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Machinima And Video-based Soft Skills Training

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MACHINIMA
AND
VIDEO-BASED SOFT SKILLS TRAINING

by

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ABSTRACT

Multimedia training methods have traditionally relied heavily on video based technologies and significant research has shown these to be very effective training tools. However production of video is time and resource intensive. Machinima (pronounced “muh-sheen-eh-mah”) technologies are based on video gaming technology. Machinima technology allows video game technology to be manipulated into unique scenarios based on entertainment or training and practice applications. Machinima is the converting of these unique scenarios into video vignettes that tell a story. These vignettes can be interconnected with branching points in much the same way that education videos are interconnected as vignettes between decision points. This study addressed the effectiveness of machinima based soft-skills education using avatar actors versus the traditional video teaching application using human actors. This research also investigated the difference between presence reactions when using avatar actor produced video vignettes as compared to human actor produced video vignettes. Results indicated that the difference in training and/or practice effectiveness is statistically insignificant for presence, interactivity, quality and the skill of assertiveness. The skill of active listening presented a mixed result indicating the need for careful attention to detail in situations where body language and facial expressions are critical to communication. This study demonstrates that a significant opportunity exists for the exploitation of avatar actors in video based instruction.

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nights, tedious data entry or repetitive audio recording. We have our weekends and evenings back!

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LIST OF ACRONYMS

CD-ROM	Compact Disk - Read Only Memory
COTS	Commercial off the Shelf
DL	Distance Learning
DVD	Digital Video Disk
ER	Emergency Room
IRB	Institutional Review Board
ITC-SOPI	Independent Television Commission – Sense of Presence Survey
IVI	Interactive Video Instruction

CHAPTER ONE: INTRODUCTION

Multimedia is widely used in the delivery of educational, training and practice content. (While the differences between training and practice sessions using multimedia are acknowledged, this study will refer to both terms as training). While there are varying definitions of multimedia, generally it can be defined as extending training beyond pure text using a combination of several potential media types such as graphics, animations, video, auditory, and photographs. Indeed, technological advances continue to produce new media types that can be used in multimedia based training and educational venues.

Investigating the educational effects of multimedia has been an active area of research for several years. Doolittle provided a summary of the work of many of the leading researchers in this field (Doolittle, 2001). Doolittle starts with the foundational work of Mayer's Cognitive Theory of Multimedia (Mayer, 2001) which defines key theories for multimedia learning. A fundamental premise of Mayer's research is that visual and auditory information are processed through separate but limited capacity processing channels. The processing of new information in these channels is an active process that seeks to form mental representations of the new information. In addition to this foundational base of multimedia theory, studies of multimedia based training are well established in the literature (Cronin & Cronin, 1992; Mayer, 2001; Singh, 2003; University of North Carolina, 2006). Moreover, several academic conferences regularly report on multimedia applications for education and business (e.g. New Media Consortium, Special Interest Group on Multimedia).

One multimedia technology that was of particular interest to this study was video. The use of motion pictures for training has a long history and, as predicted from their invention, motion pictures have played a significant role as an aid in education. That role has continued to

grow as motion picture technology has evolved to what we now simply call "video." With the advent of the digital age the training industry has seen significant advances in the use of video based education with much of this medium already moved to computer based platforms for delivery. A significant advancement in this medium was videodisc technology that often used human actors to portray targeted behaviors in scenarios that were then presented to trainees as a series of vignettes. Empirical studies demonstrated that videodiscs delivered marked improvements over conventional instruction methods and documented it as an effective aid to teaching (Fletcher, 1990). Specifically, these studies showed that videodisk technology exhibited increased trainee time on task with a cost reduction advantage for self-paced-training. However, despite their effectiveness, the use of video-based technologies has not been as widespread as they could be. This was due to cost, difficulties with the logistics and production of video, and with the long term maintenance and updating of the video products. In these areas the emerging technology of machinima offers help.

Machinima

One activity that the video gaming communities have embraced with enthusiasm is machinima. A misspelled blending of the words "Machine" and "Cinema," machinima is the application of video gaming to the creation of animations and videos. However in machinima, unlike animation where each frame of a movie has to be laboriously drawn out or rendered, the video game engine becomes the production environment. Puppeteering methods allow avatars to be manipulated, often in real time, to act out an animation sequence. Machinima is filmmaking in a real time 3d environment without all the monetary and logistical overhead of traditional filmmaking (M. Jones, 2005).

In the field of training and education, the question that machinima technologies raise is whether it can be used as a training medium by itself. Machinima most closely approximates the

videodisc technologies (described previously) that were popular in the 1980/90's and that later migrated to computer video presentations based on CD-ROM and DVD technology. Good examples of these are found in the commercial world that use professionally captured video scenes to teach soft-skills leadership principles (D. Henderson & Sloane, 2005). Work by Cannon-Bowers, Jentsch and Sanchez has positively demonstrated the effectiveness of video based training in corporate settings (Cannon-Bowers, Jentsch, & Sanchez, 2005).

Problem Statement

Given the potential that machinima has for training, the principle question of this research was: can machinima based training be as effective as video captured based training? As noted, the advent of digital simulation technologies now provide the ability to digitally simulate all manner of natural, physical, and emotional content through a significantly new educational technology. Also, within the context of this research, machinima now offers a new medium for the creation of human-like avatars for soft-skills training. Traditionally soft-skills training, or skills that involve the inter-personal actions between humans, has been presented in "live" training or with video based training applications that utilized human actors.

Figure 1 – Video and Machinima Generated Training Modules

'Live training' typically involves the use of trainers who lecture on concepts and then organize role-playing exercises where the trainees act out roles that illustrate a particular point

(Syverson, 2002; Troyka & Nudelman, 1975) The authors' experience has been that these role-playing exercises were typically used in sensitivity training seminars. In video based training exercises actors were filmed while acting out various scenarios that illustrated positive or negative soft skill attributes. Trainees then viewed the video and observed the various interactions. Since first delivered, using video tape machines, this technology has evolved to interactive video disks and computer programs where the training vignettes are dynamically called up in response to user interactions and responses.

The challenge for these technologies is their developmental costs, long term reuse and flexibility. Using human actors for video vignettes is relatively expensive and logistically complicated[1]. While actors bring a broad range of abilities to this form of training, the cost of implementing a training program using professional actors can be limiting to all but the most well funded projects. This technology also has limited flexibility because every effort must be made to get the dialog and training perfect while the actors and sound stages are assembled. It is difficult, and costly, to reshoot a scene weeks later after mistakes in the film are discovered.

Machinima avatars offer the promise of significant monetary and developmental advantages to developers of soft-skills training programs. With new technology tools emerging in the machinima community a small team of graphic artists can create an animated training product, often in-house. And changes are easily made months or even years after the initial product was created, thus providing flexibility, reuse and low budget costs.

[1] Getting exact figures for video production costs is difficult for competitive reasons among the studios. Research by the author into "rules of thumb" for video production costs revealed wide ranging costs. Samples ranged from $1000 per minute of finished video for low end while some upper end commercial broadcast projects were $15000, and up, per minute. However, one web site claimed that the average cost for a training video was roughly $1150 to $3500 per minute after adjustment for inflation from the 2003 estimate (czh-ga, 2003; Grapevine Communications, 2008).

However, two core questions are: how effective are the avatars in delivering skill based training to the end user; and will trainees accept the avatars? This second question is of particular interest in light of the body of work emerging from the use of embodied agents (Cassell, Sullivan, Prevost, & Churchhill, 2000; Yee, Bailenson, & Rickertsen, 2007) that primarily focused on studies of agent effectiveness as an independent entity and found embodied agents to be effective as elements in training applications. Embodied agents (EA) are defined as digitally modeled actors driven by algorithms while avatars are digitally modeled actors driven by humans (J. N. Bailenson, Yee, Merget, & Schroeder, 2006). Little, if any, research has so far compared avatar actors with human actors for their effectiveness in soft-skills training. There are many dimensions of human interaction and perceptions that can affect the production of effective avatar based training.

Equally interesting are the questions: will the trainee have the ability to have an immersive experience (level of presence) while using avatars actors versus using human actors; and if the presence values are negatively affected how will the training outcomes be affected?

The Purpose of This Study

Traditionally, because of the nuances of human interactions, soft-skills training applications have employed human actors using costly and inflexible video delivery mechanisms. The use of avatars for the delivery of animated training applications has shown great potential for increased efficiency, flexibility and cost reductions. Thus the purpose of this study is to measure the effectiveness of a soft-skills training application delivered with avatar actors via video delivered animations. This data will be compared to the same training when delivered via video created incorporating human actors.

The author's goal is to determine if avatar training can produce training results equal to or superior to traditional human actor training captured on video delivery. Questions regarding the effectiveness of skill training delivery and the degree of "presence" induced by this emerging technology will be investigated. Specifically, the effectiveness of machinima generated avatars will be tested and measured. This is an important element of this research because it is not the author's intent to study the effect of avatars produced with high-end animation software or professional 3D animators. While machinima is not capable of producing the near photo-realistic images that professional 3D animators are currently capable of producing, machinima technologies offer real time, low cost animation capabilities based on rapidly improving gaming technologies (Spencer, 2008). And while both high end animations and machinima require the use of trained graphics artists, the productivity of a machinima artist can be significantly higher than productivity for a high end animator. This is due to the real time animation aspects of machinima that do not require the graphic artist to work "frame by frame" in creating an animated video. Machinima creates relatively rapid animated video of moderate to good fidelity. The training effectiveness of moderate fidelity avatars created with machinima technology is what is being questioned. Are machinima generated avatars and environments visually "good enough" and "effective enough" for training purposes?

This study will also probe the relationship of trainees interfacing with avatars versus trainees interfacing with human actors. One question is, do avatars introduce emotional distance when compared to human actors in interactions with trainees? Rickenberg demonstrated that animated characters have an effect on the emotional state of the humans they interface with and that this effect is very similar to the effect they would have if interfacing with a human. In both of the cases reported on the humans felt they were being monitored (Rickenberg & Reeves,

2000). However, Bailenson reported findings that indicated that the more realistic a human representation (avatar) was the more likely the trainees were to have reactions of embarrassment when interacting with the avatar on intimate subjects (J. N. Bailenson, Swinth, Hoyt, Persky, Dimov, & Blascovich, 2005). This study raised an interesting possibility that when it comes to human actor versus avatar based training, trainees may in fact be more comfortable with avatars than human actors.

Presence is informally defined as the "sense of being there" in a mediated environment (Lessiter, Freeman, Keogh, & Davidoff, 2001). As an attribute 'presence' indicates that a human participant "senses" they are actually part of a mediated environment and, that they are in the environment as opposed to viewing it from the outside. Participants become part of the movie, televised sports events or the virtual reality environment. They jump to catch the football from the couch or they reach to sit down in a virtual chair before they "remember" that this experience is not real.

Formally there are many concepts associated with presence. A 1997 study by Lombard (Lombard & Ditton, 1997) indicated there are no less than six definitions for presence in the general literature. Lombard refined those six definitions down to a common element: the perceptual illusion of non-mediation. The word "perceptual" indicates that it involves the responses of human senses, cognition and affective systems to an environment. The "illusion of nonmediation" is the condition when a human fails to acknowledge or perceive a media system in their communication environment. Trainees "lose themselves" in the mediated environment and respond as if the medium were not present (Lombard & Ditton, 1997).

Measures of presence are commonly used to gain a sense of the effectiveness of various media in immersing participants in a mediated event. Presence measures have been extensively

used in virtual environment studies but are also used in other media such as movies (Hu, Janse, & Kong, 2005), television (Kim & Biocca, 1997), video games (Nowak, Krcmar, Farrar, & Cleveland, 2008) and even video conferencing (Chatting, Galpin, & Donath, 2006) to name a few. This research intends to measure the presence experience for human actor presentations versus avatar actor presentations.

Finally, the author intends to open up an avenue of research in the field of human interaction with either embodied agents or avatars characters. The main difference between the definition of embodied agents and avatars is where is control maintained: computer algorithms for embodied agents versus direct human manipulation for avatars. Studies of both character types have concentrated on human to agent interactions and the effects of various agent features on human interface effectiveness. However, the focus of this study is not to evaluate human reactions to the agents but to compare training delivered by human actors via video to equivalent training delivered by an agent actor via video. As far as can be determined, the effectiveness of agents as training instruments has not been tested against human actor video based delivery. Understanding this relationship will provide insights into human actor strengths that should be replicable in avatar based training thus improving effectiveness and paving the way for future studies using embodied agents.

Research Questions

This research will investigate whether avatar actor based training will produce training effects that are as effective as human actor delivered training; whether avatar-based actors induce "presence" in trainees; how do the "presence" measures compare with the human actor condition; will skills taught by the avatar actors be acquired as effectively as when delivered by

the human actor delivered vignettes; and whether embarrassment factors prove to be a significant advantage for avatar actors delivered training when compared to human actor delivered training? The author expects to demonstrate that the low fidelity, real time animation techniques afforded by machinima technologies will be adequate for training soft-skills.

Definition of Terms

Commercial off the Shelf – a product that is available in the commercial sector of the economy as compared to products specifically designed and only available to the military sector.

Levels / Maps – Levels in gaming parlance refer to a specific environment that the game player(s) must work in. Levels can consist of detailed terrains, building interiors or entire city domains. Another common term for levels is maps.

Mod, mods, modding, modder, modded - Gamer culture derivation of "to modify" or "to mod". In the same since a "modder" is one who "mods," engages in "modding" or is one who can "mod" a game.

Machinima – "machine cinema or machine animation, is both a collection of associated production techniques and a film genre defined by those techniques. As a production technique, the term concerns the rendering of computer generated imagery (CGI) using real-time, interactive (game) 3D engines, as opposed to high-end and complex 3D animation software used by professionals."[2]

Presence – Often defined as "the sense of being there" while in a mediated environment such as a virtual reality environment but applies to many multimedia forms. The user "forgets" that they are experiencing a mediated environment and temporarily believes they are a part of the mediated environment.

Serious Games – Games where the object of the game is more than pure entertainment – generally an educational or training pursuit.

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[2] Wikipedia http://en.wikipedia.org/wiki/Machinima#_ref-Lowood_2006_26_0

CHAPTER TWO: LITERATURE REVIEW

Since the invention of motion pictures man has been trying to enhance education with this new tool. The advent of the digital age has added new and extended opportunities in this quest. Machinima adds the most recent technical twist to this century old theme. However, to properly introduce machinima it will be necessary to acquaint the reader with several technologies that should provide a better foundation for understanding the current convergence of technologies that the author proposes with this study. Following this, the author will provide theoretical arguments to support the notion that machinima can be an effective medium from which to deliver training. Finally, specific hypothesizes for the planned experiment will be presented.

New Media

Figure 2 - Videodisc Training System - Circa 1989

The use of motion pictures for training has a long history, going back to Thomas Edison who was convinced that motion pictures would change the face of education (Brooker, 1947). As Edison predicted, motion pictures have played a significant role as

an aid to education since their invention. That role grew as the technology behind motion pictures evolved into what we now simply call video. The advent of the digital age saw significant advances in the use of video based education with much of the medium moving to computer based delivery platforms. A significant advancement in this field was the marketing of videodisc technology in the late 1970's. Videodisc was simply the next method for video delivery, a method that replaced film with a digital disc that was easier to transport. It also changed video from a strictly serial mode of delivery, as with film, to a flexible delivery media. Videodisc, combined with computers, could vary the video supplied to a student based on the answers supplied by the student. Video could, for the first time, be adaptive. Empirical studies demonstrated that videodiscs delivered marked improvements in training over conventional instruction and documented it as an effective aid to teaching while (Fletcher, 1990) exhibiting increased trainee time on task, along with cost reduction advantages associated with self-paced training. One challenge to the wide spread distribution and production of quality educational videos has traditionally been their production costs. Video production can require significant physical and human resources (Bardzell, Bardzell, Briggs, Makice, Ryan, & Weldon, 2006).

Motion picture, video and videodisc training are major components of the broader category of multimedia based training. Mayer defined multimedia as the presentation of materials using both words and pictures. Words in his definition include both written and spoken text while his definition of pictures covers everything from stationary graphics to video. Mayer specifically differentiates multimedia delivery from pure verbal delivery (Mayer, 2001). Multimedia, generally speaking, is more effective at improving trainee

learning when compared with the traditional classroom environments using interactive learner-paced situations. A positive effect is most noticeable when the multimedia material encourages dual coding of information, especially when the students are new to the material and the media support each other (Najjar, 1996).

The author will now discuss in more detail concepts relevant to New Media either currently being used or now becoming available. These concepts include: Simulations; Video Gaming; Generational Effects; Modding; Machinima; Convergence; Distant Learning; Production; Gaming Experiences; and Agents and Avatars.

Simulations

The widespread deployment of digital technologies starting in the late 70's ushered in the advent of digital simulation technologies that have provided the ability to digitally simulate all manner of natural, physical, and emotional content while providing a significant new educational technology. Simulations have the potential to "immerse students within artificial experiences restructuring cognitive habits" (Privateer, 1999). This is significant because digital simulations often cannot mimic actual human motor skills. This is because most of the interface is provided using keyboard and mouse control that does not lend itself to generalized motor skill development. However, simulations can reshape cognitive expectation and performance. In the context of this research, simulation offers a new medium for the creation of moving images for training. We must remember that not all simulations are interactive; many simulations are purely visual (e.g. executing a model of a hard to understand concept). Studies have long validated that augmenting teaching with simulations can result in increased learning and retention (Woodward, Carnine, & Gersten, 1988). Their findings were particularly pronounced in

science and math. One specific finding for students with low reasoning ability was that simulations offered a bridge to learning and understanding (Cox, Abbott, Webb, Blakeley, Beauchamp, & Rhodes, 2004). Simulations were also shown to create interaction and reflection opportunities for learners working with Kolb's experiential learning models (Kolb, 1984; Kolb, Boyatzis, & Mainemelis, 2001; Montgomery, Brown, & Deery, 1997). However, simulation technology, until the advent of personal computers in the early 1980's, was generally limited to the military and to the engineering and entertainment industries, making it difficult to widely implement for educational purposes.

Video Gaming

Simulation technologies, in turn, drove the development of video gaming technologies that quickly emerged as a major consumer industry. Video gaming exploded so fast onto the consumer market that it soon drove large R&D investments into the newer and more engaging gaming technologies. The growth of video gaming, also known as computer gaming, subsequently opened up significant new opportunities for the creation of educational motion imagery by making digital multimedia technology more accessible. One of the educational opportunities that came from the development of simulation and video game technologies was game-based training, also known as Immersive Learning Simulations ((Wexler, Aldrich, Johannigman, Oehlert, Quinn, & van Barneveld, 2007), a title that strongly reflects its simulation ties and roots. For military training applications, game based training has attracted significant attention in recent years as the gaming industry has vaulted ahead of the traditional simulation industry in many technological capabilities. This is a major reversal from the historical trend where,

in the late 1970-80's, the defense based simulation industry was a technology driver for significant computer innovation. Today, however, the computer gaming industry drives much of the new innovation due to the sheer economies of scale that the gaming industry enjoys. The founder of Atari, an early gaming company, points out that a number of pivotal technologies that are now standard in business computing were originally invented for computer gaming (Bushnell, 1996). The potential for video games is especially evident when the cost of the end consumer product is considered. Commercial-off-the-shelf (COTS) video games normally sell for around $50. For $50 the gamer typically receives a realistic physics-based-environment, increased humanistic character animations, sophisticated near-real graphics, user controls, high fidelity sound, plus the ability to run local or globally networked games with multiple users (Andreoli, De Chiara, Erra, & Scarano, 2005; Kot, Wuensche, Grundy, & Hosking, 2005). These are impressive capabilities, at affordable prices to the end user, and have led to the infiltration of gaming technologies into numerous industrial fields such as defense, medicine, architecture, education and city planning (Smith, 2007).

By some estimates video games now rival the movie industry in level of scope and influence (Bangeman, 2008; Caron, 2008; Gilbert, 2008). Video games have become so pervasive and their ability to motivate and engage individuals so compelling, that the notion of games for education now garners considerable research. One report sites over 300 academic institutions worldwide offering game related programs of study (Fletcher & Tobias, 2007). Hogle's review of early games for education research advanced the use of computer games as cognitive tools (Hogle, 1996). Hogle noted the advantage that games have over simulations in retention of information, holding student attention and

increasing time on task. More recent research indicates that computer games can affect cognitive processes and, for some specific tasks, transfer performance from game-play to task-performance, including real-life tasks. This kind of transfer is most likely when the cognitive process engaged in the real-life task and the game is similar (Fletcher & Tobias, 2007). Additional studies have investigated the motivational aspects of games and how to apply them to training environments (Conkey, DuBuc, Henderson, & Ricci, 2008).

However, despite the successful use of "pure" computer games in many classroom settings (Kirriemuir & McFarlane, 2003), it is essential to understand that the majority of computer games are not designed with instructional system design principles in mind. O'Neil claims that a framework for the evaluation of computer games for educational and training purposes does not exist. He, however, does attempt to map Kirkpatrick learning levels to game based learning in an effort to establish a framework for evaluation (O'Neil, Wainess, & Baker, 2005). Mishra echoes this sentiment and also criticizes the lack of good empirical studies to validate the claims of games (Mishra & Foster, 2007).

But there is also a body of work that generally supports the effectiveness of serious-games for education. Serious-games are more likely to be games that were created with instructional system design principles or with learning objectives in mind. Egenfeldt-Nielsen ((2007)) argues that we are in the third generation of computer games in education and that these games are simply another tool in the educators expanding toolbox. This gaming tool can provide rich micro-worlds for the student to explore if teachers properly integrate them into their curriculum (Egenfeldt-Nielsen, 2007). An analysis on the effect of games and simulations on cognitive abilities suggest that they

can have a positive effect on real-world human performance (Fletcher & Tobias, 2007). Studies have also documented the power for serious games to deliver real training advantage in different environments (Mautone, Spiker, & Karp, 2008; Roman, 2008).

Generational Effects

There are studies that strongly indicate significant percentages of young adults, widely labeled as the Net Generation (Net Gener), are familiar with video gaming platforms and interfaces (Barnes, Marateo, & Ferris, 2007; Simpson, 2005). The Net Gener group is generally defined as those persons born between1980 and 1994. This group currently represents around 7% of the US population. This generation and subsequent generations have grown up digital – never experiencing or understanding the analog world of their parents (Jones, Harmon, & O'Grady-Jones, 2005). While previous generations were engaged in the then traditional activities of sports, television and reading, the Net Gener, by the time he/she is 21, according to some estimates, have him/her spending 10,000 hours playing video games versus less than 5,000 hours reading, most of which was reading Web sites. The Net Gener generation is more visually literate and more comfortable in an image rich environment (Oblinger & Oblinger, 2005).

