit this behaviour in humans to motivate gameplay by both providing rewards for successful actions such as powerups, access to hidden content, or audiovisual rewards, and punishment for unsuccessful ones, such as losing lives or items.

One difficulty in the provision of reinforcers is that people are conditioned to find different things rewarding, making the process of reward assignment somewhat guesswork. Game designers tend to mitigate this problem by providing reinforcers which gamers are used to from previous games, but also by providing different types of rewards and punishment, and on different schedules, within the same game.

Skinner proposed four (less controversial) possible schedules of reinforcement; Fixed Ratio, Fixed Interval, Variable Ratio and Variable Interval. Fixed schedules provide reinforcement after every *nth* action in the case of ratio schedules, or after a given unit of time in interval schedules. An example of this would be a game where you receive a character upgrade every time you defeat 10 enemies, or for every hour of play. This type of reward schedule in games produces a burst of motivation when the reward is close, as the player works to achieve it, but will often result in a pause in activity once the reward has been given, since players understand that their actions will not receive reward for the next *n* actions [Hopson 2001]. This problem is actually exacerbated by ratios which increase over time as when a reward is provided, the player knows it will take even longer to reach the next one.

Variable schedules provide reinforcers every nth opportunity *on average* in the case of ratio, and after an average period of time for interval. An example would be a game where you receive an extra life on average every ten enemies defeated, but the precise schedule has a random element. This type of reward schedule is known to be the strongest driver of behaviour [Coon and Mitterer 2009] and it is no surprise that this schedule is often found in gambling, however the games industry has also appreciated the addictive qualities of the variable schedule. The appearance of ‘Great People’ (amongst other things) in Civilization is based on a variable ratio schedule and perhaps tellingly Maxis, the makers of Civilization produced a parody of an alcoholics anonymous website as part of the marketing campaign for Civilization IV detailing the problems faced by Civ-addicts [CivAnon].

A key objection to the use of rewards is that they provide extrinsic motivation which is generally considered to be both less productive and fulfilling, but in some circumstances

can actually decrease intrinsic motivation for an activity which is already intrinsically motivating [Lepper & Green 1978]. Essentially the rewards can become a crutch which can undermine motivation from within. This apparent decrease in intrinsic motivation is clouded by scores of apparently contradictory psychological test results, and appears to be highly dependent on several factors [Cameron & Pierce 1994]. If the reward is tangible, for example money, intrinsic motivation is generally thought to be negatively affected. If the reward is intangible, such as praise, or the virtual rewards provided by videogames, the results are mixed, with studies showing both increases and decreases in intrinsic motivation [Deci & Ryan 2000]. A further factor is the expectancy of the reward, with expected rewards fairing better than unexpected, but again results are highly variable [Cameron & Pierce 1994].

Although the problem of extrinsic motivation may well contribute to gamers losing intrinsic motivation both for particular games, and videogames in general, the problem is helped by the fact that gameplay is a highly intrinsically rewarding activity (fun). For activities beyond videogames, which may not be as fun, the use of extrinsic motivation has the potential to be a much greater problem.

(2.4) Games Beyond Games

This section will explore how game mechanics are used in Web 2.0 services (Section 2.4.2). However in order to explain the use of game mechanics within this area, some clarification is required as to how a game mechanic could be applied to anything beyond a game.

(2.4.1) Applying Game Mechanics

In one sense the mechanics of games can be transplanted into other software, literally utilising some of the mechanics of games within functional software, such as using the mechanics of Doom [5] for sysadmin purposes (*shoot* system processes etc.) [Chao 2001] [5]. However more subtly, the central nature of a game mechanic, the feedback loop, can be directed to turn actions not part of games per say, into what could be described as game mechanics. For this to happen, the application must have some of the features of games, and in particular, the application must have game rules. The rules of the game both establish goals in the minds of players, relating to the challenge of beating the game, and decide the outcome of individual interactions (game mechanics) in respect to this goal.

To take an example, the action of *reviewing* a product on Amazon can become a game mechanic if there are game rules behind it, for example a scoring mechanism which assigns the action 2 points. These rules are communicated to the user with feedback resulting in either user goals, for example to acquire more points, or indeed since Amazon is not a game for me, the user may choose to ignore the feedback. Figure 6 illustrates how this loop might, or indeed might not proceed.

5 - This paper has been cited far too much, and I'm actually a bit embarrassed to do so myself

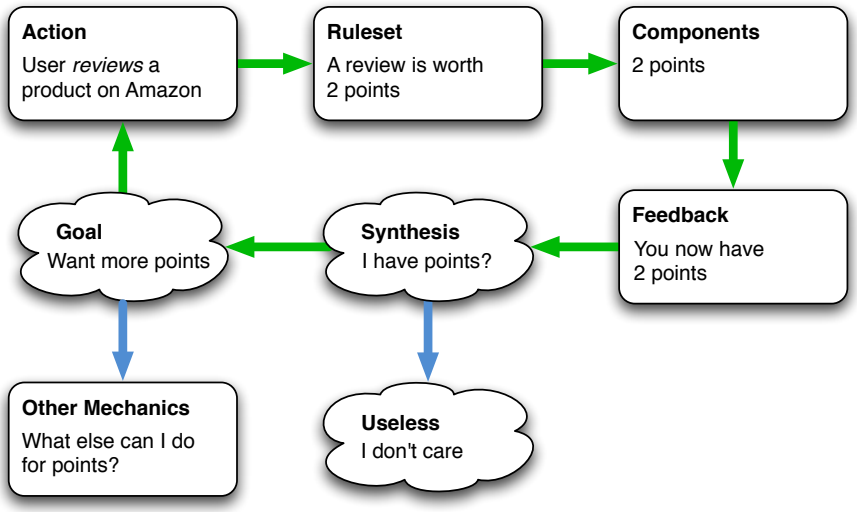

Figure 6: Hypothetical Review Mechanic Loop for Amazon

In this manner the interactions of functional software can be transformed into game mechanics by the addition of game rules and the feedback which communicates them. Moreover, this feedback can become a more powerful motivator through the use of reward systems, such as receiving a trophy for reviewing the most products in the hypothetical Amazon example, or even just a pleasant sound played when you submit a review. In a sense, functional software using these aspects of games, could actually be considered to be games. However the key difference is that functional software has purposes beyond the magic circle.

(2.4.2) Game Mechanics in Web 2.0

This section will examine how game mechanics have, and could be employed within web based services. To begin with a short definition of the somewhat dubious term of Web 2.0.

Defining Web 2.0

There are perhaps two possible methodologies to defining Web 2.0, one focused on technology (and acronyms) and defined in reference to the use of the interactive spice provided by AJAX or the sharing enabled by XML or RSS. This paper will adopt the alternative approach, that of defining Web 2.0 in terms of the difference it makes to people. The second revolution on the Web was about people participation, moving away from the one way traffic characterised by Web 1.0, to a read/write medium where encouraging people to get involved is the central concern. From applications created with sole purposes of collaboration or sharing such as Wikipedia, YouTube or Digg, or the social networking services helping people to create spaces dedicated to them and their networks, such as Facebook or MySpace, through to the changes the revolution has brought about in the giants of Ebay and Amazon, the message from the new wave of internet services is clear, people power is king. Whilst this is not entirely true, and participation on these sites is often

somewhat illusory, the shift in emphasis is very real. Whether this change is enough of a shift to increase the version number of the Web is for others to decide.

Examples of Game Mechanics in Web 2.0

A simple web search for applying game mechanics will quickly end up at Amy Jo Kim's "Putting the Fun in Functional" [Kim 2007, Kim 2009] which given the amount of references, is clearly an influential set of presentations. Kim outlines five game mechanics which she argues can be (and are) applied in functional software on the Web; Collecting, Points, Exchanges, Customisation and Feedback. As noted earlier, feedback is intrinsic to the nature of game mechanics and can therefore not be counted as a game mechanic itself. Customisation could be considered a game mechanic in games such as Grand Theft Auto 3 [7] or World of Warcraft where avatar customisation is central to the nature of the gameplay, however in general allowing the players of games, or the users of websites to customise the appearance of these services, whilst clearly being a useful feature, is not normally based in the rules of a game. Feedback and customisation aside, all the others are worth of further discussion.

Collecting

The desire to collect things of all types is clearly a strong one; from our hunter-gatherer past, to the ownership drive created by capitalist society, people have an deep-rooted psychological need to acquire. This need is often exploited by videogames, which commonly use this desire to motivate people to play for longer. Whether it is collecting all the 100 *Hidden Packages* in Grand Theft Auto 3 (a tedious task this author has personally spent hours completing), the countless *Achievements* possible playing Xbox games, or the amassing of items on World of Warcraft, gamers never seem to get tired of collecting virtual goods.

Kim [2007] argues that this desire is also well exploited by social media services, offering the collection of friends on MySpace as an example. Unlike Facebook, the number of friends is prominently displayed on MySpace user profiles. This public display, coupled with the initial assignment of 1 friend[6] to every new profile to get people started, drives the behaviour of friend acquisition, motivating people to both use the service more (more active users will generally acquire more friends) and over a longer time period (creating a large audience is an investment that users are unlikely to want to throw away. Figure 7 illustrates the attitude toward this phenomenon of Mike Davidson [Davidson 2006], who hacks his friend count to display this ironic extreme amount of friends.

6 This friend is actually Tom Anderson, a co founder of MySpace

Figure 7: Mike Davidson's MySpace profile with ironic hacked friend count [Davidson 2006]

In a sense collecting is not the actual game mechanic per say, rather it is the psychology of why other mechanics can be motivating. The actual mechanics are based in the user interaction with the system, so a *friendship request* becomes a game mechanic if users treat the service at least in part as a game, and begin to view friends as items to be collected.

Exchanges

Exchanges are an inherently social form of interaction and are used in all areas of our lives. Indeed the turn taking in a simple conversation with the subtle cues to whose turn it is, could be seen as a game mechanic, and certainly a debate could be viewed as a game, with clear winners and losers, perhaps provided by a vote at the end. Exchanges are also central to games, such as the explicit rule-based turn taking in Chess or the attack/defend aspects of role playing games (RPG) or turn based strategy games (TBS). Indeed Koster suggests [Sheffield 2007] that all games are essentially turn based, in that they consist of loops of player interaction and system response, games are literally mechanics based.

On the web exchanges are also common, and because of their social nature, are commonly found in social networking sites such as Facebook or MySpace. Friendship requests are explicit social exchanges [Kim 2007] in that the comprising rules are hard wired into the systems. Facebook in particular has a multitude of implicit exchanges, such as social rules that have developed surrounding *Gifting* and *Poking* (I have to poke back now!) or the implicit exchanges within tit for tat *Wall Posting* (also seen in MySpace profile comments). Again the actual mechanics would not really be described as exchanges, rather the mechanics are the interaction such as *poking,* and the exchanges are part of the (often socially constructed) rules the mechanic is *based* within.

Points

As noted earlier (Section 2.3.2), keeping score can be a strong driver of behaviour as for many people (who may well have tendencies toward the DGD *Conqueror* player type), the sight of numerical performance indicators can be motivation alone to attempt to improve that number. In recent years there has been a surge in devices and services designed to show people statistics about many aspects of their lives in the hope of driving behaviour change, often called Persuasive Technology [Fogg 2003]. Examples of this phenomenon

include; tracking your running performance using a Nike+[7] sensor, or your energy consumption using a Wattson[8]. The numbers produced by these types of devices can be viewed as a score and can induce competitive gameplay with oneself by introducing metrics comparable over time, where the desire to improve your Nike+ or Wattson statistics motivates you into leading a healthier life, or reducing your carbon footprint. However it is with social display that these figures become highly motivating [Lin 2006], such as the Nike+ website showing leaderboards and challenges.

Kim [2007] suggests multiple examples of point scoring on the web, including positive and negative feedback scores for buyers and sellers on Ebay, Flickr (.com) 'interestingness' points for photos, and YouTube ratings for videos. Kim also suggests the concept of *Social Points* to describe these scoring mechanisms, as in all these cases the points are awarded by other users, and indeed are often socially displayed on forms of user profile. However again the point scoring is not a game mechanic, rather points are rewards provided as feedback, creating a loop out of interaction such as *uploading* a photo to Flickr.

