Chapter VI
Drawing Circles in the Sand: Integrating Content into Serious Games

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ABSTRACT

One of the most important differentiators between Commercial Games and Serious Games is content; delivered in a way that is successfully integrated with engaging game play and achieves the desired learning outcomes by delivering skills and knowledge effectively to the end-user. This ability to integrate content effectively is the key to producing “killer” Serious Games that deliver demonstrable learning outcomes, business benefits and overall value. However, achieving this nirvana is not a trivial task. Utilising lessons learned and case studies, this chapter provides an overview of why this process can be so challenging, including the differing experiences from the perspective of three stakeholders (game designer, instructional designer/learning psychologist and subject matter expert), how to manage preconceptions and balance their priorities. The case studies will also show how different methodologies, techniques and technology have been applied to help solve this fundamental challenge of delivering a successful serious game. Advice is provided on how to facilitate this process, capture the correct requirements and create a design that meets and exceeds the expectations of all the stakeholders involved, including the client/customer and the end user.

INTRODUCTION

Much interactive material and training has, in the past, consisted of ‘click to turn the page’ applications, where the technology was merely used as a delivery tool for the content. Recently we are seeing more focus on other more interactive applications for the technology, moving from a delivery platform to products with actual educational significance. The technology can be
Drawing Circles in the Sand

used to engage learners and provide experiential opportunities which learners may not have had before. As Kurt Squire explains... “For educators designing games, this shifts the question from one of delivering content to one of designing experience” (Squire, 2006, p20). Serious games are considered to be the new interpretation of what e-learning can offer, but with the benefits of engaging story lines, player rewards and goals, and true interaction.

Serious games also offer instruction beyond traditional means of skill and drill, multiple choice questionnaires and text with fancy graphics; however, the skill sets required to develop them are often out of reach of many instructional designers and subject matter experts. Therefore a partnership is required, forged by the passion of creating something exciting: a learning program that people actually want to complete and come back to again and again in order to practice and improve.

Unfortunately it is not as easy as finding a games designer, subject matter expert and an instructional designer and locking them in a room together, expecting a game design within the week. Communicating with someone that speaks a different language can be very difficult and shouting or speaking slowly is not the answer! The serious games industry is no different. Game designers and instructional designers often speak very different languages and have very different requirements.

Now drawing circles in the sand is a slight exaggeration, but communication between each of the parties involved in serious games design is one of the major challenges faced by the industry going forward; however, it is one that can be solved. Using real examples in the form of case studies, this chapter aims to translate practical experience into lessons learned for the industry when designing and developing serious games with diverse subject content.

So why is it so hard? There is also a misconception by many new to the industry that serious games will be successful because they use games technology (Gee, 2005). Simply by forcing content into games technology will not produce an effective learning environment. Commercial off the shelf (COTS) games may act as the motivational wrapper, but there is a lot more to achieving real, tangible learning outcomes than that.

Many claims have been made in the past two decades that link real life behaviours to the influence of video games, and often in a negative light. A popular culture reference to the impact video games can have, came from the movie ‘Snakes on a Plane’ which depicted a character able to pilot and land a plane safely due to his skills learned from Microsoft’s Flight Simulator game. This is the ideal, but rather unrealistic goal of serious games.

It could be asked, why a training course could not just be taken to create a simulation or a game that uses all the learning outcomes? The answer is that most learning is seen in black and white and is extremely linear. This is the course, this is the content, and this is what you will learn. Most training material is created focusing on the ‘What’ and not the ‘How’ and this is one of the contributing factors to high drop-out and low retention rates of traditional training and e-learning. In most cases, learning outcomes are only achieved through facilitation and one to one interaction with a skilled teacher or trainer; however, this is often an inefficient, costly and lengthy process, particularly for large numbers of learners. Serious games are more flexible in the way you can interact with them. You can choose whether to follow the story line or explore the environment, sometimes you are able to choose which missions you tackle and you can experiment with how you choose to play. The learner takes a far more active role with a game than in other, more passive forms of learning. Quinn (2005) concludes this nicely: ‘We are not, cannot be, about designing content. A fundamental perspective I want you to take away is that we are designing experiences. If nothing else, start...
thinking not about creating content but about designing learner environments and architecting experiences.’