While not all Net Geners are avid gaming fans most have played at least casually and are familiar with the popular gaming paradigms. The 2008 Pew study on games and teenagers claimed that "fully 97% of teens, ages 12-17, play computer, web, portable or console games" (Lenhart, Kahne, Middaugh, Macgill, Evans, & Vitak, 2008). Innovative gaming platforms such as Nintendo's WII are also making inroads into older generational communities (Baertlein, 2007). This is notable because as Henderson pointed out, the types of games that older generations grew up with are quite different than the modern

video game (J. Henderson & Hainley, 2006). Thus the video game experience appears to be expanding to older generations. In fact Oblinger's survey found that 65% of respondents claimed to be at least an occasional video game player with fully 20% of adults over 50 claiming to be a video gamer (Oblinger, 2006). The multi-billion dollar video game industry is approaching the size and influence of the film industry and is becoming part of our modern culture, not only for the rising generation but increasingly for previous generations. Video gaming is becoming a paradigm that is now more widely understood and hence is worthy of investigation as a serious instructional medium.

Modding

An often overlooked feature of many games is their ability for the player(s) to alter the virtual environment shipped with the game. A few of the more popular games now come with editors that allow the gaming community to alter the packaged "levels". Levels, in gaming parlance, refer to a specific environment that the game player(s) must work in. Levels can consist of detailed terrains, building interiors or entire city domains (See Appendix A). Levels contain all of the audio, visual and interactive objects required to create the player(s) own virtual environment (Raybourn, 2007). Often the completion of one level "qualifies" the gamer to open and begin the next level where they are usually rewarded with additional capabilities and challenges. While most packaged games include only one set of levels, a subset of games are sold with "level editors" that allow the gamer community to alter the levels shipped with the game (See Appendix B). This process is generally referred to as "modding." The packaged editors are quite powerful and offer the game modding community the tools to create very powerful games in and of themselves.

The reason a game company supplies "modding" tools is basically economic. It lengthens the interest period in the game, it increases user attachment to the game and expands the level content available for the game (Diller, Ferguson, Leung, Benyo, & Foley, 2004; Mactavish, 2007; Postigo, 2007). Many popular games now have active gaming communities that are complete with user groups and online forums who, once the gaming levels provided with the game have been conquered, they "mod", or create, new game levels. These levels can range from simple alterations of the packaged levels, such as adding new buildings, to completely new environments that bear no resemblance to the original game levels -- thus the number of available game levels expand. While a typical game may have been packaged with 20 levels, the modding community can create hundreds of additional levels to play on. Gamers tell their friends of the new level they created which generates additional interest for the game and also provides the modder with social capital (Kücklich, 2005). Ultimately this improves game sales as additional gamers buy the game since the only way to run game mods is to have a copy of the original game. Successful mods in turn influence the gaming industry while acting as both a source for research and development into potential new markets and as pools of digital media talent (Nieborg, 2005).

The packaged editors are sufficiently powerful to offer the game modding community the tools to create new games by themselves. There are several cases where commercially successful game products have been created entirely from the modding capabilities of a base game; the modding to the initial game being so extensive that no vestige of the original game could be detected in the visual appearance of the modded game (Nieborg, 2005). Yet, the new game took full advantage of all the physics,

character animations, sound system, networking and graphical rendering of the original game -- thus providing huge savings in developmental costs of the new game. A notable example of this is the popular game CounterStrike which was modded from the commercial game Half-Life.

Machinima

Modding became so popular that it led to the creation of a new art form called machinima. A misspelled blending of the words “Machine” and “Cinema,” machinima is the application of video gaming to the creation of animations and videos (Nitsche, 2005). However, unlike traditional animation where each frame of a movie has to be laboriously drawn out or rendered, or computer animations where special effects can require hours of processing, in machinima the video game engine becomes the production environment. Puppeteering methods allow avatars to be manipulated, in real time, to act out an animation sequence. Machinima is filmmaking in a real time 3D environment without all the monetary and logistical overhead of traditional filmmaking (M. Jones, 2005). Like traditional animation, machinima allows film techniques that are impossible in traditional filmmaking, but, unlike animation, the results are, for all practical purposes, real-time. Instead of always following the traditional third-eye view that films have trained us to expect, we can move the point of view to anywhere in the scene (Gonzalez, 2007).

Machinima traces its roots back to early game modding efforts that allowed modders a new media outlet for their modding efforts (Lowood, 2006). Instead of just creating new game variants the modders started engaging in narrative driven media creation causing some to declare that machinima represents a new art form (Jenkins, 2000). Like game modding, the creation of machinima products is based on specific

game content. Machinima products, like modding products, are often classified by the game engine used to create them as is shown at the machinima outlet web site www.machima.com. It classifies submittals by the major game engines and virtual worlds used to create them; World of Warcraft, Halo, HalfLife, Grand Theft Auto, Call of Duty, Spore, The Sims, etc. Also, like modding, machinima increases user community ties and attachment to a game, it produces word of mouth advertising for the game and it motivates the gaming industry to improve and expand game technologies that support the creation of machinima. In the end, the game company wins regardless of why the end user is buying the game. Either they are buying for the sake of playing the game or to use the game environment to create new machinima. It's a sale either way.

Historically machinima efforts have focused on using existing video games to create machinima products. However the user base has now become large enough and the technology has advanced to the point where stand-alone machinima production products are now available (Short Fuze Limited, 2007). The market is now large enough that even hardware products are being developed to fine tune the puppetry actions of machinima (Ali & Michael, 2007) Traditional 3D animators are even beginning to take notice of Machinima. Long considered a inferior form of animation, the graphics have improved to the point where the high animation community is taking notice of the rapid turnaround potential that machinima offers (Spencer, 2008). To date, the bulk of the machinima market is aimed at entertainment oriented endeavors with very few educational efforts noted.

Convergence

This introduction has discussed a wide variety of subjects: multimedia,

simulation, video games, generational learning differences, game modding, and culminating with this discussion of machinima.

How do all these subjects tie together? They tie together as a multimedia training opportunity. The modding and machinima capabilities of modern games combined with the broad exposure to gaming technologies of the Net Gener generation raise interesting questions for the training community. These questions include: can game modding be harnessed as a low cost method for creating multimedia training applications? Can training videos be created using machinima technology based on modded video games? And finally, can the video and gaming aspects of machinima act as a bridge for applying training across generational boundaries?

The author proposes that machinima represents a convergence of old and new technologies and bridges the tried and true methods of delivery with the largely undefined interactive methods that are now emerging. This convergence expects to bring together the dynamic content creation capabilities of gaming technology while delivering its content in the established methods used by video.

Game-based learning, as defined earlier, is “in” today. It’s the focus of considerable effort to work serious games into educational venues. It is the latest technology in a long list of technologies that were going to turn the classroom upside down (M. G. Jones, 2005). However for all its promise game-based training has met with several major challenges.

One of its major challenges is market reach. Previously, the Net Generation was discussed and their digital native qualities detailed. A citation on how older generations are adapting to some game platforms was noted. However, according to recent studies by

Belanich, the recent exposure of older generations to modern video gaming is generally limited in scope. The study concluded that estimates of avid gamers, even among the Net Generation, are significantly overinflated (Belanich, Orvis, Moore, & Horn, 2007). This study showed that significant sections of the survey population of soldiers in the US Army did not self-identify as video gamers, with the gap growing larger with increasing age. Work done by Koon indicated that age differences between generational cohorts can adversely affect successful delivery of training materials because of the significant differences in educational media capabilities available during their developmental years (Koons, 2006). Particularly older generations, the generations commonly making key policy decisions, have little experience in or understanding of the media expectations of the Net Generation. This gap in experience with not only gaming interfaces but with many modern digital interfaces poses a major challenge for those looking to bring video gaming technology into the classroom.

Training is an ongoing need applicable to all generations, especially with multi-industry careers now becoming the norm in the workforce. Game-based training does not naturally appeal to all segments of the population. As Belanich discovered, even the Net Generation has large population segments that are not video gamers but participate instead in a multitude of other activities besides video gaming.

Carr argued that machinima is a bridge to older generations (Carr, 2007). He argues that machinima uses the modern game technologies to produce dynamic content but delivers it as video, a format that has been in wide use educationally since WWII (M. G. Jones, 2005). With machinima, there are no complicated installation procedures or complex computer interfaces to learn. Twitch speed is not expected (Prensky, 1998).

Machinima offers familiar passive moving images that are produced at relatively low cost.

Distance Learning

Distance learning technologies are a growing segment in the education field with significant resources being allocated to internet based training delivery. The promise of reduced staffing and an improved reach to students is driving a greater flow of content to internet based delivery. However, distance learning (DL) has ongoing issues with student motivation as exhibited through higher student attrition rates. There are also lingering questions as to the effectiveness of distant learning training as compared to classroom delivered instruction (Bewley, 2006; Keller, 1999; Sherry, 1996). One area being explored as a potential solution to these distance learning issues is the increased use of interactive content, including the increased use of simulation and gaming modules. Research into the incorporation of simulations and gaming into distance learning environments has shown they can meet content standards and still provide content that is controlled by distance learning management systems (Conkey, Smith, DuBuc, & Smith, 2006). However, infrastructure inadequacies now pose daunting issues for the implementation of many of these strategies. As games and simulations grow ever more realistic and engaging their bandwidth and storage requirements have grown dramatically, often exceeding gigabytes of data. Many simulations and/or games require hardware upgrades to run them properly. This challenge conflicts significantly with government and corporate computing requirements where generic computers are normally assigned across the employee base. Even when the computer is capable of running the simulation or game, large file sizes can cause disruptions in training due to

the longer download times required. If the training files are pre-deployed on physical media then the benefits of distance learning are undercut with additional logistical demands. Many security policies now prohibit the installation of executable programs without approval from the computing administrators, adding additional logistical demands.

This is where machinima offers an opportunity to improve the attractiveness of distance learning content by taking advantage of gaming and simulation visual strengths, but doing so with "a lite" computing and networking footprint. No large data downloads and no installation requirements – computing and networking "lite." While streaming video is already an accepted internet medium much of its educational content is "talking heads" with little learner engagement value. Machinima vignettes generated with story-lines can increase student engagement levels. Also, some interactivity can be inserted by using short machinima venues separated by decision or assessment points. Again, this is where machinima technology can bring 3D gaming worlds, with their characters and landscapes, to the educational arena in a format that does not challenge networking infrastructures or education requirements.

In addition to the networking issues there are basic computer support issues. One is in the classroom where gaming and simulation hardware requirements can pose significant challenges for the average teacher led class. Many teachers have not been properly trained in operating computers and even less trained on the details of setting up and operating games and simulations. Added to these issues is the matter of class time required to run games. Many games are open ended and don't fall neatly into existing packed lesson plans. It becomes hard to set aside a specific set length of time for a video

game. This leads to considerable resistance by teachers to deploying these technologies (Ibbitson & Irvine, 2005; Rice, 2007).

Machinima technology can be treated just as other multimedia tools that have set time tables with the teacher able to stop and start the lesson at any time. This provides order and predictability for the classroom environment – and teacher.

Production

The production of game based training and the creation of suitable content is an area in which many educators have little or no experience. Unless the end user, in this case the educator, is able to line up an existing gaming product for educational use, as with Squire's efforts with Civilization (Squire, 2004), the effort to create a serious game or simulation is often too overwhelming for most organizations. Also remember that typical video games are not created with instructional purposes in mind and as Zyda observed, the game industry is generally not interested in exploiting serious games, especially after the earlier flop of "edutainment" efforts (Zyda, 2007). Several authors have detailed the challenges of building viable gaming applications. Many myths pertain to serious games. These myths include: they are cheap, they can be developed fast, they can be deployed quickly, they are effective in real world training transfers, they are trainer-less in delivery, and they are universally accessible to end users (Chatham, 2007). As Kelly pointed out while reviewing the work required to create serious games: "It is, however, extraordinarily difficult to implement a video game that accurately represents the underlying science and that is sufficiently engaging to hold a student's attention." (Kelly, Howell, Glinert, Holding, Swain, Burrowbridge, & Roper, 2007). Blow detailed many of the challenges and complexity of creating a modern game and the amount of

engineering that is involved (Blow, 2004). These production challenges have only increased in recent years even though many serious games do not need the realism required of many commercial games.

Machinima, through the use of modding, can avoid many of the engineering challenges associated with game creations. Machinima offers a way to concentrate on leveraging the existing game engine technologies and focusing on the end educational product. Machinima offers a much lower technological hurdle.

Gaming Experience

Another interesting challenge with interactive game and simulation based training comes from trainee gaming experience levels. Trainees come with wide variations in their exposure to gaming and game platforms. This difference in exposure can significantly affect training effectiveness with game based curriculum. Research by Tortell indicated that the more experience a trainee had with gaming platforms coming into a game-based training application the less emotionally involved they would become with the training, thus lessening the effectiveness of the training (Tortell & Morie, 2006). Machinima generated training has a leveling effect because of how pervasive video media has become throughout society. Trainers can be less concerned with these differences in the trainee population because of the experience the trainees have had with a gaming platform's software or hardware. The video nature of machinima requires no special skills or knowledge to understand it or to operate it.

Agents & Avatars

Embodied agents and avatars are terms used for animated characters in video games, computer mediated training, modding, and other modern media. It is, however, important to understand that there is a difference between the two animation types but that this difference is minimal for the purpose of this study.

Bailenson (2006) explains the basic difference between embodied agents and avatars. While embodied agents and avatars are both digitally modeled animated actors, embodied agents are driven by algorithms while avatars are manipulated by humans. So an embodied agent is algorithmically driven and thus responds to circumstances and events through a preprogrammed set of responses. They are popular for use as instructional tutors. An avatar is also a digitally modeled actor but it is controlled directly by a human. The avatar is often the representation of a human in a virtual space (Fabri, Elzouki, & Moore, 2007). This model is borrowed from the video gaming world where gamers control the actor in the digital scene. As previously explained, this is the foundation for game modding: to puppeteer avatars for the creation of machinima video. The key issue to understand here is that both embodied agents and avatars are digitally modeled representations where the only difference is in how they are controlled. For the purposes of this study analysis of the results from previous studies using both embodied agents and avatars will be utilized.

The body of work built around embodied agents focuses primarily on agent effectiveness as an independent entity (Cassell et al., 2000; Yee et al., 2007). Yee performed a meta-analysis of experimental data with results from 46 studies on embodied agents. The generalized results showed some primary effects with agents in interfaces.

Yee found that having an agent in an interface is more important for positive social interactions than not having an agent. In fact, Yee said, having a low fidelity agent is more important than having no agent at all, and that the realism of the agent is of lesser importance than just having an agent. This was a very important finding because it supports the supposition that lower resolution is of lesser importance than having a basic avatar representation. Van Vugt also reported that realism is of lesser importance in the avatar representation (van Vugt, Konijn, Hoorn, Keur, & Eliëns, 2007). Hoorn, et al., (2003) further elaborated on this issue by arguing that increasing the emotional relevance of a simulated environment is more critical than increased realism in the virtual components. Avatars can be either realistic or not realistic and there was no reported effect on user involvement with the avatar. However, user perceptions of avatar aesthetics can affect the user's engagement with a character and is a high predictor of user satisfaction in avatar interactions. In a previous paper, van Vugt demonstrated the importance of user-agent interaction in user satisfaction measures (van Vugt, Hoorn, Konijn, & de Bie Dimitriadou, 2006).

Social interaction is an element of constructive learning theory that promotes active learning (Biggs, 1996). This leads to the question: does interaction with an agent induce the benefits of social interaction in a mediated environment? This was the question tested by Okita in an experiment that pitted an algorithmically embodied agent against a human controlled avatar in interactions with test subjects where the subjects were informed of the difference in control mechanisms for the animated characters. The results showed a clear preference for the human controlled avatar that led to increased

learning levels by the subjects. Analysis further indicated that the subjects perceived a socially relevant interaction with the human controlled avatar.

Human factors' research by Yee into embodied agents further found that having human-like agent interfaces produced positive social interactions and that there is value in establishing rapport with animated characters in computer mediated training applications. The positive reactions from human-like agents were more pronounced than not having human representation and more important than the overall fidelity for the humanoid agent. Yee found that having an embodied agent as part of an interface leads to more positive social interaction (Yee et al., 2007). Yee's research into embodied agents is noted here because of the strong character animation capabilities associated with machinima technology. Character, especially facial animations are some of the hallmarks of high end machinima. Leveraging positive social interactions is a machinima strength. Henderson makes the case that the value of using human emotion, a known contributor to retention, for training has taken a back seat to increasing simulation fidelity (D. Henderson & Sloane, 2005). It is here that the increasing fidelity in gaming and simulation and the need for emotional content converges in machinima where the character and facial animations are improving dramatically but still in a relatively moderate fidelity environment. Duplicating the emotional experience in well produced multimedia video education is a rising capability of machinima.

Realism

The realism of avatars when compared to humans has been tested in several studies. Photo realism of avatars has been evaluated using a variety of methods that sought to create near photo-realistic avatars. These studies failed to demonstrate that the

increased realism of the avatar increased subject presence measures (J. N. Bailenson, Beall, Blascovich, & Raimundo, 2001; Garau, 2003). In fact, Garau's work showed that if avatar visual realism was increased without an increase in behavioral realism then presence measures decreased.

Conversely, however, other studies have demonstrated that increased human appearance is a factor in the perceived value of avatars for interaction. Situations with no avatar or non-human avatars were judged as less useful and created less presence than avatars with more human appearance (J. N. Bailenson et al., 2005; Nowak, 2004).

These studies again illustrate that working with avatars and agents is more than just an exercise in pursuing the highest possible avatar visual fidelity. Avatar actions presented with motions and emotions carried as much if not more weigh in determining the quality of the user experience.

The Opportunity

The opportunity that machinima offers is to converge and leverage the capabilities of simulation, game modding, and game-based training with the traditional capabilities of motion picture/video based training technologies. Machinima adds to the multimedia educational toolkit by leveraging the rule of thumb that students only retain 10% of what they read but 30% of what they see (Oblinger & Oblinger, 2005). Machinima also offers the opportunity of leveraging many of the Net Generation's love for gaming with prior generations comfort with video. Machinima also has less data and networking overhead than gaming solutions in distance learning environments. It is also easier and less expensive to produce than games. It also avoids the classroom complications of gaming and simulation solutions while generally leveraging existing computer resources, and it

avoids the uneven time commitments that many game-based training solutions require. Machinima offers a unique opportunity to get the best of both worlds – machine and cinema based technologies.

Learning Theory

The author now explores how machinima-based training fits into established learning theory? Game-based training has established roots in experiential and constructive learning theory, theories that encompasses virtual world exploration, cognitive development, and procedural rehearsal. Machinima, however, is a blending of traditional multimedia video based educational methods with synthetic learning environments. Videodisc delivery highlights branching and navigation techniques that allowed for decision, assessment and reflection to become part of the otherwise push-oriented training delivery system (Chen, 1995). Fletcher's studies documented the effectiveness of videodisc delivery as an educational medium (Fletcher, 1990). The 3D virtual world used to create machinima brings an immersive quality to the presentation while leveraging the trainee's familiarity with the operation of gaming genres.

The following sections review the literature regarding the several learning principles that affect media that includes Dual Coding Theory; Constructivism; Unstructured Learning; Anchored Instruction; Experimental Learning; Training "Soft-Skills;" Emotions in Learning; Embarrassment; Assertiveness; and Active Learning.

Dual Coding Theory

Multimedia practitioners have espoused dual coding theory to explain multimedia's success in educational. Dual coding theory obtained its basis through the use of imagery for memory enhancement, a technique that has been traced back

thousands of years. Paivio introduced dual coding theory in the early 70's. Its key premise is that there are two independent channels for processing information in the brain. One channel handles verbal information while the second channel processes non-verbal information. Verbal information is defined as text or audio while non-verbal information is images such as environmental sounds and drawings. According to dual coding theory, learning is enhanced when both channels are used to deliver information to the brain. An additive function, known as referential processing, enhances the learning of the information, possibly creating multiple neural pathways, thus enhancing recall. A good example of this is when a child is taught the word representing an object while simultaneously seeing media of that object (Najjar, 1995; Paivio, 2006).

Constructivism

Cognitive research has demonstrated that students learn best when learning in context (Bransford, Sherwood, Hasselbring, Kinzer, & Williams, 1990). One tenet of constructivism, teaching in context, has historical precedence with learning guilds and trade schools. In higher education, internships are used to provide context to solidify learning with practice. Where context has been difficult to achieve the human element has provided a bridge that relates personal experience to theory. Machinima based activities can provide the contextual setting for learning by giving the learner the environmental context for training.

Unstructured Learning

Game-based training is often associated with experience/exploratory based learning (de Freitas, 2006). However, an unstructured deductive discovery form of learning has been criticized as inappropriate for novice learners (Fletcher & Tobias,

2007; Shaffer, Squire, Halverson, & Gee, 2005). Shaffer pointed out that having learners "float in rich experiences with no guidance only triggers the very real human penchant for finding creative but spurious patterns and generalizations." This study suggests that the novice needs to be guided in their initial choices to build experiences that fit into the epistemology of the community they are joining. Here again, machinima offers opportunity for guided, directed learning with choices that fit the epistemic frame of the training objectives. Taking away free form game or simulation play may be entirely appropriate for many courses, especially introductory classes.

Jones made the argument that excessive interactive gaming and simulation based training can deny trainees of reflection time. He further argued that reflection time is a critical part of experiential learning theory and should be a part of the training (Jones et al., 2005). Again, machinima generated training and presentations, like video based training, can provide the breaks in training that are required for reflection and/or personal assessment while providing more control and structure to classroom use of the new technology while helping to overcome, to some extent, the unrealistic time requirements many game based training solutions place on already stressed classroom time.

Anchored Instruction

Another perspective is the anchored instruction theory, a theory that suggests that to be meaningful, learning must be placed in a relevant context (Grabinger & Dunlap, 1996). This context provides meaning and value to learning and helps assimilate the new information into existing mental models. Supported by constructivism, anchored instruction's premise is that in order for learning to be meaningful it must be offered on a base or platform of knowledge that serves as its anchor – thus its name. Knowledge of

important concepts, theories and principles act as anchors for extending learning (Bransford et al., 1990). Bransford proposed that the then emerging interactive video technology offered a means to create authentic learning solutions. These concepts then became the foundation for teaching students how to develop problem solving strategies by leveraging the vibrant details that video offered as compared to textual descriptions offered in books. Video can offer rich context for learners to establish their own anchor for learning.

Experiential Learning

Another related theory is the experiential learning theory (ELT) where experience is seen to build mental models for future reference. New experiences are evaluated against references to previous experience and the knowledge derived from that experience. Kolb developed four phases for ELT: Concrete Experience, Reflective Observation, Abstract Conceptualization, and Active experimentation (Kolb, 1984; Kolb et al., 2001). Machinima-based experiences would apply to the first two phases: experience and reflection. A machinima generated environment would offer virtual experiences for the learner. Since the experiences are serially presented along a timeline, this machinima generated environment also offers the opportunity for reflection and consideration of the content. The value of reflection is seen as a critical part of experiential learning. Machinima structured learning can capitalize on reflection in ways that game based or interactive, twitch speed, training cannot.

Training "Soft-skills"

Soft skills, or skills that involve the inter-personal actions between humans, involves training skills such as leadership, supervision and communication (Cronin &

Cronin, 1992). Moss & Tilly (1996) formally defined soft skills as "skills, abilities, and traits that pertain to personality, attitude, and behavior rather than to formal or technical knowledge." Soft skills development is an area that has made significant use of computer and video technologies to augment training, especially with the advent of interactive computer technologies.

