NEW TUTORIALS FOR DIGITAL GAMES: GAME DESIGN MEETS INSTRUCTIONAL DESIGN

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New Tutorials for Digital Games: Game Design Meets Instructional Design

by

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And you too mom, don't worry, I wouldn't leave you out.

ABSTRACT

Contemporary digital games do little to help novice and disadvantaged players wanting to learn to play. The novice-expert divide is a significant barrier for entry for individuals wanting to play digital games. Given that digital games are widely being used in pedagogical situations, these barriers to entry present a significant problem in the use of digital games in the classroom. In response to this problem, three new tutorials for WORLD OF WARCRAFT were designed in an attempt to improve the existing tutorials. These new tutorials offered different modalities of instruction, as well as instructional strategies in assisting players. Tutorials were designed using the Structured Sound Functions (SSF) model of instructional design, following the Attentional Control Theory of Multimedia Learning (ACTML). This work addresses three important and previously unexplored areas of research. First, the exploration and in-depth study of game tutorials is as yet missing from both the education and games studies literature. Secondly, literature concerning tutorial systems in Massively Multiplayer Online Role-Playing Games (MMORPGs) such as WORLD OF WARCRAFT is currently non-existent. Finally, meaningful advice for the design of

tutorial systems in digital games is a previously unexplored area in educational research. Results suggest that players react favourably to a faded or "just-in-time" instructional strategy, showing significantly increased motivation for play, engagement, and play mastery. Consistent with earlier research, multimedia sound was once again shown to be durable and resistant to forgetting, as the SSF groups had significantly higher game mastery than their visual-only counterparts. Implications for game design, game studies research, and future educational research are discussed.

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1. INTRODUCTION

The introductory chapter of this doctoral dissertation is an outline of a problem confronting novice players of digital games, and digital games researchers, namely: players are expected to experiment with the controls in order to gain play mastery (Thomson, 2009). Digital games form an important part of modern pedagogy and educational research (Akilli, 2007; Becker, 2007; Nieborg, 2011; Shelton, Satwicz, & Caswell, 2011; Ulicsak, 2010), game designers take for granted the skills possessed by players (Tosca, 2003), and in doing so fail to teach them the requisite skills necessary for gameplay. Novice players are left instead to contend with minimal or absent help systems in games, or are left to solve problems on their own. In education, this has been called "minimally-guided instruction", an element of "discovery learning" (Sweller, Kirschner, & Clark, 2007, p. 117). Discovery learning, defined as learning that has learners solve problems with minimal instructional guidance, can cause problems for beginning learners (Sweller et al., 2007), such as novice game players. This work illustrates the design and implementation of three new tutorial

systems ("tutorials") for the best selling massively multiplayer online role-playing game (MMORPG) currently available: WORLD OF WARCRAFT (2008). It then assesses the effectiveness of these tutorials using Dick, Carey, and Carey's (2011) model of formative evaluation with sixteen young adult females. The female sample was the result of opportunistic sampling procedures. Given the relative marginalization of women and girls in game culture (Jenson & de Castell, 2010), it was simply much more feasible to gather a participant group with no prior gaming history by recruiting women. It is important to note that this dissertation is not a study of gender and gameplay, but rather a formative evaluation of three new tutorial systems for WORLD OF WARCRAFT with the goal of offering improvements and revisions to digital game tutorials generally.

This work is situated in two unaddressed areas of research. It contributes to the game studies literature with an as yet absent in-depth study of game tutorials generally, and contributes similarly to the literature on games and education by addressing how educators might provide tutorials in a digital game to support novice learners.

Background and Context of the Problem

Playing digital games has become a mainstream activity (Nieborg, 2011). As of 2011, 59% of Canadians self-identify as gamers, with 30% playing games daily (Entertainment Software Association of Canada, 2011). The average MMO player spends approximately 23 hours per week online (onlineschools.org, 2012). WORLD OF WARCRAFT's latest expansion pack ranks 16th among most popular and purchased games in Canada as of 2011 (Entertainment Software Association of Canada, 2011), and has a subscriber base of over 11 million players (onlineschools.org, 2012). The large number of players spending time and money on digital games illustrates the seriousness of the problem addressed in this dissertation. Insufficient or absent tutorials in digital games present barriers to entry and mastery for novice players (Hayes, 2005; Thomson, 2009; Tosca, 2003).

Central to the problem is that many digital games rely solely on a tutorial strategy that makes no allowances for the inexperienced player (Tosca, 2003). These tutorials most often employ a "flashcard

tips pop-up" instructional strategy for player assistance. As Hayes comments, "good tutorials are essential for new gamers" (Hayes, 2005, p. 27), however, game developers have recently begun to omit them from contemporary digital games.

Statement of the Problem

Many digital games rely on a tutorial system that makes little or no allowance for the inexperienced player, and some games contain no tutorial system whatsoever. Where tutorials are present, they often rely on a flashcard-based, visual-only instructional strategy for player assistance. More effective tutorials are needed, drawing from years of research on the use of computers and multimedia in education that consider the lack of long-term knowledge possessed by the inexperienced, and employ new modalities and instructional design strategies. Formative evaluations of new tutorials in digital games may assist future game studies researchers and game designers in understanding elements of tutorial systems that can be helpful for novice learners.

2. LITERATURE REVIEW

The literature on tutorials in digital games is relatively scant. Furthermore, the literature on novice players learning to play games is all but non-existent. This makes the current study appropriate for inclusion in the larger body of research examined in this chapter. By studying the learning of novice players with programmed tutorial interventions in WORLD OF WARCRAFT, the dissertation contributes equally to the literature on games and education, as well as game studies.

Chapter two consists of a review of the extant literature on tutorials commonly present in digital games. It introduces WORLD OF WARCRAFT to the reader, and provides an introduction to game culture generally. It then analyzes the instructional strategies, instructional design theories, modality considerations, and programming conventions used in the design of the new tutorials discussed in this dissertation. An examination of current digital game tutorial strategies using a contemporary needs assessment model known as the D.E.C.L., which stands for delivery, environment, content, learner, (Adams,

Mann, & Schulz, 2006) is then presented. A description of the tutorials evaluated in this dissertation is given. The chapter contains a description of WORLD OF WARCRAFT and its place in larger game culture, as well as research related to the game.

WORLD OF WARCRAFT

WORLD OF WARCRAFT is an MMORPG developed and maintained by Blizzard Entertainment, Inc. One of the most popular online role-playing games, WORLD OF WARCRAFT maintains a subscriber base of over eleven million players (onlineschools.org, 2012). Still the dominant MMORPG, the average American WORLD OF WARCRAFT player spends 22.7 hours per week online and the total yearly revenue from North American players alone, who represent only 22% of the player base, totals more than 800 million US dollars (onlineschools.org, 2012).

WORLD OF WARCRAFT has been the subject of many studies from multiple disciplines. For example, scholars interested in philosophy value WORLD OF WARCRAFT for its simulation of a world

society (Cuddy, 2009). Racial tensions originating in the virtualization of labour (Barboza, 2005; Nakamura, 2009) have also arisen, paving the way for social science studies in the game (Bainbridge, 2010). There are also interdisciplinary edited collections of scholarly research projects published, each of which involve WORLD OF WARCRAFT in some way (Corneliussen, 2008).

WORLD OF WARCRAFT has also been the subject of doctoral theses. Gordon Calleja's (2007) thesis examined the notion of immersion in virtual worlds. Marinka Copier conducted an in-depth study on social networking in WORLD OF WARCRAFT (Copier, 2007). Faltin Karlsen's (2008) study was entitled "Emergent Perspectives on Multiplayer Online Games", and examined WORLD OF WARCRAFT directly. As a contemporary, widely played game, and one that has previously been used in graduate study, WORLD OF WARCRAFT makes an ideal testing platform for the formative evaluation of new game tutorials.

This dissertation focuses specifically on the tutorial system present in WORLD OF WARCRAFT. While studies interrogating tutorial systems are limited, and when it comes to WORLD OF WARCRAFT

nonexistent, some scholars are actively working on learning and tutorial systems in digital games generally. Christina Conati and her research group at the University of British Columbia explores the role of non-player characters (NPCs) in games as pedagogical agents (Conati & Zhao, 2004). Her group also explores the role of cognitive scaffolding in digital environments (Amershi & Conati, 2006), as well as using game systems to provide adaptive feedback (Conati & Manske, 2009). This dissertation is similarly focused through the use of non-player character voices as tutorial guides, the employment of scaffolding and cognitive apprenticeship methods of teaching, and the use of game mechanics to gauge and actively respond to learner needs. New in this work is an as-yet missing exploration of the types of tutorials and instructional strategies already common in digital games. Also novel to this work is the creation and formative evaluation of new materials to improve upon digital game tutorials.

Tutorials in WORLD OF WARCRAFT

Like many contemporary digital games, WORLD OF WARCRAFT exclusively employs a flashcard tips pop-up strategy in delivering its

tutorials to players. The tutorials are generic, in that they do not adapt to the player through programming. They can also be accessed at any time via the game's ESC key menu. Figure 1 illustrates a typical screen capture of a player encountering a tutorial pop-up within WORLD OF WARCRAFT.

Figure 1. Screenshot from WORLD OF WARCRAFT. This screenshot illustrates the large amount of visual data present on the screen when playing WORLD OF WARCRAFT. This is an unmodified interface. Modified interfaces contain even more visually presented information. The tutorial pop-up can be seen on the right side of the image.

Tutorials for Digital RPGs

Tutorials in WORLD OF WARCRAFT, like in many other games, are presented in context relevant ways. When a player first steps into water, for example, the game will present the pop-up for water. This does not take into account whether the player was able to figure out the water controls herself, nor does it take into account whether the player is simultaneously dying due to enemy attack, or attending to her inventory. This furthers the visual-only nature of the interface by providing even more on-screen information to the player, as can be seen in Figure 1.

When a tutorial pops up in WORLD OF WARCRAFT, a small auditory cue is also present. A slight ringing sound directs the learners' attention to the tutorial, or at least to the screen. A potential drawback of ringing and other auditory cues resides in the requirement for simultaneous attention to presentation modalities and task requirements that can contribute to confusion in some important computer applications. Perhaps the most serious confusion occurred at the Three Mile Island Nuclear Facility in the United States, in which several different warning systems were activated simultaneously (Mann, 1997). Another potential drawback of auditory cues is that

they can cause vertigo or motion sickness during flight, such as when pilots experience transient motion cueing, a condition in which the brain has been cued to believe that it must prepare for motion that never actually happens; the conflicting result is motion sickness or coriolis, until the transient motion cue washes out (Valinski, 2010).

Figure 2 illustrates two models of working attention on a difficult or unfamiliar task, one model showing (a) high mental effort associated with unmanageable cognitive load from the input from the visual channel only, the other model showing (b) normalized mental effort associated with manageable cognitive load from balanced input from both visual and auditory channels (Mann, Newhouse, Pagram, Campbell & Schulz, 2002, p. 298). On easy tasks or with familiar items experienced users will implement pre-attentive processing to examine stimuli systematically and completely. On difficult tasks or with unfamiliar items however, users will apply controlled processing; also known as attention focusing. Attention focusing on divided-attention tasks is serial; only one task is handled at a time (Mann, Schulz, Cui. & Adams, 2012).

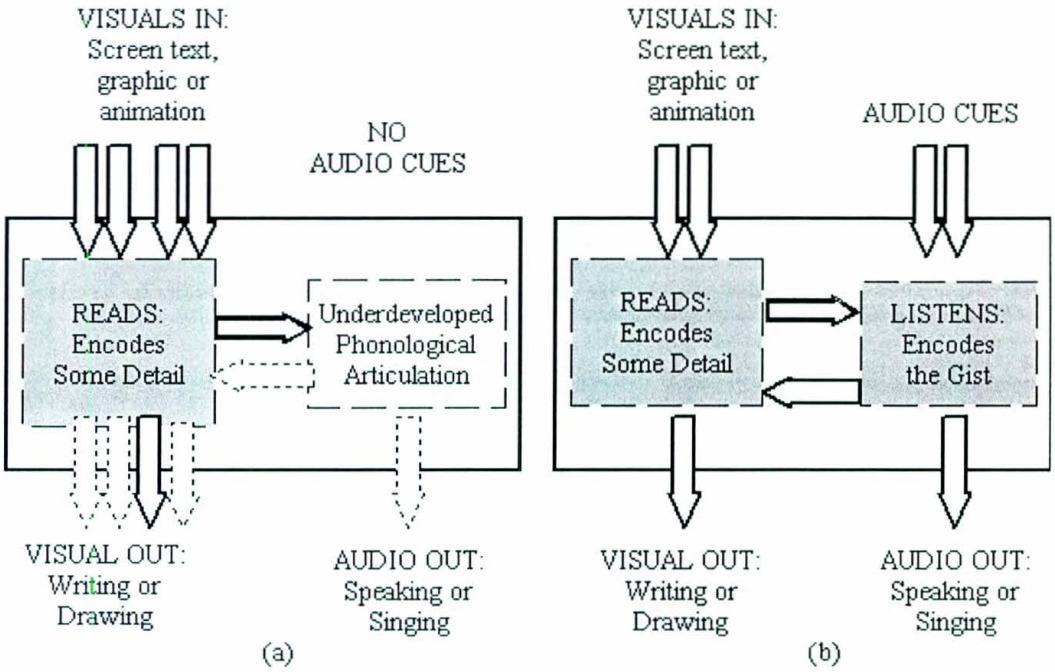

Figure 2. Illustration of two models of working attention on a difficult or unfamiliar task, one model showing (a) high mental effort associated with unmanageable cognitive load from the input from the visual channel only, the other model showing (b) normalized mental effort associated with manageable cognitive load from balanced input from both visual and auditory channels. [Adapted from Mann, B.L., Newhouse, P., Pagram, J., Campbell, A. & Schulz, H., Journal of Computer-Assisted Learning, 18(3), p. 298, 2002].