Serious games must also work in the domain of learning theory. ‘The use of instructional theories has been shown to enhance learning, increase motivation and student achievement’ (Gunter, Kenny, Vick, 2006). Gunter, Kenny and Vick aimed to create a unique design rubric specifically conceived for serious games by analysing instructional methodologies and comparing them against current game design ‘best practices’. They conclude instructional strategies must be applied concurrently to the content development in game design, and therefore students would quickly adapt to the process of learning and actually enjoy the conditions under which they learned the concepts. Piaget (1970), and Vygotsky (1978), both leading names in learning psychology, shared the commonality of an interest in the active role a learner must play in the learning process, and Vygotsky (1978) placed an emphasis on the interpersonal aspects of learning, including collaborative group work, where he demonstrated students achieved higher intellectual levels when working in a group, compared to working on their own.

Gagne (1977) highlighted nine “events of instruction” that contributed and facilitated an individual’s learning, each of which can easily be applied within a serious games environment. They were:

- Gain attention; where the learner’s attention is initially grasped by an exciting story line or animation, for example.
- Set out clear learning outcomes; give the learner a set of instructions or goals that they are aiming to achieve.
- Stimulate recall of prior learning; where the individual has to use prior knowledge to aid them in the current situation.
- Present the content.
- Provide guidance to help the individual; this could take the form of step-by-step instructions, for example.
- Elicit performance; this is achieved through practice and completing tasks.
- Provide feedback; this allows the individual to understand areas that need improvement, and also gives them positive, motivating feedback on areas where the individual excel, or are improving.
- Assess performance; which typically occurs through a post-test evaluation, or debriefing session.
- Enhance retention and transfer; allowing the learner to generalise the information they have learnt and apply it to other situations.

Keller (1987) developed the ARCS model of motivational design as an alternative to Gagne’s events of instruction. Keller proposed four steps, instead of nine, that could be put in place to promote and maintain learning; attention, relevance, confidence and satisfaction. For Keller attention involved both perceptual and inquiry arousal, where inquiry arousal relates to providing questions and problems for the individual, as well as varying the content presented. Relevance referred to achieving goals and matching motives (where the learning style of the user and the users interests are matched as closely as possible), whereas confidence was associated with the learners’ perceived self-control and opportunities for success. Satisfaction looked more at the extrinsic rewards (external rewards) and intrinsic reinforcements (internal reinforcements) an individual could gain from the task. Attention, relevance and confidence all have a dependence on the content.

UNDERSTANDING CONTENT

To understand how to integrate content, one needs to understand what the content is. Gee (2004) refers to this as ‘a central paradox of all deep learning’. Gee analyses the two sides of the coin by arguing that it will not work to throw the learner into the deep-end due to a lack of knowledge to leverage
the environment effectively and that the domain of knowledge needs to be built up over time and is a complex process that will be beyond a novice. This paradox is a concern to both instructors and advocates of immersion. The key as Gee explains is to use “post-progressive” pedagogies that combine immersion with well-designed instruction; and one area that is exceeding in this mix is the use of Video Games and Simulations.

Just in Time content delivery is easily exploitable within games. Shaffer, Squire, Halverson, & Gee (2005) have created an emerging model of games and propose that they excel by providing learners with situated experiences of activities, whereby they develop new ways of thinking, knowing, and being in ‘Worlds’.

It is understood that content is central to a serious game, but what exactly counts as content? Aldrich (2004) describes 3 categories of content: Linear, Cyclical and Open-ended content. Each category requires a different approach.

