Serious games, ie those which have a main purpose other than pure entertainment, have been used over the past three decades for a variety of purposes from the political to the didactic. By examining the means by which these games have been used to enhance military, educational and medical fields we can extrapolate further areas of development for this emerging market.

The first of our three sectors to embrace games as potential tools was the military. Since the late 1800's military games have been used to simulate battle conditions and to train officers and troops alike. Throughout the majority of the 20th century, too, games were seen as a useful tool to train soldiers, as can be seen from the wargames produced by RAND and Avalon Hill, a commercial company founded by a former military officer based upon his experiences. These simulations used tools like the Lanchester Equations to calculate the statistically average result of a particular simulated military encounter in an attempt to make their results more realistic (Smith, 2009).

However, the military also has the longest heritage as co-opters of electronic games for training and assessment. During the 1980s an arcade game called BattleZone was released by Atari. The US Army approached the developers and asked if the game could be turned into a training platform for gunners in Bradley armoured vehicles. Army Battlezone, also known as Military BattleZone or "The Bradley Trainer" was a standard arcade cabinet which was inexpensive compared to the cost of military spec simulation equipment to date(Bradley Trainer, n.d). This made it particularly attractive, and although Army Battlezone never went into full production (only two units were ever produced) armed forces have continued to examine games technology with an eye towards adapting it for their own purposes. Two particularly noticeable contemporary examples of this have had commercial ties; Full Spectrum Warrior, for the Xbox(THQ 2004), which was a dual-purpose game both for training military personnel and for pure entertainment; and DARWARS AMBUSH (2003), a DARPA sponsored training simulation based upon Operation Flashpoint. America's Army (US Army, 2009) is also significant here, insofar as it was aimed at civilians and to function as a recruiting device, or at the

least present military service in a positive light amongst the community. Contemporary uses of game interfaces in military applications extend to the control systems of unmanned drones and other remotely controlled equipment; by utilising existing game based control schemes for both serious games-based training and for the equipment itself, the military can leverage people's prior experience and expectations with the controls to greatest effect.

Games for education, particularly literacy and numeracy, are the second of our three areas of focus to have developed links with game technologies.

From the mid-1990s onwards software companies like Broderbund specialised in creating interactive educational titles which tried, with varying degrees of success, to hide didactic exercises within game mechanics in an attempt to make them more palatable to players, particularly children. These games have focused on areas such as biology, mathematics and geography. Treehouse (Broderbund,1991), one of the earliest productions of its type, incorporated minigames that tested the player's knowledge of basic biology and music. Maths Workshop (Broderbund, 1995) used cartoon style animation and interactive NPCs to engage players in a series of mini-games designed to exercise the player's skills in areas such as mental arithmetic, logic and problem solving, and spatiality. Math Blaster (Davidson, 1994) and Logical Journey of the Zoombinis (Broderbund, 1996) both took this one step further by framing the mini-games with an overarching narrative, the outcome of which is determined by the player's skill level.

Logical Journey of the Zoombinis in particular is significant because it is highly specialised; rather than being about mathematics in general, this title focused on logic skills such as relational arithmetic and pattern matching. This increasing degree of specialisation is important because it is paralleled by other serious game sectors, such as medicine, which will be discussed in greater detail below.

Serious educational games are not restricted solely to fields like mathematics and science; a number of global stock exchanges including the ASX give high school students the opportunity to play with virtual money and experiment with the stock market, even giving out prizes to schools whose students perform exceptionally well. In and of themselves these games are purely to educate students about the realities of trading on the market, but they have a secondary purpose insofar as they function as advergames to publicise the exchange as well.

Serious games in the educational sector hardly target children exclusively however. Companies that act as brokers in secondary markets such as foreign exchange often offer demonstration accounts with the ostensive purpose of educating people about the market, but in reality also function to condition potential adult traders to the interface of the trading company in question. The game-like systems put together by companies like eToro (eToro, 2011), for example, function as abstractions, hiding away the details of the foreign exchange market by representing different types of investment with game-like metaphors like a race. This not only makes the concepts easier for people to get a hold on, but functions to entice by making the market seem easy.

Some serious games with educational purposes utilise more 'video game'-like conventions, in contrast to earlier examples like the Broderbund titles which use mini games that resemble physical activities to educate. DoomEd (Desq, 2006) is an educational title aimed at teenagers and older players with a strong emphasis on first person shooter gameplay which interleaves educational content into puzzle solving as well as exploration elements. It does not discard the video game frame of reference whilst using video game technology as those earlier attempts at educational serious games do; rather it attempts to integrate the two in an engaging manner, which will be necessary moving forward into the future, particularly as children become more culturally aware of conventions of video games and expect certain experiences to be available when playing a game, no matter its educational value.

Medicine has only recently embraced gaming technologies; the past 5 years or so have seen the most significant uptake, first and foremost for the creation of simulations that allow for training, practise and quantitative and qualitative analysis of health care professional performance. Games and game-like simulations have a number of other advantages; firstly, a tight feedback cycle permits the player/student to measure their performance straight after attempting a task, reducing the total time to train. Secondly, it permits repetitious practise of skills in conditions that might be far too rare to make real-world testing viable; thirdly it provides an opportunity to objectively qantify the performance of an individual.