Multimedia sound is durable and resistant to interference and forgetting, yet sound alone is insufficient to learn from multimedia, hence the need for purposeful advice on how to enhance learning from technology with sound (Mann, 2008). In WORLD OF WARCRAFT, a stochastic flashcard tips pop-up instructional strategy cues the players to maximize their interactions with the system instead of assisting the player in shifting their attention between the auditory and visual sensations in the game. In general, stochastic sound cueing distracts users' attention away from difficult or unfamiliar tasks (Mann, 1997). This kind of cueing is therefore an important part of instructional design, however it is employed haphazardly in WORLD OF WARCRAFT.

Mayer's (2003) cognitive theory of multimedia learning contains a variety of principles. Among them are two principles that are germane to the auditory cues being employed in this dissertation: the modality principle, and the signalling principle. The modality principle states that learners better assimilate information when verbal data is presented to them auditorily as speech rather than visually as text, such as when on screen dialogue is replaced with narration. The signalling principle illustrates that learner attention can be directed by

highlighting appropriate elements of the display, such as by providing a ringing cue, as in WORLD OF WARCRAFT to gain learner attention. Mayer's theory, however, are based heavily upon research exclusively involving adults, and usually college students (Mann, 2008). Several different theories informed the design of the new tutorial strategies investigated in this thesis. These include the Attentional Control Theory (Mann, 2008) and Cognitive Load Theory (Sweller, 2010).

Needs Assessment

The implication from the description of tutorial strategy inefficiency outlined in earlier sections is that there is a discrepancy between the way things are and they way they ought to be. In the field of education this is known as a "need" (Seels, Fullerton, Berry, & Horn, 2004). After establishing a problem and a need, the next step is to determine if one or more of these needs can be met with an educational intervention. This process is known in education as a "needs assessment" (Kaufman, 1993; Stufflebeam, 1985; Witkin, 1984). In this dissertation a contemporary model of assessing need

referred to as Delivery, Environment, Content, and Learner (D.E.C.L.) was used to determine whether one or more of these needs could be met by tutorial instruction (Mann, 2008). The D.E.C.L. was chosen over other models because of its ability to break the interrogation of need down into specific sections, or factors.

The four factors of which D.E.C.L. is composed are applied to the default WORLD OF WARCRAFT tutorial strategy, and to digital game tutorials generally in this dissertation. In the process of examining the tutorials in contemporary games, explained in the following chapter, as well as examining the default WoW-Flashcard tutorial, the D.E.C.L. factors were considered in a stepwise fashion. This model of needs assessment fits nicely within the framework of formative evaluation conducted in this thesis.

Delivery (D)

The delivery factor or "D" in D.E.C.L. comprises four variables: the presentation, strategies, scope, and sequencing. These four variables and their application to the present work are described here.

Presentation.

"Presentation" includes the speed of the display, the graphics, audio, colour, movement, text sizes/fonts, and the quality of the interactions, including any help or tutorial accessible by the player. Before 1988, the tutorial or "tutor mode of computer operation" required content to be developed in a specific discipline with substantial coding by expert computer programmers (Mann, 2009). Computer tutors could accommodate a wide range of user differences. Today many users are developing their own tutorials for education or training (Mann, 2009). The tutorials in most digital role playing games (RPG) typically employ a visual-only "flashcard tips pop-up" instructional strategy, as previously stated, that does little to accommodate novice players wanting to learn to play the game, and frequently assumes prior knowledge of relevant gameplay. There may well be deficiencies in the presentation of digital RPG tutorials that could be improved to accommodate novice players.

Strategy.

"Strategy" in this context concerns the rules and regulations of digital RPGs. Rule systems in digital RPGs are fairly similar between games, and specifically refer to how users interact with the player-characters, or "avatars" found within these games. While there are numerous types of RPGs, this study focuses specifically on the massively-multiplayer online role-playing game, or MMORPG, as explained in chapter one. These are fairly standard in their strategies for completion. For example, all MMORPGs rely on RPG conventions such as quests, slaying monsters, inventory management, and gaining experience points. RUNESCAPE (2001), RAGNAROK ONLINE (2002), FINAL FANTASY XI (2004), STAR TREK ONLINE (2010), and LORD OF THE RINGS ONLINE (2007), all MMORPGs, employ extremely similar gameplay systems and strategies.

Scope.

"Scope" refers to the size of the game. Size is a difficult factor to gauge in an RPG that does not occupy physical space. Size can, however, be measured by a factor of time taken to completion. Some

digital role-playing games require relatively little time to traverse, with games like THE LEGEND OF ZELDA: SPIRIT TRACKS (2009) spanning 10-15 hours. MMORPGs such as WORLD OF WARCRAFT often demand 2000 hour commitments, with players often spending 20 or more hours per week in-game (Yee, Ducheneaut, Nelson, & Likarish, 2011). Such a significant time investment could potentially alienate or intimidate novice players.

Sequencing.

"Sequencing" concerns the ordering of goals, events, and challenges within the digital RPG. While structure and sequence vary from game to game, WORLD OF WARCRAFT follows a very linear, well defined set of goals that the player must accomplish in order to progress. All players of the game will therefore encounter a similar sequence of events regardless of differences in their individual play styles. In WORLD OF WARCRAFT, for example, all players can expect to encounter a new-player area where monsters are passive and quests are fairly easy. The game becomes more difficult after they have passed a certain point in gameplay. As in the previous section,

MMORPGs employ similar sequences for advancing the game, regardless of the game's title.

Environment (E)

The environment factor in D.E.C.L. is comprised of two variables: climate and setting. The environment variable is consistent with system theory. A system comprises all external factors and forces beyond the influence of the decision makers but nevertheless affects the consequences of the players' actions. The environment outside an RPG tutorial system, for example, consists of a collection of other systems, human and machine (Heylighen, 1992) - the RPG, other RPGs, other programs, players, non-players, instructors, or students that interact with one other. This collection of systems that operate outside an RPG tutorial system can also be conceptualized as a system. The mutual interactions of the component systems in a way "glue" these components together into a whole. From the perspective of "the whole", each of the individual parts previously described are seen as subsystems. From the perspective of "the parts", the whole is seen as a supra-system.

Climate.

"Climate" refers to the level of organizational involvement. This involvement can be in-game, such as in a guild (Ang & Zaphiris, 2010), or external, including schools, colleges, or society at large. While investigation of digital games in education is being undertaken, and suggestions for the use of games in education exist (Akilli, 2007; Becker, 2007; Miyamoto, 2010; Nieborg, 2011; Shelton et al., 2011; Ulicsak, 2010), it is not yet common to see digital games appearing in curriculum documents, or in lesson plans at a classroom level. Organizational adoption of video games is still relatively nascent, the vast majority of games being used in computer labs still being "edutainment" software (Egenfeldt-Nielsen, 2011). This lack of widespread organizational adoption eliminates a venue through which novice players might be exposed to games, and thus contributes to the need illustrated in this assessment.

Setting.

"Setting" according to the D.E.C.L. model, refers to the physical locations in which digital RPGs are played. The setting for interacting in

a digital RPG could be anywhere, anytime on a desktop computer or handheld device. In the current study, the setting was controlled to accurately illustrate how the digital RPG, and more specifically the instructional design of the tutorial strategy and modality within the RPG affected learners' motivations and play skill.

Content (C)

The content factor or "C" in D.E.C.L., comprises three variables: domain, tasks, and the mental operations required. Digital role-playing game content varies, but generally follows themes such as fantasy – LORD OF THE RINGS ONLINE, FINAL FANTASY VII (1997) – or science fiction – FALLOUT 3 (2008), MASS EFFECT 2 (2010). The content poses a potential source of player alienation, as not all content is appealing or suitable to all players.

Domain of the game.

"Domain" refers to type of game content. Since the nature of game content varies from one digital role-playing game to the next, it is difficult to assess which types of game content are least

exclusionary to novice players. A thorough literature review in both game studies and education yielded no studies investigating various types of digital role-playing games across players sorted by experience level. Furthermore, classifications of digital games typically default to industry-developed genre conventions such as FPS (first-person shooter) games such as CALL OF DUTY: BLACK OPS (2010), or RTS (realtime strategy) games such as STARCRAFT II (2010). Within these limitations, however, academic studies have shown that RPG gameplay is linked to self-directed, novelty-seeking behaviour (Kim et al., 2010). RPGs, as opposed to other genres, also tend to move players from a state of low to high lucidity (Conway, 2010).

Tasks in the game.

The "tasks" variable refers to the goals set for the players by the game developers. Tasks are indicative of current trends in game design, such as the "achievement system", a system of point gathering that has become common in digital games since the release of the XBOX 360 console. Notably the degree of sophistication in the tasks could increase cognitive load in novices through high element

interactivity (Sweller, 2010). An option may be to decrease the level of sophistication of the RPG for novices. Content and delivery are inextricably linked in digital RPGs, as content in games is delivered to players as they progress through the tasks laid out for them by game designers (Conway, 2010). WORLD OF WARCRAFT is representative of current trends in MMORPGs, and indeed digital gaming generally, as many games employ similar tasks.

Mental operations required.

"Mental operations required" refers to the generic thinking skills required to interact with the game – the kind and level of motor skill required, intellectual abilities (discrimination, problem identification, and solution) strategies (devising, predicting), reaction time, and other discrete motor skills. The difference between novice and expert play has been conflated with a male-female divide in games research (Jenson, Fisher, & de Castell, 2011). Digital RPGs typically require basic use of human interface devices such as keyboards and mice, some computer proficiency, and basic problem solving and spatial navigation.

Learner (L)

The learner factor or "L" in D.E.C.L. comprises four variables: competence, capacity, demographics, and attitude. Much of the data investigating novice game play habits can be explained by the learner component of the D.E.C.L. It is tempting with novice players or learners to levy research questions *ad hominem*, while failing to account for the instructional technology within the game.

Competence.

The "competence" variable refers to game-specific abilities that make learning easier or more difficult for inexperienced players. Exploration of play habits in digital games has revealed that competence and skill level play a significant role in game consumption, particularly among novice players (Jenson et al., 2011). As novice players begin to play in a socially collaborative, clumsy way, they increasingly move to more aggressive, competitive forms of play (Jenson & de Castell, 2008). For example, a Jenson and de Castell study (2008) found that "[...] in the first weeks of the [gaming] club, there is much more 'helping' dialogue occurring than direct

competition as [players] familiarize themselves with the games. Later on, for most players who attend regularly, this dialogue drops off and they begin taking up positions as 'experts' in particular games" (p. 1). Players build competence by playing games, and transfer occurs between games of similar genres, particularly MMORPGs such as WORLD OF WARCRAFT (Taylor, de Castell, Jenson, & Humphrey, 2011).

Capacity.

"Capacity" refers to the abilities of the player relative to the requirements of the RPG. While the needs assessment did not specifically address learner capacity for gameplay, as it was primarily focused on investigating the tutorials present in WORLD OF WARCRAFT, the random sampling method employed in the pilot test and field test, explained in chapters four and five respectively, would account for variances in player capacity.

Demographics.

"Demographics" refers to age, socio-economic status, and other measurable factors of players of digital RPG's. Socioeconomic status

has been found to have a negative correlation with game playership (Tobias, 2011). Age-range is also an important factor controlled in this study (Greenberg, Sherry, Lachlan, Lucas, & Holmstrom, 2008). This dissertation research sought to involve 18-28 year olds, as this age group had ample opportunity to be exposed to digital games from a young age and are among the most frequent players of games (Greenberg et al., 2008). It was very difficult to find a large pool of novice gamers, resulting in the low sample size. Furthermore, due to opportunistic sampling practices, the gender demographic was unintentionally controlled. Women are still less likely to play games, including WORLD OF WARCRAFT, whose players are 80% male (onlineschools.org, 2012), which made it much easier to find a large group of female participants who had absolutely no prior experience with MMORPGs.

Attitude.

"Attitude" in this model refers to motivation to play the game, both intrinsic and extrinsic, including peer pressure, to play or not play games. The novice players recruited for the research undertaken in

this dissertation did not possess intrinsic motivation to play MMORPGs, having no particular experience with them. This factor was not explored as part of this study, however player motivations after having played through different tutorials were investigated, as explained in chapter six.

The D.E.C.L. model is introduced here to explore the problem faced by inexperienced players. The D.E.C.L. factors and variables offered a more sophisticated method of assessing need from that of evaluating the gap between current and ideal situations. In this dissertation, the D.E.C.L. model was used to identify the degree to which one or more of these factors affected play mastery in a digital RPG. The D.E.C.L. model may be used to conduct educational research on the Internet (Mann, 2006), to create digital educational materials (Mann, 2005), and to evaluate those materials for revision (Mann, 2006).