The use of points to literally count the number of times a seller is rated positively on Ebay, or the number of times Digg (a social news aggregator) users *digg* news stories does suggest the possibility that people would start to treat such services as a game, and indeed this has become a problem for many of these websites, which struggle to cope with people gaming the scoring system. Digg in particular has suffered badly from users exploiting algorithm weaknesses [MacManus 2005], or ganging up to collectively push their own stories to the front page, and Ebay has also been trying to deal with users selling items at low cost in exchange for positive feedback [Mills 2007] and a user base which is intimidated from leaving negative feedback by the threat of so called retaliatory feedback [Klien 2009]. However despite these problems, the power of points as a behaviour driver, when correctly channelled, can be used to motivate users to perform actions which are desirable by these services.

Gene Koo [Koo 2008] discusses the web based campaign management system provided by MyBarackObama.com (MyBO), noting that although it featured minimal graphics, no sound and flawed gameplay, it should still be considered the game of the year for 2008. MyBO began by awarding points for users who completed real world tasks such as hosting groups and fundraising, as well as virtual activities such as writing blogs. Koo notes that he suspects that for most people these points were just a curiosity. However clearly some users were taking the points seriously [Koo 2008], and as Koo also notes, the point system graded the possible actions in terms of value to the campaign, such as 15 points for a hosted event and 3 points for a blog post [MyBO Activity Tracker]. As well as providing this grading purpose, the point system on MyBO actually turns real world actions, actions existing entirely outside

7 Nike+ is a small sensor inserted into your shoe which links with iPods to deliver motivational messages as you run, and allows you to track your progress when you return

8 A Wattson is an energy monitor which calculates and displays energy usage using a wireless sensor attached to an electricity meter

the virtual world, into game mechanics by creating a feedback loop with game rules and rewards within a virtual space.

The problem with points alone is that comparison between users becomes difficult unless the points are presented in another form, such as a leaderboard. Indeed MyBO later changed the scoring system to use numbered levels (instead of explicit point totals) to allow for more easy comparison between its userbase of over 1 million [Koo 2008]. In this way, point scoring can provide the basis for other forms of *reward systems*; including levels, ranks, achievements and leaderboards [Kim 2007], shown in Figure 8.

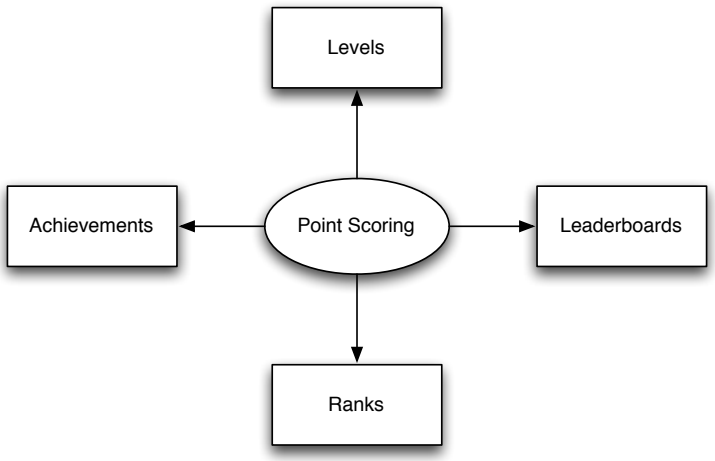

Figure 8: Possibilities provide by keeping score

Levels

The use of levels in videogames is so common that it is hard to imagine one that does not include them in some form. From the disguised levelling exemplified by the acquisition of extra hearts in the Legend of Zelda or the 6 star Wanted Level in Grand Theft Auto, to all the fanfare surrounding levelling up your character in World of Warcraft, a process so rewarding that there are countless videos of this process set to music on YouTube [YouTube Search]. The rationale behind the use of level is multifaceted. As Kim suggests; levels can punctuate the game experience, but they also provide opportunities for rewarding players with new features (or even just eye candy), and allow for the adjustment of the difficultly level in the hope of maintaining a flow experience. Although Kim offers the Ebay power seller program as one example of a web service which grants new privileges based on the number of points (sales) accrued, in general the use of levels in Web 2.0 is not widespread. However a partial implementation of levels is often found, without the inclusion of new abilities, that of ranks.

Ranks

Points alone could be considered to be form of rank, however the use of numbered and in particular, named ranks is a common feature of many community sites such as Yahoo Answers, and is primarily designed to motivate users to contribute more to the community by creating the challenge of achieving the next rank. In general numbered ranks (such as

Level 5) permit easy comparison between users and are therefore more suited to more competitive situations than named levels (such as *Silver Contributor*) which although will often have a obvious hierarchy, provide an opportunity to inject some humour into the ranking system in the hope that users will not treat it too seriously [Yahoo Social Design Patterns].

Achievements

The use of achievements, often taking the form of awards or trophies is also becoming more common on the web. The personal finance site Mint.com has recently introduced a financial fitness feature (along the lines of Brain Age in Brain Training [6]). Users of the site collect points for saving money or managing credit and these points translate to achievements such a *Financial Guru* award [Kincaid 2009]. The Nike+ website also awards trophies for the milestone completion of running miles or calories burned. Achievements can be personally motivating as these examples may well be, however achievements may often also be displayed socially on user profiles, creating an additional motivating factor. Furthermore achievements can be collected and displayed in a form of virtual trophy room, tapping in the desire to collect.

Leaderboards

Leaderboards are a highly competitive form of ranking system in that they actively encourage comparison between users and provide a definitive view on who is performing best [Yahoo Social Design Patterns]. As Kim [2007] notes, many sites which did implement leaderboards have removed them, the reasoning being that leaderboards strongly distract people away from the purposes of the site, crystallising services with functional purposes as games in the minds of users, leading to behaviour emphasising quantity over quality such as writing large amounts of poor quality reviews on Amazon for the purposes of position on a Top Reviewers leaderboard [Porter 2007]. Whilst many of these game reward systems have the potential to encourage this type of behaviour, it is the strongly competitive element of leaderboards in particular which can distract from the non-competitive functional purposes.

(2.5) Game Mechanics in a VLE

This section will offer a functional definition of a VLE (Section 2.5.2), before exploring how game mechanics could be integrated within such a system and the problems and utility of doing so (Section 2.5.3). However, whilst this project is not strictly about the potential for learning by playing games, and learning was not evaluated at all in the VLE experiment (presented in Section 3), given the academic basis of VLEs and the use of game mechanics in the experimental VLE, a short discussion surrounding games and learning is required.

(2.5.1) Games and Learning

Given that games are highly engaging activities, it is perhaps not surprising that organisations and individuals wishing to create learning software (engagement also being a key component of learning) look to games for inspiration. This is not to say that academic

institutions do not engage their students, or that video games work for everyone, just that games are almost entirely created with the sole purpose of engaging people, and game designers have become experts in this area. Furthermore, for many game designers and commentators [Koster 2004, Crawford 2002] the fun of games is synonymous with learning. In particular it the learning generated by the feedback loop of the game mechanic which enables players to learn the intricacies of the rules of the games and the strategies which can win them, through a process of trial and error [McGinnis et al 2003].

Many of the attempts to create learning games tend toward building games, or in most cases adapting existing games, which have pedagogical content or story [Edery and Mollick 2009, Connolly and Stansfield 2006], such as adapting SimCity to teach people to run a university. An alternative strategy, and the one employed in this paper, is to use elements from gameplay within teaching contexts, using the gameplay as hooks into the academic content. Gameplay can actually be introduced into teaching in a variety of ways, many of which are both subtle and common. Most classes will incorporate asking questions of the class, which are a form of game in that students compete to get the correct answer first, however there are more surreptitious forms of game incorporation. Harvard Professor Ellen Langer used the technique of telling the class that some of what they were about to hear was untrue, noting that students spent so much time trying to work out what it was, that they become more engaged and retentive [Prensky 2002].

The use of game features to increase participation within e-learning systems is not entirely without precedent, and potential for work in this area is discussed eloquently by McGinnis et al [2003]. Liao [2007] demonstrated that the use of identity features (avatars) does have a positive impact on levels of participation within student discussion boards, and Regueras et al [2008] at least attempted to show that levels of satisfaction might be improved by elements of competition within a VLE type system, although the actual results of that study do not confirm this. Lim and Lackaff [2008] also discuss the use of Kim's [2007] game mechanics to enhance the engagement of students using blog and wiki tools, although the results of that process are sadly not addressed, beyond the observation that it was positive experience, and fun [Lim 2008].

(2.5.2) What is a VLE

A virtual learning environment is essentially a virtual service designed to support the teaching process from both teacher and learner perspectives, though the provision of tools, often within a central framework. Some of the products commonly in use are Blackboard [1], Moodle [9] and Bodington [2]. Clearly a VLE will provide different services to different people and in different institutions, however in general, there are several core services which VLEs will often provide, as shown in Table 3;

Service	Features
Social Space for Communication	Blogs, discussion forums, commenting

Service	Features
Methods of Assessment	Quizzes, electronic assignments, document upload
Resource Provision	Lecture notes, reading lists, other multimedia
Course Management	Timetables, Events, Announcements
Collaboration Facilities	Wikis, Email lists, discussion forums

Table 3: Core Services provided by VLEs

(2.5.3) Problems (and Possibilities)

As noted earlier, the feedback loop of the game mechanic can be structured around actions not generally considered part of games, in order to transform these actions into what could then be described as game mechanics. Within a VLE these actions might be *posting* a blog entry, *contributing* to a wiki, or even just *logging i*n to the system. All of these actions can become game mechanic loops, if the appropriate feedback and game rules are present. The use of a reward system, as well as forming part of the feedback within game mechanic loops, can provide an additional motivating factor, elevating the mechanics beyond the motivating potential of a flow like experience.

For any game mechanics to be applied in a VLE system, a key component of games, the rules, must also be present. The rules of the game both limit what players (or in this case students) are able to do, thereby creating a challenge, and they decide the outcome of the game, the winners and losers. However there are couple of obvious problems with applying game mechanics in this particular situation; that a VLE should not be a challenge for students, and indeed that it should not be a competition.

The Problem of Challenge

To begin with it is likely that (at least some) students will not react positively to being limited in respect of what they can do with the VLE in order to serve the purposes of providing a game challenge. Of course in a sense VLEs are already limited in what actions they permit, but to turn a learning environment into a challenging game, perhaps by limiting the time students have to compose a forum post for example [Regueras et al 2008], would clearly be unacceptable, even if it might be fun. A partial method of accomplishing this challenge element might be to have structured levels within the VLE, with certain tools, abilities or privileges only accessible after a certain time, or completion of the required activities. As well as providing an element of challenge this might encourage a flow experience by focusing the system on certain tools (and goals) to allow students to master them, rather than presenting all the different tools simultaneously.

The Problem of Competition

A VLE should encourage a collaborative attitude amongst the users of the system, both within students and teaching staff, in keeping with the spirit of the academic institutions they serve. As such it would seem to be incompatible with the introduction of competitive

elements, through the use of a scoring system for example. In particular, the idea of having winners and losers is clearly at odds with this ethos. However there is a sense where (a certain amount of) competition is already happening within universities particularly centred around marks, which indeed could be viewed as a form of points. Although it would clearly be against the spirit of university life to be finding the losers in academic work, from this student's personal experience (just finishing my 5th student year!), you often get a sense of who is winning, or at least who might be doing better than you, despite knowing that in the end, the performance of others is not what really matters. In light of this, it would seem possible to introduce an element of competition within a VLE, as long as that competition is not taken too seriously.

However most students are at university for several years and will use the VLE for most of that academic life, and this would also seem to be incompatible with the idea of being able to *win* the VLE game. This could be overcome by having different win-states, perhaps over periods of time, such as the *winner of the week*, or on a module by module basis. However this is actually missing the point, in that the introduction of game mechanics is not intended to motivate behaviour in the long term, rather to add engaging hooks into a system which is hopefully valuable in its own right.

The Problem of Reward

A related problem concerns the use of rewards system which, as noted earlier (Section 2.3.3), provide a form of extrinsic motivation, which has the potential to decrease motivation from within. In this sense adding a reward system such as achievements or a ranking system, might undermine (what little) intrinsic motivation students have to engage with a VLE, or even disastrously, with learning in general, despite the mitigating intangible nature of these kinds of virtual rewards. Simon [2009] offers the example of voting as an activity which people just do not see the benefit of doing, suggesting that although you could conceivably provide a game like reward system to voting (Citizen points) which might encourage voting in the short term, this extrinsic reward would become a damaging crutch in the long term, and would certainly not help us to a better democracy.