BreakAway Games' titles such as the Dental Implant Training Simulation (DITS) and Pulse!! are particularly good examples of these characteristics(Breakaway, 2010). Both of these simulations attempt to engage new audiences through the implementation of game-like interfaces and mechanics as well as utilising instant feedback to magnify the effects of player decisions inside the simulation.

Games have also been used for pain mitigation, particularly amongst younger patients undergoing painful medical procedures; Free Dive being the most prominent example of this. Free Dive takes its design inspiration from free-form exploration game mechanics to provide an interactive environment for young patients to engage in that can help them manage pain. By taking game aspects such as exploration and empowering the player through giving them the sensation of flight and underwater breathing, Free Dive encourages the player to disassociate themselves from the physical pain their bodies are experiencing.

Re-Mission (HopeLab, 2010) is another title which leverages game interfaces, and mechanics to achieve health outcomes for young patients. Re-Mission empowers the player to literally fight cancerous cells inside a simulation of their body. The environments in which this gameplay occurs

function to inform the player of aspects of cancer treatment and their importance as components of an integrated treatment strategy. The intended effects of this game are numerous: firstly, by educating players as to the importance of treatment components they are more likely to cooperate, for example, with taking medication at appropriate times; secondly it promotes self-efficacy with regards to recovering from treatment from the disease and thirdly it helps patients to manage conditions that might lead to a recurrence of their illness.

Looking forward into the future, there are a number of areas where these fields can converge and be further improved from the utilisation of game metaphors or interfaces.

Medical and military simulations, for instance, are slowly heading in the same direction with the military aspects leading up to battle, with the medical aspects dealing with its aftermath. Simulations designed to help soldiers recover from traumatic experiences can equally apply to the treatment of civilians with similar conditions, and also could be adapted to provide behavioural therapy; likewise military simulations designed to help combat medics gain experience pre-deployment can both benefit from the degree of polish present in civilian medical simulations as well as inform those in order to better prepare 'first responders' to deal with natural disasters, accidents, earthquakes and the like.

Specific types of medical procedures are likely to be targeted in the future with game based simulations for training; for example recent research shows that video game training can assist with endoscopy, increasing efficiency and reducing procedure duration.

Education could also be further extended through increasing levels of game-based simulation; by taking physics engines and other simulation techniques from games, it would be possible to develop software that simulates 'virtual labs' to allow students undergoing distance education to participate

in the same sorts of practical science experiments their colleagues who study on-campus can experience.

There are also potential points of convergence between military training and civilian educational simulations; the primary example of this is Tactical Iraqi which is designed to impart language and cultural sensibilities upon American troops prior to their deployment to Iraq. This training could be adapted to any number of social/cultural/linguistic situations appropriate for civilians and could be used to educate a number of target groups, from school students practising their language skills to high-level businessmen needing instruction in the cultural context of a new target market.

With all these emerging possibilities even just amongst these three sectors discussed, it is easy to see the significance of serious games as informing future development of technologies across all facets of society. True, some aspects of this might be greeted with some scepticism but that is reminiscent of the initial refusal for educational television programs to be taken seriously. Educational television is now a major part of government sponsored television broadcasting as well as having a burgeoning private sector, and with the possibilities inherent in game based interfaces and technology there is no reason to believe serious games have less potential.

References

"Bradley Trainer", http://www.safestuff.com/bradley.htm, retrieved 3/3/2011.

Full Spectrum Warrior [Computer Software]. THQ, 2004

DARWARS AMBUSH! [Computer Software]. DARPA, 2003

Dental Implant Training Software [Computer Software], Breakaway Games, 2010

DoomEd [Computer Software], Desq, 2006

eToro, http://www.etoro.com/, Accessed 3/3/2011

Logical Journey of the Zoombinis [Computer Software], Broderbund Software, 1996

Math Blaster [Computer Software], Davidson and Associates, 1994

Maths Workshop [Computer Software], Broderbund Software, 1995

Pulse!! [Computer Software], Breakaway Games, 2010

Re-Mission [Computer Software], HopeLabs, 2010

Smith, Roger. *A history of serious games* (Presentation). no date, no publisher, retrieved from

http://www.slideshare.net/roger.smith/a-history-of-serious-games on 3/3/2011.

Treehouse [Computer Software], Broderbund Software, 1991

ASSESSMENT COVER SHEET

Name: Stephen Whittle

Login #: 101275

Lecturer: Jens Schroeder

Program: BIE Games Design

Course: GDS209

Assessment: 1

Weight:

Date Due:
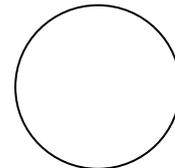
Tutorial Group: 1

Tutor: Jens

HAS SPECIAL CONSIDERATION BEEN GRANTED:

NO

Special Instructions:

✂ -

This confirms the submission of your assessment at the time and date indicated

Course:	
Assessment #:	
Login #:	