Instructional Design and Learning Theories

Instructional design theories are goal-based. They provide explicit instructions on how to help people better learn and develop (Reigeluth, 1983). Instructional design theories are concerned with the various events of instruction (Gagné, 1974) as well as how the instruction is delivered (Merrill & Twitchell, 1994). It is important to differentiate, however, the instructional design "process", which applies an already existing instructional design model to content, and instructional design "theory", which is concerned with the examination of new models or strategies (Reigeluth, 1983). This dissertation is concerned primarily with instructional design theory, informed by several learning theories, by way of designing three new tutorials for WORLD OF WARCRAFT. The following section illustrates the theoretical basis for the new tutorials by elucidating some instructional design and learning theories that contributed to their development.

Attentional Control Theory of Multimedia Learning

The Attentional Control Theory of Multimedia Learning (ACTML)

is a learning theory that describes how users assimilate new information from multimedia. Figure 3 illustrates the structure and process of working attention of students as they interact with a tutorial system containing sound designed with this theory in mind. This theory has two uses for the instructional designer and interface developer. This learning theory illustrates a structure of the learner's working attention to multimedia, and is useful for conducting experiments that identify the processes involved during the integration of information coming from multiple sources. Additionally, the theory describes how learners process information in different modalities (Mann, Schulz, Cui, & Adams, 2012).

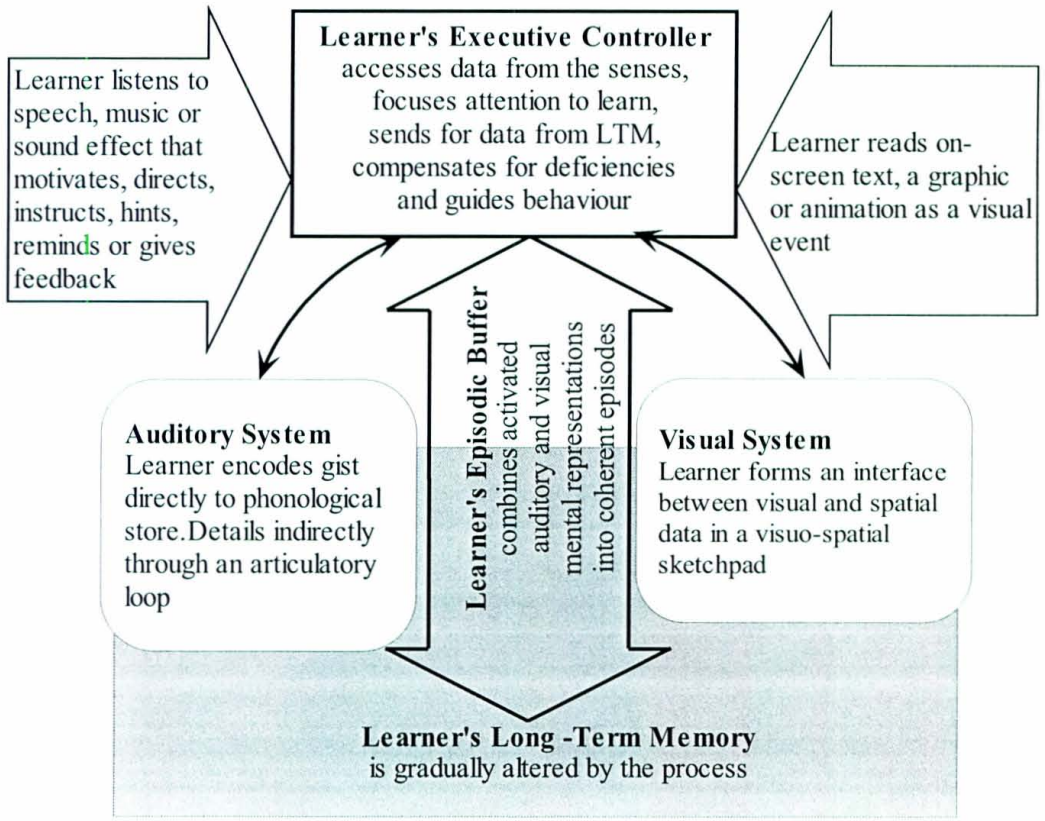

Figure 3. The Attentional Control Theory of Multimedia Learning (ACTML). In Mann, B.L. (2008). The evolution of multimedia sound, Computers & Education: An International Journal 50(4), p.1163.

The ACTML is uniquely suited to game design in that it not only describes the process of assimilating knowledge from multimedia, but provides specific design instructions for the use of sound via the Structured Sound Functions (SSF) Model of Instructional Design.

SSF Model of Instructional Design

The SSF model of instructional design addresses a persistent problem in computer games for education; namely, that the users tend to ignore or forget to read important instructions and feedback presented in text or other visual displays (Mann, 2009). The structured sound function model addresses this issue by using sound cueing during instruction (Mann, 2009). The SSF model of instructional design can be said to be one half of Mann's description of learning from multimedia, with the attentional control theory, as a learning theory, being the other. Taken together, the psychological description (the Attentional Control Theory) and the instructional design suggestions (the SSF model) can be said to be a two-way street (Mayer, 2003). Whereas the attentional control definition of multimedia learning can help one to understand what is going on in the learner's mind when the SSF model is used, investigations with the SSF model inform the functionality of the structures within the attentional control definition of multimedia learning. For example "once design components like text, graphics and sound have been assigned functions, their roles can become fixed in the designer's

mind, regardless of advances in the technology" (Bishop, Amankwatia, & Cates, 2007, p. 480). Speech cueing found within the SSF model of instructional design shifts user attention to visual events (Mann, 2008).

Convergent temporal speech cueing.

Convergent temporal speech cueing, also called convergent temporal sound, is a component of the SSF Model. Convergent temporal sound consists of an audio cue that focuses the learners' attention in a stepwise procedure toward a specific solution (Mann, 2006). The act of remembering always begins with a cue, which initiates the retrieval process (Suprenant & Neath, 2009). Since cueing does not have intrinsic mnemonic properties, the cues must be embedded within the broader context of the instructional situation (Mann 1997). In this dissertation, convergent temporal speech cueing is employed in the SSF-JIT and SSF-Flashcard tutorial strategies in an attempt to direct learner attention to visual events in the game (Mann, 2008).

Cognitive Theory of Multimedia Learning

Mayer's theory of multimedia learning, like Mann's, deconstructs learners' various sensory faculties into their component mental functions. According to Mayer, the cognitive theory draws on Paivio's (J. M. Clark & Paivio, 1991) dual coding theory, Baddeley's (1992) model of working memory, Sweller's (Chandler & Sweller, 1991; Sweller, Chandler, Tierney, & Cooper, 1990) cognitive load theory, and Wittrock's (1989) generative theory. The theory states that learners posess visual and verbal information processing systems, such that auditory narration is processed by the verbal system whereas animations are processed by the visual (Mayer & Moreno, 1998).

In this dissertation, the cognitive theory of multimedia learning was employed to assess the design of tutorials present in other digital games, and to inform the design of the tutorials being developed and evaluated. Specifically, game tutorials analyzed throughout the literature review were examined for evidence of the various principles described by Mayer and Moreno (1998). The two principles that primarily informed the design were the split attention principle and the modality principle (Mayer & Moreno, 1998).

Split attention.

The auditory split-attention principle refers to the limited capacity of learners to process incoming auditory information. Music and sounds compete with narration for auditory attention. According to Moreno and Mayer (2000):

> When additional auditory information is presented, it competes with the narration for limited processing capacity in the auditory channel. When processing capacity is used to process the music and sounds, there is less capacity available for paying attention to the narration, organizing it into a coherent cause-and-effect chain, and linking it with the incoming visual information. Based on this theory, we can predict that adding interesting music and sounds to a multimedia presentation will result in poorer performance on tests of retention, matching, and transfer. (p. 2)

Split attention is a common effect of tutorials in digital games, forcing the player to attend to numerous stimuli simultaneously. In the tutorial review, BAYONETTA (2010), RED FACTION: GUERRILLA (2009), and others were found to ignore this principle. Split attention informed the design of the use of sound in the SSF-Flashcard and SSF-JIT tutorial strategies.

Modality principle.

According to Moreno (2001), the modality principle states that "students learn better when the verbal information is presented auditorily as speech rather than visually as on-screen text both for concurrent and sequential presentations" (p. 118). Nearly all of the tutorial systems surveyed ignored this basic principle. With the exception of FABLE II (2008), all surveyed tutorials were presented visually, or simultaneously visually and auditorily. They were also displayed in the presence of numerous competing visual stimuli. Many games interrupt gameplay to provide the player with a flashcard pop-up, such as RED FACTION: GUERRILLA, which pauses the game when tutorial pop-ups are displayed. The modality principle informed the design of the SSF-JIT and SSF-Flashcard tutorial strategies and modalities by informing the use of sound.

Cognitive Load Theory

In education, cognitive load refers to a theory of learning that describes the capacity for simultaneous information that can be processed and absorbed by the human mind. For example, "by

simultaneously considering the structure of information and the cognitive architecture that allows learners to process that information, cognitive load theorists have been able to generate a unique variety of new and sometimes counterintuitive instructional designs and procedures" (Paas, Renkl, & Sweller, 2003). By managing learner cognitive load through instructional design, educators can ensure that learners have optimal cognitive resources to devote to schema generation. In this thesis, cognitive load theory explains the additional mental effort that is required of novice learners who are learning to play digital games. It was therefore primarily employed in the examination of existing digital game tutorial systems described in chapter three.

Having described the theories that contributed to the development of the three new tutorials programmed and investigated in this thesis, the following chapter includes a review of tutorials already present in digital games as a basis for the design of the tutorials to be used in the formative evaluation contained in this dissertation.

3. TUTORIAL STUDY AND FORMATIVE EVALUATION PLAN

As part of the study of three new tutorials for WORLD OF WARCRAFT undertaken in this dissertation, a review and study of tutorials existing in contemporary digital games was undertaken. This took the form of playing approximately thirty contemporary digital games for various systems, including the XBOX 360, PS3, and PC. Both screenshots and notes were taken regarding the tutorials present in the games, if any. These tutorials were analyzed as educational objects using the theories and instructional design principles described in the previous chapter. The following section illustrates the results of that study. The remainder of the chapter consists of a plan for the formative evaluation undertaken in this dissertation.

Study and Development of Tutorials in Digital Games

This section first provides an explanation of tutorials in contemporary digital games and their design, then specifically addresses those present in WORLD OF WARCRAFT to provide context

for the description of the three new tutorials designed for this dissertation, and the formative evaluation plan, both presented later in this chapter.

Tutorial Strategies

It is important to distinguish tutorial strategies from drill-and-practice strategies (Mann, 2009). The tutorial presents the novice with the first five events of instruction (Gagné, 1974): gain their attention, inform them of the objective, stimulate their recall of prior learning, present the new content, and provide some learning guidance. This can be through either direct instruction or constructivist learning methods. A drill-and-practice strategy presents the learners with the latter events of instruction (Gagné, 1974). These are elicit performance, provide feedback, assess performance, and enhance for retention and transfer. This study is concerned with tutorial strategies, the former of the two types of strategy described in this section.

Tutorials Present in Contemporary Digital Games

This section examines tutorials currently employed in contemporary digital games. Many digital games rely on a tutorial system that makes few considerations of the player's experience. "Good tutorials are essential for new gamers" (Hayes, 2005, p. 27), however, game developers have recently begun to leave tutorials out of many titles altogether, such as STAR OCEAN: THE LAST HOPE (2008), pictured in Figure 4. Part of the reason for this may stem from the recent trend of releasing very similar games, sequels, and so on (White, 2009), assuming that players have already played other games in the same genre. Gamers are assumed to have built experiences around particular genres; often it is enough to refer to "RPG", "shooter", and so on in order to recall the relevant skills, expertise, and strategies long-term gamers have built over years of experience. In the below example, players are expected to fully "experiment" with the controls in order to figure out how to manipulate their players. Experimental, or discovery learning can cause difficulty for beginning learners (Sweller et al., 2007).