Linear content, that of movies, books or television is most familiar to us. It is a recipe that works for entertainment. Most training is also linear: lectures, PowerPoint presentations and most e-learning. Linear content allows most online courses to easily be stored in a Learning Management System (LMS). LMS’s are very often used in large organisations; however they vary immensely from one another. The LMS is the interface between the learning content and the learner, and is the place where the learner’s records of achievement are kept. Serious games have no standard methodology for LMS integration and therefore it is a choice to be made by both the developer and customer or client on how important this issue is. What is certain however is that in order for more flexible, non-linear user-centred content to become the norm, LMS structures must be reconsidered to be relevant in the Web 2.0 world (Derryberry, 2007).

Cyclical content is the same action performed repeatedly, whilst the action or method is perfected. Aldrich defines cyclical content as the ‘DNA of video games’ (p26). For example, a user spends hours perfecting micro movements in order to shave a few seconds off the time left by taking a corner more smoothly.

Open-ended content refers to content where there is no right or wrong answer, and two experiences are rarely the same. Second Life or The Sims are good examples of open-ended content in games.

Each content category is valid in its own right, and can be used independently; however Aldrich argues that for any educational game all 3 should be combined, liberally. The authors would argue that there is a 4th category of content that is well used in games and simulations, which is non-linear, branching content that sits somewhere in the middle between traditional linear content and completely open-ended content. At the end of the day these categories sit on a continuum, rather than as discrete classifications.

Malone (1981) defines two alternative categories of content in games: Intrinsic and Extrinsic. The example mentioned above where the movie character was able to land a plane from playing a simulation in his spare time, is an example of intrinsic content, which is integral to the structure of the game. Achieving success in the game is equal to learning to fly the plane. Extrinsic content, Malone’s second classification, is less tightly linked to the game play, where there is a structure which has flexible content, such as quiz shows and question/answer-based role-playing and adventure games. Again, these categories are not an either/or but a continuum of possible options that compliment different content styles.

Training and e-learning generally use Linear Extrinsic content, whereas games can use a mixture of all the categories defined above. The challenge is combining each category effectively with the existing subject matter to produce an effective serious game. Early choices made in the development cycle will impact the effectiveness of the content and the effectiveness of the game as a learning tool. If the wrong game genre is
SYNERGISTIC ALIGNMENT OF GAME AND CONTENT

We know what content is and we know that certain types of game suit particular content types. So what are the rules? Prensky (2001) argues that there is no one way for developing applications and that serious games must be created on a case by case basis. In his description of game-based learning, he calls out principles of instructional design, domain or subject knowledge and game design. However, as mentioned previously the likelihood of success from locking these skill sets in a room together, no matter how long for is minimal. This is a view that is expressed by many serious games experts. One thing is true, however, in that the content must be intertwined with the subject matter within the game and usually with some kind of emotive context. Separated game play from content is merely the carrot on the stick; the reward completely independent of any learning and is not what the authors would consider a serious game.

The balance of content with affective components within serious games is a delicate one and in order for the application to be effective, the right balance must be achieved. Appelman & Goldsworthy (1999) argue that to create the most effective learning environment, the designer must balance the content density against the level of understanding of the content by the user, and continuously adapt this balance throughout the game experience. For example, as the learner’s familiarity with the content increases, the presentation can become more abstract and the level of fun or ‘affective experiences’ required can be reduced. This inverse relationship highlights the reason why simply integrating content into games technology will not work: too much instruction will ‘suck the fun’ out of the game, but too much fun, particularly in an abstract or context-less game environment, can make the learning harder to contextualize without extensive reflection or a skilled facilitator.