However intrinsic motivation is not something that just happens, you do not wake up one morning feeling motivated to use a VLE, rather intrinsic motivation is built up over time by appreciating the benefits of such a system. In the same way that a Nike+ system of virtual rewards encourages you to get running, so the use of rewards can encourage students to engage with a VLE. However in the case of Nike+, it is the rewards of running itself that maintain interest, and for a VLE it is the rewards of learning.

(3) VLE Experiment

(3.1) Introduction

This section reports on the main study of this project, an experiment which investigates using game mechanics to increase motivation to participate within a VLE, designed to address the problems of under-participation within standard VLE systems (Section 1). Two versions of a VLE (one with additional game rules and rewards) were built to test whether the transformation of standard actions within the VLE into game mechanic feedback loops, had any effect on levels of participation or the student experience of using the systems. The game rules and reward systems utilised in the Gaming VLE were a *reputation system* based on a scoring mechanism for participation, a *leaderboard* for quiz results, and various *trophies* for high scores across multiple categories.

A large undergraduate course were given access to the VLE, students being split 50/50 between the two versions and levels of participation were actively monitored. A exploratory questionnaire and interviews with participants were used to provide insight into the student experience behind those numbers.

(3.2) Aims

This experiment was intended to show that game mechanics can have a positive impact on levels of student participation within a VLE, and on the student experience of using such a system. Participation is defined here as having two components: *Engagement*, measured by the number of times students access the system and the number of page views, and *Contribution*, measured by counts on how often students interact with the available activities, which in this case are forum posts, voting on colleague activity, and quiz attempts.

The experiment also investigates the student experience of using the experimental VLE, through a short exploratory questionnaire, and a series of longer interviews, and will attempt to show that the student experience of using the VLE is generally improved by the addition of the game mechanics.

Therefore this experiment has two hypotheses:

Hypothesis 1
Levels of participation, both engagement and contribution, will be higher for the game version.

Hypothesis 2
The student experience will be generally more positive when using the game version

(3.3) York Assembly

This section will discuss the design and build of the two version VLE, constructed specifically for this experiment and tailor-made around the specifics of a course syllabus. The two versions for discussion are the Vanilla Version (Section 3.3.2), which forms the control sample, and the Game Version (Section 3.3.3), which was identical to the vanilla aside from the integration of the game rules and rewards, creating game mechanic loops out of the standard actions. A report on the technical build of the system is also presented (Section 3.3.4). However before moving to examine the makeup of the VLE, an overview of the module it was created to assist, and the process of the design discussions with teaching staff is given.

(3.3.1) Module Overview and Selection Process

Selection Process

The selection of the module *Undergraduate Research Methods* in the Politics department at York University to form the participants for the experiment was based on finding a module running within the short timeframe of this project, which had either low or no previous VLE usage history. This decision was partly due to York University already having a well established VLE system (YorkShare) and (very reasonable) resistance from the organisers of that VLE to running an experiment of this type. However there was also reasoning that it would be unethical to disrupt the learning of a module already running a successful VLE component.

The Politics department was identified because the author had previous experience of a politics degree which could be beneficial when designing the VLE, as well the hope that politics students would not have a particular bias in terms of computer or gaming experience, and that the gender mix would be reasonably evenly spread, in order to mitigate the potential confounds of both these factors. The specific module was chosen after interest in the experiment was shown from the course convenor.

After meeting with the course convenor, a functional specification of the VLEs was provided to the course convenor in a proposal document, before any major development work was started. This allowed for input from teaching staff to be integrated within the design of the VLE. One major change was requested to the initial design document provided, as teaching staff felt that the use of structured *levels* within the game version, which restricted the initial functionality of game participants and provided this functionality as rewards for participation, had the potential to irritate students. This problem was intensified by the use of a single university course for both VLE versions as the vanilla participants would have no such restrictions. This problem, and indeed the omission of structured levels are both discussed further in Section 3.7.3.

Module Overview

The module *Undergraduate Research Methods* [Module Overview] is a large module (107 participants) running in the summer term for second year undergraduate politics students (and joint honour students) at York University. The module aims to prepare students for independent political research by introducing them to basic qualitative and quantitative research techniques, and provide practical experience of implementing these techniques in both an individual and group setting. The module had no history of previous VLE usage as teaching staff felt that students were unlikely to engage with such a system within the context of a module which was generally considered not to be a student favourite.

(3.3.2) The Vanilla Version

Since the experiment was running in a live situation, the quality of the vanilla VLE version was given high priority in both design and development to ensure that all students would find the experience valuable in their studies. The functionality provided by the vanilla VLE was designed by examining the core services which the official York VLE (Yorkshare) provided, in addition to looking at important facilities provided by open source VLEs in general, such as Moodle or Boddington.

The use of an open source VLE as the basis of the experimental VLE was discounted on the basis of the difficultly in seamlessly integrating both the game elements and the logging required by the experiment, within an already complicated system (see Section 3.3.4). This decision did limit the functionality which the vanilla VLE could provide, to a small subset of what is technically possible with full-featured VLE systems, due to the time and manpower constraints created by the development of a VLE from scratch. Therefore functionality which might have been included, such as tools to support students working in groups (private discussion forums, email lists), community tools (wikis and blogs) and multimedia aspects (video uploads, podcasting) were just beyond the scope of the project. However the selection of functionality was considered to ensure the system could still meet the requirements of the module and provide a valuable experience to both the staff and students. Indeed limitation can often be a blessing in disguise, as the lightweight system inherited a focus and simplicity often absent in VLE systems which must be everything to all [Weller 2006].

Design

The module selection heavily influenced the design of the experimental VLE. In particular, a political metaphor was chosen to reflect the academic content of the module, and make use of the existing conceptual models of the students taking the course. Metaphors have the potential to be limiting factors in the scope of software products [Blackwell 2006] however the metaphor was not taken too literally, and was mostly reflected in the language used within the VLE. Hence much of the terminology took cues from this metaphor, for example the VLE was named *York Assembly*, the forum a *Debate Room*, and the metaphor was

introduced as elements of humour such as a participant's *activity history* suggesting that the report was not to be used for expense claims[9].

In general the visual style of York Assembly was modern and clean, whilst still retaining a simple hierarchical structure and navigation. In particular, a global navigation bar with seven clearly defined sections, each providing different functionality and having a different bold coloured highlight, ensured that the structure of the VLE was clearly displayed. This navigation was clearly delimitated from other content by the use of a black header and white content area. The content area was structured around a two column grid (roughly divided around the golden ratio [MathWorld]) with the left hand column providing user information and other contextual navigation, and the right hand side providing the main content of particular sections. Extensive use of white-space was used to clearly segregate these different functions. Important user features (such as the Add Debate button shown in Figure 9) were also highlighted in bold colour and also tended to match the colour set for the different sections.

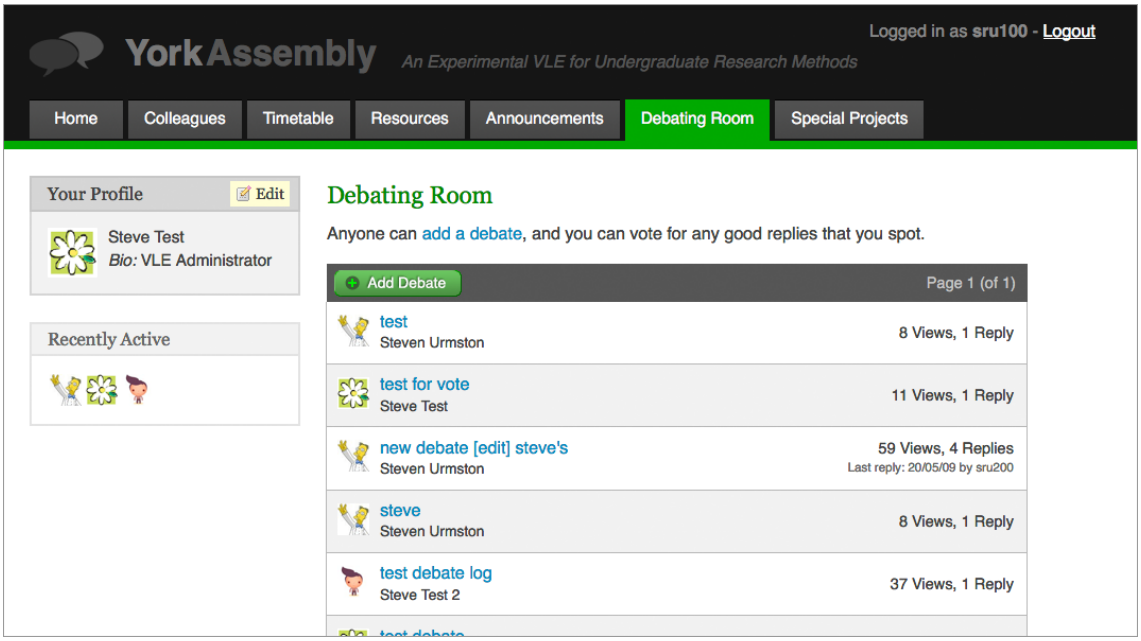

Figure 9: Screenshot of the Debate Room in York Assembly (Development version and content)

A short description of the main functionality provided by the VLE will now be presented.

Colleagues

It was decided that students would benefit from being able to look up both staff and fellow students using the VLE, and thus a searchable and sortable list of staff and students taking the course was provided. It was hoped that this facility would help engender a community feel to the VLE, and the the naming of the corresponding VLE section (Colleagues) was considered in this light. Each individual had their own editable profile page which contained name, email address and optional student completed 'bio' (a short tagline) and

9 The expense claims of UK politicians was an highly active scandal during the course of the experiment.

accompanying avatar. In addition, each participant had an individual activity history which provided a timeline of that individual's contributions within the VLE, for example "18th May - Replied to: Examples of unethical research".

Avatars

All staff and students had the facility to choose a small avatar from a predefined list, to be displayed in any context where their name was shown on the VLE, including forum posts and dashboard updates. Both students and staff were permitted to use an avatar of their own creation, but as expected, few had the time or the inclination to do so. The use of avatars was intended to provide a element of personalisation for students and also to help make the VLE more colourful and inviting. Whilst the use of avatars is a feature common to many games, and has been shown to increase engagement with discussion boards [Liao 2007], this aspect of games was not being analysed in this experiment and hence it was decided that the avatars should be common to both versions to avoid any potential confounds.

Timetable

A list of lectures, workshops, practical classes and assessment dates was provided in calendar format so students could keep track of where they were supposed to be. The timetable was organised by university week and showed the current week by default with facility to cycle through different weeks events.

Resources

This section provided a categorised list of documents for download, including lecture notes and SPSS files, and web links to other useful information for students. Functionality for teaching staff to add resources to this section was provided, but not used.

Announcements

Teaching staff were provided with functionality to add announcements to the VLE which were then displayed in date order. This provided a communication opportunity for staff and students, as students could add comments to announcements, however unfortunately only staff used the commenting feature.

Forum

The forum (called *Debate Room* in York Assembly) was designed to allow teaching staff and students to post topics and reply to threads around a range of issues related to the course, and the wider political landscape. The initial page showed a list of topic links ordered by the most recently active topic and also showed metadata including author information and the number of replies and views a topic had received. Once clicked the topic opened to show the full topic and the option to reply. Additionally, both staff and students could rate student replies (through students were not permitted to rate staff posts, at staff request). It was decided that the rating system should avoid the negative form to prevent any student embarrassment about writing something on the VLE. Thus the rating system took the form

of a link at the bottom of every post called 'Good Reply' and showed the number of positive votes the post had received.

Special Projects

The special projects were essentially a series of quizzes which teaching staff could create and students could then complete. Three different quiz templates which tied in with the course material were provided to staff. The first template was based on the credibility of information sources and allowed staff to add sources such as a news article or document link and assign that source a credibility rating from Very Poor to Very Good with a description of why it was given that rating. Students taking the quiz would be shown the individual sources in order and also asked to provide a rating. Once a source was rated the VLE displayed the staff rating and the reasoning behind it. Upon completion of the quiz, the student was congratulated and a list of sources, with both staff rating and reasoning, and corresponding individual student ratings, was provided in full for reference purposes. Students were only permitted to complete each quiz once, although the quiz sources remained available after completion.