When Cronin was researching the use of Interactive Video Instruction (IVI) for training soft skills, IVI was a technology that had emerged early in the computer age when storage capacities were extremely limited in training computers. Using video disks, as illustrated in Figure 2, the computer would interactively branch between various video vignettes based on user responses during the training. Cronin commented that while Interactive Video Instruction has shown a significant advantage over more traditional teaching styles in select areas of instruction, very little of this research focused exclusively on soft skill training (Cronin & Cronin, 1992). Never-the-less, their study suggests, that the general reviews of IVI argue for the power of interactive video over linear video presentations for the presentation of soft-skills training. Specifically, IVI for soft skill training had superior learning transfer, motivational aspects, user technology acceptance and time required to master content (Cronin & Cronin, 1992).

Campbell later pointed out that high student to faculty ratios constrain how much interactive and face to face training students can receive in interpersonal skills development. These types of skills often require situational assessment (Campbell, Lison, Borsook, Hoover, & Arnold, 1995). Campbell also noted that while meta-studies on the effectiveness of interactive video generally show 20-30% savings in learning time, few of these studies looked at interpersonal skills. Subsequent research indicates that these

technologies, computer and video supported learning, could reduce instructor time while increasing learner performance (Campbell et al., 1995).

Emotions in Training

In his studies Picard found that emotions can play a critical role in perception and learning (Picard, 2000). In the area of soft-skill training this can be doubly important, with Picard suggesting that computers must learn to recognize and display emotions. While general purpose computers that actively display emotions are still in the future, video based training has been mastering this capability for decades. Communications is only partly verbal as Mehrabian noted with his 3 Vs rule, which states, that communication is 7% verbal, 38% tone and 55% visual (Mehrabian, 1971). Body language is important in the communication of intent, a function that avatars can be very effective at. When the voice indicates "there is nothing wrong" but the person won't maintain eye contact and has a closed body stance, then body language is indicating the opposite. Emotionally expressive avatars have the capability to enhance subject experience and engagement with users leading to increased learning opportunities.

Machinima technologies have now evolved to the point that basic emotions, both facial and body, are incorporated into many gaming engines or machinima tools (Spencer, 2008). Fabri & Moore (2005) argue that emotionally accurate avatars have the potential to stimulate empathy in the virtual world for other participants. Empathy aimed at decoding an accurate understanding of the feelings of avatars in a virtual environment, or, as in Fabri's study, at inducing empathy for the human controlling an avatar. Building believable agents has long been an area of research with early researchers taking clues from the animation studios like the Disney studio (Bates, 1994). Research has also

continued to focus on the importance of emotions in creating believable agents (Cassell et al., 2000; de Rosis, Cavalluzzi, Mazzotta, & Novelli, 2005; Gratch, Wang, Gerten, Fast, & Duffy, 2007).

Embarrassment

The topic of embarrassment, as a subtopic under emotion, has a particular interest to this study because of work performed by Bailenson and associates on the perception and treatment of avatars as humans in virtual environments (J. N. Bailenson et al., 2005). Bailenson's key finding was that when there is a disparity between appearance and behavioral realism of an agent then subject presence is low. However, their conclusions stated: "It seems that virtual representations that look like a realistic human, as opposed to either a familiar or unfamiliar nonhuman, elicit embarrassment reactions that would be appropriate only in the presence of a real human" (J. N. Bailenson et al., 2005), p. 390). Their finding could lead to the premise that for certain training applications the use of less-than-human avatars for interactive training may be desirable. However this would be in conflict with other research that has pointed to increasing realism for human avatar (or embodied agent) as desirable for virtual environments. It would also lend support to the avatar actor versus human actor question, supporting the less than human presentation of avatars as actually having an advantage over human actor training.

In a follow-on study, Bailenson researched the effect of avatar likeness to intimacy behavior (J. N. Bailenson, Blascovich, & Guadagno, 2008). Half the avatars resembled the participants and half did not. While the participants were more intimate with the avatar that bore their resemblance, a key observation here was that humans were interacting intimately with avatars.

Assertiveness

To be assertive is defined as stating or declaring positively and forcefully your desires or intentions. Acting assertively is a complex interpersonal skill that includes both verbal and non-verbal communication skills (Alberti & Emmons, 1974). Being assertive in a courteous manner can be a difficult behavior for many people. Lashing out with anger or backing off and not asserting are common failures in this respect. Regulating one's emotions is a key aspect of assertiveness and is a skill that can be improved with training. As previously mentioned, video disc technology was an early form of video based multimedia training which had application in soft-skills training. Video vignettes were often crafted around interpersonal skill training. The application of this training with machinima technologies is a logical extension. The evidence was that in virtual settings human trainees can be more at ease with avatar actors than with human actors, especially regarding embarrassment, and leads to these queries: does this behavior extend to other interpersonal skills such as assertiveness and will humans be more at ease with soft-skills training with avatar actors versus human actors? Based on the preceding discussion, it is plausible that students trained in assertiveness may show improved training results using avatar based training.

Active Listening

Active listening, also known as emphatic listening, has received considerable attention both in popular and professional literature (Brownell, 1986; Nugent & Halvorson, 1995; Rogers & Farson, 1975). First developed by Rogers & Farson (1975), active listening teaches how to empathize with the speakers point of view. Specifically, active listening teaches the following skills: listen for total meaning, respond to feelings,

and noting all clues. Listening for total meaning teaches how to listen beyond the simple message, to listen for the feeling and attitude that the message is delivered with. Responding to feelings teaches that the underlying feelings and attitudes that a message is delivered with can be far more important than the actual message. The active listener will pay attention to those messages and respond to the feelings expressed.

Finally, "note all clues" teaches a listener about the non-verbal clues that a speaker often presents. Like attitude, non-verbal clues can often relay more information than the simple verbal message. Body language, speech hesitation, voice inflections, body posture, and facial expressions are just a few of the additional clues that a speaker can rely on with their simple verbal message. Following the basics of active listening conveys a sense of genuine interest and importance to the speaker. It conveys a feeling that the listener has respect for the speaker and their opinions. It helps to build a bridge to personal understanding.

As with assertiveness, active listening is a soft-skill that has used video based multi-media training to help practitioners practice. Therefore it is also appropriate to ask how using avatar actors for active listening will affect the trainee performance. As with assertiveness training it is reasonable to speculate that avatar based training will result in improved training effectiveness.

In analyzing comparative responses it is common to employ word counts and response quality between the two sources. This method would be appropriate in analyzing the results of assertiveness and active listening interactions with study participants.

In summary, the author has demonstrated how machinima fits into established learning theory; how machinima supports dual-channel theory by providing rich visual and verbal media; how constructivism teaches that context is a key to learning; how anchored instruction builds on constructivism's context with the key knowledge that anchors the context; how machinima supports the training of the anchor concepts and provides the context for the learning; how experiential learning theory stresses experiences for building mental models for future reference in evaluated new situations; and how machinima supports the building of virtual experiences and allows for reflection.

The author also discussed how machinima can support structured learning environments where time limits and equipment resources can limit the use of exploratory learning with video games and virtual worlds. And finally, in teaching soft-skills, it was discussed how machinima allows for the creation of characters with emotions, a key element for the retention of learning.

A key question raised in this presentation was how to develop effective machinima-based training to maximize the learner experience with computer-generated actors.

This question cuts directly to the concept of presence, which will be described in detail in the following section on Presence which will discuss in greater detail Definitions of Presence; Elements of Presence; and Measures of Presence.

Presence

Presence is informally defined as the "sense of being there" in a mediated environment (Heeter, 1992; Lessiter et al., 2001; Witmer & Singer, 1998). As an attribute

this indicates that a human participant "senses" they are actually part of a mediated environment and that they are in the environment as opposed to viewing it from the outside. Presence involves a mediated environment in that the environment is viewed via an intervening medium, normally video based for these discussions. Viewers become part of the movie, televised sports events or the virtual reality environment. The viewers jump to catch the football from the couch or reach out to sit down in a virtual chair before they "remember" that it is not real. They have fallen through the looking glass[3] and they, cognitively speaking, have become part of what they are viewing – they are "present".

This interest in presence comes from many disciplines and backgrounds because presence can affect many aspects of the human experience and is both academic and practical. Instituting a sense of presence in a customer is the goal in many modern product experiences, especially in the digital media field. Understanding what elements of an experience support or detract from "loosing oneself" in the moment is crucial to numerous products and experiences. Lombard and Ditton (1997) document several examples that include high definition movies, theme park adventures, remote communication for business, education or medicine and military training, to name a few.

Academics seeking to understand the human cognitive process are turning to mediated experiences for measures that instill a sense of presence while allowing cognitive measures in a controlled environment. Their goal is to recreate an environment where the evaluation produces a sense of "presence" in the person being evaluated so their cognitive processes react in the same manner as the non-mediated event would produce. Relevant examples continue to come to light as digital media and new communication technologies continue to invade every aspect of society.

[3] ***Alice's Adventures in Wonderland*** (1865), Lewis Carroll, Macmillan

Beyond the business and academic reasons there are many practical benefits of presence. Lombard and Ditton (1997) list simple enjoyment of an event, deepened involvement in a mediated event, and improved task performance and skills training programs as strong benefits from events that invoke "presence." Desensitization to future or actual past traumas, the ability to enhance persuasion, and possible improvements in memory are additional benefits to having strong presence in a mediated event.

Definitions of Presence

Presence is not a precise notion and there are many concepts associated with it. Substantial work on presence has come from the study of virtual reality systems. However, as Kim and Biocca (1997) pointed out, presence as a concept must be applicable across all forms of media, and it is, they claim. A 1997 study indicated no less than six prevailing definitions for presence are found in the general literature (Lombard & Ditton). These six presence categories are: social richness, realism, transportation, immersion, social actor within medium, and medium as social actor.

These definitions cross a wide variety of situations where humans perceive themselves as a part of a mediated situation or as a perceived mediated element as a part of their own reality. When media is perceived as sociable, personable, or as part of an intimate setting where members interact, a sense of "social richness" can exist and can lead to a sense of presence. In settings where environments provide high degrees of physical realism at the sight, sound and event level, users can be lulled into a sense that what they are seeing is real. "Transportation" is a variation on this concept where the user actually feels that they are in fact being transported to the mediated site and are a part of the mediated setting. The user's sense of presence can be such that they perceive that they

were “transported” to a situation, that a situation was “transported” to them or that they were “transported” into a remote social situation.

“Immersion” deals with those situations where technologies supplant the majority of human senses with visual, audio, and tactile input provided though mediated interfaces and producing a perceptual immersion and strong sense of presence. Social actors ‘within’ a medium is a circumstance where users identify with a presenter from a mediated interface and perceive them as a social actor, or as someone they can interact with when in reality they are in a one-way media interface where no interaction is possible. Conversely, when a medium can interact with a human user, as is increasingly the case with many computer programs using sophisticated visual and audio interfaces, such that they can produce an interactive exchange with the user, then the user may begin to respond to them as a social entity instilling a sense of presence in the interaction.

Lombard refined these six variations down to a common definition: the perceptual illusion of non-mediation. The word “perceptual” indicates that it involves the responses of human senses, human cognition and affective systems, to an environment. The “illusion of non-mediation” is the condition when a human fails to acknowledge or perceive a media system in their communication environment or they perceive the medium as a valid social entity. They “lose themselves” in the mediated environment and respond as if the medium were not present ((Lombard & Ditton, 1997)). This sense of presence may not be a continual experience and may in fact come and go as the mediated experience transpires over time depending on the strength of the environment and the number of distracters.

Elements of Presence

What are the Elements of Presence? What factors influence a sense of presence in a mediated environment? Another question: what characteristics contribute to and distract from presence? At the top of this list is the fidelity of the mediated experience. Heeter (1992) noted that virtual reality has focused on how closely it can simulate the stimuli of the human senses in creating presence. High fidelity images, sound and tactile feedback lead to ever more believable and immersive mediated environments. Steuer (1995) and others argue that the more human senses involved in the presentation the greater the chance for producing presence. As long as the information being presented in the various sensory channels is consistent with each other in presenting a constant representation of the environment then a sense of presence can develop. Chief among the senses is vision and the characteristics of the visual display are important to presence studies. These attributes include the quality of the image, size of the image, camera techniques used and the total visual field presented. Called pictorial realism by Witmer and Singer (1994), they suggest that presence is a direct function of the connectedness, stability, constancy and meaningfulness of the displayed information. The visualization aspect of presence has a role to play with the personality of the end user. Slater and Usoh (1993) reported that persons who are visually dominate, as opposed to auditory or kinesthetically dominate, report higher levels of presence.

Immersion in the event also instills the belief that one has "left the real world and is now present in the virtual environment" (Sadowski & Stanney, 2002). Sadowski also argues that virtual reality, of all the media that can invoke presence, makes the strongest

use of immersion. Virtual reality supplants many real world sensations with mediated sensations.

Interactivity with the mediated environment is a significant factor affecting presence. When users are allowed to interact with the simulated environment in a manner that is natural and not confusing or complicated, then the chances of presence during the experience are enhanced. Steuer (1995) argues that the more degrees of freedom given to the user to control the environment the more interactive it is. The higher the range of control in the simulated environment the greater the control experienced by the user (Witmer & Singer, 1994). If the responses to a users input are nimble and prompt, so not to distract from their experience, then the greater the presence possibility. Usoh adds that the degree of presence is correlated to a users degree of association with their avatars (Usoh, Arthur, Whitton, Bastos, Steed, Slater, & Brooks Jr, 1999). The more a user's avatar is correlated to their activities in the virtual environment the higher the presence, a finding duplicated by Mikropoulos and Slater (Mikropoulos & Strouboulis, 2004; Mel Slater, Usoh, & Steed, 1995; Väljamäe, 2005). Conversely, Sadowski & Stanney (2002) pointed out that the more difficult the experience at navigating or interacting with the environment the less likely presence will occur.

Dimensional hi-fidelity sound can be crucial to situations that promote presence. If the audio includes voices then Nass and Steuer (1993) indicate that voice interfaces add a powerful social clue that humans relate to. Lombard & Ditton (1997) extended this notion to indicate that the more human the voice sounds the more powerful the illusion and sense of community.

It was found that keeping the entire mediated interface low key relative to user presentation was vital. Held and Durlach (1992) argued that the mediated interface should not draw attention to itself and remind the user that this is a mediated environment. It must, as much as possible, be invisible to the user with no distracters. Use of any type of media conventions that take people out of the story via flashbacks, voice over narrations or other transitional methods can disrupt the sense of presence (Lombard & Ditton, 1997).

Having other people in the mediated presentation is a method suggested by Heeter (1992) as a potentially easy method of promoting presence. Steuer (1995) suggested that the more social actors in the mediated environment the more likely presence will develop.

A fundamental requirement for a presence experience is the willingness of the user to suspend disbelief. They have to be willing to look past the obvious mediation of the event and allow themselves to become part of it. This is common in theater, movies, television and even literature where the individual "accepts" certain premises concerning the mediated event and "suspends disbelief." However, this willingness to suspend disbelief varies widely among individuals and some are never able to "quite get there" due to curiosity about the medium or to other distracters (Lombard & Ditton, 1997).

Several authors point out the role that emotion plays in promoting a strong presence experience. One group is studying the relationship between presence and emotions with the supposition that stronger emotions lead to stronger presence (Ravaja, Saari, Turpeinen, Laarni, Salminen, & Kivikangas, 2006). Experimental results indicate that environments that can obtain a variety of emotions could rouse stronger feeling of presence. These authors also argue that emotion is more important than higher realism

and that the media designers should be focusing more on the experience than on the visual display (Baños, Botella, Liaño, Guerrero, Rey, & Alcañiz, 2004). In related work, Freeman demonstrated that interest in the content also affects perceptions of presence (Freeman, Avons, Pearson, & Ijsselsteijn, 1999).

Presence is a complex concept, a concept that is affected by many variables not the least of which is the background that the user brings to the experience. Other studies have also demonstrated that culture can have a profound effect on presence measures. In separate studies Bartneck and Bucolo demonstrated significant differences between Asian and European subjects in their ability to sense presence (Bartneck & Hu, 2005; Bucolo, 2004). Sacau further investigated personality traits and cognitive abilities roles in supporting presence effects (Sacau, Laarni, & Hartmann, 2007).

Measures of Presence

Measures of presence are commonly used to gain a sense of the effectiveness of the various media in immersing participants in a mediated event. Presence measures have been extensively used in virtual environment studies but are also used in other media such as movies (Hu et al., 2005), television (Kim & Biocca, 1997), video games (Nowak et al., 2008) and even video conferencing (Chatting et al., 2006) to name a few. Given all the potential factors affecting presence, as reviewed in the previous section, measuring presence is still a challenging task. But the primary method for measuring presence is still the survey. Over approximately two decades of active presence studies, several survey instruments have emerged, evolved, and matured.

For example, the 1994 Slater, USoh & Steed (SUS) survey measured the single factor of special presence with six questions (M. Slater, Usoh, & Steed, 1994). The

Presence Questionnaire (PQ), from Witmer and Singer, developed a four factor survey with 32 questions (Witmer & Singer, 1998). The PQ has been widely used (Nunez, 2007). The Independent Television Commission's Sense of Presence Inventory (ITC-SOPI) was developed in 2001 as a four factor 44 question survey that was designed for use across a variety of media (Lessiter et al., 2001). This last point is significant as most presence surveys are focused on virtual reality environments while the ITC-SOPI is valid across desktop VR, 3D games, and cinema (Fabri & Moore, 2004). The ITC-SOPI has had wide usage and significant validations. The MEC Spatial Presence Questionnaire (MEC-SPQ) followed in 2004 with eight constructs but has seen limited usage (Vorderer, Wirth, Gouveia, Biocca, Saari, Jäncke, Böcking, Schramm, Gysbers, & Hartmann, 2004). Finally the Temple Presence Inventory (TPI) evolved from 2000 through 2004 as a three factor, 50 question survey oriented to IMAX Theater, TV and Virtual Reality environments. However, relatively few studies have used this study (Nunez, 2007).

It should be noted that there is controversy concerning the exclusive use of surveys in the measurement of presence. A running debate between Witmer and Singer (1998) and Slater (1999) over the validity of survey instruments highlighted this controversy. Slater argues that questionnaires are inappropriate for determining presence measurements and researchers should move away from them (M. Slater, 2004; M. Slater & Garau, 2007; Usoh, Catena, Arman, & Slater, 2000). Slater, and others, have experimented with alternative presence measures based on physiological measures such as heart rate and galvanic skin responses as methods of detecting presence in higher stress situations (Meehan, Insko, Whitton, & Brooks, 2002; M. Slater, Guger, Edlinger, Leeb, Pfurtscheller, Antley, Garau, Brogni, & Friedman, 2006). Others have noted that prior

exposure to presence inducing environments and low understanding of the concept of presence can lead to observer bias and unstable measures (Freeman et al., 1999). These issues require grounded survey instruments and careful assessment of procedures. Bailenson (2006) notes that each of the primary methods of measuring presence, both subjective and objective methods, are problematic since none directly reveal what people really are experiencing. There is a trend to develop and combine more objective measures with the existing subjective survey methods. However, until physiological methods can be expanded into broad based presence studies, surveys will remain the primary investigative tool.

For the purposes of this study the author intends to measure presence effects for human actor presentation versus avatar actor presentation. The ITC-SOPI instrument will be the survey instrument for the presence aspects of the study. Its broad media support is suitable for computer screen presentations. Its four factors, Engagement, Physical Space, Naturalness and Negative Effects, are appropriate to the challenge of determining the effect on replacing human actors with avatar actors. But a question remains: how will presence measures be affected by the difference in presentation? This study hopes to answer this question.

Research Statement

In the preceding literature review it was argued that machinima represents a potentially useful training medium that solves some of the challenges typical to other media, especially video delivery media. Specifically, machinima offers relatively rapid production of low cost video training materials that can be immersive and engaging.

Machinima training materials are, unlike much video, reusable and alterable long into the future.

In order to exploit the opportunity afforded by machinima the author summarized several aspects of Learning Theory that can help design effective learning environments using machinima. These include multimedia dual coding theory, constructivism, anchored instruction and experiential learning. However, the opportunity to use machinima for soft-skills training while implementing emotions and interpersonal actions in characters; was argued to be of particular interest for the training community. Additionally, research into media "presence" can help determine how machinima based training can be optimized for learning -- specifically, the ability of machinima generated environments that bring trainees "into" the story.

Hence, the focus of this research is to ascertain whether machinima based training techniques are effective in the delivery of soft skill training applications. This study will investigate the application of machinima technologies to the application of soft-skills training as compared to traditional human actor video training vignettes. This study will make use of existing video training that was developed with the use of human actors for the purposes of training interpersonal skills. A second version of this training will be developed that uses avatar actor based video with comparisons made between the effectiveness of the training and the effect on presence measures for the participants.

Based on the authors review of the literature it is predicted that there will be an effect on skills training and on presence measures, and that avatar actor based training will prove more effective, while at the same time also predicting that the participants will experience higher presence with the human actor based training. These predictions

present a dichotomy that is based on a simple observation noted by Bailenson; that humans apparently prefer to interact with less lifelike avatars actors in embarrassing situations than they do with highly realistic avatars (J. N. Bailenson et al., 2005). The less realistic avatar actors offer emotional distance for the trainee. Extending this observation, the author desires to test whether the interactions with avatar actors elicit more relaxed training when compared to human actor interactions while, at the same time, acknowledging that the sense of presence felt by the trainee is most likely higher with human actors. Avatar actors may present an emotional distance that allows trainees to "open up" during the training despite having a lower sense of presence. This is important because prevailing research assumes that higher presence levels equate to greater involvement and engagement, items that could influence effective training.

For the purposes of this research topic the following hypotheses are offered:

Hypotheses

HABT = Human Actor Based Training
AABT = Avatar Actor based Training

- Both HABT and AABT will be effective in training soft-skills.
- Skills Analysis
  - H1: "Assertiveness" Skill will exhibit greater performance for AABT as compared to HABT.
  - H2 : "Listening Actively" Skill will exhibit greater performance for AABT as compared to HABT.
- Response analysis
  - H3: Participant interactions will be higher for AABT as compared to HABT when analyzed through word counts. (Choose to interact more)
  - H4: Participant response quality will be better for AABT as compared to HABT when analyzed.

- Presence
  - H5: There will be a perceived difference in favor of HABT with regards to spatial presence between the AABT and HABT.

- H6: There will be a perceived difference in favor of HABT with regards to naturalness between the AABT and HABT.
- H7: There will be a perceived difference in favor of HABT with regards to negative effects between the AABT and HABT.
- H8: There will be a perceived difference in favor of HABT with regards to engagement between the AABT and HABT.

CHAPTER THREE: METHODOLOGY

The principle question of this research was: Can machinima produced avatar based training be as effective as video captured human actor based training? A computer based simulation was used to test that question.

Participants

Participants were recruited from the students, faculty and staff at the University of Central Florida. A total of approximately 75 participants were recruited for the experiment. Power analysis using the statistical software G*Power 3 (Faul, Erdfelder, Lang, & Buchner, 2007), medium effect size 0.4 at .80 power, indicated a minimum n of 52. The participants were randomly divided into 2 groups for testing against the two major categories. All participants were treated in accordance with the "Ethical Principles of Psychologists and Code of Conduct" set forth by the American Psychological Association (1992), the UCF Institutional Review Board (IRB) and the US Navy IRB regulations.