METHODOLOGIES IN PRACTICE

In their study to create a new instructional design paradigm, Küreşat and Kaplan (2006) concluded that instructional design requires teamwork consisting of very diverse skills including, field knowledge, proficiency in technology, strategic, holistic and especially creative thinking abilities, project management skills, leadership qualifications, communication skills, responsibility, honesty, empathy, professionalism. High-level programming knowledge and advanced coding skills were also required, although these are highly specialised skills that are often sought from experienced computer scientists and game developers. They also concluded that the quality and qualifications of the team members affect the quality of the instructional system produced.

They emphasised flexibility and a holistic approach to instructional design, where a modular approach would be ideal. At the centre of their ideal instructional design methodology is prototyping and evaluation. They defined their own model for instructional design for game based learning entitled the FIDGE Model which stands for “Fuzzified Instructional Design Development of Game-like Environments” for learning. Within FIDGE there are is a dominant focus around context, both in regards to the situation in which the instruction takes place, and the socio-cultural needs of the organisation.

Most serious games companies, such as TPLD, have no, or very limited, credible direct subject knowledge in many domains. Although when moving into a new area we try to immerse ourselves in the subject matter and content, we do not try to learn everything or become experts in a condensed timeframe for a particular project.
or product development; rather, we look to engage with appropriate and credible subject matter experts, who become integral to the project.

Here are the key participants typically involved in a successful Serious Game design process at TPLD:

- **Game designers:** Responsible for recommending the most appropriate game genre and game rules/mechanics for achieving the desired learning outcomes, creating any storylines and defining any characters required, as well as designing levels and helping to define the artistic style (although this is often done in collaboration with an experienced artist).

- **Instructional designers/learning psychologists:** Responsible for validating whether the learning outcomes will be achieved by the proposed game design during all stages of development, typically including a number of evaluation studies with target end users (ideally throughout the entire development cycle, through the use of iterative development methodologies, such as Agile), often working in collaboration with the game designer on the pedagogical aspects of the design, as well as ensuring that good learning practices are being adhered to. TPLD utilise a number of serious games essentials to ensure sound pedagogical design. (Routledge and Seeney, 2003)

- **Subject matter experts:** Responsible for defining the desired learning outcomes and the necessary subject content required to deliver these outcomes, often in the form of processes, decision trees, standard templates/exhibits as well as more traditional text-based content or character dialogue, depending on the game genre and content delivery mechanism

We also work hard to ensure that throughout the process the whole development team assigned to a project is involved to some level with the design, whether in conceptual brainstorming or reviewing a final idea. This ensures that as the application is developed, the team are aware of what they are creating and why, which helps give them a sense of ownership. It also makes it easier for them to know intrinsically what to build, as not everything can always be defined or effectively communicated up front.

In software terms we have moved to AGILE development over the last year and this too encourages involving the whole team with continual reviews and refactoring through iteration. Taking this one step further, with much of our more recent work we try to create opportunities for our developers to see the game actually being used by the target audience, as without this it is often difficult for them to step away from the ‘gamer’ perspective and move to that of, for example, a 45 year old executive or a 14 year old high school student.

**CASE STUDIES**

Using a number of case studies and examples, the authors now aim to share their first-hand knowledge and experience to better inform those working on serious games, either at present or in the future. These case studies range from games where the content and the game play are completely seamless, to more context-based simulations where the content and game are less tightly integrated.

**eQA**

eQA, which stands for Electronic Quality Assurance, was created as a bespoke project for a molecular diagnostics company in the UK. The client came to TPLD with a fairly well-defined design and script, and we were given the task of embedding this content within an immersive 3D environment, primarily in the form of dialogue...
interaction between a player avatar and multiple non-player characters (NPCs).

After an initial review of the design, we encouraged the client to consider adding some further elements to the game to provide more engagement for the target users, who were primarily University students. These included a laboratory management aspect, where users must purchase and install lab equipment, after which required diagnostic tests can be performed and some kind of feedback is given to indicate whether the dialogue, tests and other decisions within the scenario are going down the correct or incorrect path. The proposed feedback mechanism consisted of a sick patient in an adjoining room, who was visible through a large window. The patient would gradually become worse or get better depending on the player’s choices. In reality this situation would never occur, and the patient would most likely be quarantined in an isolated hospital ward many miles away from the laboratory; however, this instant feedback mechanism provided some much-needed emotional engagement for the player, who (we hoped) would become genuinely concerned about the well-being of the patient.