Both the second and third templates were created during the experiment (roughly 3 weeks in) after consultation with teaching staff regarding what would be useful to students. The second provided a method of identifying political bias in sources, along a left to right scale, and the third allowed either interview or questionnaire questions to be rated for suitability for inclusion in research. Both of the additional templates produced quizzes with similar functionality to the first.

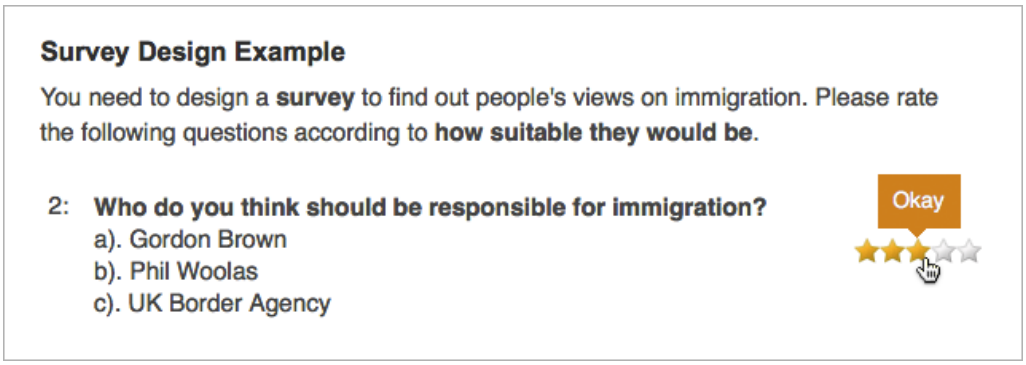

Figure 10: Screenshot of a possible quiz question (answer is probably not 'okay')

Dashboard

The dashboard was designed to both highlight new content and provide easy access to said content, and was the first screen shown after login. It displayed a timeline of recent VLE events, including new announcements, forum posts and replies, which had occurred since the last login [10] by a particular person. The author name and avatar were also displayed where possible, an example being ':Avatar: Full Name posted a new debate topic: Debate Topic Link'. Graphical and content similarities to the Facebook *News Feed* were not

10 - There was actually some leeway in the time cut-offs for different events, roughly, events were shown which were a couple of days before the last login

accidental as it was felt this would be familiar to many students and help ease people into the new system.

(3.3.3) The Game Version

The game version was identical to the vanilla apart from three key additions based in game rules and rewards, creating game mechanic loops out of standard actions in the VLE. In addition there were several smaller changes to some of the vanilla functionality, all of which are discussed in detail below.

Ranking System

Participants using the game version were assigned an initial rank. Participants were able to level up (called *promotions* within the VLE) through participation. Individual activities were assigned a numeric score, and participants completing that activity had the appropriate score added to their total. Scoring for the various activities is summarised in table 4.

Activity	Participation Points
Login (only scored once per day)	2
Debate Started	10
Debate Reply	6
Voted in Debate Room	3
Received Vote in Debate Room	6
Comment on Announcement	2
Question Answered in Special Project	1

Table 4: Scoring weighting for various VLE activities

The score for the various activities was purposely weighted to encourage activities which were thought desirable, such as contributions in the debate room and special project quizzes (although only 1 point was given per question, there were many questions). Likewise receiving a vote in the debate room was considered more desirable than giving one, as receiving a vote would suggest a well considered post had been written, rewarding quality as well as quantity. The different ranks which could be achieved were named using a political career metaphor (with one additional Star Wars reference) to tie in with the political metaphor which underpinned York Assembly, and to suggest a progression in the minds of participants. The various ranks along with the number of points required to achieve that level are summarised in table 5.

Promotion Rank	Points Required
Campaigner (Starting Rank)	0
Local Councillor	10
Member of Parliament	25
Cabinet Minister	50
Prime Minister	100
Supreme Chancellor	200

Table 5: Ranking levels with points threshold

The ranking system was designed to give participants an early rank upgrade (Local Councillor) for minimal effort, so they might quickly understand how the game worked, and to (hopefully) stimulate a disposition to desiring further rewards. For every subsequent rank, the points required to advance effectively doubled, to ensure a corresponding rarity to rank titles that were considered more desirable (it was thought that politics students would react well to titles such as Prime Minister for example). It was also considered that the rarity of the higher levels would emphasise their desirability, a common technique in many MMOs such as World of Warcraft which create value for items through artificial scarcity [de Bruijn 2005]. The ratio of rank points to advance also reflected a further common technique in video games, that of progressive increases to the difficulty level. Thus, a higher level of VLE activity was required to advance to the later levels, in a manner analogous to the speed increases in Tetris.

An individual participant's promotion rank was displayed prominently on virtually every page in the VLE along with a progress bar showing the completion percentage toward the next promotion level (see Figure 11). The progress bar mimicked the 'Profile Completeness' bar found on the professional networking website LinkedIn.com and was designed to motivate participants to want to achieve the next level by providing them with a clear goal, and displaying their progress toward it.

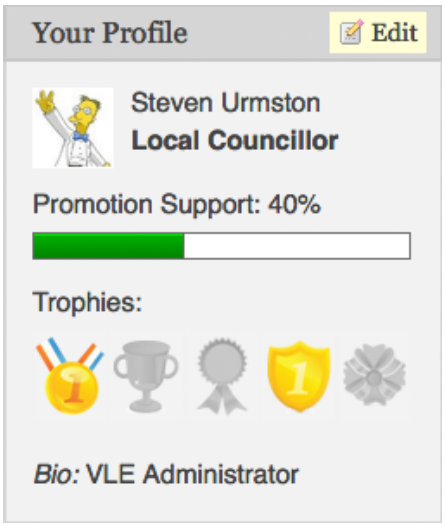

Figure 11: Screenshot of the profile sidebar displayed throughout the VLE

In addition, when participants achieved a promotion the dashboard displayed this achievement to all other game participants. This public display was important in rewarding the participant in social terms, but also provided an important hook for other game participants, who were given hints to how the promotion system worked and what levels were possible. This was particularly important as in game-like fashion, the promotion levels and point scoring activities were hidden from participants until they actually achieved them, or in this case, were given clues by seeing others doing so.

Calm Messaging System

The points and promotion ranks were underpinned by the use of *calm messaging* [Dyck et al 2002] to communicate point scoring and promotions to participants without being overly distracting from workflow. Calm messaging is a common feature of many games, examples being transient notifications about city production in Civilisation and the use of sound to indicate changes to the threat level in the Legend of Zelda. However as well as being a useful interface tool, this communication was the primary method of feedback, turning actions such as posting a debate into a game mechanic loop.

On completion of a point scoring activity a green message in the top right of the screen faded-in and informed the participant that they had received 'Promotion Support' for that particular activity, and gave the percentage gain towards the next promotion level.

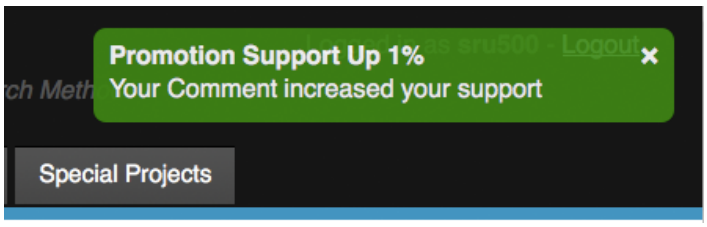

Figure 12: A point scoring message

If the participant passed the total required to advance, a similar red message was shown offering congratulations and the showing the new rank achieved. (In addition the progress bar also animated to its new total)

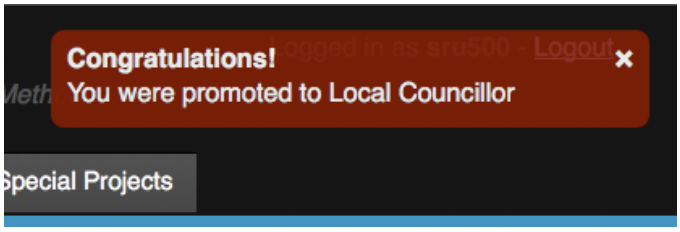

Figure 13: A promotion message

All calm messages did not require dismissal by the user and faded out on their own accord after 5 seconds (although a close link was also provided). When a participant logged in, if any points had been gained during their absence (from votes received) the calm messaging initiated automatically.

Trophies

A selection of competitive trophies was introduced to complement the more ego-centric promotion ranks. These trophies were designed to switch between students in a manner analogous to the '*Capture The Flag*' mode found in many first person shooters (FPS). Game participants who gained a trophy on the the basis of the total number of contributions in various categories, held that trophy until another user surpassed their total, and the trophy was then *taken* by the new owner. The dashboard also displayed the award of trophies, for example "Participant Name was awarded the Chief Whip trophy"

Each trophy had a small icon associated with it, and the trophies a participant had gained were shown in the profile block (See Figure 11). Trophies a participant did not hold were shown as greyed out icons, with a tooltip that hinted at how the trophy might be gained when the cursor was hovered over it. The trophies used, along with the reward criteria and the hint provided to participants are shown in Table 6.

Icon	Trophy Name	Award Criteria	Hint Given
	People's Champion	Highest number of votes received	*Work for votes*
	Frontbencher	Highest number of debate replies	*Speak your mind*
	Chief Whip	Highest number of votes given	*Keep others in check*
	Speaker	Highest number of debates started	*Start the conversation*

Icon	Trophy Name	Award Criteria	Hint Given
	Special Envoy	Highest total score in special project quizzes	*Keep up the project work*

Table 6: Trophies used with award criteria and hint provided to participants

Special Projects Leaderboard

Every quiz answer given by a student was actually assigned a numeric score in the background. This score was determined by how close their answer was to the one provided by teaching staff. For example, on a scale of 1-5 (1-5 having different meanings for different quizzes), if staff put the answer at 4 then a students who answered 4 received 3 points. If their answer was one notch away, in this case 3 or 5, they received 2 points. Any other answer received 1 point, as effort should always be rewarded!

The quiz points were separate to the promotion scoring mechanism (quiz answers always received 1 participation point), and a tally was stored with the user record in the database. This permitted the display of a cumulative leaderboard of special project scores for users of the game version. This leaderboard was a simple list of student scores with name and avatar in rank order. Vanilla participant scores were also shown within the game version, however only game participants could access the leaderboard.

(3.3.4) Technical Architecture

In order to create an engaging experience, the game elements needed to be fully integrated within a VLE, rather than feeling like they were tacked on. Because of this requirement, it was decided that using an existing open source system, such as Moodle, as the basis for York Assembly would actually require more work than starting from scratch. Therefore the VLE was custom built using a combination of web standards compliant HTML, CSS and JavaScript. This combination of technologies was employed in a manner which (hopefully) ensured that York Assembly was accessible to students with disabilities, such as having a semantic HTML base, controlling styling entirely using CSS files, and ensuring that the core services provided by the VLE were usable without JavaScript. Backend code was written using PHP, communicating with a password protected MySQL database which securely stored all student data. This particular architecture is typical for many websites and applications and is shown in Figure 14.

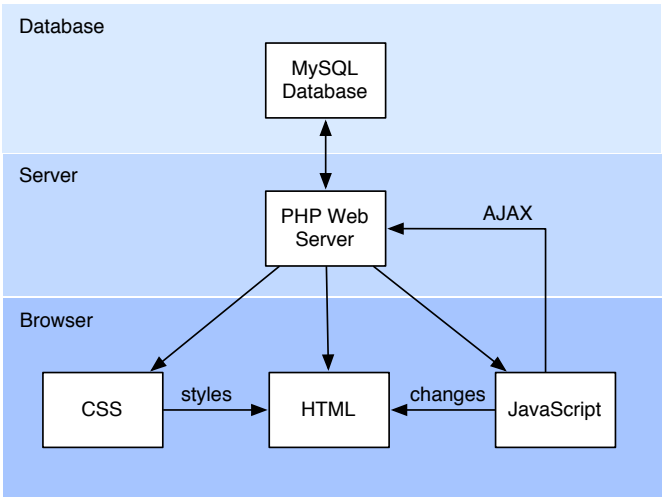

Figure 14: Technical architecture for York Assembly

The two (three including the admin version) versions of the VLE were run together, using one set of core files and assets, with conditional display of the extra game elements, or in the case of teaching staff, administration privileges (such as facilities for adding announcements and controlling special projects) dependent on the status of the current user. As well as being good coding practice, this allowed all of the content created by staff and students (such as debate posts or announcements) to be available for all other users, regardless of which version they were using. Figure 15 shows this structure. Likewise, all of the scoring mechanisms ran in the same way on both the game and vanilla versions, so vanilla users (and staff!) acquired points and obtained promotions without ever being shown this information. This allowed for the possibility that a particular student might want to switch versions (which was ethically reasonable to allow), as well as being potentially useful information later on.