Experimental Testbed

The core of this study was based on research conducted in 2005 by Cannon-Bowers, Jentsch & Sanchez entitled Technology-Enabled Learning in Soft-Skills Training: Demonstrating High-Tech Solutions for Preparing the Workforce (Cannon-Bowers et al., 2005). That research evaluated the effectiveness of video based solutions for soft skills training in a corporate environment. The Workforce Florida study used a

computer based simulation (CBS) that provided the simulated task environment that was the basis for this study. The simulated task environment replicated a hospital emergency room complete with a carefully scripted narrative storyline to increase participant immersion in the training. As demonstrated in the left-hand picture of Figure 1, the original project was executed with live actors and video recording. As shown in the right hand figure of Figure 1, the main goal of this project was to replace the actors with puppeteered avatars which were rendered to video and used to duplicate the Workforce Florida training experience. The primary measures were sense of presence and user skill attainment.

Storyline

The participants were provided an introduction to the Emergency Room scenario and the overall story arc that they were entering. (See **Appendix F**). Participants were informed that they were part of an evaluation period to determine if their suitability for a job opportunity in the hospital.

Environment Training

The participants received a self-guided Microsoft PowerPoint presentation of the simulation process. The interactive nature of the simulation was explained along with techniques of how to successfully use the audio recording system of the simulation. The story arc was reinforced with an additional overview of the Hospital Emergency Room (ER) scenario and the rules that govern all interactions at the hospital. Specifically, the hospital's customer policies were explained. Additional details of working at the ER front desk were presented to the participants. This covered the procedures for dealing with hospital employees, e-mail, and the public address system. Finally, they were introduced

to the characters in the simulation, the five hospital employees they would interact with: Louis, Rick, Tanya, Kelly and Lynn. All of the participants saw the hospital employees in the presentation as humans. PowerPoint slides for this section are in Appendix G.

Skills Training

The participants received self guided Microsoft PowerPoint presentations on the two key training skills: assertiveness and active listening.

The assertiveness section explained the balance between being overly passive and overly aggressive in dealing with customers. Assertiveness was defined as "the balance between the two extremes." Clear definitions of assertive and respectful behavior were provided. Additional instruction with strategies to regulate emotions in a stressful environment was also provided. This training was tied into the overall story narrative as the participants were instructed on the importance of being assertive, professional and courteous in their customer service role so that they would project a positive image for the hospital and themselves. The basic training materials were obtained from dissertation work done by Moshe Feldman (Feldman, 2008) and enhanced with audio and graphics.

A review of the key concepts of active listening was also presented to the participants. Definitions of and strategies for active listening were presented via PowerPoint. Concepts such as integration of prior information with current conversations, evaluation of information relevancy, and adapting responses to different speakers were presented. This training material was obtained from the original Workforce Florida project (University of Central Florida, 2005) and enhanced with audio and graphics.

Multimedia Simulation Familiarization

The participants were presented a multimedia training segment using the Workforce Florida training environment. This was computer based training using the same Workforce Florida program that was used for the main simulation. This was the introductory module from that program. This training prepared the participants for the full ER training simulation and the interactive nature of the audio and video presentation. Participants had the opportunity to practice the audio input and computer interaction skills necessary to complete the full simulation and were presented with skill training exercises presented by human actors.

Main-Scenario Exposure

This was the main component of the experiment: the formal Emergency Room computer based simulation (simply the 'simulation' from now on). The participants were assigned the role of a customer service representative at the emergency receiving room of a local hospital. The simulation enabled participants to interact with numerous characters that were portrayed in the simulation and practice the skills they had learned. The simulation characters represented hospital staff members who are both peers and supervisors of the participant in their role as a customer service representative. Figure 1 represents an example character, one of the nurses in the simulation. The simulation also simulated customers and patients in the emergency room many of which were in highly emotional states due to personal trauma or of trauma to a relative. The various characters involved in the emergency room simulation were emotionally expressive allowing the participant's to interact with the characters both verbally and through psychosocial cues in their role as a customer service representative for the emergency room. All the

characters can be seen in Appendix L. The simulation scenarios are described in Appendix M.

The simulation is constructed as a series of video vignettes presented via computer. Each vignette represents a different interaction between a participant in their role as a customer service representative and a hospital staff member or an emergency room visitor. At the end of each vignette the participants are prompted for either a verbal or written response. Verbal responses to the simulation were via a headset microphone. All conversations were recorded by computer software which detected the beginning and end of spoken content from the participants, i.e. voice activated technology. The intent was for the participants to perceive the simulation as a normal conversation between themselves and the characters in the simulation without the distractions of buttons to push or a computer mouse to manipulate. Whenever the simulation characters interacted in a way that required an audio response, the software presented a short video loop of the characters "waiting" for the response. The characters blinked their eyes during this period. For instance, the character may plead for permission to go back into the hospital. The simulated character will then "wait" for the participant to respond with an answer. When the participant speaks, the speech triggered the software to start recording the participant's response to the query. The computer software also detected when the participant ceased speaking and then stopped the audio recording. The software then seamlessly progressed to the next vignette in the narrative.

The simulation was originally developed as part of a Workforce Florida project to develop simulation training and practice aids for entry level workers to learn and practice inter-personal communication skills. Subject matter experts in interpersonal

communications were consulted to help craft realistic situations that could be included in the emergency room narrative that would stress the interpersonal communication skill of assertiveness in the participant's. Making use of the voice activation technology, the simulation collects participant reactions to various situations in the normal course of running the simulation. These situations vary from dealing with aggressive patients demanding and pleading for access to loved ones, to irritable supervisors making excessive demands and even sexual harassment situations. These varied scenarios require participant's to interact with multiple characters while upholding the hospital's strict rules; even when it results in apparent negative consequences to themselves. Participants are to conduct these interactions while maintaining an even temperament. The participant responses are recorded for later analysis of their interpersonal communications effectiveness. The only action required from the participant are to maintain an awareness of what is happening in the emergency room and to speak in a clear and timely manner into the microphone or to respond to emails in an effective manner.

Manipulation

The customer service simulation was manipulated in two directions for this dissertation. The participants were randomly divided into two groups. One group was exposed to the emergency room simulation using human actors. The other group was exposed to the simulation using avatar based actors. Both groups had full voice interaction with the characters and all characters used duplicate voice tracks. The Human Actor half of the experiment was the original Workforce Florida program. The avatar actor section used the Workforce Florida media packaging but used avatars in video vignettes that were created with the machinima creation tool IClone 3 (Reallusion, 2010).

(IClone3 represents a new generation of machinima; a software tool that while based on video game technology, is not a video game and does not come with the intellectual property restrictions that using a commercial video game would have.) The two presentation formats are illustrated in Figure 1. The only difference between the two simulations was the visual aspect. One video used human actors and the other used avatar actors.

In summary, this study manipulated the delivery of the main-scenario computer based simulation using video vignettes with human actors or with video vignettes with avatar actors. Both conditions exposed the participants to the same Emergency Room environment, the same characters, the exact voice tracks, and imposed on them the same hospital regulations. Both scenarios asked the participants to respond to the same situations and provided the same requests for responses. The critical difference was in the character presentation. This manipulation sought to determine if the participants would experience different levels of presence and if the participants would interact differently with the characters based on human or avatar forms.

Equipment and Materials

Surveys

There were several survey instruments being used for this study. This study collected survey forms on personnel demographics and on immersive and assertive tendencies. The demographics section was created by the author and supplemented with the demographic section from the Independent Television Commission – Sense of Presence Survey (ITC-SOPI) which provided basic information on participant

characteristics such as physical characteristics (age, sex, etc), and media exposure (computer game usage, TV viewing, etc). The immersive tendencies survey was introduced by Witmer & Singer (1994) and was designed to determine a participants tendency to experience a "sense of presence" while in a mediated environment. The assertive tendencies survey was developed by Lorr & Moore (1980) to identify behaviors linked to assertiveness. Copies of these survey forms are located in Appendix C, Appendix D, and Appendix E.

Following the completion of the ER scenario the participants were presented with post-event surveys. The first survey was the ITC-Sense of Presence Inventory (SOPI). This survey measured the participant's level of "presence" while in the ER scenario. This survey can be viewed in Appendix H.

Training Materials

The purposes for these training materials were previously presented. This training was a combination of verbal presentation and Microsoft Office ® PowerPoint 2003 © self-guided instruction. The PowerPoint slides included a combination of text, audio and pictorial information. There was also a practice training section that was computer based and was taken from the Workforce Florida computer based simulation. These training materials are found in Appendix G.

Computer-Based Simulation

As previously discussed, the center piece of this study was a computer based simulation used to teach soft skills for Workforce Florida. The computer based simulation (CBS) was executed on a standard computer of the Pentium 4 processor class with adequate memory and audio interfaces. Participant voice responses were captured

with the laptop audio system using a headset microphone. The development tool used for this simulation was Adobe Macromedia Director©. The tool used to produce the avatar animations for the Emergency Room was IClone 3. The simulation was displayed on 19 inch monitors connected to the computers to provide eye level contact with the characters in the simulation. The audio was produced using standard PC computer speakers.

Measures

Presence

A detailed definition of and background for "presence" was presented previously in Chapter 2. In short it is the "sense of being there" while in a mediated environment. This study measured the sense of presence that the participants experienced while working in either of the computer simulations: the human actor or avatar actor versions. There are numerous survey instruments available for measuring presence that have been developed from various disciplines interested in the topic of presence. After a review of available survey instruments for presence, the ITC-Sense of Presence Inventory (SOPI) was selected because of its support of a broad media base. This survey consists of 44 questions that asked participants to rate a recent mediated experience. Participants were then asked to rate each statement on a scale of 1 (strongly disagree) to 5 (strongly agree) to help establish if "presence" was experienced. Sample questions include: "It felt like the content was live," or "I felt like I was visiting the places displayed in the environment." The purpose of this measure was to determine if using avatar actors results in a difference in presence measures for the participants as compared to human actors.

Prior research has established that populations have varying levels of susceptibility to presence. Witmer and Singer developed an Immersive Tendencies Questionnaire (ITQ) (Witmer & Singer, 1994) to establish a measure of a person's tendency to experience presence in mediated environments. This survey consists of 29 questions which ask participants to rate their immersive tendencies. Participants were asked to rate each statement on a scale of 1 (never) to 7 (often) to measure immersive tendencies by the participant. Sample questions include: "Do you easily become deeply involved in movies or TV dramas," or "Do you ever become so involved in doing something that you lose all track of time." This study used the ITQ as a pre-measure to establish tendencies in the participants to experience presence. This data was used as a cross check for the overall presence data.

Assertiveness

Assertiveness is the act of defending a personal position while remaining civil. Being assertive while maintaining civility was a key objective for the original Workforce Florida training program. As with presence, different individuals have varying levels of "natural" assertiveness as part of their personality. Lorr & Moore developed an Assertive Tendencies Questionnaire for establishing a baseline on participant's natural assertiveness tendencies (Lorr & More, 1980). This survey consists of 31 questions that asked participants to rate their assertive tendencies. Participants were then asked to rate each statement on a scale of 1 (strongly disagree) to 6 (strongly agree) to a list of statements that measure assertiveness tendencies. Sample questions include: "In discussions, I go alone with the will of the group," or "I defend my point of view even if

someone in authority disagrees with me." This data was used as a base measure against the effectiveness of assertiveness training.

The actual measures of assertiveness were gathered by analysis of participant's responses to interactions and questions delivered in the computer based simulation. All voice responses were recorded for later analysis. Coders coded the responses and evaluated the participant's success at assertive and civil interactions with the characters in the simulation. The participant voice recordings were evaluated for the quality of the assertiveness responses and for the overall quantity of responses. The quantity was evaluated though word count analysis. There were several scenarios in the simulation specifically designed to test the participant's assertiveness skills.

Active Listening

Active listening is the skill of understanding the total communications interface between self and another individual. Individuals strive to understand not only the verbal but also the non-verbal messages being delivered. There were no pre-measures for active listening in this study.

The measures of active listening were gathered by analysis of participant responses to interactions and questions delivered to them in the computer simulation. All voice responses were recorded for later analysis. Coders coded the responses to evaluate the participant's success at active listening in the simulation. The participant's voice and text recordings were evaluated for the quality of the active listening responses and for the overall quantity of the responses. The quantity was evaluated though word count analysis. There were several scenarios in the simulation specifically designed to test the participant's active listening skills.

Procedure

Pre-surveys

The overall flow of this study is illustrated in **Error! Reference source not ound.**. In summary, there was a serial training stage for all participants followed by a population split for the manipulation section of the study.

All the participants were initially required to sign consent forms before engaging in this study. At a station separate from the computer based simulation, participants were administered their pre-surveys. The first surveys to be administered to the participants were the general demographics and IPT-SOPI background surveys. This was estimated to take between 5 and 10 minutes to complete.

The second survey to be administered to the participants was the Witmer & Singer immersive tendencies survey. This survey was estimated to take approximately 10 minutes.

The Lorr & Moore Assertive Tendencies survey followed. This survey was estimated to take approximately 10 minutes to administer.

Training

Once the pre-measures were administered and gathered, the instructions for operating the equipment and further reinforcement of the story line were presented in a self-paced PowerPoint package with audio overlay. This package provided details on the simulation and how to successfully use the equipment. It also introduced them to the characters in the story line. This presentation required approximately 10 minutes.

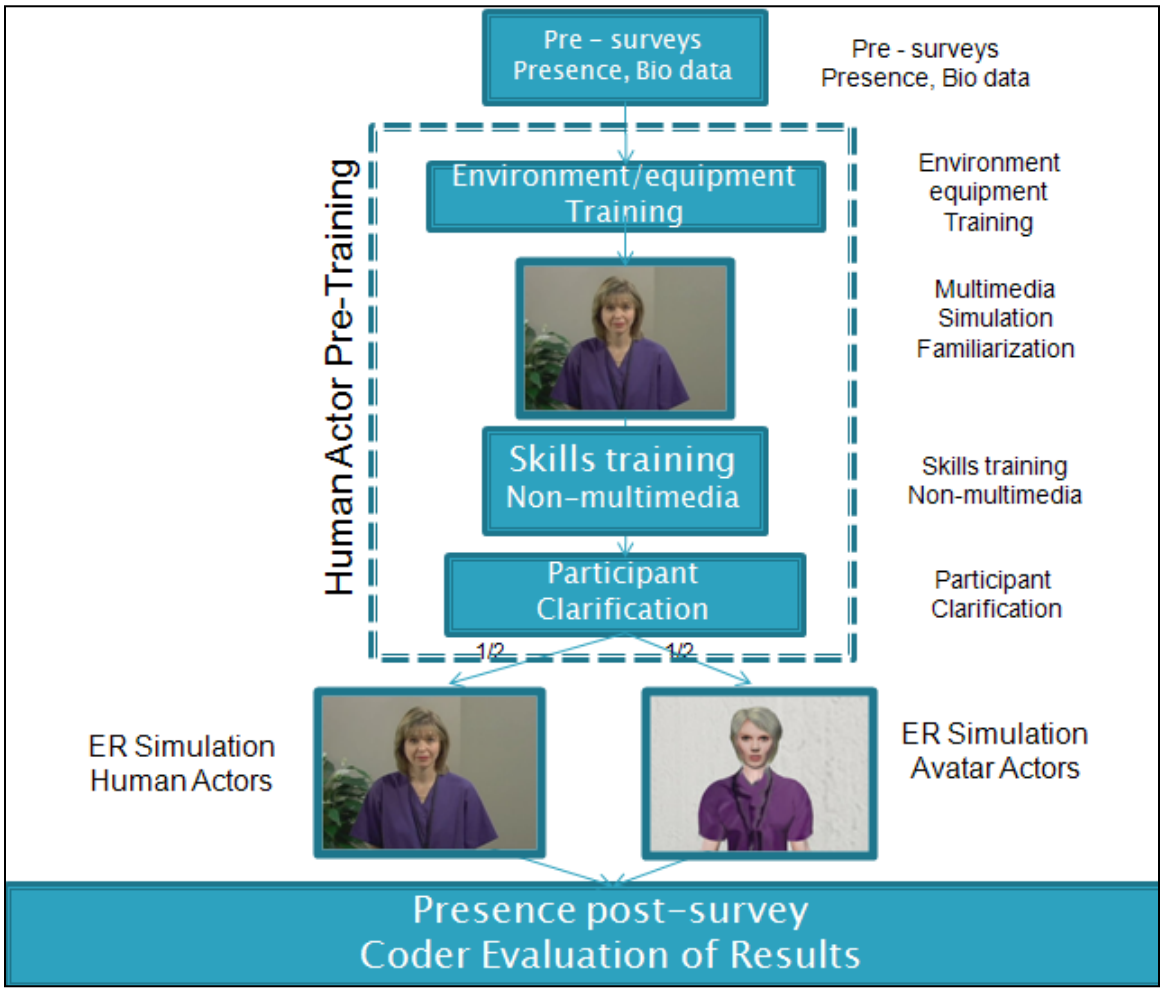


Figure 3 - Method Flow

The next section of training and practice was a computer based simulation. The WorkForce Florida simulation contains a 20 minute introduction to the Emergency

Room(ER) scenario and practice training on the operation of the equipment. This simulation familiarized the participants with the computer interface and gave them an opportunity to practice speaking into the microphone. Any issues with microphones and video presentation were resolved at this stage.

Following practice equipment training the assertiveness training was administered. This was a continuation of the self-paced PowerPoint package. This section described methods for being politely assertive. This package was expected to require approximately 10 minutes to complete.

A self-paced package on active-listening skills was the final section of the PowerPoint package delivered to the participants. This package required approximately 10 minutes to complete.

Participant Clarification

Following the skills training the participants were queried on any questions they had that needed clarification concerning the computer based simulation. This section of the study required approximately 5 minutes.

Up to this point in the study, all participants had received the same instruction on how to operate the input devices, use the voice mail and email systems and how to operate the public address system. They all received the same job description and were instructed with the same job rules and regulations. They all saw the same Emergency Room scenario and were given the same instructions on assertive and active listening skills.

Main-Scenario Exposure

After the initial pre-tests, introductions and instruction, the participants were randomly divided into two groups. Both groups were administered the Emergency Room (ER) scenario, half with the ER having Human actors and half with the ER having Avatar actors. Once operating the scenario ran automatically. The simulation was predicted to require 40 minutes to complete.

Post-surveys

Following the completion of the ER scenario, the participants were presented with a post-event survey, the ITC-Sense of Presence Inventory (SOPI) survey. This survey accessed the participant's level of "presence" while in the ER scenario. It consisted of 44 questions and required approximately 10 minutes to complete.

Participant Debrief

Following the completion of these surveys, the participants had completed their part of the study. There was a short debrief where participant comments and concerns about the mechanisms of the experiment were recorded. The participants were then released.

CHAPTER FOUR: RESULTS

After receiving IRB approval in the Spring of 2009, data gathering commenced and proceeded throughout the Summer and into the Fall of 2009. Power analysis using the statistical software G*Power 3 (Faul et al., 2007), medium effect size 0.4 at .80 power, indicated a minimum n of 52. Each experimental session was approximately 2 hours long with a total of 75 subjects participating. Of these 5 subjects were eventually excluded and the subject pool was reduced to 70. Coder recruitment, training and inter-rater analysis occurred through Fall 2009.

Demographics

Table 1 breaks out the basic demographics of the subject pool for the experiment. The age range was 18 to 34 with a mode of 18 (N=70). The gender mix was close to evenly split with 36 males and 34 females. The Participants were predominantly Caucasian (67.1%).

Additional demographic data was collected to establish each participant's technical ability as well as their comfort with technology. The data shows a technically adept group was recruited as subjects. While small percentages (13%) are in technical degrees, they are never-the-less very technically adept with 72% claiming a high level of comfort in using technology for personal usage. Two other measures probed this by asking them to mark lists of common technologies that they own and use. These ranged from the very basic ownership and usage of a mobile phone to more sophisticated home computing items and activities. These were simple scales intended to indicate a rough order of comfort with technology usage. The simple premise being that the more

technology they own/use the more comfortable they are with technology in general. The list of items and activities surveyed can be located in Appendix C. In both cases the smaller group was clearly those that indicated few technologies used (25% with less than 8 items) or few technology activities engaged in (11% with less than 8). This group is fairly comfortable owning, using and engaging with modern technology.

Additional areas surveyed included a specific question on computer experience with 67% rating themselves as intermediate or above. One survey response that was quite interesting was the question on video game and virtual world. While the majority of subjects did report some level of video gaming usage, a fairly large group (35%) reported that they never played computer games. This goes against conventional wisdom but is not unheard of and was reported in Chapter Two's Convergence section.

Finally there was a quick question on television usage which indicated that the group was fairly uninvolved with television with 51% reporting less than 8 hours of viewing a week and 86% reporting less than 16 hours a week. This is supported by the results of another survey that asked the subjects to rate their usage per week in 10 entertainment areas. These included traditional entertainment such as television, sports and movies. It also included new activities that have emerged with the digital revolution including social media sites, texting, video games, web surfing, etc.

Table 3 shows the results of this survey. The subjects were asked to rate the activities where they spend the most time per week and to identify the one activity they used the most. Thus the lower the total score, the more usage it received across the group. Here television ran middle of the pack but far ahead of video game play which came in

last for hours spent per week. The new social media dominates a majority of this group's time: talking, texting, internet social sites and surfing are their big time commitments.

This extensive demographic data was gathered in order to provide a foundation for this experiment that involves new emerging digital media technology. Machinima, as was explained in chapter two, comes from the video gaming community. Its creation is a fairly high technology exercise while its usage is as easy as viewing any movie. The degree to which the subject pool was comfortable with emerging technology was of interest to the author.

Table 1 - Demographics

Variable		Frequency	Percentage	Mean Age	Std. Dev.
Condition					
	Human Actor	33	47.1	19.42	3.16
	Avatar Actor	37	52.9	18.70	1.10
Gender					
	Male	36	51.4	19.44	3.02
	Female	34	48.6	18.62	1.129
Race					
	Caucasian	47	67.1	18.94	2.4
	Hispanic	8	11.4	18.88	1.13
	Asian	11	15.7	19.36	2.8
	African American	4	5.7	19.75	0.957

Table 2 - Subject Technical Aptitude Measures

Variable		Frequency	Percentage
Technical Degree			
	No	57	81.4
	Yes	13	18.6
Technical Comfort			
	Somewhat	3	4.3
	Moderately	16	22.9
	Very	26	37.1
	Extremely	25	35.7
Technology Used			
	< 8 Items	18	25.7
	8-12 Items	32	45.7
	> 12 Items	20	28.6
Technology Activities			
	< 8 Activities	8	11.4
	8-12 Activities	27	38.6
	> 12 Activities	35	50

Variable		Frequency	Percentage
Computer Experience			
	None	0	0
	Basic	23	32.9
	Intermediate	35	50
	Expert	12	17.1
TV Viewing (week)			
	0-8 hours	36	51.4
	9-16 hours	25	35.7
	17-24 hours	6	8.6
	25-32 hours	2	2.9
	33-40 hours	1	1.4
Computer Games			
	Never	25	35.7
	Occasionally	26	37.1
	Often <50% days	10	14.3
	Very Often > 50% days	7	10
	Every Day	2	2.9

Table 3 - Subject Entertainment Activities

Variable		Score Lower Score = higher usage
Entertainment Activity		
	Talking/texting with friends	199
	Internet Social sites	246
	Internet Web site surfing/shopping	313
	Playing Music	340
	Television	342
	Sports (Running, team sports, swimming, etc)	355
	Internet Movies, TV (YouTube, Hulu, etc)	413
	Movies (Home DVD/BlueRay or in theater)	421
	Reading (Books, magazines, etc)	434
	Playing Video Games or Virtual Worlds	477

Hypothesis 1: Assertiveness

This hypothesis predicted that the avatar actor based vignettes would demonstrate greater assertiveness performance than when presented with human actor vignettes. Assertiveness was taught to the subjects as the ability to be clear, direct, polite, and calm while interacting with customers.