The scenario consisted of 4 NPCs for the player to interact with, not always present at any point in time. The script we were given for these characters was initially very dry and technical and didn’t enable the player to form any emotional or memorable attachment to the characters. Therefore, another proposed change was to give each character extreme personalities, occasionally going as far as major personality disorders. For example, a megalomaniac boss intent on taking over the world and a paranoid lab technician, who was convinced that everyone was out to get him! This led to some humorous dialogue exchanges that we felt enhanced the game significantly and provided the engagement that was previously lacking.

Unfortunately these dialogue changes were a step too far for the client and many of them were removed late in the project; however, some of the character quirks remained and this did enhance the learning experience. Overall we think it would
be fair to say that this game does not represent our most successful attempt to integrate content into the game play in a seamless way. However, because the game was primarily dialogue-based, with scripted NPC movement and basic interaction with objects, it was relatively simple to create a game editor to allow some of these aspects to be easily customised, and even author entirely new scenarios using the existing game’s art assets.

GYST

GYST, which stands for Get Your Sales Together!, is another example of a primarily dialogue driven game targeted at sales training and development; particularly in a Business-to-Business context. This game was a joint product development with an American-based creative learning company and a leading subject matter expert (SME) in the field of sales training.

Although the subject matter expert had authored a best-selling book and the creative learning company had run many sales training workshops, there was actually very little content present at the start of the design process. Therefore, we held a series of workshops to step through a typical sales engagement process and to identify the desired learning outcomes from the game, as well as listing a number of common “traps” that sales people fall into, which often lead to an unsuccessful conclusion or lost opportunity. This led to a well-defined process consisting of a number of steps to close a sale, including “doing your homework”, “getting in” and “closing the deal” as well as mapping out a decision making process within the target customer’s organisational structure.

From a content perspective, this naturally led us to the conclusion that a branching scenario, which consisted of a combination of research and dialogue interaction with the target customer, was the best way to go. Early in the project we decided that because of the importance of getting the language right (including the appropriate level of “Americanisation”), as well as being able to successfully embed many of the messages from the SME’s book, the majority of the content would be authored by the SME directly, using specific tools and templates for the project.

Due to the globally dispersed nature of the team, this lead to a clearly defined separation between the game play development and the content creation, with minimal levels of understanding about each other’s respective disciplines, despite a number of face to face meetings to try to get things back on track when they started going awry. An experienced game developer was brought in by the content authors to help mitigate this issue, but due to differing ideas and priorities, this solution caused as many problems as it solved from a content perspective (although this individual made a significant contribution to the technical design of the game).

The game was created as a template or shell for the subject matter content and some excellent graphical authoring tools were created for the SME to define scenarios and dialogue with NPC’s. A demo scenario with dialogue content designed specifically to show off all aspects of the game’s functionality was also created, which included a number of powerful concepts that moved it well beyond the typical multi-guess dialogue systems found in most e-learning simulations and dialogue-based games. A number of guides and tutorials were also created for the SME to learn how to use the tools to create the content they desired.

Unfortunately, the content that was created during the lifetime of the project was generally poor and made very little use of the powerful features provided by the game framework. Although the dialogue was professional and reasonably engaging, many opportunities were missed due to the SME’s lack of experience with basic game design principles, such as having an appropriate difficulty curve and introducing new features and complexity slowly over time. A good example was in the up-front research phase that required the user to do background research on
the target customer in the game. This was supposed to consist of some basic information to get the user started in the objective of understanding the customer’s needs in order to create an initial communication that included a value proposition to get the company’s attention. What actually happened was that over 40 documents needed to be reviewed by the player before they could extract this basic information and move forward in the scenario. Engaging and captivating the audience, within the first 5 minutes, this certainly was not! Unfortunately the end result became yet another not entirely successful attempt to seamlessly integrate gameplay and content.