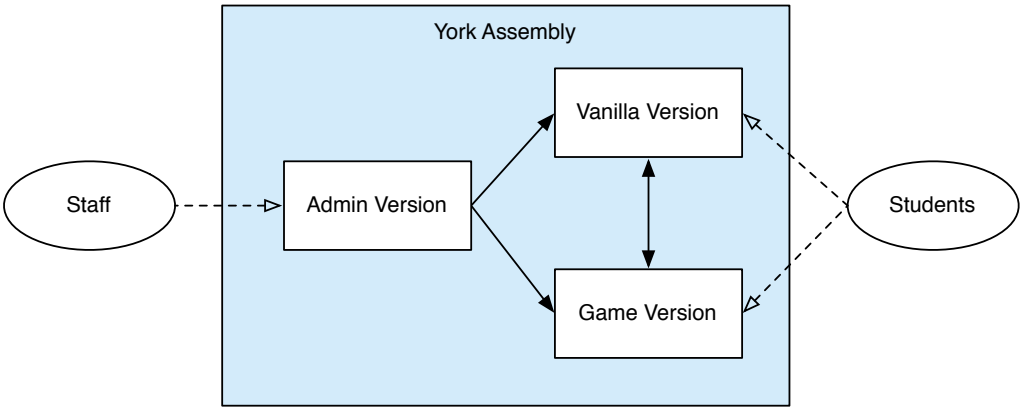

Figure 15: Version Overview of York Assembly

Comprehensive logging was also built into to the system to record any page views or actions within the VLE (excluding administrator users), and link those records to the individual participant, the version used, and a date/time when the event occurred. The logging code was written using PHP to record the events in a database table.

The use of client side scripting to interact with the server without requiring a page refresh, commonly referred to as AJAX (Asynchronous JavaScript And XML, although it is not strictly asynchronous and may not use XML!) was essential to the gaming version as it allowed the system to provide immediate feedback (such as the calm messaging and animated promotion support bar) which helped encourage a causal relationship between action, game rules and rewards in the minds of participants. For example when a quiz question was answered, JavaScript detected the event and called a PHP script to store both the promotion and special project points, and could then show not only the results, but also give immediate feedback to game participants about game progress such as reaching the next rank, mid-quiz.

(3.4) Method

(3.4.1) Design

The experiment used a between subjects design of two equally sized groups of students; the Game and Vanilla groups. The groups were randomly constructed from one university course by assigning students to different groups on an odd/even basis when they completed the ethics form, resulting in an initial 50/50 of participants between the two groups.

The independent variable was the addition of the game rules and rewards discussed in section 3.3.3 to the VLE of one group. The dependent variables were levels of participation, and the positivity of the student experience. The measurement of participation was separated into two aspects, one regarding engagement, and the other contribution, shown in Table 7. The student experience was not measured per say, but rather explored qualitatively using the questionnaire and interviews.

Engagement	**Contributions**
Number of Logins	Number of Debates Started
Number of Page Views	Number of Debate Replies
	Number of Votes
	Number of Completed Special Projects

Table 7: Measurements of Participation

(3.4.2) Participants

107 second year undergraduate students (48 female and 59 male) completed an ethics form and successfully logged into the VLE (54/53 game/vanilla). In addition to the one Senior Lecturer, there were 3 Teaching Assistants (who ran the seminars and workshop classes) and one Library Liaison who were given administrative access to the VLE.

All of the experiment participants were invited to complete the questionnaire, and 6 participants were selected and agreed to interviews with the researcher. The selection criteria for the interviews was based around finding participants with interesting levels of participation, and were weighted towards the game group as this group was most relevant to the research. The individuals selected are shown in Table 8.

Game Interviewees	**Vanilla Interviewees**
High Engagement / High Contribution	Very High Engagement / Low Contribution
High Engagement / Low Contribution	Average Engagement / Average Contribution
Average Engagement / Average Contribution	
Low Engagement / Low Contribution	

Table 8: Interviewees across the two groups

(3.4.3) Materials & Equipment

The York Assembly VLE was deployed on a Linux server running Apache 2 and a domain name (www.yorkassembly.co.uk) was registered and pointed at the server. The VLE is currently still available (September 2009) at that address, using the login details; username: *test*, password: *test*. Full source code is also available on request.

Participants were required to complete an ethics form, devised in accordance with departmental guidelines. This ethics form was completed online by participants, at teaching staff request, however the transcript is provided in Section 6.1.

A short online questionnaire (15 questions) was created during the course of the experiment. The questions were devised by adapting the QUIS User Satisfaction Questionnaire [Harper and Norman 1993] to account for the context of the research, for example the use of word-pairs such as B*oring-Exciting* and *Motivating-De-Motivating* in place of *Frustrating-Satisfying* and *Rigid-Flexible*. Additional questions were developed to explore the levels of experience participants had with both computer games and social networking. The questionnaire was not piloted, but was checked over by teaching staff before it was distributed. The questionnaire is available in Appendix 6.4.

An outline interview script was created to serve as the basis for some informal interviews with participants. Slightly different versions of the script were used with participants from the two groups, to allow for some discussion specific to those different groups. The script either had 6 main topics with 47 other possible lines of questioning (vanilla group) or 9 main topics with 49 additional questions (game group). The outline script is available in Section 6.3.

(3.5) Procedure

The VLE experiment ran for the length of the selected module (8 weeks), commencing in Week 2 of the summer term (4th May 2009) and finishing at the end of Week 10 (3rd July 2009). The class were informed that two versions of an experimental VLE were being evaluated but were not explicitly told what was being researched. Students were asked to complete an ethics form online (Section 6.1) and were not permitted to access the system until consent had been given. Students were informed that participation in the VLE was entirely optional, and that 5 prizes of £20 Amazon Gift Certificates would be awarded randomly to students who had logged in to the system at least once, at the end of the experiment.

Both versions of the VLE were integrated, and all staff and student created content was available to all students, regardless of version, for example a debate reply added in one version was visible in the other (see Figure 15). Students were permitted to switch version at any point during the experiment, however this offer was only taken up by one student during the first week.

During week 8 of the experiment, all participants were sent an email asking them to complete an optional short web-based questionnaire which had 15 questions split into 3 steps. Partially completed questionnaires did not register a result.

During weeks 8 through 9, ten students were asked by email if they would be able to participate in a short interview with the researcher. Six students eventually accepted this, and met the researcher for a short (15-30 minute) interview. The interview used an outline script of questions, however the interviews were deliberately kept informal to give the interviewees chance to talk about what they felt was important. The interviews were all recorded with participants consent.

At the end of the experiment all participants were sent an email thanking them for their participation and informing them of the prize wining students (who were generated randomly from the database). Prize winners were sent their Amazon vouchers by email. After all data (including interviews) had been completed, students were also sent a short description of the research aims, and some preliminary results.

(3.6) Results

The primary method for measuring levels of participation to determine the strength of hypothesis 1, that levels of participation will be higher for the game group, was analysis of the log data discussed in section 3.6.1. Both the questionnaire (3.6.2) and the interviews (3.6.3) are designed to evaluate the strength of hypothesis 2, that participants will be more positive about their experience using the VLE within the game group.

(3.6.1) Log Analysis

Engagement

Analysis of the log files using a one tailed Mann Whitney test shows significantly higher levels of engagement in both measurements for the game group (Table 9). The Mann Whitney test was preferred to the more standard Students T test because the distributions of the engagement results for both groups was not normally distributed, but was rather positively skewed with a large amount of participants with low activity. Figure 16 shows this distribution for logins.

	Game Group			**Vanilla Group**			**Mann Whitney** (1 Tailed)
	Mean	Median	SD (σ)	Mean	Median	SD (σ)	
Logins *(per participant)*	8.5	8	5.8	6.4	4	5.5	Z = -2.39 p = < 0.01
Page Views *(per participant)*	74.6	55.5	68.1	50.8	38	43.5	Z = -2.16 p = 0.015

Table 9: Engagement Results

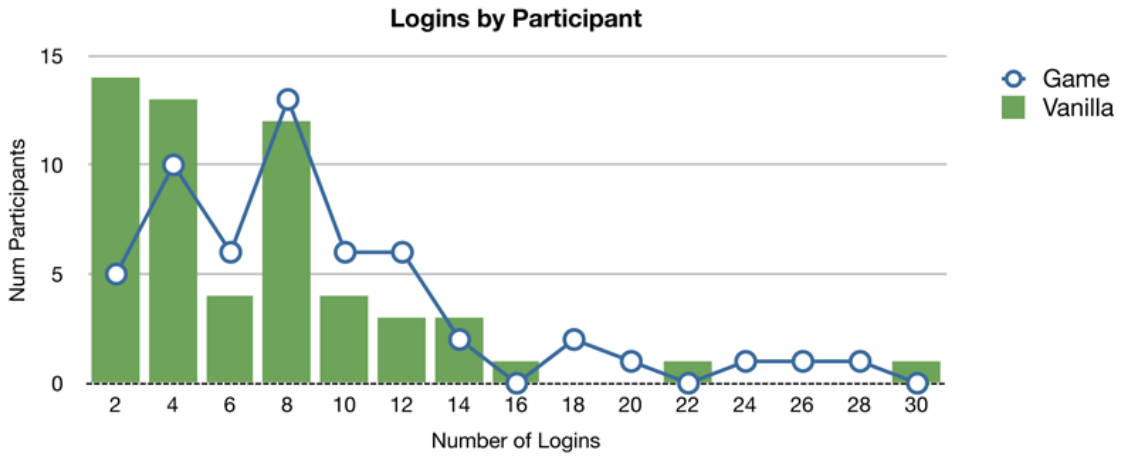

Figure 16: Logins by Participant

The total number of both logins and page views were generally higher for the game group throughout the course of the experiment, as shown by Figures 17 and 18. Weekends had low activity (unsurprisingly) and there was a large increase in activity on June 11th, coinciding with students using York Assembly during workshop classes.

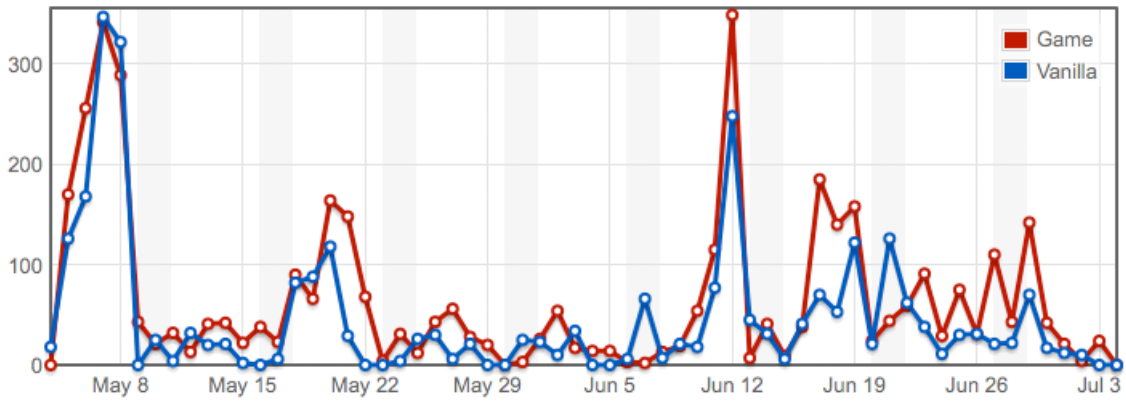

Figure 16: Total Page Views by Experiment Day

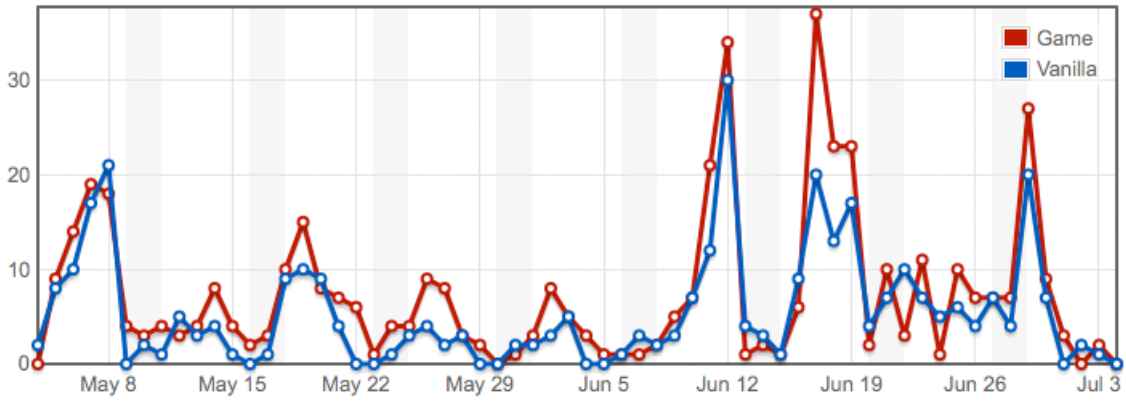

Figure 17: Total Logins by Experiment Day

Page views were higher for the game group within all sections of the VLE, as shown by Figure 18, although the Debate Room and Special Projects showed the largest differences (a ratio of 1.7). Interestingly these areas had the highest number of participation points available.