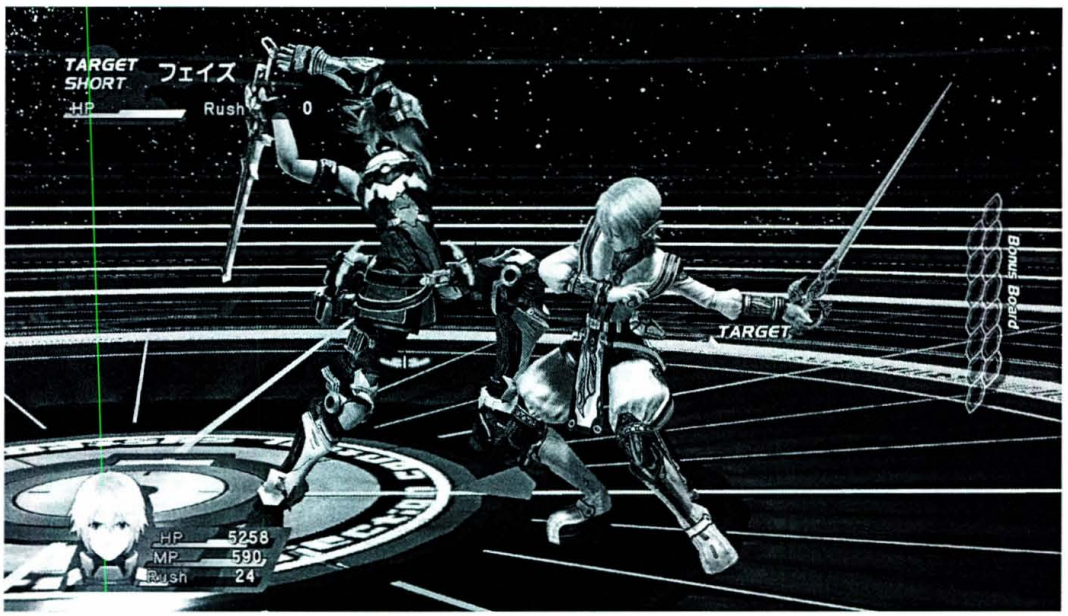

Figure 4. Screenshot from STAR OCEAN: THE LAST HOPE. In this screenshot, the player character (left) is "learning" to attack enemies (right). No help system is displayed, and the player is expected to press buttons in full experimentation. This kind of "discovery learning" has been criticized as being detrimental to beginning learners (Sweller et al., 2007).

Tutorials leave out basic information such as camera controls, movement controls, menu navigation, and other skills necessary to

play the game; this is based in the assumption that the players would not want to be burdened with this kind of rudimentary instruction. The interface's programming does not seem to respond or provide feedback when players are having trouble with these basic concepts and makes no attempt to determine player skill level. In STAR OCEAN: THE LAST HOPE and other games, the help is also not included in the menus of the game, leaving players completely without instruction.

The kind of discovery learning illustrated in Figure 4 is by no means an exception. Numerous games employ absolute discovery learning in their approach to novice players. Many games begin in the middle of a fight or difficult situation that the player must traverse with no prior knowledge. In BAYONETTA, players are quite literally "dropped" into a fighting situation with no instructions regarding the control or movement of their player character, as is illustrated in Figure 5.

Figure 5. Screenshot from BAYONETTA. The player character (centre) has just begun the game, and is placed directly into combat on a piece of building material falling through the air. No instructions are provided.

This is also true of games aimed at younger audiences and non-traditional "gamers". Figure 6 illustrates LEGO INDIANA JONES (2008), like BAYONETTA, this game drops the player directly into gameplay with very few instructions.

Figure 6. Screenshot from LEGO INDIANA JONES. While some instructions are given, basic material such as how to move, how to open menus, how to jump, or the object of the game are left out. This knowledge is assumed of the player.

Though some games make cursory efforts at scaffolding, or give the player options to turn tutorials on or off, no current example of a digital role-playing game that has fully implemented such an instructional strategy exists.

In contrast to the didactic tutorial designs typically found within contemporary digital games, innovative and efficient tutorial systems are beginning to emerge. A contemporary example is HEAVY RAIN (2010), shown in Figure 7, which starts players with benign tasks and on screen prompts that do not interrupt game action. The actions become more significant if players master them quickly, but continue to allow players to experiment if they are having trouble. There are no major penalties for failing to grasp the controls immediately. Tutorial systems such as this, built using scaffolding and cognitive apprenticeship models of teaching (Dennen, 2004), that are not "too didactic" (Hayes, 2005, p. 27) might allow future researchers to cultivate game skills in vivo without requiring "starting from scratch" by looking for old titles that had tutorials. HALF-LIFE (1998), for example, contained a full tutorial system, because it was one of the first extremely popular three-dimensional shooters. Previous shooter-

type games had been entirely two-dimensional, and thus game players lacked instruction in how to navigate in three-dimensional space. Because of this, the anticipated audience all required instruction in the novel control scheme.

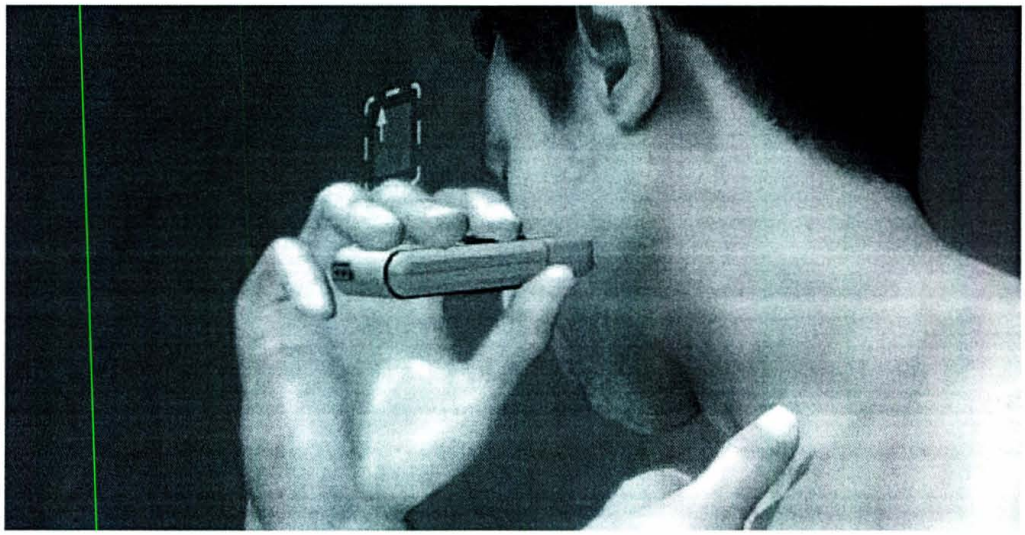

Figure 7. Screenshot from HEAVY RAIN. In this image, an onscreen prompt (arrow) is shown to instruct the player to use her controller to manipulate the shaver. If the player fails at this, the game reacts intuitively by slightly scratching the player character and showing the prompt again with highlighting. No major penalty for failure exists.

The better designed tutorials discard assumptions about players and introduce novel concepts such as movement controls in a way that is endogenous and non-threatening, such as in HEAVY RAIN in Figure 7. A further example can be found in FABLE II in Figure 8, which presents a trail that leads learners to the next objective when they are having trouble navigating the space.

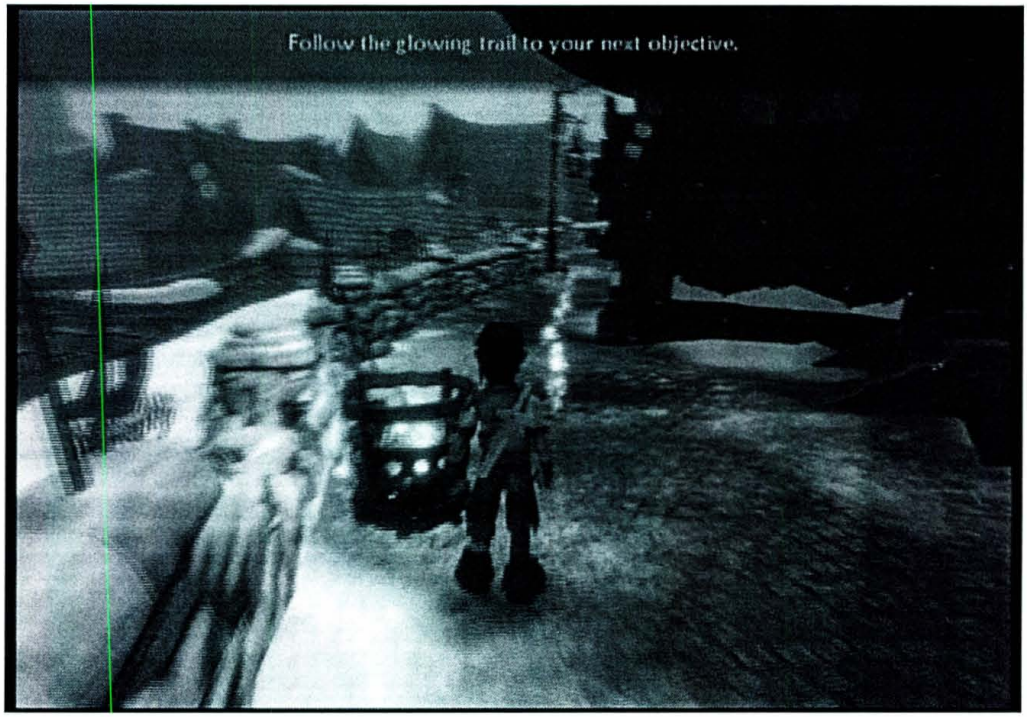

Figure 8. Screenshot from FABLE II. The player character (centre) is being directed to the next objective by a glowing trail that flickers on the ground. Advanced players can remove this feature.

A further consideration of modern digital game tutorial design is that novices will incur additional extraneous cognitive load than their expert counterparts, and thus may be more likely to disengage or lose interest in the content. Extraneous cognitive load occurs when material with high element interactivity is presented to the learner inefficiently, or without taking mastery level into account. This occurs when many things must be combined to be successful in the game; such as aiming, shooting, and walking simultaneously. High extraneous cognitive load leads to disengagement and lack of interest in material (Kirschner, Sweller, & Clark, 2006). Considering the demonstrated benefits to temporal sound cueing, two of the tutorials that have been designed employ the SSF Model (Mann, 2009) to use audio in meaningful ways so as not to overload the players' working attention.

The optional tutorial level.

A common practice in contemporary digital games is to create an optional "tutorial level" or section, which the player may choose to open if she is having trouble with the game. Problematically, without

knowing that such a tutorial level exists, many players attempting to navigate a game without the aid of an experienced friend or relative may mentally disengage from the game. Many novice players may in fact not understand enough about the control scheme to even manipulate the controller in such a way as to access the tutorial level.

Figure 9. Screenshot from ROCKBAND (2007). In order to access the tutorial, the player must successfully navigate to the home menu with the guitar controller with no instruction.

Figure 9 illustrates the "tutorial level" method of implementing tutorials in digital games. Other games have employed this method, such as NHL 2011 (2010) illustrated in Figure 10.

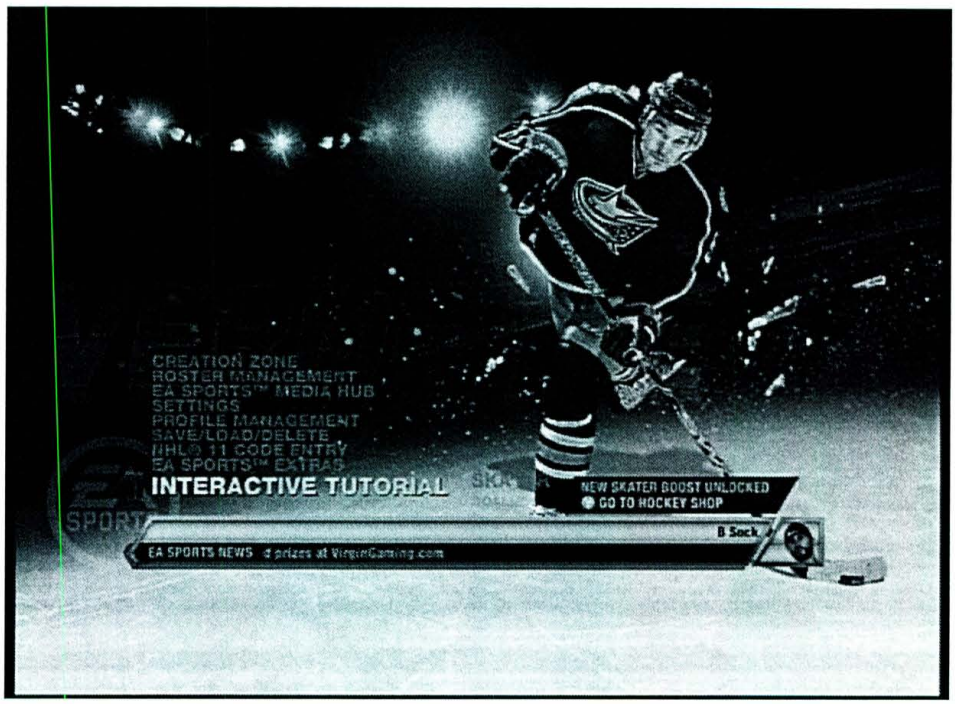

Figure 10. Screenshot from NHL 2011. Like in ROCK BAND, players must navigate the menu via use of the controller, before having received instruction on how to do so, in order to access the game's tutorial system.

Further compounding the problem for novice players wanting to play digital games is the absence of well-designed instruction within the tutorial strategies.

Instructional strategies.

Whether intentional or not, any tutorial system that appears on screen in a digital game employs some kind of instructional strategy. Many of these are stochastic (Mann, 2009) and do not take learner mastery, gender, or a variety of other factors into account, ignoring the difference between novice and expert play (Jenson et al., 2011).

Flashcard instructional strategy.