The actual data for this hypothesis was audio recordings of responses to specific situations in the simulation that tested assertiveness. The audio recordings were rated by coders trained to interpret the results for assertive performance in the simulation. Through a series of training rounds, inter-rater correlation was documented at .85 or better before the raw data was released to the coders. A team coding methodology was used. The inter-rater assertiveness rules are documented in Appendix K.

Assertive performance levels between the two conditions showed a 0.08 separation between the means (See Table 4). Statistical analysis of the data revealed no significance to this difference: $t(66) = .588$, $p > .05$. Therefore the hypothesis is rejected. Assertive performance levels are statistically no different when subjects received the avatar actor vignettes than when the human actor vignettes were presented.

Table 4 - Assertive Performance Analysis

	Condition								
	Human Actor			Avatar Actor			*t*	*df*	*sig*
	N	M	SD	N	M	SD			
Assertiveness	33	2.92	.42	35	2.85	.52	.588[a]	66	.411

Note: [a] = $p < .05$, N = 68[4]

[4] N dropped by two from the Immersive Tendencies survey due to two unintelligible files in audio data set

Hypothesis 2: Listening Actively

This hypothesis predicted avatar actor based vignettes would demonstrate greater active listening performance than human actor vignettes. Events in the simulation that tested active listening skills were defined in the original WorkForce Florida study (University of Central Florida, 2005). The specific simulation events were 20, 21, 22, 29 and 30. In each event the participant was expected to use/access information they should have observed from previous events in the simulation. The participant's ability to recall and use this information was tested within the context of the simulations story line and captured for later analysis. The actual data for this hypothesis was audio and text recordings of responses to specific scenarios in the simulation that tested active listening. The audio and text recordings were rated by coders trained to interpret the results for active listening performance in the simulation. This data was rated on a dichotomous scale. Through a series of training rounds, inter-rater correlation was documented at .85 or better before the experimental data was released to the coders. Team rating methodology was used. Two of the events, 21 and 29, had two sections in the analysis questions, thus 21A, 21B, 29A and 29B. The active listening analysis rules are documented in Appendix K.

T-Test analysis showed a significance in favor of the Human Actor condition: $t(66) = 3.344$, $p < .05$ (See Table 5). Therefore, hypothesis two is rejected. This is unlike the rest of the hypothesis where failure to show significance for the avatar condition meant basic equivalence between human and avatar condition. In this case, the human actor condition shows a significant result for performance of the skill active listening. This result will be analyzed in the discussion chapter.

Table 5 - Active Listening Analysis -T-Test

	Condition						*t*	*df*	*sig*
	Human Actor			Avatar Actor					
	N	M	SD	N	M	SD			
Active Listening	33	.615	.173	35	.465	.194	3.344[a]	66	.001

Note: [a] = $p < .05$

Hypothesis 3: Interactions

This hypothesis theorized that subjects would be more vocal and talkative with the avatar actors than with human actors. The mechanism to test this was through word counts of the subject's audio responses. The data pool for this hypothesis was reduced by two from 70 to 68 due to poor audio quality in 2 of the responses. While the word counts showed a sizable difference of 27 points in the means comparison, T-Test analysis indicated a significance value of .141: $t(66) = 1.49$, $p > .05$. Thus this hypothesis was not supported and was rejected. There is not enough statistical evidence to argue that the avatar actors induced significantly more interaction than the human actors. Complete tables with this event data are included in this section (See Table 6).

It is interesting to note however that while not significant, the data leans in the favor of human actor condition with a 27 point difference in the means. This tended to argue directly against the notion that avatars would induce more interaction. The raw data tended to support a trend of more interaction for the human actor condition.

Table 6 - Word Count Analysis

	Condition								
	Human Actor			Avatar Actor			*t*	*df*	*sig*
	N	M	SD	N	M	SD			
Word Counts	33	162.97	87.99	35	135.94	59.56	1.491[a]	66	.141

Note: [a] = $p < .05$

Hypothesis 4: Response Quality

Hypothesis four theorized that the avatar actor based vignettes would demonstrate greater response quality than when presented with human actor vignettes. The notion of response quality was evaluated on terms of professionalism. The subjects in both conditions were evaluated as to the professionalism of their response. Events in the simulation that tested active listening skills were evaluated. The specific events were 20, 21, 22, 29 and 30. Unlike active listening where some events had multiple ratings, only one quality rating was given for each of these events. The actual data for this hypothesis was audio and text recordings of responses to specific scenarios in the simulation that tested the active listening condition. The active listening audio and text data was also graded for professionalism. The data was rated by coders trained to interpret for professional responses in the simulation. A series of training rounds were conducted before a team rating methodology was used for the evaluation. The inter-rater quality rules are documented in Appendix K.

Response quality levels between the two conditions were measured for each event. Statistical analysis of the data revealed no significance in the failure rates for the two conditions. T-Test analysis of the events indicated no statistical difference between the conditions: $t(66) = 1.20$, $p > .05$ (See Table 7). Therefore the hypothesis was rejected. Response quality levels were statistically no different when subjects received the avatar actor vignettes than when the human actor vignettes were presented.

Table 7 - Response Quality - T- Test

	Condition								
	Human Actor			Avatar Actor			*t*	*df*	*sig*
	N	M	SD	N	M	SD			
Quality	33	.752	.218	35	.674	.307	1.201[a]	61.429[b]	.234

Note: [a] = $p < .05$, [b] = Equal variances not assumed from Levene's Test for Equality of Variances

Hypotheses 5,6,7,8: Presence Factors

The sense of presence that a person experiences in a mediated environment was the basis for Hypotheses 5, 6, 7 and 8. The premise for these hypotheses was that human actor based vignettes would produce a stronger sense of presence than avatar actor vignettes. Vignettes with actual humans in them should have an advantage in the ability of the participants to read facial and body clues.

Presence was measured post simulation using the ITC SOPI presence survey, a copy of which can be found in Appendix H. This survey measures four presence factors: Spatial Presence, Naturalness, Negative Effects, and Engagement. Table 8, at the end of this section, presents the Human Actor versus Avatar actor measures. The T-Test significance values are much greater than 0.05 for all factors thus demonstrating no statistical difference between human actor versus avatar actor presentation in the vignettes. The Naturalness factor is the only factor that was close to showing significance with a 0.30 difference in means: $t(68) = 1.53$, $p = .131$, which is still well above .05. The Engagement factor actually is approaching a value of one: $t(68) = -.172$, $p = .864$ indicating that subjects found each presentation, for practical purposes, equally engaging. Perceptions about the Spatial ($t(68) = .537$, $p = .593$) and Negative factors ($t(68) = -.509$, $p = .612$) in the two conditions were also statistically insignificant. Subject viewed the spatial feel equally and had practically equal negative effects in both conditions.

Consequently the four Hypotheses based on Presence were all rejected. There was no measurable difference in presence measures between the two conditions. In the results section the author will discuss why this is actually a desirable outcome.

Table 8 - Presence T-Test Measures

	Condition						*t*	*df*	*Sig (2 tailed)*
	Human Actor			Avatar Actor					
	N	M	SD	N	M	SD			
Spatial	33	2.99	.75	37	2.90	.79	.537[a]	68	.593
Engage	33	3.03	.73	37	3.06	.74	-.172[a]	68	.864
Naturalness	33	3.58	.83	37	3.28	.81	1.530[a]	68	.131
Negative	33	1.84	.75	37	1.93	.64	-.509[a]	68	.612

Note: [a] = $p < .05$

CHAPTER FIVE: DISCUSSION

The results of the study are highly encouraging. The general rejection of the hypotheses is not a negative result. The only negative result would have been if Avatar based vignettes had proven inferior to human based vignettes. This was not the case. In all but one case the training showed no significant difference between the two conditions. This was an important finding because it demonstrates effectively that the use of avatar based training is a viable training and practice avenue.

Specifically, this dissertation has demonstrated the training of two soft-skills, and the measurement of relevant environmental factors, using avatar actors and human actors in video vignettes encased in a simulation. The assertiveness mean values of 2.92 (Human Actor) and 2.85 (Avatar Actor) are both just below the mid-point value of 3.0. The scale that was used to rate assertiveness is available in Appendix K. A perfect assertive response was rated at 3.0. Aggressive responses rated higher and passive response rated lower. In this study the averages for both human and avatar vignettes were slightly passive. Assertiveness was demonstrated to be statistically equivalent in outcomes.

Two additional measures, response quality and verbal intensity, were included to investigate if subtle interactions exist between simulation subjects and simulation actors. The response quality measure, or professional demeanor, was determined to be statistically equivalent between the two conditions across all measured events. The values of .752 (Human Actor) and .674 (Avatar Actor) are averages for dichotomous data. The responses were rated a Pass or Fail depending on what the participants response was. In this case 75% of participants in the human actor vignettes had quality (professional)

responses to questions they answered in the simulation. The other measure, interactions, was a simple word count spoken by the participant to the characters in the human actor vignettes and the avatar actor vignettes. While there was a noticeable difference in the means, T-Test analysis, $t(66) = 1.49$, $p = .141$, indicated that there was no statistical correlation between the conditions. This hypothesis was based on work by Bailenson (2005) that suggested avatar actors may promote more discussion of intimate facts. However, this was termed an embarrassment factor in the original study and this study did not specifically present a situation of this nature. The simulation focused on assertive and defensive situations with the purpose to see if the behavior would translate to other behaviors, such as assertiveness. Trainee interactivity with avatars versus human actors is the type of measure that deserves additional research. This concept will be expanded in future research directions.

The subject's sense of presence, or the feeling that they were engaged in the presentation, was statistically equal between the two conditions; but how do the means compare to other ITC-SOPI results. The author was able to compare this to the ITC-SOPC means from the original definition paper (Lessiter et al., 2001). The original study used six media platforms which were described in the paper. Of the six, the SOPI platform that most closely approximated this study was computer gaming due to its

interactive nature and small intimate monitor.

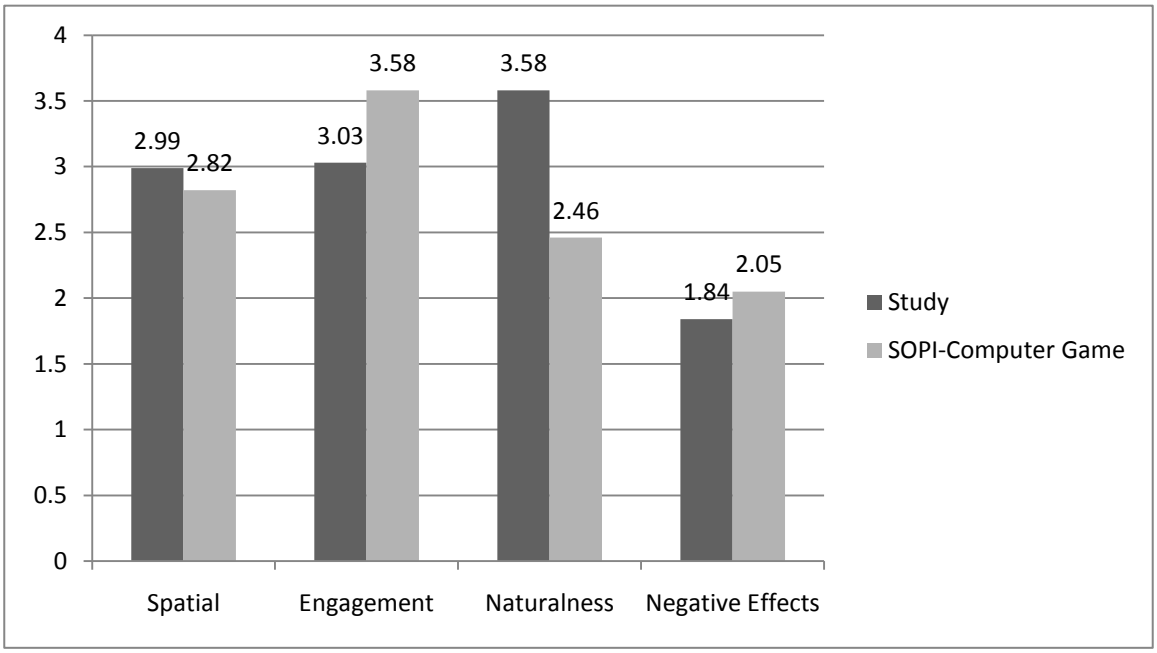


Figure 4 - Presence Factors compared to historical SOPI data

Results are illustrated in Figure 4. The presence factor "spatial" compares favorably between this study and the measures for computer gaming from SOPI. Given the interactive nature of both and the similar presentation formats, this makes sense. The presence factor "engagement" for this study measured ½ point below the original SOPI measure. However, the original SOPI study used a car racing computer game and a higher level of engagement is not unexpected when compared to the video vignettes used for this study. The presence factor "naturalness" shows a major difference in the means between SOPI and this study. The root cause for this difference is most likely historical. The original SOPI tests were run in 2000-2001 and the level of graphics support for computer games was significantly lower than what is the norm for graphical presentation today. The author believes the low resolution of the racing game when compared to the high video quality of this studies emergency room scenario is the most likely the reason

why naturalness is a point lower for the SOPI data. The presence measure "negative effects" shows similar values between the two with a slightly lower value for this study. The author again believes that the quality improvement in graphic capability between the two studies is the main source for this difference. The cleaner graphics produced fewer graphical distractions for the subjects in this study.

The active listening mean values of .615 (Human Actor) and .465 (Avatar Actor) are averages for dichotomous data. The responses were rated a Pass or Fail depending on if the participant response was correct. In this case 61% of participants in the human actor vignettes gave correct responses relative to the active listening questions. The active listening skill was the last measure of the study and presented conflicting results. Initial T-Test analysis indicated a significant measure for the human actor condition. Given that this result is the averaged result of multiple simulation events measured on a dichotomous scale, chi-squared analysis of the events was undertaken to determine which specific events had significance. Individual chi-squared analysis of each event indicated no significance difference in the human actor condition versus the avatar actor condition for 5 of the 7 measured events. Statistical details for all the *active listening* events are listed in Table 9. Significance was found in event 20, $\chi^2(1, N = 68) = 0.03$, $p < .05$, and event 29B, $\chi^2(1, N = 68) = 0.04$, $p < .05$, in favor of the human actor condition. The other events failed to show significance. Therefore, as stated in the analysis chapter, hypothesis two was rejected. *Active listening* performance levels are statistically stronger in two of the 7 active listening events for subjects who received the human actor vignettes compared to avatar actor vignettes. This was unlike the other hypotheses where failure to show significance for the avatar condition meant basic equivalence between human and

avatar condition. In this case, the human actor condition shows a significant result for performance of the skill active listening. However, again it must be noted that in 5 of the events there was no statistical difference between the conditions.

The author considered this result and found two alternatives that needed to be considered. The first alternative was that something in the experimental setup inadvertently skewed the results to favor the human actor condition. The second alternative was that there was something inherent in the active listening skill that is naturally skewed towards human actor interfaces.

Table 9 - Active Listening Performance Analysis – Chi-squared

Event		Condition: Human Actor	Condition: Avatar Actor	χ^2	*df*	*sig*
20	No	10	20			
	Yes	23	15	4.96[a]	1	.026
21A	No	1	5			
	Yes	32	30	2.675[a]	1	.102
21B	No	1	4			
	Yes	32	31	1.759[a]	1	.185
22	No	26	27			
	Yes	7	8	.027[a]	1	.870
29A	No	17	26			
	Yes	16	9	3.788[a]	1	.052
29B	No	20	29			
	Yes	13	6	4.177[a]	1	.041
30	No	15	20			
	Yes	18	15	.929[a]	1	.335

Note: [a] = $p < .05$

In reviewing this experimental setup and execution, the first review being the character presentation, that perhaps it was the character presentation that gave a hint, or clue, that one condition was favored over the other. Given that both conditions used the identical audio tracks we can eliminate a verbal or voice tone issue. The only difference

was the visual component. In examining the characters and their presentations, there was one difference that was noted between the character presentations. (Character sheets for the human and avatar actors can be viewed in Appendix L) While this study tried to maintain look and feel between the human actors and the avatar actors this was not taken to extremes since the study groups would never see the opposite condition. So while race and gender were modeled, clothing was not meticulously duplicated. For example, in event 20 the avatar character wears a winter cap but doesn't while in the human condition. This is the only noticeable difference in the conditions. It was not obvious to the author how this detail could affect the outcome. In reviewing the actual execution of the experiment, random draws were used for all subject assignments between avatar and human conditions. After initial training by the experiment proctor; there was no additional contact between the proctor and the subject until the simulation ended. In addition, two rooms were used to run the separate instances of the experiment in tandem. Assignment to the experiment rooms was completely random. In reviewing the experimental setup and execution, the author could not identify any obvious clues that could tip off the subject to one condition versus the other.

The author now considers the active listening skill and how it relates to this experiment. In this experiment active listening was defined as "attention to oral information where the subject learned to actively adjust their listening skills to clarify intent and purpose". Additionally, the subjects attempt to integrate current and prior knowledge in addressing a goal, task or purpose while paying attention to the details being verbally communicated and using those details to meet communication needs. One widely held theory is that the majority of human communications is non-verbal. As

discussed in Chapter 2 , Mehrabian (1971) postulates the 7% words, 38% tonal and 55% body language theory. It may be that the character manipulation capabilities in the generation of machinima tools used for this experiment were too coarse and that the human actors' ability to communicate via body language provided a powerful clue in some events. We will now examine this possibility more closely for these affected events.

Event 20 is a situation where the emergency room attendant, the experimental participant, had to enforce the hospital rules on not releasing information concerning a "Jane Doe" patient. (Jane Doe patients had requested anonymity while in the hospital and the ER attendant must not reveal information about their presence in the hospital). The data for this event was captured and rated as an audio file. Two persons had presented themselves previously requesting to see the Jane Doe. One person was quite angry and very confrontational while the other person was more subdued, cautious and hesitant. Event 20 involves the second subdued, hesitant person and the participant's requirement to keep the confidence of the Jane Doe. The hesitation and uncertainty of the second character, the boyfriend, is less well modeled in the avatar character. His face comes off as rather flat and not the hesitant, intimidated character the human actor portrays. These differences in body language presentation could have affected the subject's perception of the characters. More attention to the body language modeling of the character would have been appropriate.

Event 29 is the second situation that required investigation. In this event the emergency room attendant, the experimental subject, had to respond in an email to a hospital supervisor, Luis, concerning his/her observations of a fellow employee, Rick,

who had been accused of sexually harassing another hospital employee, Kelly. This event occurred very early in the simulation and the subject is being asked to recount what he/she observed. There are two specific questions that must be answered: "*1) did you hear Kelly clearly let Rick know that his comments were offensive to her? And, 2) did you hear him make a second inappropriate comment to her after he was told that Kelly was offended?*"

Question 2 was event 29B. This data set showed a significant effect in favor of human actors. This was a challenging question for the subjects to judge. The key phrases were "did you hear him" and "comment to her" or, in other words did you hear Rick directly harass Kelly a second time. What really complicated this question, and challenged the subject's active listening skill, is a subtle prior event where Rick recounted to another hospital employee a second sexual comment he made to Kelly. The subtlety is that the subject knows that Rick made another sexual comment but he/she did not witness him make the comment directly *to* Kelly. Subjects that used this second event as justification for telling Luis that Rick had made a second comment were given a fail (0) rating. However, the primary means of conveying this information was verbal and body language did not play a significant role in the author's opinion. It is difficult to see why the human actors would have a presentation advantage here.

Contribution to Study Methodology

This dissertation used modern simulation technology for the experiment. The simulation was originally developed in 2005 for experimentation in workforce training and practice applications. A critical technology used in the original technology was voice capture and recording. To be specific, this is not voice recognition but simple voice

capture. This technology simply activates and deactivates a microphone when voice energy is detected or lost. Whenever a subject was expected to respond to a specific situation in the simulation voice capture technology was used to record the response. This proved to be a significant limitation. The technology is very susceptible to the wide variances normal in human speech patterns. Subjects with soft spoken voices or those who have natural pauses in their speech, cause the speech capture software to cut off answers both at the beginning and end of the responses. In previous studies this has been a major impediment to achieving acceptable sets of usable data.

This study dramatically reduced the limitations of this technology by incorporating additional voice capture technology that recorded the entire 45 minute session on a master recording. This significantly reduced the cut-off recordings to only those incidents where operator error or equipment malfunction stopped the master recording. However, this came at a high cost in time and effort as significant time was required to analyze the recordings for cut-offs and then locate the full response in the master recording and make corrections.

Limitations of Current Study

Overall the results of this study were positive, but this study was limited in some aspects that should be noted. First, the subject pool was drawn exclusively from students at the University of Central Florida which meant that the mean age was very young. This is a group which, by and large, is very comfortable with emerging technology and new ideas. A larger distribution in the age category might impact the results.

Although the problem with the voice capture technology was discussed previously, its limitation needs to be discussed in this section. Anyone looking to

continue this work should fully understand its limitations and investigate alternative methods of gathering audio data or at least duplicate the method used in this study. The ambitious researcher may want to investigate creating digital markers in the audio master files to mark the beginning of events. These would make patching audio cut-offs significantly more efficient.

While efforts were made to replicate the visual attributes of the human actors used in the original video vignettes, the level of detail replication was generic at best with gender, age and race being the primary factors duplicated. But there was no effort to replicate every physical detail of each human actor. Since each experimental condition was presented uniquely to each subject group this was not deemed critical to the experiment.

Directions for Further Research

There are several areas where this work could be extended. As noted in the limitations section, the mean age of the study group was very young. Replicating the experiment with an older age demographic would be useful. This is not just an academic exercise. It will have a direct application to the significant changes occurring in workforces worldwide in determining if older populations will respond similarly.

Another area that has not been addressed is long term retention of skills and knowledge. Determining if avatar actors or human actors have a more lasting impression on skill and knowledge retention would be important in validating overall effectiveness. A long term retention study between these two conditions would highlight if one method produces enhanced retention over time.

The hypothesis on the verbal interactions between subjects and the different actor types could be extended to investigate the reactions of subjects to specific types of interactions. Questions of a more personal nature, with potentially embarrassing aspects to the question, could be posed to determine if avatar actors would induce extended responses. This could be a very interesting line of investigation for those working on soft-skills training and practice applications with avatars.