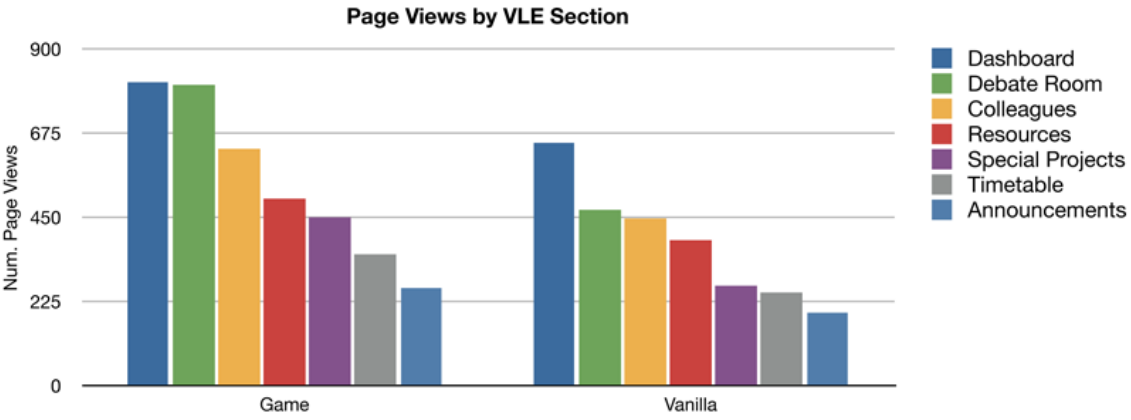

Figure 18: Page Views by VLE section

Contribution

Total levels of contributions were disappointingly low, particularly in respect of debates started and replied to, as shown in Table 10. Furthermore, when total contributions are broken down by participant (Table 11), general levels of contribution look even weaker as a small number of game participants contributed a disproportionate amount of debate replies, and particularly votes. Whilst participants who *contributing something* (see Table 11) bordered on a significant difference between the two groups ($\chi 2 = 3.27$, $p = 0.07$), there was no difference between the game and vanilla groups in any individual measurement.

Contribution Type	Game Group:	Vanilla Group:
Debates Started	2	1
Debate Replies	27	7
Votes in Debate Room	159	4
Completed Special Projects	19	11

Table 10: Total Contributions by the 2 groups

	Game Group:		Vanilla Group:	
Activity Type:	**Yes**	**No**	**Yes**	**No**
Started Debate	2	52	1	52
Replied to Debate	11	43	7	46
Voted in Debate Room	10	44	4	49
Completed Special Project	19	35	11	42
Contributed Something *(any 1 of the above)*	28	24	16	37

Table 11: Contributing Participants with Activity Type breakdown

(3.6.2) Questionnaire

39% (42 of 107) of participants completed all three steps of the questionnaire, participants with only partial step completion did not register a result. The response rates was higher from the game group with 50% responding (27), compared to only 28% from the vanilla (15). The questionnaire had four aspects; Likert scale responses, Positive and Negative Features, and experience with both Video Gaming, and Social Networking, all of which are shown individually below.

Likert Scale Responses

This part of the questionnaire asked participants to indicate a preference on a 7 point Likert Scale to a series of word-pairs, one negative and one positive, in relation to different aspects of the VLE. Due to the disproportionate number of game participants responding to the questionnaire, the total values shown in Figure 19 are not relevant, and the graphs are included to demonstrate the shape of the curves, which for the most part are remarkably similar, with only Boring-Exciting showing any indication of a difference. However it should be noted that the responses to all questions were generally positive for both groups, with the possible exception of Pointless/Useful.

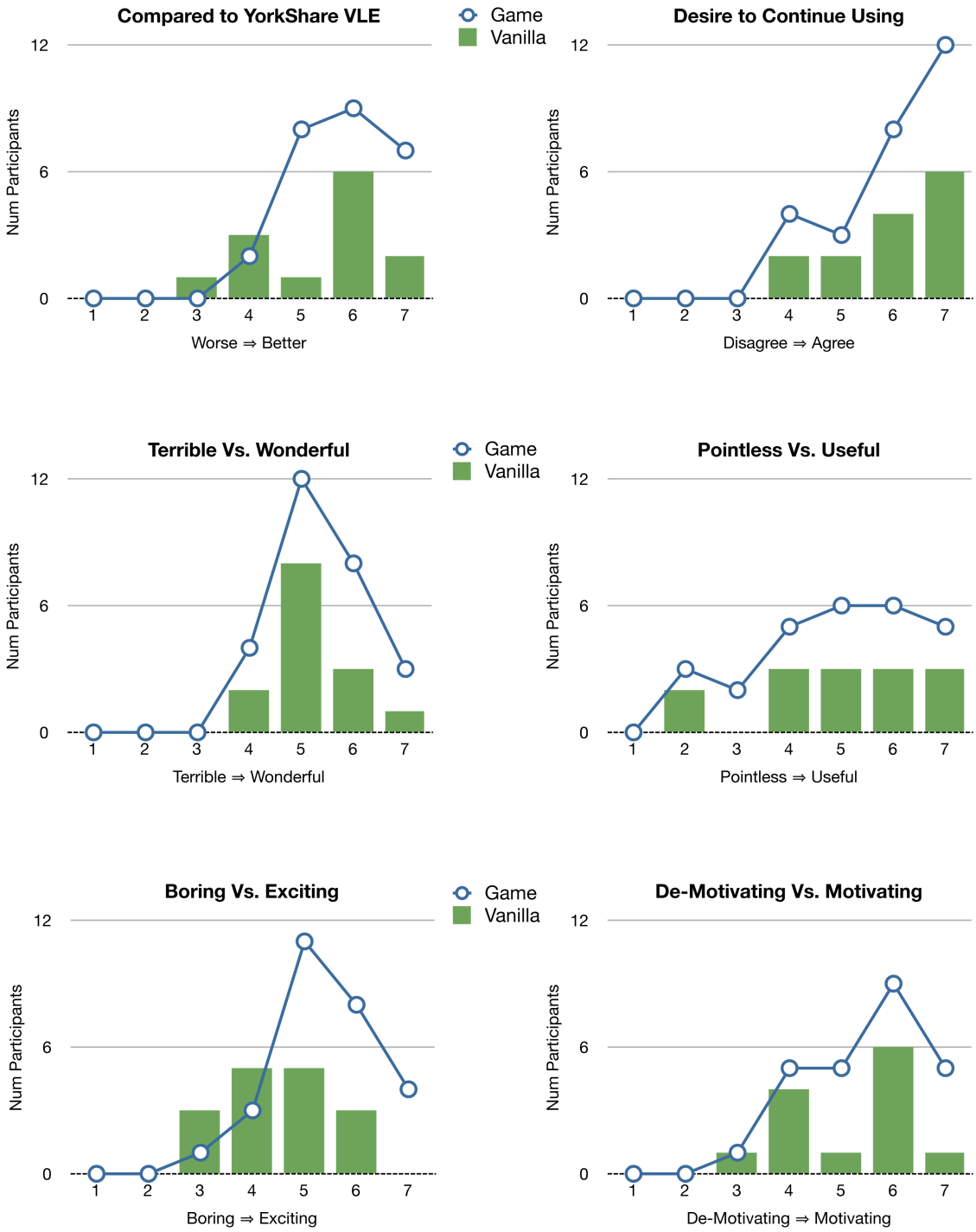

Figure 19: Likert Scale Question Responses

Positive and Negative Features

A content analysis was performed on the answers given to questions asking participants to list their favourite and least favourite aspects of the VLE, and the resulting codes with the number of mentions is shown in table 12. Again comparison between the total mentions within the two groups is impossible due to the disproportionate number of respondents from the game group, and they are included for reference purposes.

Positive Codes			Negative Codes		
Code	**Game**	**Vanilla**	**Code**	**Game**	**Vanilla**
Aesthetics	5	3	Admin Problems	1	1
Communication	12	5	Confusing	4	1
Fun	7	1	Game Aspects	1	n/a
Functionality	4	7	Lacks Functionality	6	4
Learning	1	0	Limited Scope	1	2
Motivating	6	1	Low Participation	3	0
Usability	10	7	Pointless	1	0
User Profiles	5	3			

Table 12: Coding of Positive and Negative responses, with the number of mentions by version

Video Gaming Experience

45% of respondents (19 of 42) stated that they played video games, with high usage of PC games, Web Games (e.g. Facebook or Flash games) and Console Games (xBox, Wii), and limited usage of Mobile and Handheld games. 48% of game group respondents (13 of 27) stated they used video games, compared to 40% of vanilla group respondents (6 of 15). Activity levels playing games was spread fairly evenly, although nobody seemed to play more than once a day. Figure 20 shows these results.

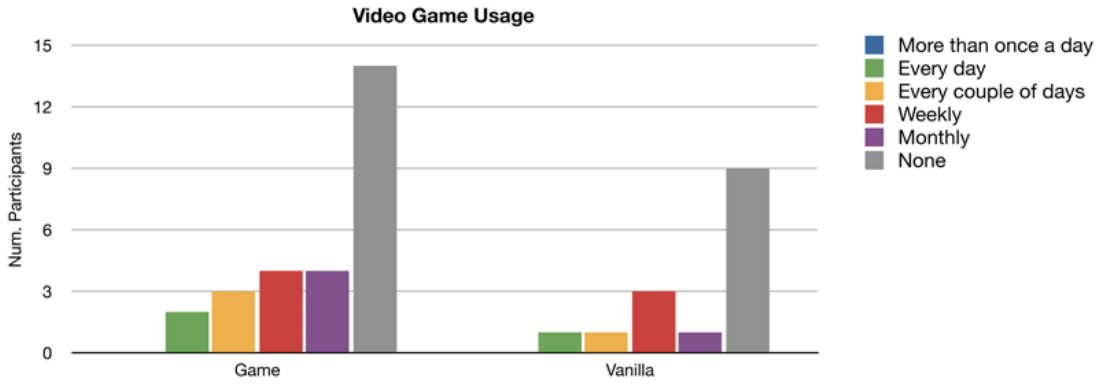

Figure 20: Video Game Usage of the two groups

Social Network Experience

83% (35 of 42) of respondents stated that they used social networking services, all of them using Facebook, and limited usage of both MySpace and Twitter. Social networking use was spit evenly between the two groups with 85% of game respondents using these services and (23 of 27) and 80% of vanilla (12 of 15). Activity levels on social networks were also quite high for these respondents, as shown by figure 21.