The flashcard instructional strategy is common in digital role-playing games, and in digital games in general. This instructional strategy provides the player with "pop-ups" which are similar to flashcards. Flashcards are often used to study memory-intensive subjects within a defined curriculum such as languages, math, science, medicine, law, and so on. Typically individuals will use flashcards for independent practise, or pairs of students will use them to practise

with one another. Traditional flashcards are note cards with a question, problem or fact on one side and the answer or a related fact on the other. In the context of digital games, flashcards take the form of on-screen pop-ups that display a piece of information about a game mechanic that the designers felt would be relevant to players. A flashcard can be anywhere on the screen, any size, shape, or colour. Pop-ups vary in application, but are mostly rather didactic in their approach to educating players.

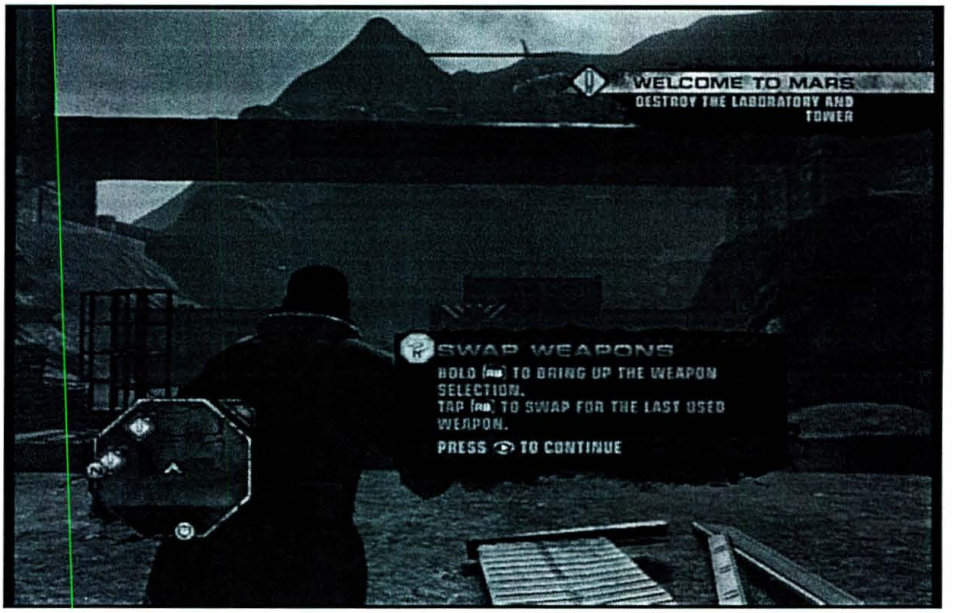

Figure 11. Screenshot from RED FACTION: GUERRILLA (2009). An example of the flashcard tips pop-up instructional strategy.

The image in Figure 11 displays the flashcard tips pop-up instructional strategy. Players are shown tidbits of context-relevant, but not necessarily temporally-relevant information via an on-screen pop-up. These pop-ups often interrupt gameplay, and are often exclusively visual. Flashcards such as these are often designed by intuition (Mann, 2009), based on the experiences and preferences of the designers.

Figure 12. Screenshot from WORLD OF WARCRAFT. An example of the flashcard tips pop-up instructional strategy found within WORLD OF WARCRAFT.

Figure 12 illustrates the pop-ups employed in WORLD OF WARCRAFT, the tutorial under examination and modification in this dissertation. Players are required to simultaneously attend to the task of reading and understanding the tutorial pop-up whilst avoiding in-game consequences such as death by enemy attack, loss of timed quest bonuses, disorientation in three-dimensional space, or removal from a player group due to idling. The pop-up also disregards information that might be useful to players with little to no prior gaming experience. In Figure 13, a pop-up from WORLD OF WARCRAFT illustrates to players how to move their characters using the mouse; this however leaves out information. Players can also move their characters with the keyboard, move the camera with the left mouse button, move both the camera and the player with both mouse buttons, and autorun with the middle mouse button. This is common in digital games, and information is often left out of the help system.

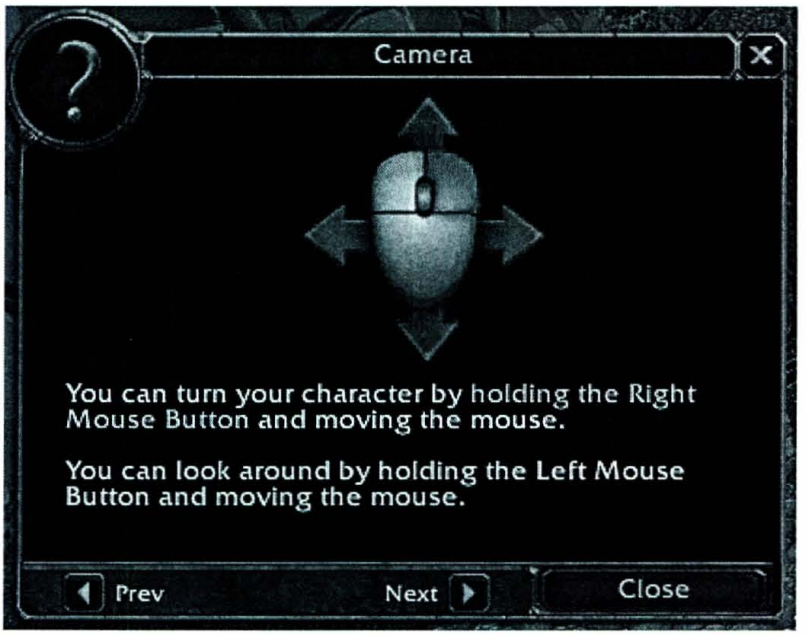

Figure 13. Screenshot from WORLD OF WARCRAFT. This instructional pop-up informs the player of some of the options available to move her character. Problematically, it leaves out a great deal of information.

Just-in-time scaffolded instructional strategy.

In this research, any instructional design strategy that provides decreasing instruction as learners' proficiency and mastery grows is defined as being partially or wholly scaffolded (Kennedy & Poi, 2011; Sun, Wang, & Chan, 2011). The removing of instructional material as

learners gain mastery is known as instructional fading (Burton, Moore, & Magliaro, 1996). Providing quick, relevant information as learners become frustrated or approach disengagement is known as just-in-time information (Thomas, 2011). These scaffolded instructions are consistent with the literature on cognitive apprenticeship (Jin & Corbett, 2011; Poitras & Poitras, 2011). Any digital game that employs some or all of these methods is employing a just-in-time, scaffolded instuctional strategy for the purposes of this dissertation. In the context of this research, "just-in-time" refers to the definition found in Dennen (2004) and Kuhn (2007), which refers to information provided just before learners become frustrated and mentally disengage. Some of the tutorial strategies and modalities designed in this thesis employ just-in-time audio and text, which is explained in greater detail later in this chapter. In the game pictured in Figure 14, the tutorials fade as players master the controls, an example of rudimentary scaffolding.

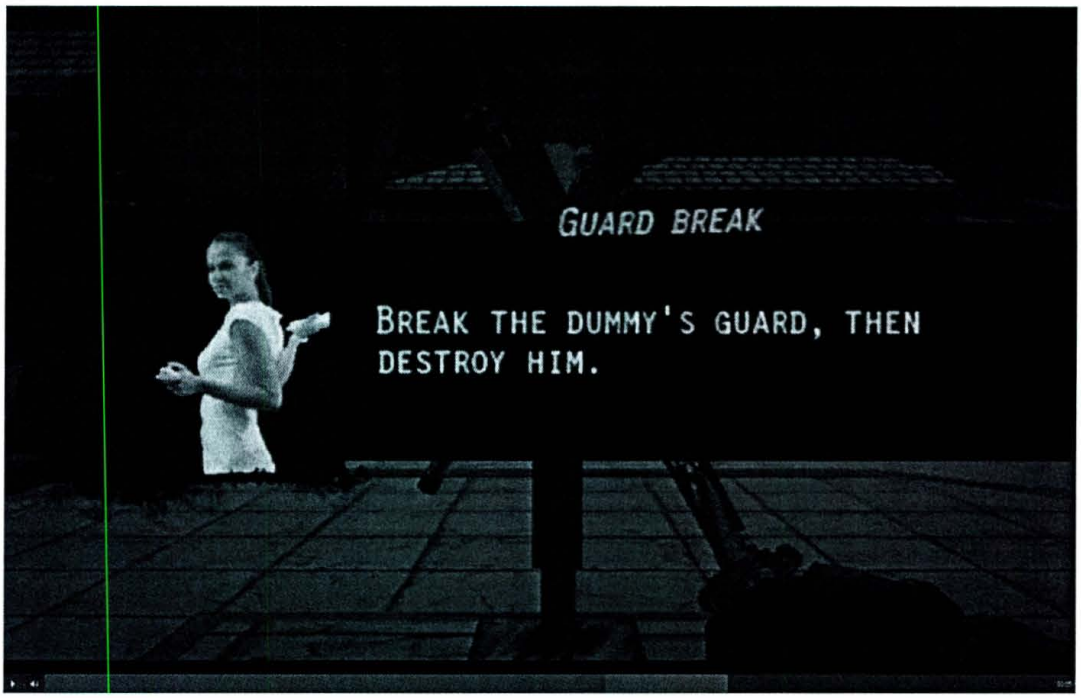

Figure 14. Screenshot from RED STEEL 2 (2010). In this screenshot, tips are displayed to the player in accordance with her skill level. As the player is more able to strike the target, the tips decrease. While this is still a tutorial level, it demonstrates the use of instructional fading in digital games.

In a JIT instructional strategy, players can expect instructions to occur in direct relation to their skill in playing the game, which the game itself detects through logical programming. Players who make more errors are greeted with more frequent and in-depth instruction, while players who make few or no errors are not burdened with superfluous instruction.

Tutorial Development

This section explains the development of the three new tutorials for WORLD OF WARCRAFT. It also explores the design of the existing WoW-Flashcard tutorial packaged with WORLD OF WARCRAFT. An overview of programming and design for WORLD OF WARCRAFT is given with examples. The chapter ends by specifically outlining the design of the new tutorials to be evaluated in this dissertation, and provides the formative evaluation plan for that work.

Instructional Design in WORLD OF WARCRAFT

Instructional design has a long history. Reiser describes the field of instructional design and its interactions with technology as:

> The field of instructional design and technology encompasses the analysis of learning and performance problems, and the design, development, implementation, evaluation, and management of instructional and non-instructional processes and resources intended to improve learning and performance in a variety of settings, particularly educational institutions and the workplace. (Reiser, 2001, p. 53)

The present study continues the trend of using instructional design in technology. By applying the instructional design theories previously discussed to the design of tutorials in WORLD OF WARCRAFT, this work is continuing the trend of applying instructional design to new and emerging technologies.

Recent research has applied instructional design to virtual and distributed worlds such as SECOND LIFE (2003) (Mayrath, Traphagan, Heikes, & Trivedi, 2011). The present study follows principles of instructional design with the intention of designing, and formatively evaluating tutorials for digital games like WORLD OF WARCRAFT.

There are many methods for designing instructional treatments

for distributed environments like WORLD OF WARCRAFT. One method, for example, would be to simply do "whatever works", based on the preferences, predispositions, and experience of the designers, ignoring player input altogether (Mann, 2009). There are however, several other extant principles and guidelines for designing instructional treatments, some better suited to distributed learning environments. In this research, and as previously stated, convergent temporal sound cueing from the structured sound function (SSF) model of instructional design (Mann, 2008) was used to develop the new tutorials for novice players in WORLD OF WARCRAFT. The SSF model is a heuristic for applying sound to help users to control their attention to the visual events on the game user interface. An example of its use in WORLD OF WARCRAFT was to change pop-up tips away from using exclusively visual information and cues to present important information to players.

In-game, non-player characters were intended to be employed as "voices" in the modified instruction consistent with principles of embedding learning objectives and supports in games in as endogenous a manner as possible (Becker, 2007; Ciavarro, Dobson, &

Goodman, 2008). Principles of the use of sound in instructional media also informed the design of the tutorials (Higginbotham-Wheat, 1991; Mann, 2009; Mann, 2008; Mann et al., 2008). By imitating the voice of in-game non-player characters, the modifications to the tutorial were designed to be endogenous to game content. The character of Sylvanas Windrunner (a non-player character named in the game) was intended to be read by a voice actor for the participants who choose Horde characters, and Jaina Proudmoore (also a non-player character named in the game) was to be read for Alliance players. "Alliance" and "Horde" are the two factions, or teams in WORLD OF WARCRAFT. Regrettably, funding for additional voice acting was unavailable in a timely manner, and as a result, only one voice was imitated and used for both Alliance and Horde. Character and tutorial voices were female and employed in the instruction, providing context to novice learners, consistent with Higginbotham-Wheat (1991). The design was based on the approaches suggested in Mann (2008), which suggest a purpose and an effect for sound, in agreement with the SSF model described earlier.