Our experience with this project and others has led us to seriously question and doubt the approach of getting a subject matter expert with no knowledge of game design principles and best practice to directly author game content without any consultation and collaboration with a suitable intermediary, such as an experienced designer of serious games. However, over the last couple of years we have seen an increasing trend towards this model for content development, particularly with the advent of web 2.0 and its user-generated content model. From our perspective, the only place we believe this approach may work is with younger, game-savvy SMEs (or even school pupils and University students) who can effectively balance the game play and content. With tools requiring little of no technical expertise, we believe that powerful and engaging learning experiences can be created. Designing a serious game also requires a developer to become completely immersed in the relevant subject matter, even when an SME is involved, which in itself is a very effective learning process (many of TPLD’s developers are now experts in molecular diagnostics for example!). This is the reason why this type of high-level authoring and customisation tool remains core to TPLD’s company strategy in relation to content development.

After two examples where the content has not been particularly well integrated with the game play we will now go through another four examples where this integration is almost entirely seamless, with the content being delivered directly through the game play as opposed to via dialogue or direct simulation.

Contamination!

This project originated from the same molecular diagnostics company who commissioned the eQA project. Due to their previous experience working with us on the eQA project, they had been approached by a government organisation to create an immersive 3D simulation for teaching quality control processes in laboratories in conjunction with a tutorial book. Traditionally this has been a difficult area to teach, due to the high cost of getting access to laboratory equipment and the consumables required to perform and practice particular tests. Therefore, a 3D simulation that accurately modeled the process and outcomes of these tests was a logical solution.

The initial content consisted of a fairly detailed walkthrough of the desired scenario and a decision tree to show the different points in the process where things could go wrong. Like any simulation, one of the initial questions was whether the game would encourage or force the player to correct a mistake or wait until later in the scenario to see the actual impact of the mistake. We strongly encouraged the latter approach, along with some supporting information to show the player what they had done wrong in order to help them improve next time.

Our initial reaction to the content was that it provided a very useful starting point for the game design, but like the previous eQA project, it was fairly dull, dry and technical, which was not appropriate for the intended student audience. Therefore, we suggested adding an engaging back-story to provide some emotional context to the player. Given the nature of the content and desired learning outcomes we suggested setting the game in a fictional town where there has been
Drawing Circles in the Sand

an outbreak of a disease and the player needs to identify the source of contamination by going through the actual process of testing the samples. This concept was met with approval and during a face to face meeting with the subject matter experts we were even able to suggest a further embellishment to the story by making the disease turn everyone in the fictional town into zombies and using this as a direct feedback mechanism in the game! Depending on whether the user is following the correct process (i.e. if mistakes are being made), the zombies will start to attack the lab and more people within the town will be killed. We also decided to give the player regular updates about the current situation via a series of news reports that break up the simulation-based gameplay. Finally, we were able to integrate a couple of engaging mini-games to provide an effective metaphor for some of the diagnostic tests (these would normally be automated and conducted by a machine). The primary reason that these changes were accepted without question was because the subject matter expert was actually a gamer and one of her favourite games happened to be House of the Dead! Another reason was because the SME had seen some of the engagement issues with the eQA project and did not want to fall into the same trap.