The interplay between serious games and machinima based video training has high potential for research given all the recent attention to the use of serious-games for training. As detailed in Chapter 2, the limitations of using serious games for training in educational environments, both for classroom and distance learning, are well documented (Conkey, 2009). Despite these challenges, the power for serious games to deliver real training in several different environments is documented (Mautone et al., 2008; Roman, 2008). The issue is how many of those training scenarios are serious games critical. To be critical they must be in an interactive environment or the training is less effective. Could the training in fact be done with machinima based training vignettes? A powerful study would be to empirically compare the training effectiveness of a training course that is augmented by a serious game as Condition A and Condition B being machinima training vignettes created using the same serious game from Condition A. Visually the two conditions would look identical but one would be highly interactive while the second would be passive but both would be highly visual. The selected course would need to be one where there is the expectation that cognitive learning requires "doing" versus "watching". This experiment would test that expectation.

The interplay between traditional cinema and machinima is another line of inquiry. Hollywood cinema has been used for many training scenarios. This is not referring to the person-on-person training type encounters that were utilized in this study. The author is thinking more of the grand event type training where scenes from movies like “Saving Private Ryan” are used in real world training. Not just military training, but all types of emergency training could be animated in machinima. Testing if video generated with machinima tools video could offer realistic training scenarios would be the experiment. The efficacy of the machinima generated video for grand event training would be the research question.

CHAPTER SIX: CONCLUSIONS

This dissertation study was conducted to measure the effectiveness of machinima generated avatar actor video vignettes against traditional human actor video vignettes. The promise for using avatar actors holds great promise for rapidly producing training scenarios that are maintainable, extensible, effective and affordable. This study has successfully demonstrated that the difference in training effectiveness is not statistically significant for presence, interactivity, quality and the skill of assertiveness, thus opening the door for using either method as the training situation warrants. The skill of active listening presented mixed results indicating that careful attention must be given in situations where body language and facial expressions are critical to communication. These characteristics can be animated via machinima but care must be taken to do them properly.

The general limitations of this research were detailed and used as a foundation for suggesting several additional directions this research could be further enhanced and extended. The effectiveness of stand-alone avatars as stand-alone entities has been studied extensively under various titles such as embodied agents, social actors, empathic agents, and conversational agents, to name but a few of their many names. This research has contributed to, and extended, these previous scientific studies with its comparison of avatar actors with traditional human actors in video vignette training applications. The author found little previous research in this area of avatar analysis.

This study offers strong evidence that machinima based training materials are effective as a training platform. Training products developed by using machinima techniques can be produced using modern digital production techniques and maintained

over long periods with those same tools. The rapid rise in facial definition and body expression fidelity in machinima based products also offers the very near term possibility of high resolution intimate interactions, both for facial and body language, for enhanced soft-skills training. During that period between when the author settled on a tool to create the animations and to the starting of the experiments some 18 months later, the capabilities of machinima tools have literally exploded. Some of the limitations in facial and body language animations detailed in the discussion have already been significantly improved.

Opportunity

Machinima technology offers the opportunity to converge and leverage the capabilities of simulation, game modding, and game-based training with the traditional capabilities of motion picture/video-based training technologies. Machinima adds to multimedia education by leveraging the rule of thumb that students only retain 10% of what they read but 30% of what they see (Oblinger & Oblinger, 2005). Machinima also appeals to the digital generations' love for gaming while retaining prior generations comfort with video. Machinima, utilizing emerging research in the use of avatars for computer-human interaction, provides a flexible, modifiable platform for training. Machinima is easier and cheaper to produce than video games while being more flexible, affordable and supportable than traditional video based training applications. This is a distinct advantage over traditional video where training material "once in the can" is difficult logistically, and potentially cost prohibitive, to upgrade and maintain with time sensitive information. Machinima avoids some of the classroom complications of installing and operating gaming and simulation solutions. By utilizing existing computer

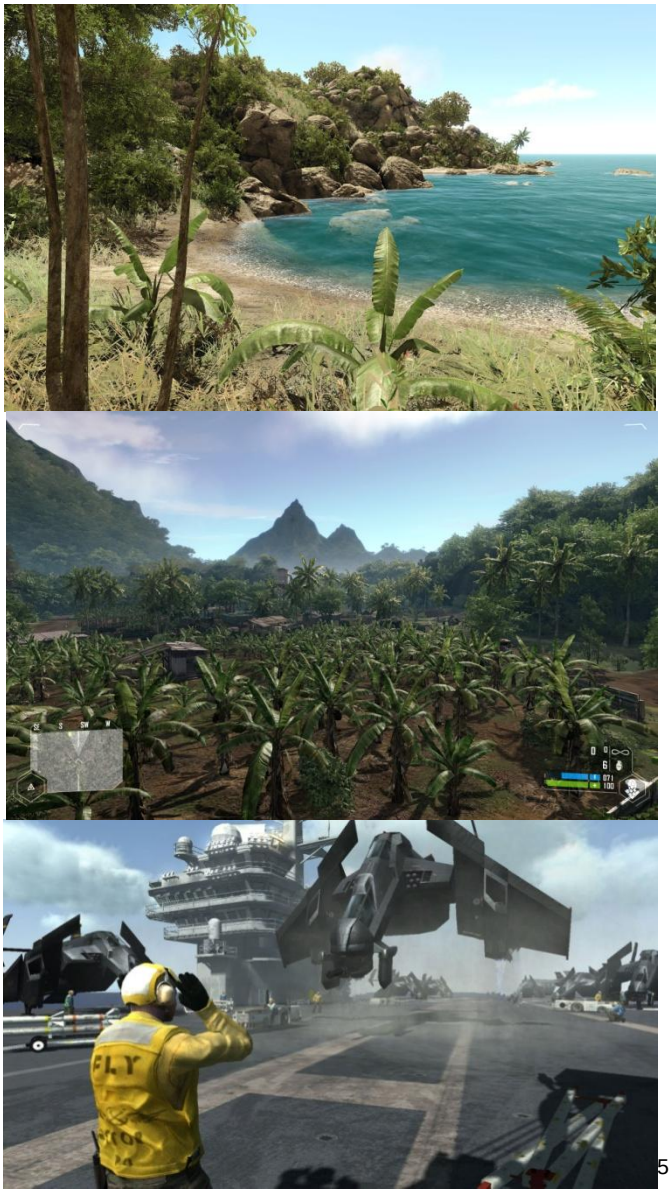
resources, machinima alleviates the uneven time commitments that many game-based training solutions require. Machinima has less data and networking overhead than gaming solutions in distance learning environments, thus reducing data bandwidth requirements substantially.

Training departments could leverage the engagement and visual stimulation of serious games without the overhead of training teachers and students on how to operate and manipulate serious games. Internal production staffs become the experts on how to operate and manipulate the gaming simulation. In conjunction with teachers they establish the training objectives for the gaming scenario, "mod" the gaming engine to establish the proper environment, establish the desired camera angles and then manipulate the game to create the ideal video training scenarios to meet the desired training objectives. Early adopters are already exploring these possibilities with military training games utilizing machinima video for rapid production, high fidelity training.

While this study has concentrated on the prospects for using machinima for soft-skills training opportunities, there are also opportunities with other applications. Procedural training is a distinct possibility where processes and procedures are documented in a multi-media environment. The US Military is using serious games like VBS2 to create video's for military checkpoint procedures, convoy operations and other procedural activities (Bohemia Interactive, 2010). Historical reenactments are another strong possibility with early examples demonstrating great flexibility in recreating significant events (Wingmen Productions, 2007). Science demonstrations would also be a practical application for educational purposes and many game engines have embedded physics engines that allow for the simulation of various scenarios in physical reality

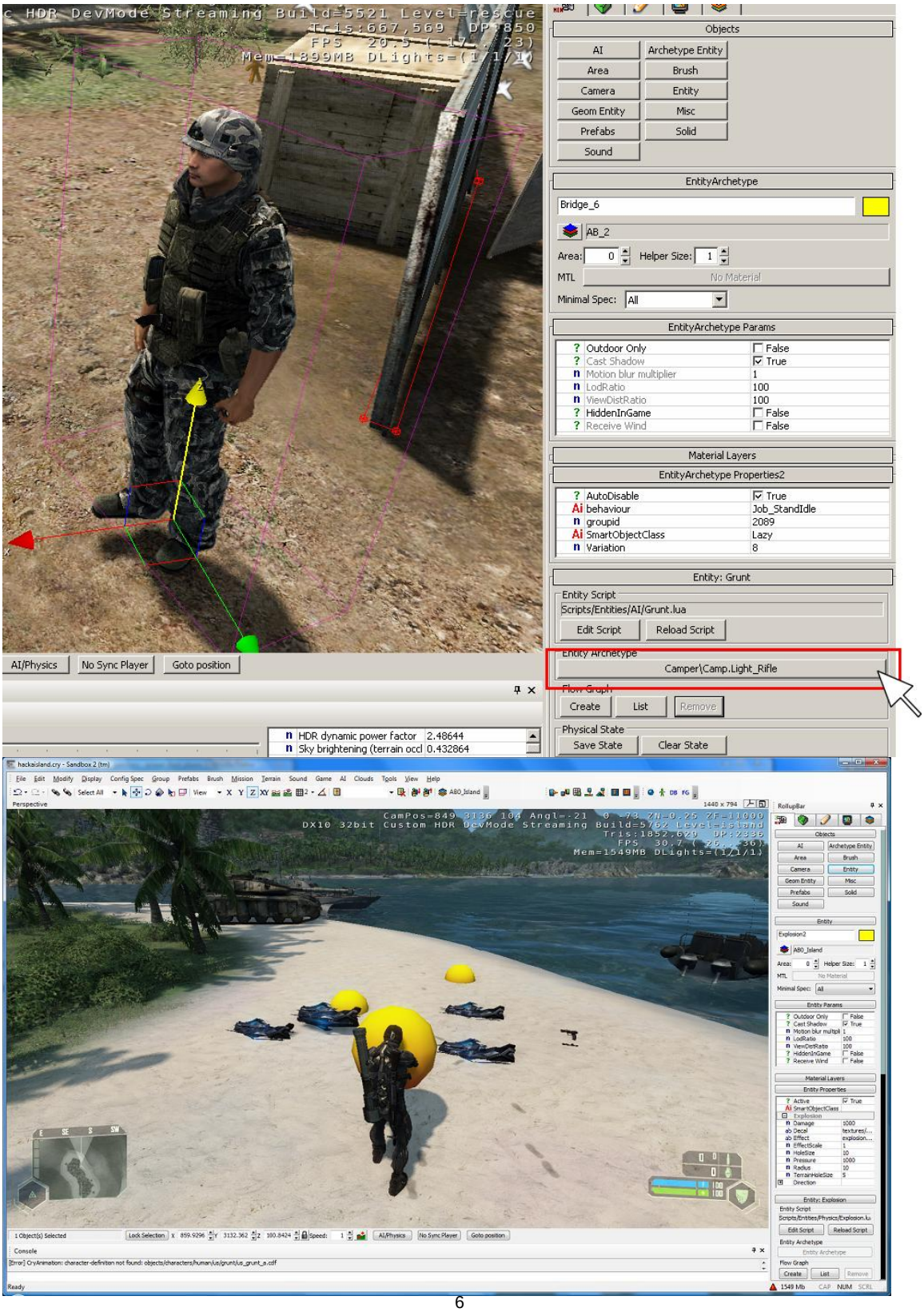
(Havok Inc, 2000; NVIDIA Inc, 2004). In summary, machinima technology offers a unique opportunity to get the best of both worlds – machine and cinema based training technologies.

APPENDIX A: GAMING LEVEL EXAMPLES

 [5]

[5] All screenshots from Crysis™. Permission to use statement in Appendix I.

APPENDIX B: EDITING TOOLS



6

[6] All screenshots from Crysis™. Permission to use statement in Appendix I.

APPENDIX C: DEMOGRAPHICS

Participant ID: Date:

Demographic Info

1) Gender: Male ⬭ Female ⬭

2) Age: _____

3) Race: Please select all that apply: Asian ⬭ Caucasian ⬭

Black ⬭ Hispanic ⬭

4) Highest level of education

High School: ⬭ Associates: ⬭ Bachelors: ⬭ Masters: ⬭ Doctorate: ⬭

If currently in college, what class level are you in:
Freshman: ⬭ Soph: ⬭ Junior: ⬭ Senior: ⬭ Graduate: ⬭ Student

5) Are you pursuing a technical degree? (Program with a math/statistical basis)

⬭ Yes ⬭ No

6) Do you have any customer service experience?

⬭ Yes ⬭ No

If yes, please give the following for each customer service job you have held:

Job title: Employer: Years Experience:

Job title: Employer: Years Experience:

Job title: Employer: Years Experience:

6) How comfortable are you with using technology for your personal use?

|____1____|____2____|____3____|____4____|____5____|

Not at All Somewhat Moderately Very Extremely

1

7) Which of the following technologies do you own/subscribe to?

Mobile Phone: ⬭	Computer: ⬭ (Any make or style)	Home Game Console: ⬭ (Xbox, WII, Playstation, etc)
Cable/Satellite TV: ⬭ (Service to your home)	Personal GPS: ⬭ (Not in Mobile Phone)	Portable Game Console: ⬭ (PSP, Nintendo DS, IPod Touch)
Pocket Computer: ⬭ (PocketPC, Palmpilot, Kindle)	Video Camera: ⬭ (Analog or digital)	Personal Printer: ⬭ (Attached to computer)
WebCam: ⬭	Personal Music: ⬭ (IPOD, Zune, etc)	Digital Camera: ⬭
High/S Internet access: ⬭		
Home Network: ⬭ (wired or wireless)	Networked Printer: ⬭ (attached to home network)	WiFi Router: ⬭

8) Which of the following technological activities are you comfortable performing?

Mobile Phone Calling: ⬭	Text Messaging: ⬭ (On Mobile Phone)	Send MP Pics/Movies: ⬭ (Mobile phone via MMS text service)
Record TV shows: ⬭ (Via Digital recorder)	Use GPS: ⬭ (To locate destination)	Send Computer Pics/Movies: ⬭ (Computer via email, file transfer, etc)
Calendar: ⬭ (Keep Electronic Calendar)	Blog: ⬭ (Facebook, Blog, web site)	Twitter: ⬭ (On Phone or computer)
Photo/Video Editing: ⬭ (Edit photo's or video)	Game Dev/Modding: ⬭ (Create video game levels)	Sending and Receiving Email: ⬭
Skype Phone call: ⬭	Shopping Online: ⬭ (Internets stores/services)	Download music: ⬭ (From Internet sites)
Play Video Game: ⬭ (Any Genre)	Play MMOGs: ⬭ (World of Warcraft, etc)	Use a Search Engine: ⬭ (Google, Yahoo, etc)

9) Please rank order the following entertainment activities by the amount of time you spent participating in them?

1 for most time spent per week, 2 for second most time spent per week, etc

Television	___
Movies (Home DVD/BlueRay or in theater)	___
Internet Movies, TV (YouTube, Hulu, etc)	___
Internet Web site surfing/shopping	___
Internet Social sites (Facebook, Chat sites, etc)	___
Talking/texting with friends (in person or on phone)	___
Playing Video Games or Virtual Worlds	___
Sports (Running, team sports, swimming, etc)	___
Reading (Books, magazines, etc)	___
Playing Music	___
Other (please write in)	
_____	___
_____	___
_____	___

Participant Number:

BACKGROUND INFORMATION

Rate your level of computer experience (tick one):

None ☐
Basic ☐
Intermediate ☐
Expert ☐

Rate how often you play computer games (tick one):

Never ☐
Occasionally (once or twice/month) ☐
Often but less than 50% of days ☐
50% or more of days ☐
Every day ☐

Rate your average weekly TV viewing (tick one):

0-8 hours ☐
9-16 hours ☐
17-24 hours ☐
25-32 hours ☐
33-40 hours ☐
41 hours or more ☐

What is the TV size you watch the most? (tick one):

Small/portable (14'' or less) ☐
Medium (15-28'') ☐
Large (more than 28'') ☐

How would you rate your level of TV/film production knowledge? (tick one):

None ☐
Basic ☐
Intermediate ☐
Expert ☐

Have you viewed stereoscopic (3D) images using polarised glasses (e.g. IMAX 3D) before?

Yes ☐ No ☐

Have you used an experimental virtual reality system before (beyond a consumer computer/arcade game)?

Yes ☐ No ☐

How would you rate your knowledge of how 3D images are produced? (tick one):

None ☐
Basic ☐
Intermediate ☐
Expert ☐

How would you rate your knowledge of virtual reality (i.e. how it works)? (tick one):

None ☐
Basic ☐
Intermediate ☐
Expert ☐

Code (researcher use only): _____

APPENDIX D: IMMERSIVE TENDENCIES SURVEY

IMMERSIVE TENDENCIES QUESTIONNAIRE

(Witmer & Singer, Version 3.01)

Indicate your preferred answer by circling the number in the appropriate box of the seven point scale. Please consider the entire scale when making your responses, as the intermediate levels may apply. For example, if your response is once or twice, the second box from the left should be marked. If your response is many times but not extremely often, then the sixth (or second box from the right) should be marked.

1. Do you easily become deeply involved in movies or tv dramas?

1	2	3	4	5	6	7
NEVER			OCCASIONALLY			OFTEN

2. Do you ever become so involved in a television program or book that people have problems getting your attention?

1	2	3	4	5	6	7
NEVER			OCCASIONALLY			OFTEN

3. How mentally alert do you feel at the present time?

1	2	3	4	5	6	7
NOT ALERT			MODERATELY			FULLY ALERT

4. Do you ever become so involved in a movie that you are not aware of things happening around you?

1	2	3	4	5	6	7
NEVER			OCCASIONALLY			OFTEN

5. How frequently do you find yourself closely identifying with the characters in a story line?

1	2	3	4	5	6	7
NEVER			OCCASIONALLY			OFTEN

6. Do you ever become so involved in a video game that it is as if you are inside the game rather than moving a joystick and watching the screen?

1	2	3	4	5	6	7
NEVER			OCCASIONALLY			OFTEN

7. What kind of books do you read most frequently? (CIRCLE ONE ITEM ONLY!)

Spy novels	Fantasies	Science fiction
Adventure novels	Romance novels	Historical novels
Westerns	Mysteries	Other fiction
Biographies	Autobiographies	Other non-fiction

8. How physically fit do you feel today?

1	2	3	4	5	6	7
NOT FIT			MODERATELY FIT			EXTREMELY FIT

9. How good are you at blocking out external distractions when you are involved in something?

1	2	3	4	5	6	7
NOT VERY GOOD			SOMEWHAT GOOD			VERY GOOD

10. When watching sports, do you ever become so involved in the game that you react as if you were one of the players?

1	2	3	4	5	6	7
NEVER			OCCASIONALLY			OFTEN

11. Do you ever become so involved in a daydream that you are not aware of things happening around you?

1	2	3	4	5	6	7
NEVER			OCCASIONALLY			OFTEN

12. Do you ever have dreams that are so real that you feel disoriented when you awake?

1	2	3	4	5	6	7
NEVER			OCCASIONALLY			OFTEN

13. When playing sports, do you become so involved in the game that you lose track of time?

1	2	3	4	5	6	7
NEVER			OCCASIONALLY			OFTEN

14. How well do you concentrate on enjoyable activities?

1	2	3	4	5	6	7
NOT AT ALL			MODERATELY WELL			VERY WELL

15. How often do you play arcade or video games? (OFTEN should be taken to mean every day or every two days, on average.)

1	2	3	4	5	6	7
NEVER			OCCASIONALLY			OFTEN

16. Have you ever gotten excited during a chase or fight scene on TV or in the movies?

1	2	3	4	5	6	7
NEVER			OCCASIONALLY			OFTEN

17. Have you ever gotten scared by something happening on a TV show or in a movie?

1	2	3	4	5	6	7
NEVER			OCCASIONALLY			OFTEN

18. Have you ever remained apprehensive or fearful long after watching a scary movie?

1	2	3	4	5	6	7
NEVER			OCCASIONALLY			OFTEN

19. Do you ever become so involved in doing something that you lose all track of time?

1	2	3	4	5	6	7
NEVER			OCCASIONALLY			OFTEN

20. On average, how many books do you read for enjoyment in a month?

1	2	3	4	5	6	7
NONE	ONE	TWO	THREE	FOUR	FIVE	MORE

21. Do you ever get involved in projects or tasks, to the exclusion of other activities?

1	2	3	4	5	6	7
NEVER			OCCASIONALLY			OFTEN

22. How easily can you switch attention from the activity in which you are currently involved to a new and completely different activity?

1	2	3	4	5	6	7
NOT SO EASILY			FAIRLY EASILY			QUITE EASILY

23. How often do you try new restaurants or new foods when presented with the opportunity?

1	2	3	4	5	6	7
NEVER			OCCASIONALLY			FREQUENTLY

24. How frequently do you volunteer to serve on committees, planning groups, or other civic or social groups?

1	2	3	4	5	6	7
NEVER			SOMETIMES			FREQUENTLY

25. How often do you try new things or seek out new experiences?

1	2	3	4	5	6	7
NEVER			OCCASIONALLY			OFTEN

26. Given the opportunity, would you travel to a country with a different culture and a different language?

1	2	3	4	5	6	7
NEVER			MAYBE			ABSOLUTELY

27. Do you go on carnival rides or participate in other leisure activities (horse back riding, bungee jumping, snow skiing, water sports) for the excitement of thrills that they provide?

1	2	3	4	5	6	7
NEVER			OCCASIONALLY			OFTEN

28. How well do you concentrate on disagreeable tasks?

1	2	3	4	5	6	7
NOT AT ALL			MODERATELY WELL			VERY WELL

29. How often do you play games on computers?

1	2	3	4	5	6	7
NOT AT ALL			OCCASIONALLY			FREQUENTLY

30. How many different video, computer, or arcade games have you become reasonably good at playing?

1	2	3	4	5	6	7
NONE	ONE	TWO	THREE	FOUR	FIVE	SIX OR MORE

31. Have you ever felt completely caught up in an experience, aware of everything going on and completely open to all of it?

1	2	3	4	5	6	7
NEVER			OCCASIONALLY			FREQUENTLY

32. Have you ever felt completely focused on something, so wrapped up in that one activity that nothing could distract you?

1	2	3	4	5	6	7
NOT AT ALL			OCCASIONALLY			FREQUENTLY

33. How frequently do you get emotionally involved (angry, sad, or happy) in news stories that you see, read, or hear?

1	2	3	4	5	6	7
NEVER			OCCASIONALLY			OFTEN

34. Are you easily distracted when involved in an activity or working on a task?

1	2	3	4	5	6	7
NEVER			OCCASIONALLY			OFTEN

APPENDIX E: ASSERTIVE TENDENCIES SURVEY

Please indicate on the scale from 1-6 your level of agreement or disagreement with the following statements.