Programming for *WORLD OF WARCRAFT*

WORLD OF WARCRAFT is a closed source game whose interface is modifiable. WORLD OF WARCRAFT's graphical interface is written in a language called Lua. The interface is responsible for the delivery of instructional content within WORLD OF WARCRAFT. Creating and implementing new tutorial strategies was primarily a matter of first learning Lua programming, and then learning its specific applications within WORLD OF WARCRAFT. The program snippet illustrated in Figure 15 iterates through a database of textual popups, and replaces them with speech cues. This is the essential function of the SSF-Flashcard tutorial. The full programming for the addons designed in this thesis is included in Appendix J. Much of the programming code used below was reused between the three tutorials programmed for formative evaluation in this thesis.

```
function TutorialEventFrame_OnUpdate(self, elapsed)
   if (nextEvent) then
      nextEvent = nextEvent - elapsed
      if (nextEvent > 0) then
         return
      end
      for i=0,60 do
         if tutorialTable[i] then
            playTutorialSound(tutorialTable[i])
            tutorialTable[i] = nil
            return
         end
       end
      if (nextEvent) then
         return
      end
   end
end
```

Figure 15. This function, found within the programming for SSF-Flashcard, replaces on-screen tutorial pop-ups with narration.

All modifications to WORLD OF WARCRAFT permitted by Blizzard Entertainment operate in a similar manner to the example shown above. Modular "add-ons" are a popular and common addition to skilled gameplay practices in MMORPGs. WORLD OF WARCRAFT addons are typically downloaded from third-party sites not maintained by Blizzard Entertainment, as they are not officially supported.

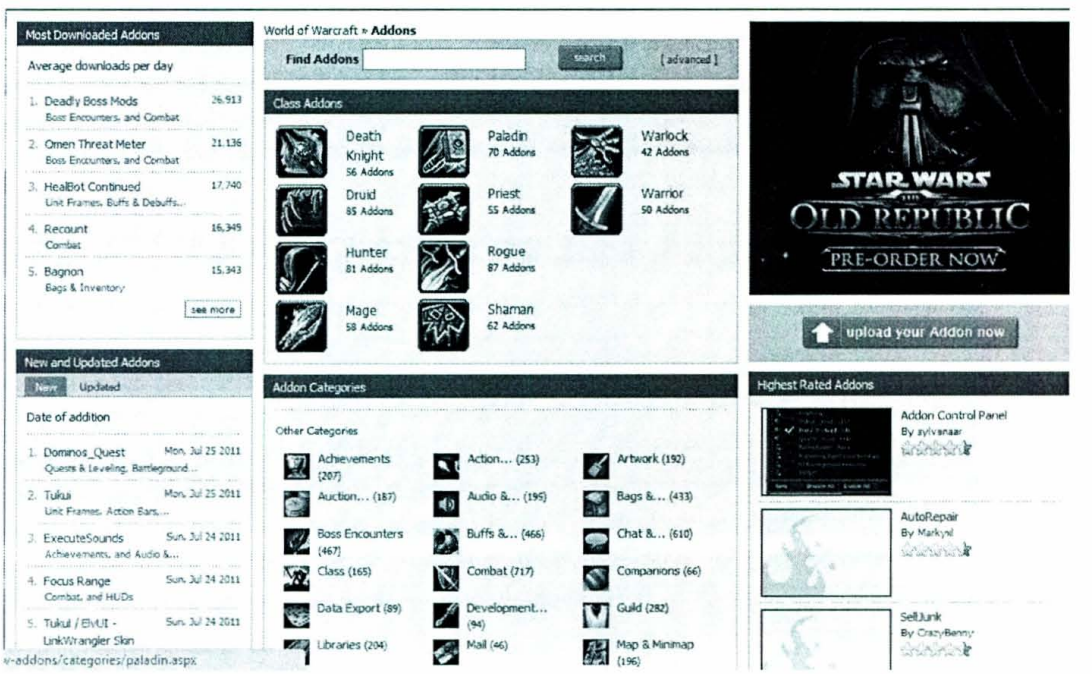

Figure 16. Screenshot from wow.curse.com. This site maintains a massive database of addons, or "mods" for WORLD OF WARCRAFT. The use of these addons, while not officially supported by Blizzard Entertainment, Inc., is part of what characterizes skilled play in MMORPGs.

The Four Tutorials

In this thesis, the instructional strategies component of the Dick, Carey, and Carey (2011) model of formative evaluation refers to the four tutorial systems. These are WoW-Flashcard (the default WORLD OF WARCRAFT tutorial), WoW-JIT, SSF-Flashcard, and SSF-JIT.

The WoW-Flashcard tutorial.

This was the default WORLD OF WARCRAFT tutorial at the time of writing. The WoW-Flashcard tutorial assumed that the player had a relevant background in games, and ignored player skill in that it did not interrogate the players' levels of proficiency, play styles or play history, nor did it provide scaffolding or just-in-time solutions. Sound was either not used, or simply played noises. With no changes having been made to the instructional design or modality of the tutorial, and no changes to the software, this strategy acted as a baseline for novice players attempting to play WORLD OF WARCRAFT. An example of a WORLD OF WARCRAFT flashcard popup is illustrated in Figure 17. A transcription of all of the WORLD OF WARCRAFT flashcards is included in Appendix I.

Figure 17. Example of a WORLD OF WARCRAFT Flashcard. This particular flashcard instructs the player in how to use her ranged weapon.

As this is the default WORLD OF WARCRAFT tutorial, no development changes were made. The tutorial therefore did not change between the three stages of the formative evaluation, unlike the remaining three.

The WoW-JIT tutorial.

Unlike the WoW-Flashcard tutorial, WoW-JIT involved fading the tips as the players' skills improved. Key information about gameplay objectives, controls, and other relevant information at the point of disengagement was also provided to players. Players were not burdened with tips if they accomplished tasks on their own, and contrarily, they were provided just-in-time solutions if they performed erroneous behaviours for an extended period of time. The WoW-JIT tutorial also employed the visual (WoW) modality, and did not employ the sound modality (SSF). The flashcards from the WORLD OF WARCRAFT default interface were used, however, the flashcards were faded (Dennen, 2004) as the instructional material became less relevant.

In terms of programming, the fading of instructional flashcards and just-in-time effects were achieved through a very long series of "logic checks". These logic checks probed for behaviours and caused the software to react to the learner accordingly. In Figure 18, learners are presented with a tip on how to use their "hearthstone", an item that returns them to the beginning area of the game, after they have

failed to do so several times.

```
if (event == "UNIT_SPELLCAST_INTERRUPTED") then
    local _,m,_ = ...
    --> Tip 30: Hearthstones.[Shows up if players cancel the
hearthstone a few times]
    if (m == "Hearthstone") then
      if not t[30] then
        tFail[30] = tFail[30] + 1
        if (tFail[30] > 3) then --> if players interrupt the hearthstone
3 times
          JIT_Trigger(31)
          t[30] = true
        end
      end
    end
  end
```

Figure 18. This program snippet, located within the programming for the WoW-JIT tutorial strategy, shows players a tip after they have repeatedly performed an erroneous behaviour.

An individual "logic check" such as the one in Figure 18 was written for each of the over fifty tutorial pop-ups included with WORLD OF WARCRAFT. By doing this, the only modification to the initial WORLD OF WARCRAFT tutorial is the instructional strategy. While the tutorial flashcards themselves remained unaltered, the instructional strategy through which they were displayed was changed from a "whatever

works / stochastic" (Mann, 2006) instructional strategy, to a just-in-time scaffolded instructional strategy (Dennen, 2004).

The SSF-Flashcard tutorial.

In contrast to the previously described WoW-JIT tutorial, the SSF-Flashcard tutorial retained the "whatever works / stochastic" (Mann, 2006) instructional strategy, however, as opposed to a visual modality, sound was employed consistent with Mann's (Mann, 2009) concept of temporal sound cueing through an audio interface modification to the script files of WORLD OF WARCRAFT. In this way, the material altered its modality to avoid the split attention effect (Chandler & Sweller, 1992; Moreno & Mayer, 2000; Tarmizi & Sweller, 1988), but retains its flashcard strategy of instruction. The following code snippet illustrates how the internal WORLD OF WARCRAFT tutorial event was captured, and then recoded to a sound file spoken by an actor.

```
function playTutorialSound(id)
   PlaySoundFile(id)
   pendingSounds = pendingSounds -1
   nextEvent = RING_INTERVAL
end

function TutorialEventFrame_OnUpdate(self, elapsed)
   if (nextEvent) then
      nextEvent = nextEvent - elapsed
      if (nextEvent > 0) then
         return
      end
      for i=0,60 do
         if tutorialTable[i] then
            playTutorialSound(tutorialTable[i])
            tutorialTable[i] = nil
            return
         end
       end
      if (nextEvent) then
         return
      end
   end
end
```

Figure 19. This snippet, taken from the SSF-Flashcard tutorial, illustrates how tutorial pop-ups are suppressed and recoded to narration through Lua programming.

This simple function captured the existing WORLD OF WARCRAFT flashcards, suppressing their visual appearance, and playing a voice recording of the tutorial instead. The audio script for the tutorials was included with the flashcards in Appendix I.

The SSF-JIT tutorial.

SSF-JIT was a combination of both the modifications to the instructional strategy (WoW-JIT), and the modifications to the modality (SSF-Flashcard) of the tutorials in WORLD OF WARCRAFT. SSF-JIT was the final and most difficult to program of the three new tutorials, employing both modifications found in the previously described tutorials. Sound in the form of temporal sound cueing was employed consistently, according to SSF design guidelines (Mann 2009). In addition, players saw faded or reduced tips as they improved in skill, and temporally relevant information in an attempt to eschew disengagement (Dennen, 2004).

Formative Evaluation Plan

A formative evaluation of four tutorials in WORLD OF WARCRAFT was conducted in accordance with an established formative evaluation model (Dick, Carey, & Carey, 2011). The four tutorials evaluated were: SSF-JIT, SSF-Flashcard, WoW-JIT, and WoW-Flashcard. The formative evaluation also included an ongoing evaluation in the form of

long-term delayed post-tests. Many doctoral dissertations have developed and formatively evaluated instructional materials as the focus of their research. Kinser's (2004) work described the development and formative evaluation of "Computer-Assisted Remediation for At-Risk Nursing Students", which dealt with designing a computer tutorial system for a set curriculum. Unlike the present study, this strictly involved teaching materials. Other studies have formatively evaluated online learning materials (Gasper, 2003). This formative evaluation, like the present study, took the form of both developing and evaluating new materials for an existing curriculum – in this case nursing. Finally, Costello's (2002) thesis focused on the development and formative evaluation of an Electronic Portfolio Template System, perhaps the most similar to the present work. The development and evaluation of an entirely new system from the ground up, as well as evaluating new materials for existing curricula are all part of the capabilities of formative evaluation.

Phase 1 consisted of a quality review by an instructional designer and a subject matter expert, described in chapter four. A quality review invites expert third parties to examine the prototype

instructional materials, in this case, the three new tutorials for WORLD OF WARCRAFT. Phase 2 was a pilot test of the prototype tutorial strategies and modalities with learners described in chapter five. In a formative evaluation, the pilot test seeks to eliminate correctable errors before evaluating the effectiveness of the instruction in the field test (Dick et al., 2011). Finally, phase 3 was a validation and comparative study of the tutorials, described in chapter six. This took the form of a field test designed to evaluate the efficacy of the new tutorials in effecting changes in players' skill, motivation for play, and game engagement.

Phase One: Review by Experts

Phase one of the formative evaluation was a review of all three new instructional prototypes by both a subject matter expert and an instructional designer. The role of this review was to eliminate errors that the initial designer may have overlooked. While these suggestions were not necessarily implemented in full, they were intended to sensitize the designer to potential problems before the remainder of the formative evaluation was undertaken with learners.

Phase one is described in detail in chapter four.

Phase Two: Pilot Test

The purpose of the pilot test is "to identify and remove the most obvious errors in the instruction, and to obtain initial performance indications and reactions to the content by learners" (Dick, Carey, & Carey, 2011, p. 258). Following the review by a subject matter expert and instructional designer, a pilot test of the four tutorials was conducted with four learners randomly assigned to one of the tutorials each, and allowed to play it for ten hours. Phase two is described in detail in chapter five.

Phase Three: Field Test

The final stage of the formative evaluation undertaken in this dissertation was the small group evaluation, which is also known as the "field test". The field test has two primary purposes, to "determine the effectiveness of changes made following the [pilot test], and to identify any remaining learning problems that learners may have. The second purpose is to determine if the learners can use the instruction

without the instructor" (Dick, Carey, & Carey, 2011, p. 258). This stage involved an additional twelve learners, again randomly assigned to one of the four tutorials, and allowed to play for ten hours. The third and final phase of the formative evaluation undertaken in this dissertation is discussed in greater detail in chapter six.

Next in this chapter is a chronology of the formative evaluation for the three new tutorials for WORLD OF WARCRAFT. The purpose of adding a chronology table here is both to aid readability, and to make the formative evaluation easy to replicate for future study.

Chronology of the Research

Figure 20 illustrates a flow chart of the research undertaken in this dissertation. Each of the stages explained above are graphically illustrated to aid in comprehension.