Overall, despite some quite dry and very technical content, due to the additional elements that were added to the story and game play this was a very effective example of how to integrate subject matter content with game play to create a powerful learning tool. We have taken many of the lessons learned from this project forward into more recent developments, such as:

- Try to ensure the SME is familiar with games and encourage them to play games and genres that may be relevant to the current project or product development.
- When working in partnership with an SME for more than one project, always be sure to take on board any lessons learned from previous projects to ensure a more successful outcome next time.
- It is often a good strategy to split the serious game design phase up into a high level design to articulate the overall concept, game play and walkthrough of the game to non-technical subject matter experts and other key project stakeholders.
  - Once this has been agreed and signed off then move into a detailed design phase.
  - Concept demonstrators will often be needed throughout the entire design process to help communicate concepts and ideas that will not be familiar to non-gamers.
  - It is important to define any assessment criteria or metrics within the design, as well as tying any game mechanics and content directly back to the desired learning outcomes, using game genres and an appropriate graphical style for the target audience.

KiddyKare

KiddyKare was created just before the eQA project and, unlike any of the previous examples; this was developed on a speculative basis rather than for a particular client. The concept was to provide an effective marketing tool for suppliers of child safety devices for the home, such as Mothercare. The gameplay consists of a typical house on two levels, with a baby walking and crawling around, being drawn towards areas of danger. The user has an RTS-style view on to the world and can scroll around without any constraints, trying to buy and deploy child safety devices before the baby can injure itself.

Examples include an iron that could fall, an electrical socket the baby could poke its fingers into, a fire that could burn the baby, a set of stairs the baby could fall down and a dog that could get a bit over-zealous while playing with the baby.
Given that the baby was not always in view, the user had a baby monitor that would sound an alarm when the baby was getting close to a hazard, which would prompt rapid deployment of the correct safety device before the baby got hurt. However, due to the humorous nature of some of the injury animations, players often preferred to see the effects of not deploying the safety devices around the home!

Although the game never became a commercial success, we felt it was a perfect example of how to successfully integrate content and gameplay, and took many of the concepts and lessons learned forward into subsequent products and projects.

**Winning**

The Winning Game was commissioned by the Scottish Institute of Sport Foundation and is based on a concept and theory devised by a leading Israeli-based subject matter expert in Winning and what it takes to become a Winner, called Yehuda Shinar of Winning Enterprises. The concept and an original computer-based simulator, which encapsulated the Winning theory, had been successfully piloted in a number of market sectors by Winning Enterprises, but TPLD was given the task of evaluating its effectiveness in Scottish Education (primarily at high school level). Our initial findings concluded that the concept was extremely valuable and provided significant benefits to school pupils for their general studies, sport and music. However, the user interface needed substantial development in order to create a deployable commercial product.

The Winning Game teaches the user to think correctly under pressure and utilises continual debriefing to improve in all aspects of the game and maximize personal potential. Unusually, the theory and content are very tightly integrated with the gameplay. The Winning principles are codified as a series of rules that are defined as “combinations” within the game engine. These combinations are constantly monitored to assess whether certain actions are triggered while the game is in a particular state. If a combination is fired, the player is given direct and instant feedback on their actions by an intelligent coach, with results summarised at the end of each game in the form of a detailed assessment report, including graphs to show metrics and improvement over time. Combined with a personal learning plan framework and an opportunity to debrief continually, with the assistance of the coach and a comprehensive replay mode, the game includes all the tools required to become one of the most successful serious games so far.

At the time of writing, we are still finalising the development of the game, so we cannot state definitively that it is a successful integration of content and gameplay; however, all indications from pilot activities so far indicate that this is the case. Perth High School, Scotland, has worked with the game’s designers to help modify its design and assist in determining how the game can be applied within a high school environment. The initial part of the pilot has evaluated the game’s impact on developing a culture of self-improvement and success within the school, both on a personal and an academic performance level. Feedback from the pupil’s has been very positive, with comments such as “The in-game coach does help; it teaches you to be calm, take time and always give encouragement” and “This is the first game I have ever played that has actually taught me anything useful”. (Boyle and Seeney, 2008)

**Eduteams/Infinteams**

Infiniteams, and its education-oriented cousin, Eduteams, are very good examples of how to effectively integrate content with gameplay. These award-winning products developed by TPLD as boxed products rather than commissioned projects, are targeted at developing team building, communication and leadership skills through a range of collaborative problem solving modules. The modules provide a safe environment
to practice working as part of a team to solve a variety of problems commonly faced in outward bounds-style physical training activities, such as getting across a river using limited resources and effective communication within the team.