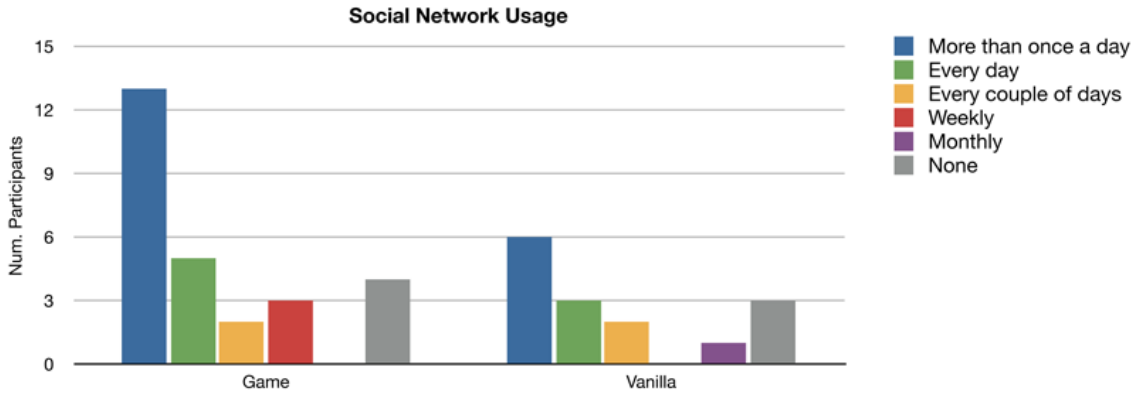

Figure 21: Social Networking Usage of the two groups

(3.6.3) Interviews

6 participants (2 from the vanilla group and 4 from the game group) took part in a short recorded interview with the researcher. Ten pertinent findings emerged from an analysis of the recorded interviews, and are presented below.

Research Methods Module

In regards to the Research Methods module the students were taking, interviewees had mixed feelings. Two people suggested that the course material was a bit dry, with one student saying "*it was just tedious*", particularly when asked to compare it to other modules. However two students enjoyed the practical components of the course, "*producing something makes you more motivated*", and two were positive about the group work aspect, "*it was really important for everyone to do well in the group project*".

Yorkshare VLE

All the interviewees disliked the official Yorkshare VLE with common complaints being the structure and the usability, "*it is far too complicated … it's just difficult to work out what to do*". When asked to compare Yorkshare with York Assembly, all the interviewees strongly preferred York Assembly, "*oh, it was much better!*", but with slightly different reasons between the two groups. The vanilla interviewees were both positive about usability, "*on this one everything was in the same place and you just know exactly what to do*", and aesthetics, with colour scheme and avatars considered good points, "*I liked the profile pictures*". The debate room was also considered an improvement over the Yorkshare forum, "*I knows it is like the discussion board, but somehow this is better*". Whilst these aspects also featured for game interviewees, York Assembly was also strongly considered to be more fun than Yorkshare "*it was really useful, but also fun, you can't really have fun with Yorkshare*".

Fun

Vanilla interviewees felt the VLE was interesting to use and quite fun, both suggesting that the profile pictures and the bright colour scheme made it inviting, "*It looked more lively, like you wanted to use it*". Three game interviewees felt that the VLE was fun, and were

generally focused on the game elements (promotions & trophies) when describing why, "*I thought it was fun, the whole you become Councillor and win trophies*" and "*the competition bit of it was really fun*". One game interviewee thought fun was perhaps the wrong word, but though the VLE had "*a sense of humour*". All interviewees felt that VLEs could appropriately be fun, "*Yeah, I don't see why not, it's not like it's fun just for sake of being fun*", with two suggesting this might improve participation and make the system more useful as a result, "*it's useful if it's fun as it makes people use it more*".

Competition

None one of the interviewees felt in direct academic competition with other students, although nearly all of them considered themselves to be personally competitive, at least in some areas of their lives. Rather they seemed to have internally focused goals, "*once you come to university, you care more about what you're doing yourself, rather than other people*". When asked whether they compared their grades to others, interviewees had mixed reactions, with two suggesting they did compare their grades to others, "*I suppose I do, it's quite difficult to know how you've done if you don't*" with others either suggesting they did not do this, or giving vague responses.

Only one game interviewee thought the VLE was competitive, suggesting they had compared their own rank to that of others, "*The whole promotions thing was a bit (competitive), as myself and Other Participant were both trying to get higher*", however one other game interviewee mentioned two participants who had taken it seriously "*some of my friends … took it really seriously!*". Other game interviewees had only slight, "*yeah a little bit, I didn't take it too seriously*", or no interest in treating the game aspects as competitive, "*no, it was never like; this guy has become this, it was never like that*".

Promotions

In general, game interviewees found the promotions intriguing and were interested in gaining promotions, "*I wanted to know what the next level was*". Two participants also suggested that they had enjoyed getting promoted, particularly due to the public display of the achievement on the dashboard, "*it made me feel proud, it said my name when I got promoted*" However in general game interviewees were not focused (or would not admit to) on fellow student's ranks, "*I looked a bit but I wasn't really bothered*", and were keen to stress that they considered them as a bit of fun as opposed to valuable achievements, "*it's not like they changed my life or anything!*".

Trophies

The trophies were almost universally considered to be confusing, "*yeah I could never really work out how you got them*", and a little frustrating since the award criteria was not explicit, "*it was frustrating (seeing others win trophies) as I didn't know how to get them*". One interviewee who had received a trophy felt good about it, "*yeah it was enjoyable to get it*", but was keen to stress that this was not important to them, and that they were not bothered when they lost the trophy, "*I can't say I really minded*".

Performing Actions for Points

Game interviewees had mixed feelings about whether they had performed actions for the sake of for points, with two students suggesting they had not done this, "*not really, I just did what I wanted anyway*". One student strongly suggested they had done this, "*I did vote loads of times just to get the promotions*", with the fourth suggesting that they had logged to check on the progress of others, after noticing others engaging in a points contest. This interviewee also made the the insightful suggestion that it, "*the way they were doing it (others performing actions for points) … maybe gearing it towards having the competition related to people using it properly would be better*".

Academic Progress

None of the game interviewees felt the game aspects were distracting from academic work, "*not really, it's not like they affected my work*", although the Debate Room was considered a possible source of distraction if it went off topic, "*I guess the debates could be if people start talking about whatever they want*". However the debates were also considered useful, "*the debates were interesting as they were about what we were doing*". Two interviewees also found the special projects useful academically, "*the special project was really useful actually, in my literature review*".

Research Aims

Nearly all of the interviewees were unaware of the research aims and struggled to make a guess as what these could be, with one suggested they had been far too busy with their own research projects to even consider this, "*I was far to busy to think about that"*. Two interviewees, one from either group, were apparently completely unaware that there were even two version of the VLE being tested (presumably they did not read the consent form, which was quite explicit about this). One interviewees had an inkling that it was gaming aspects that were being evaluated, after seeing a friend using the vanilla version, "*Participant Name didn't get the promotions*", but this student did not think this was widely known. All interviewees felt the experiment was legitimate once they were informed about the research, even after the idea that the experiment was a bit sneaky was introduced, "*it's fine, you've got to test these things*".

Facebook

All of the participants had Facebook accounts, with most suggesting they used it frequently. Most participants were quite explicit about how many friends they have on Facebook, and they could all clearly describe whether this number was comparatively low or high. Two interviewees noticed a similarity between York Assembly and Facebook, "*it's more like Facebook (comparing York Assembly to YorkShare)*". The idea that a VLE could be linked with Facebook had mixed reaction, with a couple interested in the idea, "*I don't see why not, everyone is on there anyway*" and a couple strongly against suggesting that Facebook was private, "*no I wouldn't want that, it's not for university*".

(3.7) Discussion

A discussion of the results presented and their contributions to the validity of the hypotheses stated will now be presented.

(3.7.1) Participation

As expected, analysis of the log files shows a significantly higher level of student engagement with the game version, however there is no difference in terms of contributions made between the two groups. Therefore Hypothesis 1, that participation will be higher in the game group, is rejected. This is not to say that nothing interesting was found, as the results show that game mechanics certainly have the potential to motivate students to engage with a VLE, just that the process of motivating contributions, within a system with a virtual community aspect, is much more difficult.

This is perhaps not surprising given that even in the world of Web 2.0 which this project began by lauding, actual contributions to community sites are often low, even if levels of engagement are very high. You only have to consider the amount of people writing reviews on Amazon and the amount of people who just read them, or contrast the people who contribute to Wikipedia, with the people who use the service actively, in order to see this. Indeed the often mentioned *90-9-1* rule for web communities [Nielsen 2006] states that for any given web community, 90% of people will be lurkers (non-contributors), 9% of users will be contributors in some form, with the majority of content being contributed by the top 1% of heavy contributors, and the contribution results for both groups reflect this.

(3.7.2) User Experience

In regard to Hypothesis 2, that the student experience will be generally more positive when using the game version, the questionnaire did not indicate any substantial difference between the two groups. As the interviews with participants, although interesting, were never really going to validate this hypothesis on their own, Hypothesis 2 is also rejected.

There was modest evidence in the Likert scale part of the questionnaire that participants found the game version slightly more exciting (See figure 19), and the coding performed on the positive and negative features (Table 12) did indicate the possibility that game participants found the VLE to be more fun and more motivating than vanilla participants. However for both of these factors, the results (perhaps skewed by the disproportionate amount of responses from the game group) do not show any substantial difference between the two groups.

The reaction of both groups to York Assembly was in general very positive, which the questionnaire answers demonstrate. Interviewees from both groups were also universally positive, although clearly these were people who had agreed to an interview and as such might not be entirely representative. That said, the author received emails from 5 students (both groups) who wished to pass on how much they liked the VLE, and as someone who

has built hundreds of websites, you are doing pretty well if your users feel the need to tell you so. The reaction of teaching staff was also very positive, indeed the course convenor has recently raised the possibility of continued use of the system. This leads the author to conclude that the VLE produced for the experiment was actually a good system, and the positive reaction to it obscured any potential differences which might have been caused by the game mechanics.

(3.7.3) Experimental Design

It was initially considered that two separate groups of students taking separate modules would be the preferable experimental design. However the use of a single university module split into two groups was preferred due to the possibility of introducing various confounds due to the different module cultures and teaching styles. Whilst using the single module for the study did guard against these possible confounds, it also introduced the possibility that the two groups might become aware of each other, and that participants, guessing at the research subject, might resent being in a particular group and use the system less, or use the system more due to a feeling of responsibility to the fellow student researcher. This possible internal confound was guarded against by withholding information about the nature of the research from students and asking the teaching staff not to discuss it with students. During the participant interviews, this possible confound was checked for and found to be negligible.

A further complication due to the use of a single module experimental design was that the game version needed to be compromised from what the author felt would be most effective. Principally the use of series of structured levels, students unlocking access to new features and abilities through effective use of the tools in hand (what could be described as a game mechanic hierarchy), was incompatible with the other half of the module having open access to all those features. The replacement for this feature, the ranking system, was levels in name only form, and the interviews suggested what the author had feared, that winning a title was not really much of a reward, and was more a curiosity to participants. It is believed by the author that unlocking the ability to change your avatar, or to upload video, or write a blog post, would have been far more rewarding than having the title of Cabinet Minister.

Both previous experience with video games and social networking can be reasonably eliminated as confounding factors, since levels of experience in these two areas were evenly distributed between the two groups, see Figures 21 and 20.

(3.7.4) Gaming the System

Several participants in the game group (4-5) showed evidence of gaming the voting system in order to achieve promotion levels, and it is the assumption of the author, backed by no more than a chat about gaming habits with one of these participants, that these participants may well tend toward the Conqueror player type discussed earlier. This

behaviour was somewhat anticipated[11], because the scoring mechanism allowed for a large amount of points to be accumulated simply by voting for colleagues debate room posts. This combination of low effort for high reward should really be avoided or constrained, but for the purposes of this experiment, the unlimited number of scoring opportunities provided by the voting system gave an interesting insight into participant engagement with the game elements, which the interview results discussed.

As discussed previously, the scoring mechanism actually reflects the values of the system, in that activities which are given a high point score are assumed to have greater value, and are actively encouraged. Because this scoring mechanism was so central to the game version, the point value for the different activities were given a great deal of consideration and small changes to these values may have produced significantly different results. Both the high number of votes from the game group, and the high levels of activity from the game group within high scoring sections of the VLE (Debate Room and Special Projects, see Figure 18) are evidence in support of the centrality of this scoring system.