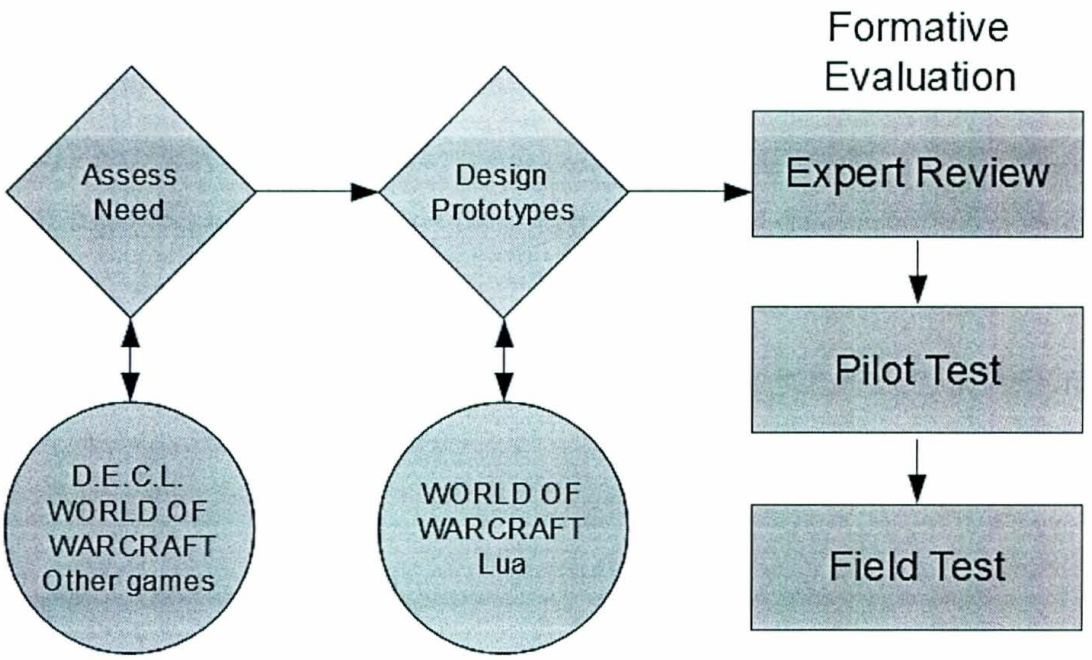

Figure 20. Flowchart of the formative evaluation.

Table 1 lays out a chronology of the research that was undertaken in this dissertation with the intention of aiding clarity of reading and comprehension. This table is presented to aid in reading the following chapters, which explore each of these steps in greater detail.

Table 1.

Chronology of the formative evaluation.

No.	Stage	Duration	Resources
1	Local need assessed	3 Weeks	Subject Matter Expert (SME), Paper Forms, Web Forms
2	Evaluation documents drafted	1 Month	Word processor, Library
3	Ethics approval sought	3 Weeks	Council for Ethics on Human Research
4	Studied / Practiced Lua	2 Months	Lua Compiler, Books
5	Instructional design of the tutorial strategies completed	5 Weeks	Screen capture software, Word processor, SME
6	Software development of tutorial strategies completed	3 Months	*WoW*, Lua Compiler, Books, PC, SME
7	Word of mouth recruitment of participants completed.	3 Weeks	MUN
8	Personal testing and debugging of software completed.	2 Weeks	*WoW*, Lua Compiler, PC
9	Space rented in university to recruit further participants.	2 Weeks	Paper forms

10	External quality review of software completed	5 Weeks	SME, Email, FTP Programs
11	Participants for pilot test randomly selected	1 Hour	Paper forms
12	Schedule arranged for pilot test with four participants	3 Hours	Participants, Forms, Timetables, PCs
13	Quality review feedback bugfixing and revisions completed	2 Weeks	SME, Instructional Designer, PC, *WoW*, Lua Compiler
14	Pilot tests conducted with four participants	2 Weeks	Participants, *WoW*, PC, Interview and questioning forms
15	Pilot test data collected and analyzed	2 Weeks	Pilot test data, PC, Forms
16	Pilot test report drafted	1 Month	Pilot test data, PC, Word processor
17	Pilot test data bugfixes and changes implemented	3 Weeks	Pilot test data, PC, *WoW*, Lua Compiler
18	Field test schedule arranged with remaining participants	2 Weeks	Internet cafe and staff, participants, timetables, forms

19	Internet cafe booked for arranged schedule	1 Week	Forms, Internet cafe staff and manager
20	Funding received from DELT	N/A	N/A
21	Field test and associated play sessions conducted	15 Days	Forms, Internet cafe, staff, and manager, interviews, participants, *WoW*, PCs
22	Data analysis conducted	4 Weeks	Field test data, SPSS, PCs, Forms
23	Post tests conducted via secure website	8 Weeks	Internet forms, Participants
24	Dissertation writeup completed	~1 Year	Word processor, supervisory committee

4. PHASE 1: THE EXPERTS' REVIEWS

Expert reviews serve to sensitize the researcher to errors in either the programming or the design that may have otherwise been overlooked. This phase of the formative evaluation contributed to the overall goal of the dissertation by ensuring that the prototype tutorials were as well-designed as possible before proceeding to the pilot test. Finally, the results of the quality review by subject matter and instructional design experts is described in detail.

Quality Review

A quality review of the instructional materials, in this case the three new tutorials, was carried out by a subject matter expert and an instructional designer. This section describes line 11 of the chronology of research laid out in chapter three.

Review by Subject Matter Expert

Dick, Carey, and Carey (2011) argue:

> [...]it is invaluable to the designer to get others to review what has been developed. One type of reviewer is usually a person outside the project who has special expertise in the content area of the instruction. This subject matter expert (SME) should comment on the accuracy and currency of the instruction. (p. 257).

In the context of this work, a subject matter expert (SME) was someone who had extensive experience designing games, particularly in an academic or educational setting. As some of the primary work being undertaken in this work involved designing new tutorials for WORLD OF WARCRAFT, an individual who has worked with WORLD OF WARCRAFT particularly was of special value. The SME commented on the currency and accuracy of the instructional prototypes with a particular focus on game design principles.

Review by Instructional Designer

An instructional designer acted as a specialist in the types of learning outcomes and instructional methods used in the design of the tutorials. This evaluator commented specifically on the instructional

strategies present in the new tutorials. An instructional designer who had particular experience in dealing with novice learners of digital games, particularly WORLD OF WARCRAFT was sought. This instructional designer commented on the instructional strategies being used in the three new tutorials designed in this work.

Subject Matter Expert (SME): Nis Bojin

Nis Bojin was consulted as a subject matter expert for the use and design of digital games, particularly MMORPGs. Bojin was a Ph.D. Candidate at Simon Fraser University's School of Interactive Arts and Technology whose research focuses on player discourse in Massively Multiplayer Games such as WORLD OF WARCRAFT. Bojin has worked as a game designer for companies such as Z2H Media, SRI International, Canadian Broadcasting Corporation, York University, and the National Screen Institute. Bojin's nearly ten years of work in game design, and his years of research on Massively Multiplayer games made him an ideal candidate to review the prototype tutorials to be used in this doctoral dissertation.

Instructional Designer (ID): Dr. Nick Taylor

The instructional design expert was Dr. Nick Taylor, York University, Canada. Taylor was a postdoctoral research fellow at York University's Faculty of Education in Toronto. His primary research interests include educational game design, research methodologies, and online games. Taylor's dissertation focused on professional gamer culture, and he has worked in educational design for nearly ten years. His professional and academic work as an instructional designer, and his particular work on Massively Multiplayer Games, and designing educational systems for games made him an excellent candidate to review the instructional design choices made in the prototype tutorials.

Recommendations and Revisions

Both the subject matter expert and the instructional design expert were invited to play through the four tutorials, including the unaltered WoW-Flashcard, at their leisure. They were asked to take notes on whether the presented prototypes were consistent with contemporary work in their respective disciplines. The instructional design expert was instructed to determine whether or not the designed

tutorials were consistent with principles of instructional design, such as adherence to the SSF model. The game design subject matter expert attempted to determine whether or not the new tutorials significantly denigrated the experience of gameplay. All recorded conversations with the SME and ID expert were transcribed, and the notes retained.

Neither expert suggested major changes to the design of the new tutorials. The full text of both experts' recommendations is available in Appendix G. Dr. Taylor had difficulty installing the tutorials, and was unable to install them prior to the testing date. This problem was caused by programming errors, and is thus reported as a limitation of the study.

5. PHASE 2. THE PILOT TEST

Chapter five of this dissertation provides a report on the second phase of the formative evaluation of three new tutorials for WORLD OF WARCRAFT undertaken in this dissertation: the pilot test. The pilot test consisted of a trial run of the four tutorials with four learners. The pilot test was used to determine the effectiveness of changes made following the quality review and to identify any problems that learners may have had. Additionally, it was used to determine whether or not learners can use the instruction without interacting with the researcher (Dick, Carey, & Carey 2011, p. 266).

This chapter first describes the procedures of the pilot test, and provides a chronology. It then illustrates the instruments used to assess variables contributing to play mastery as examined in this formative evaluation. Finally, the results of the pilot test are discussed.

Procedure

A pilot test was conducted with representatives of the target audience to assess clarity, impact, and feasibility. The procedure is more comprehensively represented in Table 2 to show the chronology of the pilot test undertaken for the new tutorials for WORLD OF WARCRAFT.

Table 2.

Chronology of the pilot test.

No.	Event	Duration	Method	Outcome
1	Obtained stratified sample by prior MMORPG experience	1 Week	Entry interview	(n = 4)
2	Explained the procedure to four participants	1 Hour/ea	From script	Nil
3	Determined their play skill through gameplay observations	10 Hours/ea	N/A	Varying levels
5	Probed for feedback using protocol analysis	During play	Yee (2006)	Many prompts
6	Recorded idle time data	During play	Software	S = 9.9 $\overline{X}$ = 11.0
7	Recorded play data	During play	Software	S = Death:1.3 GS: 22.9 Exp: 8.5 $\overline{X}$ = Death: 6.5 GS: 40.0 Exp: 17.5

8	Administered questionnaires	1 Hour/ea	Yee (2006), Brockmeyer et al (2009)	*See below*
9	Interviewed players after sessions	1 Hour/ea	Yee (2006)	*See below*
10	Probed for playability concerns or revisions	1 Hour/ea	Unscripted	*See below*
12	Took notes on how prototypes could be revised	1 Hour/ea	Unscripted	*See below*

The purpose of adding a table to outline the chronology of the pilot test is to clarify the process, provide the outcome, and make these evaluations easily repeatable. The following section explains the assessment instruments used in the pilot test, many of which were also used in the field study, the final step of the formative evaluation.

Sampling the Population

Participants were selected from the same pool as those participants to be used for the field test. Participants were novice

game players selected by email, in-person requests, and advertisement in the local university. Individuals aged 18 to 27 were invited to participate in the study. This was both to ensure participants were old enough to provide independent consent, and to capture the age of individuals for which the game was created based on its Electronic Software Ratings Board (ESRB) rating. An ESRB rating is a method of determining the appropriate "age content" of digital games, such as nudity or violence. Participants had a low to absent level of gaming knowledge, so as to eschew potential debate as to whether any differences present in the results were from the tutorials, or because of coincidentally choosing a group of people who play games frequently. Potential participants who had played digital MMORPGs in the past, such as WORLD OF WARCRAFT, FINAL FANTASY XI (2004), or EVE ONLINE (2003), were excluded from the study so as to maintain a consistent level of knowledge about MMORPGs between participants. Due to the high number of males who typically consume digital games, this sample was exclusively female as a matter of convenience and ease of access. Consistent with Mayer (2003), "when poorly designed instruction is presented, high-knowledge learners may

be able to use their knowledge to compensate, but low-knowledge learners cannot. When well-designed instruction is presented, high- and low-knowledge learners will both be able to understand the presentation" (p. 166). As there are four tutorials to evaluate, four of these participants were randomly selected for the pilot test.

Instruments

This section describes the research, evaluation, and development of the assessment instruments used in the pilot test stage of the formative evaluation undertaken in this dissertation. These instruments are also used in the field study, described in chapter six. It first outlines the instructional objectives using Dick, Carey, and Carey's (2011) process of "goal analysis", which is a method of identifying the desired outcomes of instruction, then describes the instruments in detail.

Instructional Analysis and Objectives

Before designing instruction, it is necessary to outline a set of goal behaviours that learners should possess after the instruction has been completed. In this dissertation, the variables under examination are play mastery, motivation to continue playing, and engagement with the game.

The goal of the new tutorials in this work is to help novice players who are new to MMORPGs and games in general move toward expertise in digital game performance. However, the goal of "becoming a good player" is rather vague. To clarify these goals Dick, Carey, and Carey's (2011) processes of goal analysis and skill analysis were employed to determine whether these skills are psychomotor, intellectual, verbal, or attitudinal in nature. Figure 21 illustrates the instructional goals, as well as requisite skills desired of learners after having completed the tutorials designed for WORLD OF WARCRAFT.