These soft skills are becoming increasingly important in today’s society, particularly as more organisations move towards having globally dispersed virtual teams. One could argue that the modules within Infiniteams and Eduteams are literally just collaborative multiplayer games with no visible learning value or subject matter content; however, this would be missing the point entirely. Simply watching a group of young high school pupils or a senior executive management team playing the games, it is easy to see that real learning is actually taking place. Anyone who has experienced the game would also agree that the way a group of individuals approaches the problems and challenges they face, provides a strong correlation with the thought processes involved and actions in the real world.

However, in order to bring this learning to the team’s attention, it is often necessary to have a skilled human facilitator on hand to provide support and conduct debriefing exercises with the individuals as each of the modules are completed. Failed attempts, communication breakdowns and underlying problems with the team dynamics can be brought to the forefront of everyone’s mind, with the consequences clear to see; along with the evidence of real improvement during subsequent attempts, once the team has talked about and resolved many of these issues, through reflection and debriefing, with the help of the facilitator.

In order for anyone to facilitate a session with Eduteams and Infiniteams effectively, they need to be given training on how to use the software, how it can fit in with a blended learning approach (particularly if they have existing team-based course material) and how to accurately monitor team and individual behaviour and performance within the game to help stimulate discussion during the subsequent debrief.

This training and the player’s learning is further enhanced through the use of social networking and web 2.0 technologies such as blogging, forums and wikis to share experiences and note down personal thoughts and opinions. The use of this technology helps establish communities of best practice by allowing others to learn from how the game has been applied in different ways. This type of surround and community-based support is becoming increasingly important for successful serious games, because it is unrealistic to assume they will operate in isolation in the vast majority of cases.

Both Winning and Eduteams/Infiniteams have heavily utilised user-centric design approaches throughout the design and development cycle. Early prototypes were tested with large numbers of target end users (these included both teachers/facilitators and pupils/adult learners). This process has continued through subsequent product updates, to ensure that functionality is only added or changed when repeated requests have come directly from end users. We believe that utilising a user-centric design methodology is essential for any successful serious game development. This approach also fits very well with the AGILE development methodology.

**CONCLUSION**

“What you want to do is create a game that’s built on a set of consistently applied rules that players can then exploit however they want. Communicate those rules to the player in subtle ways. Feedback the results of player choices so they can make intelligent decisions moving forward based on earlier experience. Rather than crafting single-solution puzzles, create rules that describe how objects interact with one another and turn players loose – you want to simulate a world rather than emulate specific experiences”. Warren Spector, creator of Thief, as quoted from Aldrich (2004, p. 97).
The rules used within each game should also apply to the content used. The most important rule to communicate is to ensure the medium chosen is appropriate for the content that the developer and/or client wish to get across. Also, ensure that the content is linked to learning goals, which, in turn, are linked to experiences within the game. Remember to gradually build up with content density in the game, as too much too soon can be damaging to the learner and will continue the self-fulfilling prophecy of dull serious games.

The quality of the content is incredibly important. To writers, they say, write what you know. The same is true for game designers...and if you do not know it, find someone who does. Starting with existing content will make the whole process less painful and more efficient.

As can be seen from the discussion and examples mentioned above, content needs to move from text based presentation to be truly interwoven with the game play; the choices and actions the player makes within the game. Only when this is achieved, will true stealth learning be achieved.

Achieving a balance between learning theories such as those of Gagne (1977) and Keller (1987) and engaging experiences as created by games designers will aid developers to be on the right path to creating an effective serious game.

REFERENCES


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