(3.7.5) Problems

The trophies did not engage participants as the author had hoped, and this was probably a failure in the design of the system. Although participants found them confusing, this was not necessarily the problem as it was never intended that they be obvious. The author suspects that it was the rarity of the trophy awards (a limitation of the award criteria) which resulted in a lack of exposure to them. If designing the system again, the use of trophies related to an individual user's activity (such as a trophy for your first forum post, 10 logins etc.) as opposed to competitive between users, would be the preferable design. This type of trophy system would both be more relevant to the individuals involved, and allow users to collect the set, something that was not really possible in York Assembly, although a couple of participants got close!

The leaderboard also failed to engage users, indeed analysis of the log files indicates that few students even looked at this page. In hindsight this feature would have been omitted as it did not contribute anything to the research questions the paper was trying to answer. As noted, leaderboards have the potential to promote undesirable behaviour and should probably be avoided in a VLE context anyway, but in this case the leaderboard did not even warrant consideration as a side show.

11 - Partly because this type of behaviour is something the author may also have tended toward

(4) Discussion & Further Work

There has been a lot of discussion throughout this paper, so this section will not present much more, but will rather focus on one question the author feels is particularly worthy of further research. To begin with however, an apology.

The scope of this project was broad, requiring treatments of the entirely abstract world of game definitions and the nature of participation, through the psychology of motivation and reward, to the specifics of game design which are rarely specific and the functionality of web services, and finishing with the technical design and deployment of a VLE. As such, it has raised more questions than it has answers for, a trait which I would ordinarily not apologise to the reader for, however in this case apologies are both warranted and offered, due to the particularly high ratio, and especially as I have several more to raise!

Given this (perhaps not entirely) unfortunate trait, there are clearly many areas for further research suggested, as even the nature of games is a subject worthy of books. Experiments looking at types of virtual reward systems (possibly translatable to tangible rewards) and the different effects they produce, perhaps related to the different motivations for play, would all certainly be interesting. As would studies into why games engage people, perhaps even examining the different kinds of fun provided in the MDA! In terms of this experiment, the author would very much like to know for certain if the structured levels with bonus abilities would have changed the results (I strongly suspect it would have), and to explore the use of a more explicit fantasy element within the gaming VLE, such as a introductory story detailing a junior minister and the career path they had to take. Connections between a VLE and Facebook are also an interesting area for discussion, if not necessarily entirely recommended.

However this project actually attempted a further investigation which unfortunately failed and has been omitted from the main paper (although those with a keen eye might still spot the remnants). It is this author's belief, and it is one which I am not alone in having [Delaney 2007, Hunicke 2008, Krotoski 2007], although I can find no actual evidence either way, that at least a substantial proportion of social network users treat those services as games, and indeed play to win. In particular, 'friends' on these networks often come be viewed as status symbols, to be collected, traded and even bought. The social status of a Twitter user for example is very much dependent on the amount of followers they have, indeed the web interface for Twitter displays counts on user profiles in the form of followers/following, which feels a lot like goals for/against in a football league table. And indeed Twitter followers have become the hot status symbol of 2009, with numerous of celebrities getting in on the bragging [Ostrow 2009], and various Twitter leaderboards and services generating followers in exchange for money.

The investigation this project attempted took the form of a questionnaire designed to asses if users of Facebook viewed that service as a game. The questionnaire was piloted with a

few friends of the author, and was almost universally met with blank looks and complaints that questions were not understood, at least in terms of the questions which had any real significance to the study (As noted in the interview results earlier, people can generally tell you how many friends they have, and whether this is high or low, which at least shows an awareness of the 'score', so to speak). In part, this may well be the result of a poorly written questionnaire. However it is suspected that motivations for Facebook use are multifaceted, and indeed that users of Facebook do not often think about them, and hence struggle to answer any questions relating to one aspect. In personal conversations with friends who are happy to discuss personal motivations, this outlook can be unearthed, but it requires prodding not possible in a questionnaire. Therefore it is suggested that further research (quite possibly not through questionnaires) is required to answer the final question of this paper, and indeed its final words.

Is Facebook a game?

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(6) Appendices

(6.1) Ethics Statement

In compliance with departmental guidelines, this ethics statement details both the ethical code this project was conducted under, and the specific principles which were adhered to.

Do No Harm

Clearly no one can be physically harmed by a VLE, however a VLE should be a rewarding experience for all students and staff, and primarily should be a system which facilitates learning. Hence the VLE used within the course of this experiment was constructed to the best of this author's abilities to meet those challenges; in terms of the functionality it provided, the design and usability of the system, and in terms of the accessibility of the technical deployment. Whilst the VLE was designed and built within a short timeframe, the system did not attempt to do everything, but was rather focused on doing a few things well.

Whilst there is a sense in which encouraging students to (at least partially) play games with a VLE (in the manner implemented in the gaming version of York Assembly) might be considered harmful. This was judged to be acceptable because the gaming elements introduced were not for their own sake, but rather were directed towards academic purposes, and were certainly not intended to make fun of VLE systems. Students were also permitted to switch VLE version during the experiment, should they have wished to do so.

The module selected for the experiment did not have a history of VLE use to disrupt, and experiment was conducted in a manner which minimised any disruptions to teaching staff or students involved with this selected module. The experimenter responded to any emails regarding the system promptly and fixed any (small) issues that arose as soon as possible. The experimenter was also open to suggestion for improvements to the system, and was happy to add functionality at both teaching staff and student request during the course of the experiment. The 5 prizes awarded randomly to students after the experiment had finished, were as random as a PHP function can make them, and were not dependent on any level of participation by the students involved.

Informed Consent

The participants taking part in the experiment were asked to complete an ethics form before being given access to the VLE. This form detailed the procedure of the experiment, and although the overall research aims were not explicitly stated, as this might have compromised the experimental design, this information would both have been provided if a participant had asked, and was provided to all participants at the end of the experiment. The questionnaire also included an ethics form which explained what would be done with participant responses. The interviews were recorded with the explicit consent of

interviewees, who were also informed what would be done with the information they provided.

Confidentiality of Data

All the data collected during the experiment was stored in a secure, password protected database. The VLE itself was password protected and was not accessible by anyone not involved with the module, beyond the experimenter and his supervisor. This data has now been removed from public display and will be deleted forthwith, once the experimenter has finished using it! This report and any other publications omit any information which would allow a participant to be identified, except possibly by the participants themselves in the case of interviewees.

(6.2) Informed Consent Forms

(6.2.1) VLE Experiment Consent

Your consent is required to take part in this research experiment. **Please read below:**

This experiment is evaluating two versions of a VLE created for this module. Please remember it is the VLE versions that are being evaluated, and **not you**.

The VLE is to intended to support the teaching for this module. You should use in any way you find useful. There is no penalty if you choose not to use it.

Both versions provide identical main functionality and run in tandem. All staff and student created content will be available to all students, regardless of which version they happen to be using.

The experiment runs from Week 2 to 10. In Week 8 you will be sent a short and entirely optional questionnaire. After the experiment has finished you will be given access to an overview of the research aims, and an opportunity to read further publications.

Participation

Your participation is entirely optional. We hope you enjoy the experience

£20 Amazon gift certificates will be awarded to five (5) random students who have completed this initial login.

Two Versions

You will be randomly assigned to a VLE version

You are permitted to switch version at any point. Instructions are provided at the bottom of every page

Data Collection

All data collected is stored in a secure database which **only** the researcher and his supervisor may access.

Any publications will exclude all information that would allow a student to be identified.

If you have read and understand the above, please accept using the button below:

button: I Accept and agree to take part in this study

(6.2.2) Questionnaire Consent

This short questionnaire is part of my dissertation project. It should only take 5 minutes to complete, and your answers will be extremely valuable.

Any publications will exclude all information that would allow a student to be identified. Data is stored in a secure database which only the researcher may access.

There are 3 short steps (total 12 questions). **Please answer honestly!**

Many thanks,
Steven Urmston
MSc HCIT - Computer Science, York

button: I Agree, Take The Questionnaire

(6.3) Interview Script

I'm going to ask you a few questions about your experience of using the York Assembly. I have some specific questions, but it should be quite informal, so if you have anything you would like to raise just let me know.

Is it okay if I record the interview?

Any audio will go no further, and everything will be anonymous.

How has the Research Methods module been?

- Did you enjoy it?
  - Compared to other modules?
- How motivated were you to do well on this module?
  - Compared to other modules?

Did you enjoy using the VLE?

- What did you like about it?
  - Why was that bit enjoyable?
    - Do you think it distracted you from your studies?
- What didn't you like about it?

Do you think that could be improved on, or should it be scrapped?

What about VLEs in general?

What do you think could be improved on?

What was wrong with that bit?

What would you do?

Did you have fun?

What made it fun?

Do you think VLEs should be fun?

Why not?

Did you feel like you were in competition with other students?

What made it feel competitive?

Did you compare yourself against other students?

How do you think you did (comparatively)?

Do you consider yourself to be a competitive person?

What about at university, competing with your peers?

Do you think competition is healthy, or is it a distraction in this case?

Were you aware of what promotion level you reached? (Game Participants Only)

Did you want to get to the next level?

Did you do anything just for support points? (e.g. logged in, voted)

What did you do?

Do you think you would have done that anyway?

Do you think the promotions added anything to the experience?

Did that feeling change over time, get less, more?

How did you feel when you achieved a promotion?

Did you expect something more?

Is there anything that could have made it seem more worthwhile?

Did you check what level your friends had reached?

How did you compare?

Did you look at your friends profiles?

Did you notice the Trophies? (Game Participants Only)

(e.g. Special Envoy, Frontbencher)

What did you think of them?

Did you understand the basis they were being awarded on?

Was that unfair?

Did you consider how they worked?

Did you want to get a trophy?

Did that feeling change over time?

Do you think they added anything to the experience?

Did a trophy get taken from you?

How did that make you feel?

Did you want to get it back?

Were you aware of the differences between the 2 versions?

Do you think one version was better than the other?

Why was that version better?

Would you have liked to have the extra game elements?

Do you think it was unfair to have two different version?

Why?

Do you think having 2 versions affected your motivation to use the VLE

Did you consider what my overall research aims were?

How did that make you feel?

Do you think the experiment was legitimate?

Do you think the VLE helped or distracted you from your academic progress?

Do you think VLEs in general add anything to academic life?

Would you recommend that other students use the VLE

Is there anything in particular you felt was beneficial?

How did that help you?

Is there anything in particular that was distracting?

Did that not reflect the serious nature of your studies?

Do you play computer games?

What is your favourite type of game?

Why do you like that particular type?

What about board games?

Can you see any similarities between computer games and the VLE?

Do you think that is appropriate for a VLE?

What is the difference?

Do you have a Facebook account?

How often do you check it?

Are you aware of how many friends you have?

Is that high or low (compared to your other friends)?

Do you have anyone listed as a friend how you don't really know?

What about 'friends' you don't like?

Why do you have them as friends?

Are you interested in how many friends people have, do you check?

Do you play any games on Facebook?

Do you ever want to just start again (or give up completely) on Facebook?

How would you feel if the VLE was linked to your Facebook account

(6.4) Online Questionnaire

Step 1

Have you used the official Yorkshare VLE before?

Yes/No

How did York Assembly compare?

Worse * * * * * * * Better

Overall reaction to York Assembly

Terrible * * * * * * * Wonderful

Pointless * * * * * * * Useful

Boring * * * * * * * Exciting

De-Motivating * * * * * * * Motivating

What are your favourite aspect(s)?

1/2/3

What are your least favourite aspect(s)?

1/2/3

Would you like to use York Assembly again, for other courses?

Disagree * * * * * * * Agree

Step 2

Do you use Social Networking Services? *E.g. Facebook, Myspace, Twitter*

Yes/No

Which Social Networking service(s) do you use?

Facebook, MySpace, Twitter, Bebo, Flickr, Habbo, Last.fm, LinkedIn, Other

How often do you use Social Networking Services?

Monthly, Weekly, Every couple of days, Every day, More than once a day

Step 3

Do you play Computer Games? E.g. XBOX, Wii, Phone Games, Flash Games

Yes/No

Which Platform(s) do you play on?

Console (XBOX, Wii, Playstation), Handheld (DS, PSP), PC / Mac, Mobile Phone, Web (Facebook, MySpace, Flash Games)

How often do you play them?

Monthly, Weekly, Every couple of days, Every day, More than once a day

Finish

Many thanks for completing my questionnaire. I sincerely hope you are enjoying using York Assembly, and wish you good luck for the rest of your studies.

York Assembly will continue to be available for you until September 2009.

Kind Regards,
Steven Urmston