	Strongly Disagree					Strongly Agree
1. In discussions, I go along with the will of the group.	1	2	3	4	5	6
2. I would avoid a job which required me to supervise other people.	1	2	3	4	5	6
3. I nearly always argue for my viewpoint if I think I am right.	1	2	3	4	5	6
4. I am usually the one who initiates activities in my group.	1	2	3	4	5	6
5. When an acquaintance takes advantage of me, I confront him or her.	1	2	3	4	5	6
6. When I meet new people, I usually have little to say.	1	2	3	4	5	6
7. I find it easy to talk with all kinds of people.	1	2	3	4	5	6
8. It is uncomfortable for me to exchange a purchase I found to be defective.	1	2	3	4	5	6
9. I let others take the lead when I am on a committee.	1	2	3	4	5	6
10. It is easy for me to make "small talk" with people I have just met.	1	2	3	4	5	6
11. I try to dress like the other people I work or go to school with.	1	2	3	4	5	6
12. If I have been "short-changed," I go back and complain.	1	2	3	4	5	6
13. In an emergency, I get people organized and take charge.	1	2	3	4	5	6
14. It is difficult for me to start a conversation with a stranger.	1	2	3	4	5	6
15. I defend my point of view even if someone in authority disagrees with me.	1	2	3	4	5	6
16. When a friend borrows something of value to me and returns it damaged, I don't say anything.	1	2	3	4	5	6
17. My opinions are not easily changed by those around me.	1	2	3	4	5	6
18. I follow my own ideas even when pressured by a group to change them.	1	2	3	4	5	6

19. I work best in a group when I am the person in charge.	1	2	3	4	5	6

Please indicate on the scale from 1-6 your level of agreement or disagreement with the following statements.

	Strongly Disagree					Strongly Agree
20. At a party, I find it easy to introduce myself and join a conversation.	1	2	3	4	5	6
21. I have no particular desire to be the leader of a group.	1	2	3	4	5	6
22. I find it difficult to make new friends.	1	2	3	4	5	6
23. I shy away from situations where I might be asked to take charge.	1	2	3	4	5	6
24. When I am attracted to a person I have not met, I actively try to get acquainted.	1	2	3	4	5	6
25. If a friend betrays a confidence, I express my annoyance to him or her.	1	2	3	4	5	6
26. When someone interrupts me in a serious conversation, I find it hard to ask him or her to wait a minute.	1	2	3	4	5	6
27. If the food I am served in a restaurant is unsatisfactory, I would complain to the waiter.	1	2	3	4	5	6
28. I seek positions where I can influence others.	1	2	3	4	5	6
29. I feel uncomfortable around people I don't know.	1	2	3	4	5	6
30. When there is a disagreement, I accept the decision of the majority.	1	2	3	4	5	6
31. When someone repeatedly kicks the back of my chair in a theater, I don't say anything.	1	2	3	4	5	6

APPENDIX F: STORYLINE SCRIPT

For this study, we would like you to imagine that you have applied for a job as a customer service representative in the emergency room of a local hospital. You will be playing the role of a customer service representative working their first day at the emergency room desk.

Your performance today will be assessed to determine whether you are right for the job. Specifically, you will be evaluated on your ability to be assertive. This will be accomplished by videotaping your facial expressions with the cameras located on your desk and around the room. Your voice responses will also be recorded and later reviewed."

It is important that you pretend that you are actually working in this position and that you are interacting with real people and dealing with real events that are actually occurring in real time. Hence you should behave and react as you normally would if working this job role in real life. Do you have any questions?"

Answer any question now

From now until the end of the study consider yourself as in character. You should interact with all video and live characters in your role as a customer service representative until you are notified that the study has ended

APPENDIX G: ENVIRONMENT TRAINING

Introduction

Welcome!

Training Instructions

- Please read all the information on the slides about starting your first day at SUMMIT HOSPITAL as you listen to the narration.
- Use the right arrow key  to move to the next slide.
- The information provided is important for helping you successfully perform your job.

Using the Simulation

Here's how it works:

- Like a role-play with live and video characters.
- 40-minute long story unfolds in first person (i.e., visually it appears as if characters are talking directly to you).
- You respond verbally into a microphone and at times in writing (i.e., to emails).
- The computer can tell when you start and stop speaking. A couple of seconds after you finish an answer the scene moves on. While you are speaking, the characters appear to be listening to you answer.
- All of your responses are audio taped and videotaped. Make eye contact with the characters as if they were real.

Simulation Hints

- Speak clearly into the microphone.
- Repeat your response louder if scene does not move on.
- Be patient. Scene may take a few seconds to move on after response.
- Take a moment before responding to prevent your response from being cut off.

Simulation Practice

- We will now practice with the simulation software.
- Wait for the research assistant to start the simulation training session
- Please pause here by hitting the Escape key to stop the PowerPoint presentation

Simulation Practice Complete

- Please restart here when you have completed the simulation training

The Setting

- Imagine that you have applied for a job as a customer service representative in the ER of a hospital.
- Your performance will be assessed based on your ability to be assertive.
- Your voice will be recorded for later review.
- Behave and react as if working this role in real life.
- Questions: Please ask the research assistant.

In Character

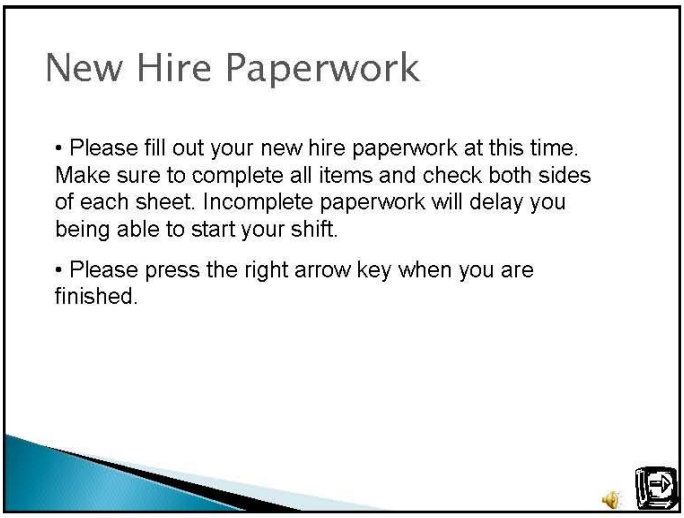
SUMMIT

HOSPITAL

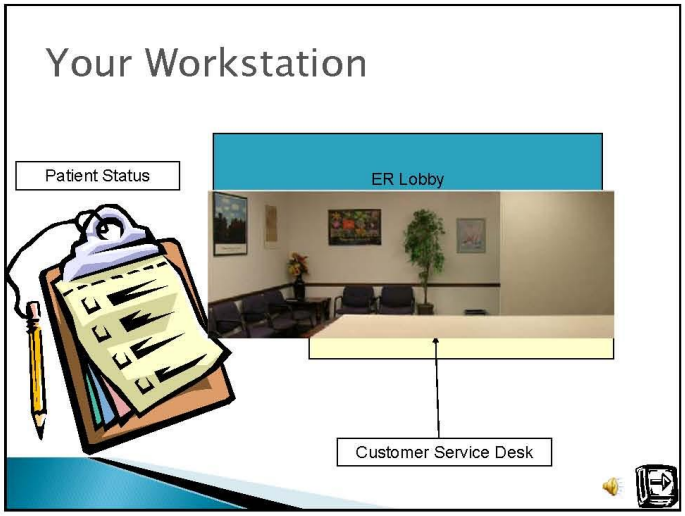
Customer Service Representative
New Hire Training

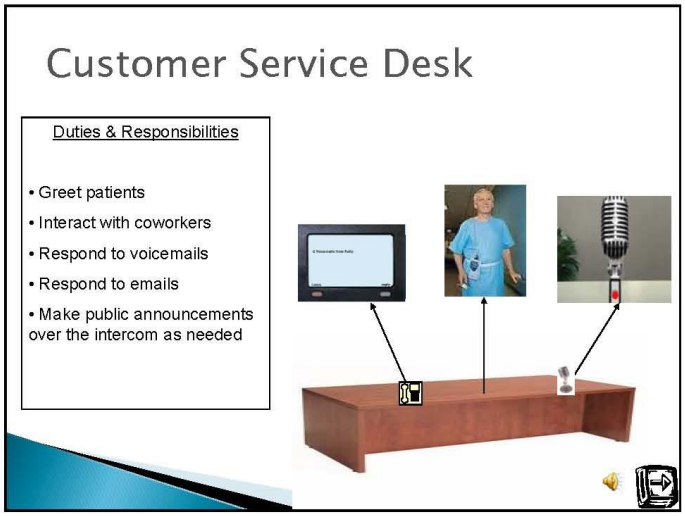
Welcome to SUMMIT Hospital

- New hire paperwork
- Customer service training
- Your employment is dependant on a trial period
- Your verbal responses will be recorded
- Managing your spoken responses is key towards being an effective customer service representative


New Hire Paperwork
• Please fill out your new hire paperwork at this time. Make sure to complete all items and check both sides of each sheet. Incomplete paperwork will delay you being able to start your shift.
• Please press the right arrow key when you are finished.


JOB DUTIES &
HOSPITAL REGULATIONS

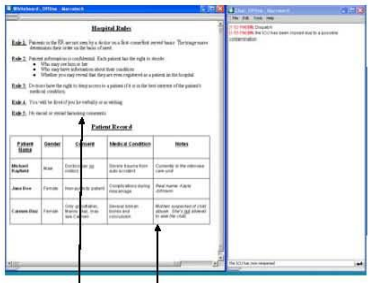

Your Workstation
Patient Status
ER Lobby
Customer Service Desk


Customer Service Desk
Duties & Responsibilities
• Greet patients
• Interact with coworkers
• Respond to voicemails
• Respond to emails
• Make public announcements over the intercom as needed

Information Chart

Duties & Responsibilities

- Follow rules & procedures.
- Reference chart for patient details.



Hospital Rules

Patient Status

Customer Policies

Please be sure to abide by the following policies when interacting with customers:

- Patients in the ER are not seen by a doctor on a first-come/first-serve basis. The triage nurse determines their order on the basis of need.
- Doctors have the right to deny access to a patient if it is in the best interest of the patients medical condition.
- Patient information is confidential. Each patient has the right to decide:
  - Who may see him or her
  - Who may have information about their condition
  - Who may know whether he/she is registered as a patient in the hospital
- Do not discuss patient information around those who do not need to know

Coworker and Supervisor Policies

Please be sure to abide by the following rules when interacting with co-workers and supervisors:

1. You will be fired if you lie.
2. No tolerance for racial or sexual harassment.
3. One customer service representative must be at the desk at all times.

Co-workers and Supervisors for Shift

Louis (Head Nurse / Head Supervisor)

Rick (Customer Service Rep)

Tanya
(Supervisor)

Kelly
(Customer Service Rep)

Lynn
(Supervisor)

HOSPITAL DISPLAY RULES

Greeting Patients

- Greet all patients before they reach the customer service desk:
  - Smile
  - Say "Hi, can I help you?"

- You will be assessed on whether you've greeted all patients as they approach the customer service desk.
  Don't need to formally greet coworkers.

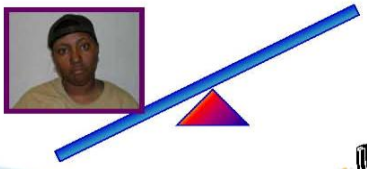
Customer Service

- Assertive
- Professional
- Courteous
- Positive image for yourself and hospital

Acting Assertively

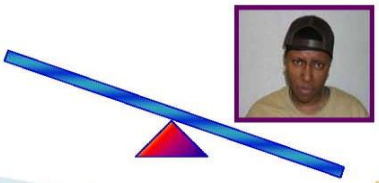
Passiveness

- Unclear or uncertain
- "Beating around the bush"
- Avoiding responsibility
- Backing down easily when confronted
- Stating your concerns in the form of a question



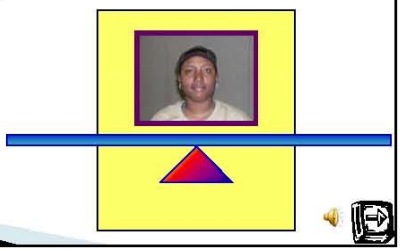
Aggressiveness

- Disrespectful
- Threatening
- Insulting
- Lack of concern for others



Assertiveness

- Clear
- Direct
- Polite
- Calm
- Respectful of others



EMOTION REGULATION STRATEGIES

Emotion Regulation in the ER

- Busy, stressful environment
- Critical and emotional situations
- Must suppress inappropriate emotions!
- **It is important that you appear polite, and professional to others!**

Strategies

- We will now offer some emotion regulation strategies to help you respond assertively
- Must use given strategies to suppress inappropriate emotions
- Using given strategies will increase performance evaluation

Muscle & Voice Control

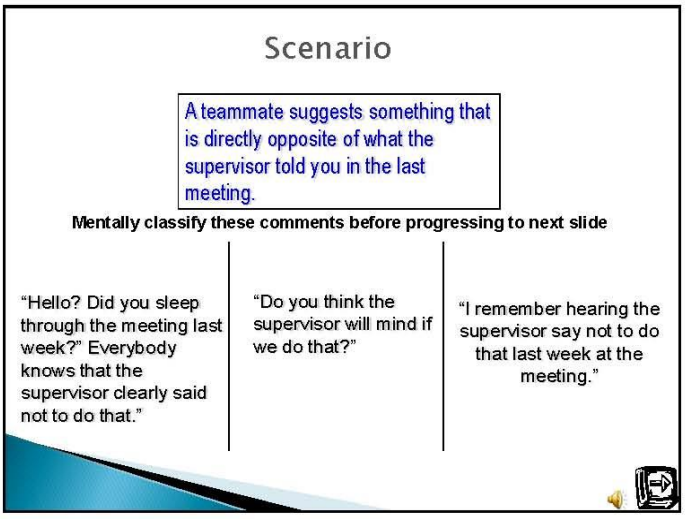
- **Facial Muscles**
  - Relax tension in mouth
  - Lift eyelids & cheeks slightly
- **Vocal Characteristics**
  - Avoid raising voice too loud or lowering voice too soft
  - Keep even tone of voice
- **Posture**
  - Sit up straight
  - Don't move forward or slouch

Practice these facial expressions before progressing to next slide

Using Emotion Regulation Strategies

Passive	Assertive	Aggressive
• Frowning • Slouching posture • Low voice • Long gaps in speech	• Lift cheeks • Confident posture • Open eyelids • Even tone of voice	• Tense mouth • Attacking posture • Furrowing eyebrow • Loud voice


Emotion Regulation Practice


Scenario
A teammate suggests something that is directly opposite of what the supervisor told you in the last meeting.
Mentally classify these comments before progressing to next slide
"Hello? Did you sleep through the meeting last week?" Everybody knows that the supervisor clearly said not to do that."
"Do you think the supervisor will mind if we do that?"
"I remember hearing the supervisor say not to do that last week at the meeting."

Passive

"Do you think the supervisor will mind if we do that?"

- Frowning
- Slouching posture
- Low voice
- Long gaps in speech

Practice these facial expressions before progressing to next slide

Aggressive

"Hello? Did you sleep through the meeting last week?" Everybody knows that the supervisor clearly said not to do that."

- Tense mouth
- Attacking posture
- Furrowing eyebrow
- Loud voice

Practice these facial expressions before progressing to next slide

Assertive

"I remember hearing the supervisor say not to do that last week at the meeting."

- Lift cheeks
- Confident posture
- Open eyelids
- Even tone of voice

Practice these facial expressions before progressing to next slide

Active Listening

Listen Actively: What does it mean?

- Attend to oral information
- Clarify purpose for listening and use listening strategies appropriate to that purpose
- Monitor comprehension and adjust strategies as necessary
- Integrate information from listening with prior knowledge to address the goal, task, or purpose

Skills include:

- Understanding and responding to learned words and phrases in simple questions and statements
- Repairing gaps in understanding by using advanced strategies

Skills include:

- Asking questions to deepen the understanding and to give feedback appropriate to the situation, the audience and the purpose of the communication

Skills include:

- Applying background knowledge and strategies such as integrating information from more than one source, evaluating the relevancy and adequacy of the information, or adapting responses to the age, gender and status of the speaker to better understand the literal and implied intent of the speaker

You should be able to Listen Actively by :

- Clarifying the purpose for listening
- Using listening strategies to improve understanding and that are appropriate to that purpose
- Integrating information gained from listening with prior knowledge to address the listening purpose
- Adjusting strategies to overcome any barriers to comprehension

Final Review

- This concludes your skills training.
- We will review the key rules and greetings that you will be required to practice as a Customer Service representative.

Review of Customer & Coworker Policies

Rule 1: Patients in the ER are not seen by a doctor on a first–come/first serve basis: The triage nurse determines their order on the basis of need.

Rule 2: Patient information is confidential. Each patient has the right to decide :

- Who may see him or her
- Who may have information about their condition
- Whether you may reveal that they are even registered as a patient in the hospital

Rule 3: Doctors have the right to deny access to a patient if it is in the best interest of the patient's medical condition.

Rule 4: You will be fired if you lie verbally or in writing.

Rule 5: No racial or sexual harassing comments.

Greeting

- Make sure to greet all patients by smiling and saying "Hi, can I help you?" before they reach the customer service desk.

End of Training

- You have now completed the training for your position as a Customer Service Representative
- You will now begin your shift as the Customer Service Representative. You have two voicemail messages waiting for you.

APPENDIX H: PRESENCE SURVEY

ITC SOPI

Please read the instructions below before continuing

Instructions:

We are interested in finding out what you feel about the experience you have just had in the 'DISPLAYED ENVIRONMENT'. We use the term 'displayed environment' here, and throughout this questionnaire, to refer to the film, video, computer game or virtual world that you have just encountered. Some of the questions refer to the 'CONTENT' of the displayed environment. By this we mean the story, scenes or events, or whatever you could see, hear, or sense happening within the displayed environment. The displayed environment and its content (including representations of people, animals, or cartoons, which we call 'CHARACTERS') are different from the 'REAL WORLD': the world you live in from day-to-day. Please refer back to this page if you are unsure about the meaning of any question.

There are two parts to this questionnaire, PART A and PART B. PART A asks about your thoughts and feelings once the displayed environment was over. PART B refers to your thoughts and feelings while you were experiencing the displayed environment. Please do not spend too much time on any one question. Your first response is usually the best. For each question, choose the answer CLOSEST to your own.

Please remember that there are no right or wrong answers – we are simply interested in YOUR thoughts and feelings about the displayed environment. Please do not discuss the questionnaire with anyone who may also complete it as this may affect your answers or theirs. We should be grateful if you would also complete the 'Background Information' overleaf.

All of your responses will be treated confidentially.

PART A

Please indicate HOW MUCH YOU AGREE OR DISAGREE with each of the following statements by circling just ONE of the numbers using the 5-point scale below.

(Strongly disagree)	(Disagree)	(Neither agree nor disagree)	(Agree)	(Strongly agree)
1	2	3	4	5

AFTER MY EXPERIENCE OF THE DISPLAYED ENVIRONMENT…

1. I felt sad that my experience was over 1 2 3 4 5
2. I felt disorientated 1 2 3 4 5
3. I had a sense that I had returned from a journey 1 2 3 4 5
4. I would have liked the experience to continue 1 2 3 4 5
5. I vividly remember some parts of the experience 1 2 3 4 5
6. I'd recommend the experience to my friends. 1 2 3 4 5

ITC-SOPI

PART B

Please indicate HOW MUCH YOU AGREE OR DISAGREE with each of the following statements by circling just ONE of the numbers using the 5-point scale below.

(Strongly disagree)	(Disagree)	(Neither agree nor disagree)	(Agree)	(Strongly agree)
1	2	3	4	5

<u>DURING</u> MY EXPERIENCE OF THE DISPLAYED ENVIRONMENT…

1. I felt myself being 'drawn in'. 1 2 3 4 5
2. I felt involved (in the displayed environment). 1 2 3 4 5
3. I lost track of time. 1 2 3 4 5
4. I felt I could interact with the displayed environment 1 2 3 4 5
5. The displayed environment seemed natural. 1 2 3 4 5
6. It felt like the content was 'live'. 1 2 3 4 5
7. I felt that the characters and/or objects could almost touch me. 1 2 3 4 5
8. I enjoyed myself. 1 2 3 4 5
9. I felt I was visiting the places in the displayed environment. 1 2 3 4 5
10. I felt tired. 1 2 3 4 5

(Strongly disagree)	(Disagree)	(Neither agree nor disagree)	(Agree)	(Strongly agree)
1	2	3	4	5

DURING MY EXPERIENCE OF THE DISPLAYED ENVIRONMENT…

11. The content seemed believable to me. 1 2 3 4 5

12. I felt I wasn't *just* watching something. 1 2 3 4 5

13. I had the sensation that I moved in response to parts of the displayed environment 1 2 3 4 5

14. I felt dizzy. 1 2 3 4 5

15. I felt that the displayed environment was part of the real world. 1 2 3 4 5

16. My experience was intense. 1 2 3 4 5

17. I paid more attention to the displayed environment than I did to my own thoughts (e.g., personal preoccupations, daydreams etc.). 1 2 3 4 5

18. I had a sense of being in the scenes displayed 1 2 3 4 5

19. I felt that I could move objects (in the displayed environment). 1 2 3 4 5

20. The scenes depicted could really occur in the real world 1 2 3 4 5

21. I felt I had eyestrain. 1 2 3 4 5

22. I could almost smell different features of the displayed environment. 1 2 3 4 5

(Strongly disagree)	(Disagree)	(Neither agree nor disagree)	(Agree)	(Strongly agree)
1	2	3	4	5

DURING MY EXPERIENCE OF THE DISPLAYED ENVIRONMENT…

23. I had the sensation that the characters were aware of me.	1	2	3	4	5
24. I had a strong sense of sounds coming from different directions within the displayed environment.	1	2	3	4	5
25. I felt surrounded by the displayed environment	1	2	3	4	5
26. I felt nauseous.	1	2	3	4	5
27. I had a strong sense that the characters and objects were solid	1	2	3	4	5
28. I felt I could have reached out and touched things (in the displayed environment).	1	2	3	4	5
29. I sensed that the temperature changed to match the scenes in the displayed environment.	1	2	3	4	5
30. I responded emotionally	1	2	3	4	5
31. I felt that *all* my senses were stimulated at the same time.	1	2	3	4	5
32. The content appealed to me.	1	2	3	4	5
33. I felt able to change the course of events in the displayed environment.	1	2	3	4	5

(Strongly disagree)	(Disagree)	(Neither agree nor disagree)	(Agree)	(Strongly agree)
1	2	3	4	5

DURING MY EXPERIENCE OF THE DISPLAYED ENVIRONMENT…

34. I felt as though I was in the same space as the characters and/or objects... 1 2 3 4 5

35. I had the sensation that parts of the displayed environment (e.g. characters or objects)were responding to me. 1 2 3 4 5

36. It felt realistic to move things in the displayed environment..... 1 2 3 4 5

37. I felt I had a headache..... 1 2 3 4 5

38. I felt as though I was participating in the displayed environment..... 1 2 3 4 5

If there is anything else you would like to add, please use the space below:

PLEASE CHECK THAT YOU HAVE ANSWERED ALL THE QUESTIONS

THANK YOU VERY MUCH FOR YOUR TIME AND PARTICIPATION

ITC-SOPI

APPENDIX I: PERMISSION TO USE

The Videodisc picture in Figure 2 was obtained from www.possum.net.au. Permission to use was obtained via email. The original email is on file with author.

From: Agnes Bankier [agnes.bankier@ghsv.org.au]
Sent: Sunday, September 28, 2008 9:14 PM
To: CurtisConkey
Subject: RE: Question about a picture on PossumWeb

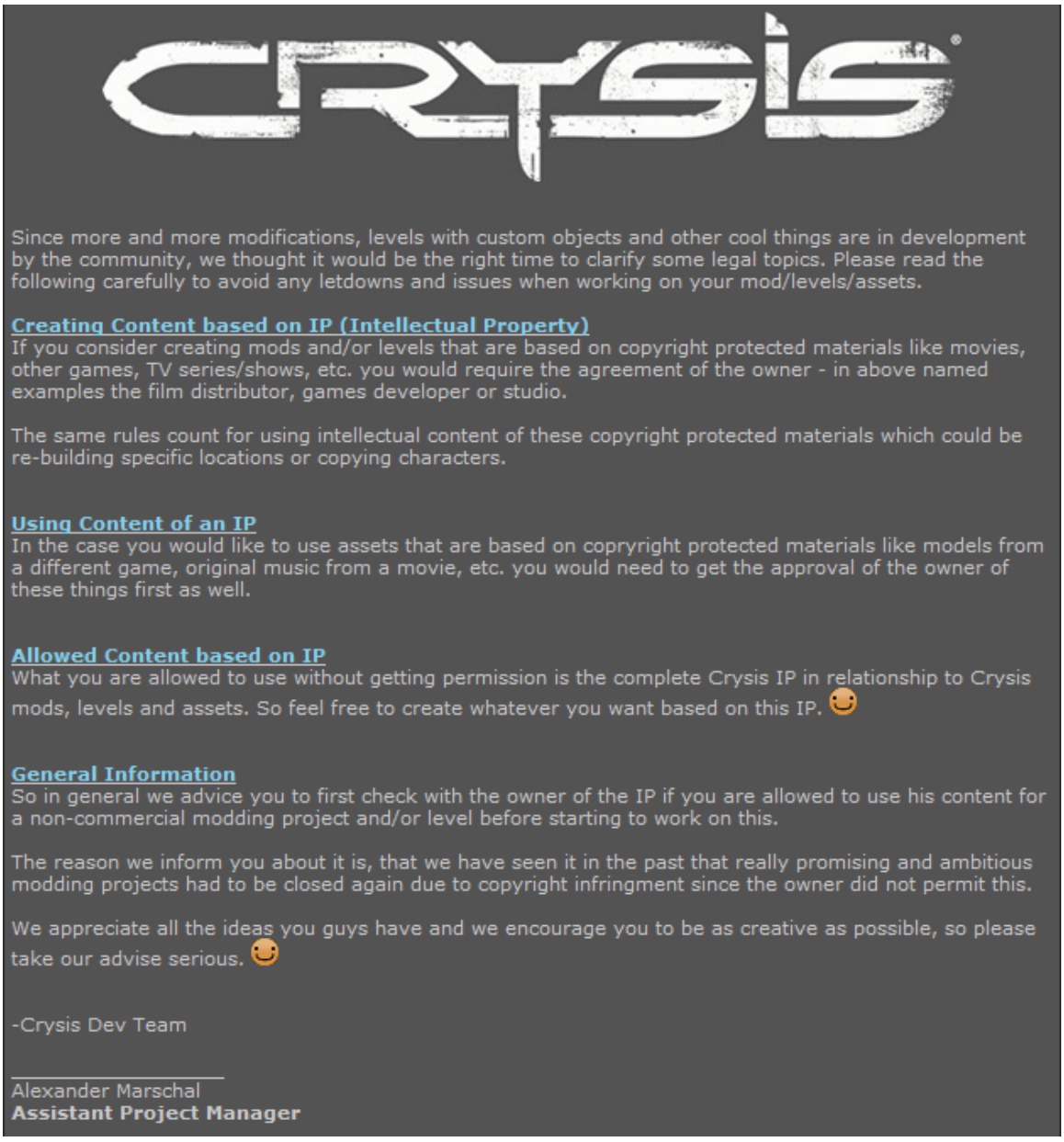
You are very welcome to use this image
Best wishes
Agnes

Professor Agnes Bankier
Director
Genetic Health & VCGS Pathology
Murdoch Childrens Research Institute
Flemington Road, Parkville, Vic. 3052
03-83416290
0408098509
www.geneticheathvic.net.au
www.vcgspathology.com.au

From: CurtisConkey [mailto:curtisconkey@gmail.com]
Sent: Sunday, 28 September 2008 5:10 PM
To: Agnes Bankier
Cc: Possum
Subject: Question about a picture on PossumWeb

Anges Bankier:
Hello, I am a PhD student at the University of Central Florida in Orlando, Florida, USA.

I am working on a dissertation concerning multimedia training methods. Part of my proposal discusses the history of Videodisc training materials. Whilst searching for a representative picture of videodisc training equipment, I discovered the very nice picture on your web site in the manual section: http://www.possum.net.au/manual/manual.htm (see below)
I was hoping that I could obtain permission to use this picture in my dissertation?
Can I get your permission to do that? I would cite your web site as the originator of the picture.
Your consideration is much appreciated.
Curtis Conkey
PhD Candidate, UCF, Orlando, Florida



Since more and more modifications, levels with custom objects and other cool things are in development by the community, we thought it would be the right time to clarify some legal topics. Please read the following carefully to avoid any letdowns and issues when working on your mod/levels/assets.

Creating Content based on IP (Intellectual Property)
If you consider creating mods and/or levels that are based on copyright protected materials like movies, other games, TV series/shows, etc. you would require the agreement of the owner - in above named examples the film distributor, games developer or studio.

The same rules count for using intellectual content of these copyright protected materials which could be re-building specific locations or copying characters.

Using Content of an IP
In the case you would like to use assets that are based on copyright protected materials like models from a different game, original music from a movie, etc. you would need to get the approval of the owner of these things first as well.

Allowed Content based on IP
What you are allowed to use without getting permission is the complete Crysis IP in relationship to Crysis mods, levels and assets. So feel free to create whatever you want based on this IP.

General Information
So in general we advice you to first check with the owner of the IP if you are allowed to use his content for a non-commercial modding project and/or level before starting to work on this.

The reason we inform you about it is, that we have seen it in the past that really promising and ambitious modding projects had to be closed again due to copyright infringment since the owner did not permit this.

We appreciate all the ideas you guys have and we encourage you to be as creative as possible, so please take our advise serious.

-Crysis Dev Team

Alexander Marschal
Assistant Project Manager

Collected from http://www.crymod.com/thread.php?threadid=13021 on Feb 14, 2010
The Screenshots in Appendixes A and B are covered by this IP release statement from Crytek for their Crysis product.

APPENDIX J: IRB PERMISSION

University of Central Florida Institutional Review Board
Office of Research & Commercialization
12201 Research Parkway, Suite 501
Orlando, Florida 32826-3246
Telephone: 407-823-2901, 407-882-2012 or 407-882-2276
www.research.ucf.edu/compliance/irb.html

Notice of Expedited Initial Review and Approval

From : **UCF Institutional Review Board**
FWA00000351, Exp. 10/8/11, IRB00001138

To : **Curtis A. Conkey**

Date : **June 10, 2009**

IRB Number: **SBE-09-06269**

Study Title: **Machinima and Video-based Soft Skills Training**

Dear Researcher:

Your research protocol noted above was approved by **expedited** review by the UCF IRB Vice-chair on 6/10/2009. **The expiration date is 6/9/2010.** Your study was determine to be minimal risk for human subjects and expeditable per federal regulations, 45 CFR 46.110. The categories for which this study qualifies as expeditable research are as follows:

6. Collection of data from voice, video, digital, or image recordings made for research purposes.

7. Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies.

The IRB has approved a **consent procedure which requires participants to sign consent forms.** Use of the approved, stamped consent document(s) is required. Only approved investigators (or other approved key study personnel) may solicit consent for research participation. Subjects or their representatives must receive a copy of the consent form(s).

All data, which may include signed consent form documents, must be retained in a locked file cabinet for a minimum of three years (six if HIPAA applies) past the completion of this research. Any links to the identification of participants should be maintained on a password-protected computer if electronic information is used. Additional requirements may be imposed by your funding agency, your department, or other entities. Access to data is limited to authorized individuals listed as key study personnel.

To continue this research beyond the expiration date, a Continuing Review Form must be submitted 2 – 4 weeks prior to the expiration date. Advise the IRB if you receive a subpoena for the release of this information, or if a breach of confidentiality occurs. Also report any unanticipated problems or serious adverse events (within 5 working days). Do not make changes to the protocol methodology or consent form before obtaining IRB approval. Changes can be submitted for IRB review using the Addendum/Modification Request Form. An Addendum/Modification Request Form **cannot** be used to extend the approval period of a study. All forms may be completed and submitted online at http://iris.research.ucf.edu .

Failure to provide a continuing review report could lead to study suspension, a loss of funding and/or publication possibilities, or reporting of noncompliance to sponsors or funding agencies. The IRB maintains the authority under 45 CFR 46.110(e) to observe or have a third party observe the consent process and the research.

On behalf of Tracy Dietz, Ph.D., UCF IRB Chair, this letter is signed by:

Signature applied by Joanne Muratori on 06/10/2009 12:11:14 PM EDT

IRB Coordinator

INFORMED VOLUNTARY CONSENT TO PARTICIPATE

Please read this consent document carefully before you decide to participate in this study.

1. You are being asked to voluntarily participate in a research study titled "Simulations for Customer Service Training." You will be asked to complete a number of questionnaires both at the beginning and end of the study. In addition you will be asked to complete an interactive simulation based training session followed by a performance session. You will be video recorded throughout the simulation. Your oral and written responses will be saved in voice files. The video and digital voice files will be used for behavioral coding and will not be published or displayed. They will be destroyed following transcription and will not be attached to your name.

You do not have to answer any questions that you do not wish to answer on any of the questionnaires, and have the right to examine the questionnaires before signing this informed consent form.

2. The purpose of this research study is to test the effectiveness of a computer based simulation.

3. The investigator believes that there are no anticipated risk and no anticipated benefits. If any of the materials or instruments related to this study makes you feel uncomfortable you are free to skip any questions or discontinue participation at any time.

4. You understand that you will receive no direct benefit other than:

- An opportunity to improve communication skills with customers, coworkers and superiors
- A copy of any publications resulting from the current study if requested

5. Your identity will be kept confidential. Your confidentiality during the study will be ensured with the use of a coded identification number that will be used to label the transcripts that are created from your video and voice file. The list connecting your name to this number will be kept in a locked file. Your name will not be directly associated with any data. The confidentiality of the information related to your participation in this research will be ensured by maintaining records only coded by identification numbers. When the study is completed and the data have been analyzed, the list will be destroyed. The video and voice files will only be viewed by members of the research team.

6. If you have any questions about this study I should contact the following individuals:

Principal Investigator: Curtis Conkey: (407)312-2613

E-mail: curtisconkey@yahoo.com

Research Assistant: Ben Repkay: (813)892-5564

Email: benripper1289@gmail.com

Faculty Supervisor: Dr. Jan Cannon-Bowers: (407) 462-6619

University of Central Florida IRB
IRB NUMBER: SBE-09-06269
IRB APPROVAL DATE: 6/10/2009
IRB EXPIRATION DATE: 6/9/2010

Email: jancb@mail.ucf.edu

7. Your participation in this study is completely voluntary and will not affect your grade or status in any program or class.

8. Your participation in this study may be stopped by the investigator at any time without your consent if it is believed the decision is in your best interest. There will be no penalty or loss of benefits to which you are otherwise entitled at the time your participation is stopped.

9. No out of pocket costs to you may result from your voluntary participation.

10. If you decide to withdraw from further participation in this study, there will be no penalties. To ensure your safely and orderly withdrawal from the study, you will inform the Principal Investigator, Curtis Conkey or the Research Assistant, Ben Repkay.

11. Official government agencies may have a need to inspect the research records from this study, including yours, in order to fulfill their responsibilities.

12. You have been informed that your consent form will be stored under lock and key.

13. If you have any questions about your rights in the study, you may contact:

Research at the University of Central Florida involving human participants is carried out under the oversight of the Institutional Review Board. Questions or concerns about research participants' rights may be directed to the UCF IRB office, University of Central Florida, Office of Research & Commercialization, 12201 Research Parkway, Suite 501, Orlando, FL 32826-3246, or by campus mail 32816-0150. The hours of operation are 8:00 am until 5:00 pm, Monday through Friday except on University of Central Florida official holidays. The telephone numbers are (407) 882-2276 and (407) 823-2901.

14. LIMITED LIABILITY: If you believe you have been injured during participation in this research project, you may file a claim with UCF Environmental Health & Safety, Risk and Insurance Office, P.O. Box 163500, Orlando, FL 32816-3500, telephone (407) 823-6300. The University of Central Florida is an agency of the State of Florida for purposes of sovereign immunity and the University's and the State's liability for personal injury or property damage is extremely limited under Florida law. Accordingly, the University's and the State's ability to compensate you for any personal injury or property damage suffered during this research project is very limited.

15. You have been given an opportunity to ask questions about this study and its related procedures and risks, as well as any of the other information contained in this consent form. You have been given the opportunity to review the questionnaire items that you will be asked to fill out. All your questions have been answered to your satisfaction. You understand what has been explained in this consent form about your participation in this study. You do not need any further information to make a decision whether or not to volunteer as a participant in this study. By your signature below, you give your voluntary informed consent to participate in the research as it has been explained to you, and you acknowledge receipt of a copy of this form for your own personal records.

_____ _____ _____

Volunteer Signature Print Name Date

I was present during the explanation referred to above, as well as during the volunteer's opportunity to ask questions, and hereby witness the signature.

_____ _____ _____

Investigator Signature Print Name Date

APPENDIX K: INTER-RATER TRAINING MATERIALS

Active Listening Ratings – final

Event 20

- **0** If the participant revealed any information to the single man (on cell phone) about Kayla Johnston (even acknowledging that she is there)
    - Uses phrases like "no visitors allowed" or "I can't let you back there" or "I'll check the status" which we are going to interpret as implying no visitors to that patient i.e. that the patient is here.
    - **Also if they begin talking about patient's right to refuse visitors (implying that the patient is there.)**
- **1** if they did NOT reveal information and kept patient confidence
    - They use neutral pronouns and not gender specific in describing that patient confidentiality prohibits revealing information.
    - If the answer is in a gray area, go technical on whether information was released

Event 21a

- **1** if the participant did include in their email that they did hear Lynn reveal confidential information about the drug patient
    - Uses of words "drug", "addict", "withdrawal"
    - Answers that indicate a simple "yes she did" are acceptable in the context that the question was specific about Lynn talking about the patient condition.
- **0** if they did NOT mention it

Event 21b =

- **1** if the participant did include in their email that the drug patient did not lose consciousness
    - **Phrases like "I do not recall" are acceptable as it is similar to "I did not see"**
- **0** if they did NOT mention that he did not lose consciousness
    - If they use terms like "I don't know" or "I don't remember"

Event 22

- **1** if the participant did mention that the single man (on cell phone) is the person who Kayla Johnson is looking for (or they know it is the single man in waiting room - on cell phone – in blue shirt, **and if they refer to the white or Hispanic man**) they know that there are two people claiming but should realize that one claims to be husband while the other was very tentative about that "my, uhm, wife"
- **0** if they did NOT mention the single man (on cell phone)
    - If they do not give some identifying information: blue shirt, cell phone, single man (by himself),

- Use phrases “he’s in the lobby” “he’s in the waiting room” since there are two people in the lobby claiming to be husband – how can we know which?

Event 29a

- **1** if the participant did mention in their email that Kelly never told Rick that his comments were offensive
  - Communication from Kelly had to be verbal not “nonverbal queues” like body language.
- **0** if they did NOT mention that Kelly never told Rick his comments (or if they say that she did) (or they can't remember)(body language from Kelly does not count)
  - Use phrases like “I don’t know”, “I didn’t hear her”
  - Indicate that other people told Rick that she was offended
  - Kelly’s body language does not count
  - Use inconclusive statement s like “Kelly tried”

Event 29b

- **1** if the participant did mention in their email that the Rick did NOT make a SECOND inappropriate comments TO Kelly
  - Phrases “only one comment” are good.
- **0** if they did NOT mention that Rick did NOT make a SECOND inappropriate comment OR if they said that he did make a SECOND inappropriate comment TO Kelly

Event 30

- **1** if the participant mentions that the phone system does not rings always (as she was told earlier by Kelly)
- **0** if they don't mention the faulty phone system

Quality Rating

Professionalism

- 1 if they were Professional in their response
  - Even tone in their voice/text.
  - Used facts to back up their report, statement.
  - Indicated that the customer's issue was of concern to them
  - If they upheld the hospital rules
    - Confidentiality of patient
    - No one goes back except as allowed by nurse
    - No Sexual Harassment or Racial harassment
- 0 if they were unProfessional
  - raised their voice, used sarcasm, belittled, etc
  - Defensive (**Using phrases like "I am being falsely accused")**
  - Used sarcastic phrases in text responses.
  - Were curt, short or impolite in their response.
    - Conveyed no real information
  - Tone of response was dismissive or uncaring
  - Did not answer the question or avoided taking a stance
    - I don't know.
  - Very casual attitude in their answer
    - No punctuation, or capitalizations, like a text message
    - Uses phrases like "Hey"
  - Giggles, mild laughter
  - Uneven tone, lots of pauses, not confident
  - Extremely bad grammar – really, really bad
    - The casual nature of the simulation did not lend itself to really formal responses
    -

Criteria for rating Assertiveness - Final

Agreement on what is considered "Not Ratable"

- Cutoffs
  - Anything that cuts off the beginning or end of a response & makes the remaining response too ambiguous to rate
    - For example, if the beginning (or end) is cutoff in a way that we would have to assume or imply what was said previous to (or after) the remaining response, we consider it **not ratable**
  - If an answer has multiple sentences and one of the sentences is cut off such that it is unusable then ignore the cut off sentence in figuring your rating. Just rate the other complete sentences and don't try to guess what the cut off sentence might say.

Aggressive – Rated "5"

- Responses that contains insults, harsh words/tones, unnecessary words, & extreme sarcasm
- Responses that are hostile, blunt, or contain counteracting tones
  - Includes "will not lie"
  - Short, harsh, and excessively loud answers – like a loud NO
  - Clear, obvious hostility in the voice
  - Shouting, raised voice.

Aggressive – Rated "4"

- Responses that contain counteracting tones, mildly harsh, or unnecessary words & perhaps mild sarcasm
  - Includes "will not lie" , it's not fair, or harsh and shifting blame – defensive – may avoid answering the question
  - Harsh or sarcastic tones trump other potentially passive characteristics
    - Like "you were in the wrong" "teach you a lesson"
  - Tells a lie as part of answer
    - Fabricates a story to avoid responsibility.
    - Passive-aggessive
- Short Terse answers that one would consider rude in normal conversation
  - They simply answer "no" or "I don't think so"

Assertive – Rated "3"

- Responses that are clear & concise, and contain supportive reasoning or suggestions
  - I don'[t want to get fire – lose my job - is acceptable but tone can push up or down
- Lacks "runarounds" or "umms"
  - Umms can be heard but they are more a normal part of speech for this person and the overall tone is still confident and clear.
  - Giving a reasoned out answered and/or defending ones actions/decision with facts is key – even if they sound soft.

Passive – Rated "2"

- Responses that contain some uncertainty.
  - Contains "umms", long pauses, extended drawn out words
    - Umms, pauses, and drawn out words here are a stalling tactic that indicates uncertainty on how to answer
  - doesn't really give a straight answer or use supporting data to back up answer
- Responses that choose to refrain from facing the situation.
  - Use phrases like "not my responsibility", don't want to get in the middle, if said in a passive, meek tone.
  - For example, in scenario 28 – a response that simply says, "I don't want to get involved with the situation between you guys (Kelly & Rick)"
- Responses that do not sound very confident.

Passive – Rated "1"

- Responses that contain much uncertainty
  - Contains plenty of "umms" & gives no actual answer
  - Shift the blame to another individual without taking credit for anything in their response
- Response that do not sound confident at all.
- They concede to an inappropriate demand
  - They lie for someone
  - They tell someone they can go back to ER without permission
  - They don't defend the hospital rules like No Sexual Harassment and give in to the offender.
  - They Accept a reprimand that is not warranted or that they could easily defend
    - For example the Disciplinary example in the last scenario

Considering vocal tone

- having a general "attitude" should minimally affect the rating
- having a harsh aggressive tone should make the rating more aggressive even if the words are assertive
- use your best judgment

using the word 'I think'

- if said in relation to a clear hospital rule or regulation then mark as passive.

Be cautious of situations where there are two correct answers – judge the situation by the assertiveness of the tone

- the getting Rick to stay scenario can be answered two ways
    - Nurse Lynn indicated we should take our breaks early
    - There is a bus accident and we need you to stay
- If they refuse to answer the question either way then that would be passive

APPENDIX L: CHARACTER SHEETS

A)

B)

C)

G)

H)

I)

M)

N)

O)

S)

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X)

APPENDIX M: SIMULATION SCENARIOS

Vignettes

Section A

- A1 Rick complains about voice messages from Kelly
- A2 Kelly comes in late – Sexual Harassment from Rick
- A3 – Bleeding Man (BM) interrupts and demands attention
- A4 – Wife of BM apologizes and pleads to get into Emergency Room
- A5 – BM leaves ER with wife

Section B

- B1 - Kelly asks for announcement on Bus accident
- B2 - Kelly – crowd shows up – states they are too busy for breaks
- B3 - Kelly – can't take break – Rick wants break – ask for help in convincing him
- B4 – Mrs Rayfield comes up with husband demanding to see their injured son
- B5 – Mr Rayfield now pleads to get back to see son
- B6 – Rayfield's are paged – Nurse Lynn mad no one has taken breaks
- B7 - Nurse Lynn called to ER

Vignettes

Section C

- C1 - Drug couple interrupted by rude father –demands entrance
- C2 – Nurse Lynn patronizes Drug couple – takes rude father back to ER
- C3 – Drug couple begs for lie that boyfriend passed out
- C4 – Doctor Luis says Free clinic will take Drug couple – need bus fair – math problem
- C4 – Nurse Lynn only has $4 – how much more – math problem
- C5 – Nurse takes money and leaves

Section D

- D1 - Carmen Johnson (CJ) and sister comes in looking for CJ wife – Rick tells him she is not here - very mad
- D2 - Rick gets CJ to go outside – Sister pleads that receptionist give info on baby
- D3 – Rick and CJ come back in – Rick does not know – Carlos (boyfriend) shows up ALSO claiming to be husband
- D4 – Carlos gets phone call – sits down next to CJ
- D5 – Kelly says Receptionist in trouble with Nurse Lynn, who thinks she left her station. Need to identify who is boyfriend of Caily Johnson - Carlos
- D6 – Nurse Lynn gets Carlos – gives evil eye to receptionist. Kelly how phone does not ring all the time.

Vignettes

Section E

- E1 - Rick tells that Kelly is complaining of sexual harassment – he expects receptionist to agree it is overblown
- E2 – Nurse Lynn and Rick dismiss Kelly's complaint and target Kelly for ridicule expecting agreement from receptionist
- E3 – Nurse Lynn called away to ER

Section F

- F1 – Rick tries to get clerk to agree with him that there really wasn't any sexual harassment.
- F2 – Rick Called away to phone call

Vignettes

Section G

- G1 - Doctor Luis announces that there is a disciplinary action against the receptionist and that they should just accept it.
- G2 – Doctor Luis leaves – tells receptionist to go home
- END

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