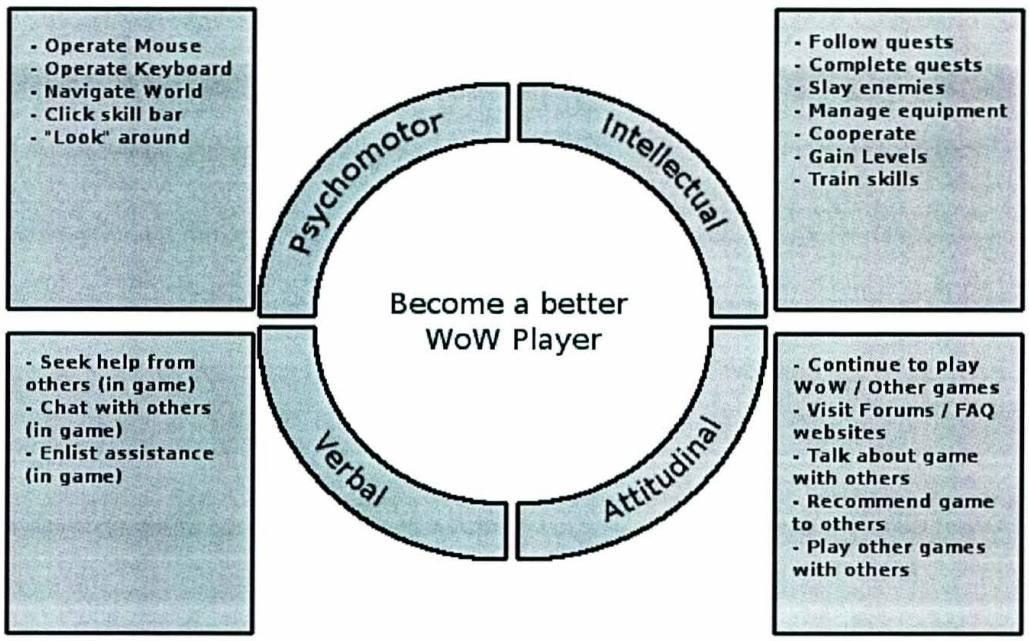

Figure 21. Instructional goal, domain, and subordinate skills (Adapted from Dick et al., 2011). The above image is sorted by domain, though the verbal domain is not strictly used in WORLD OF WARCRAFT, in that it does not recognize player vocal input.

For each subordinate skill there is a corresponding assessment instrument. In this study, each of the skills listed are measured by one or more of the assessment instruments that are outlined in the

following section.

Assessment Instruments

Assessment instruments are data collection tools used to evaluate the level of success learners had in reaching instructional objectives. The objectives and goals for the new tutorials were listed in Figure 21. This section describes the data collection instruments drafted for the purpose of assessment.

Entry skills assessment.

As stipulated in the formative evaluation plan found in chapter three, and consistent with Mayer (2003), only low knowledge learners were sought for the purposes of the formative evaluation. In approaching potential participants, those individuals who had previously played an MMORPG such as WORLD OF WARCRAFT were excluded from the study. This assessment was conducted verbally by the researcher.

Play observation.

As stated previously, during the pilot test, players were closely observed and asked to comment on the instruction, the game, the difficulty, and how the program was working. This took the form of the researchers sitting in close proximity to the participants and verbally asking for feedback. This form of observation is common in the pilot stage of formative evaluations (Dick et al., 2011). This kind of feedback was invaluable in improving the tutorials for the final stage of the formative evaluation described in chapter six. Being asked to comment on the game is the only assessment instrument employed in the pilot test that would not later be employed in the field study.

Protocol analysis.

Protocol analysis is a method of eliciting verbal reports from participants' "internal monologues" (Ericsson, 2006). When players illustrate behaviours that are of interest – in this case, falling idle from the game, a behaviour evident of disengagement – the researcher asks the participants to briefly describe what they are thinking or doing. According to Ericsson (2006), "[...] the closest connection

between actual thoughts and verbal reports is found when people verbalize thoughts that are spontaneously attended during task completion" (p. 227). In the context of this research, protocol analysis was used in this manner to "[elicit] non-reactive verbal reports of thinking" (Ericsson, 2006, p. 227). Participant utterances in response to researcher-driven probing were recorded and used in later data analysis. This data collection tool was employed both for the pilot test, and for the later field study.

Gameplay data collection.

As stated in chapter three, four play metrics were collected from learners' in-game avatars during the pilot test and field study stages of the formative evaluation: idle times, deaths, experience points, and gear score. They are outlined here.

Idle times.

Idle times are the number of times the player stops playing the game entirely. These are evidenced by either physically disengaging (removing one's hands from the keyboard/mouse), or by not

performing input: hands in place, but not pressing keys. Disengagement was noted by the researcher visually and recorded. At the end of a play-session, the numbers of times players idled were added to collect a total idles score.

Deaths.

Death is an undesirable outcome, even in games. In WORLD OF WARCRAFT, death results from failing to avoid enemy attacks until sufficient damage is sustained to bring about one's demise. Death punishes the player by making her run, as a ghost, from a nearby graveyard to her corpse. In terms of play metrics, repeated and frequent deaths illustrate failure to grasp tutorial concepts, or simply failure to be motivated to perform well in the game. WORLD OF WARCRAFT records the number of deaths experienced by a player, so this number is easily accessible by the researcher. The screenshot in Figure 22 illustrates the death consequence. Of note is the fact that the game literally "greys" out the screen, making the player feel alienated. Sounds of howling ghosts and wailing souls can be heard.

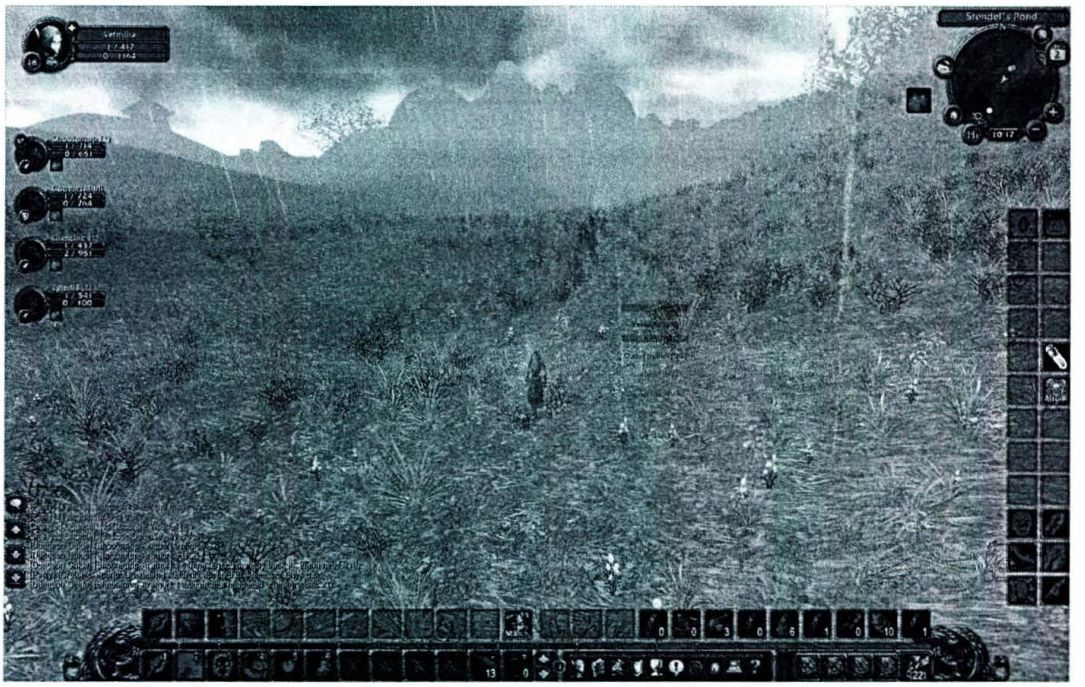

Figure 22. Death screenshot in WORLD OF WARCRAFT. The player must spend time locating her body. This is often a frustrating and time-consuming experience.

Experience points.

Experience points are a type of progress indicator in many RPG's, and particularly in WORLD OF WARCRAFT. Players gain experience points until they advance in "level", a measure of strength

and power within the game. Experience points are positive, begin at 0 and increase perpetually until a level of 85 is reached. The number of experience points a player gathers in a limited time – in this case the ten hour play window allotted to participants in both the pilot test and field study – is a measure of the degree to which they are learning from the tutorials, as players will gather experience faster if they illustrate goal behaviours, such as completing quests. Players who frequently die, wander off path, and ignore the tutorials will, however, receive fewer experience points in a limited time frame.

Gearscore.

Although the original plan was not to measure the improvised statistic known as "gearscore", it became apparent during the pilot test that those players who were spending time managing their in-game inventory, a behaviour indicative of high mastery of the game, would have less time to gain experience within the limited ten-hour play session. Because of this, it was decided that experience alone was not a sufficient measure of efficient use of play time. Idle times, deaths, and experience when taken together provided insight into the

variations in play habits and play mastery between groups. "Item level", as it is known in WORLD OF WARCRAFT, is a measure of the relative "power" of each of the players' items (such as a dagger or piece of armour). A rusty dagger would have a low item level (perhaps 3), whereas a sword spoken of only in legend would have a considerably higher item level (perhaps 50). Gearscore is measured by adding the item level of all of the players' items together, and gives a picture of the overall power of their character, and thus, mastery.

Instruments.

In addition to measures of in-game mastery collected from player characters as outlined above, participants were each presented with a variety of surveys and interviews. These are outlined below.

Game engagement questionnaire.

A peer-reviewed, established game engagement questionnaire was taken from Brockmeyer, et al. (2009) for use in the pilot test and field study stages of the formative evaluation. This is a highly reliable instrument, with item reliability of .96, and a Cronbach's alpha score

of .85 for the entire questionnaire. A full description of the reliability is provided in the Brockmeyer et al. (2009) work. The study of engagement in games is common, and is consistent with literature on game acceptance (Wang & Wang, 2008). Measuring player engagement during play sessions attempted to determine the difference, if any, that may have been present between tutorial groups.

Game motivations inventory.

A game motivations inventory – a type of test probing for different types of motivations to continue to play games – was taken from Yee (2006). This peer-reviewed instrument was tested on over 7,000 subjects in a longitudinal study of player types. According to Yee, motivation is broken down into several subtypes, such as domination, and achievement (2006). Yee's definition is founded on work by Bartle (1996) on players of Multi-User Dungeons, a precursor to MMORPGs like WORLD OF WARCRAFT. The definition of motivation to play as articulated by Yee differs from the traditional educational definition of motivation for learning. Other works on digital games and

learning have operationalized motivation for learning when a game is introduced (Cheng, 2009), however, this was not the intention of this study.

Unstructured interview.

Post-play interviews designed from the questions in the Yee (2006) game motivations inventory were also conducted. After analyzing the motivation questionnaire responses, participants were asked three questions based on emergent patterns in their responses. If a player showed a particularly high social motivation, for example, the question "you showed a very high social motivation, what is it about this part of the game that you enjoy?" was asked. This was in an attempt to triangulate data gathering methods, as well as gain further insight into player motivations. Interviews lasted approximately ten minutes each, and were conducted privately with participants directly after having completed all play sessions. The data was recorded manually by the researcher and examined using thematic analysis.

Referent situation test.

A referent situation test (RST) is a method for relating a desired outcome to a learning objective in the instructional design of the materials (Mann, 1997b). In this case, the referent situation was continuing to play digital games, or continuing to be motivated to play those games as evidenced by visiting game forums, discussing them, or suggesting them to friends. A post-play demographic and playership quiz (Yee 2006) was administered six weeks following the treatment, consistent with Mann (Mann, 1997b). This test probed for behaviours such as continuing to play games, visiting forums regarding games, and continuing to play WORLD OF WARCRAFT specifically.

Having illustrated the various instruments and data gathering techniques employed in the formative evaluation, both for the pilot test and field study, the following section outlines and discusses the sampling methods used to recruit participants, which were also employed in the later field test.

Results

It was initially expected that three out of the four tutorials would require revision. This is because the WoW-Flashcard version is the standard WORLD OF WARCRAFT tutorial packaged with the game, and it was not changed. The SSF-Flashcard tutorial contained the fewest changes to the original tutorial, as the text is directly transcoded to a voice. It was therefore expected that SSF-Flashcard would require the fewest revisions. SSF-JIT and WoW-JIT both use logic to determine what the player should be doing at any given time, and thus were considered more complex and prone to error. These expectations were confirmed not through expert consultations during the quality review, but through play sessions with the pilot group. The WoW-Flashcard tutorial required no alterations as expected, and surprisingly the SSF-Flashcard tutorial also required no revisions to its programming. As expected, program bugs were present in the logic of the JIT programming. The JIT coding is reused between the SSF and WoW tutorials, thus the programming errors present in one were present in both. Participants were unable to use the instruction without the

researcher in many cases due to programming errors and bugs that would halt the program. These errors were recorded and remedied before the field study. Fixing the errors between the tutorials was facilitated by the test-retest of the logic as the code was, as previously mentioned, reused between both SSF-JIT and WoW-JIT. SSF-JIT was pilot tested first, corrections to the programming were made, and then WoW-JIT was tested. Most errors in design were therefore resolved before the field study.

Programming errors were non-substantive, consisting primarily of syntactical anomalies, typographical errors, and errant semicolons. No major programming errors were found to be present in any of the designed tutorials. This does not, however, guarantee their absence. Given that the author-developed programs were not improved by a professional Lua programmer, the source code may indeed still be riddled with errors and inefficiencies: a limitation of this study discussed in greater detail in chapter six.

Data Analysis

Data collection was conducted, as discussed in the previous sections, through interview and survey data, as well as through play-data collection. As expected, the SSF-JIT tutorial emerged with the fewest idle times, the highest amount of experience gained, near fewest deaths, and greatest final gearscore in the pilot test. Idle time is discussed first.

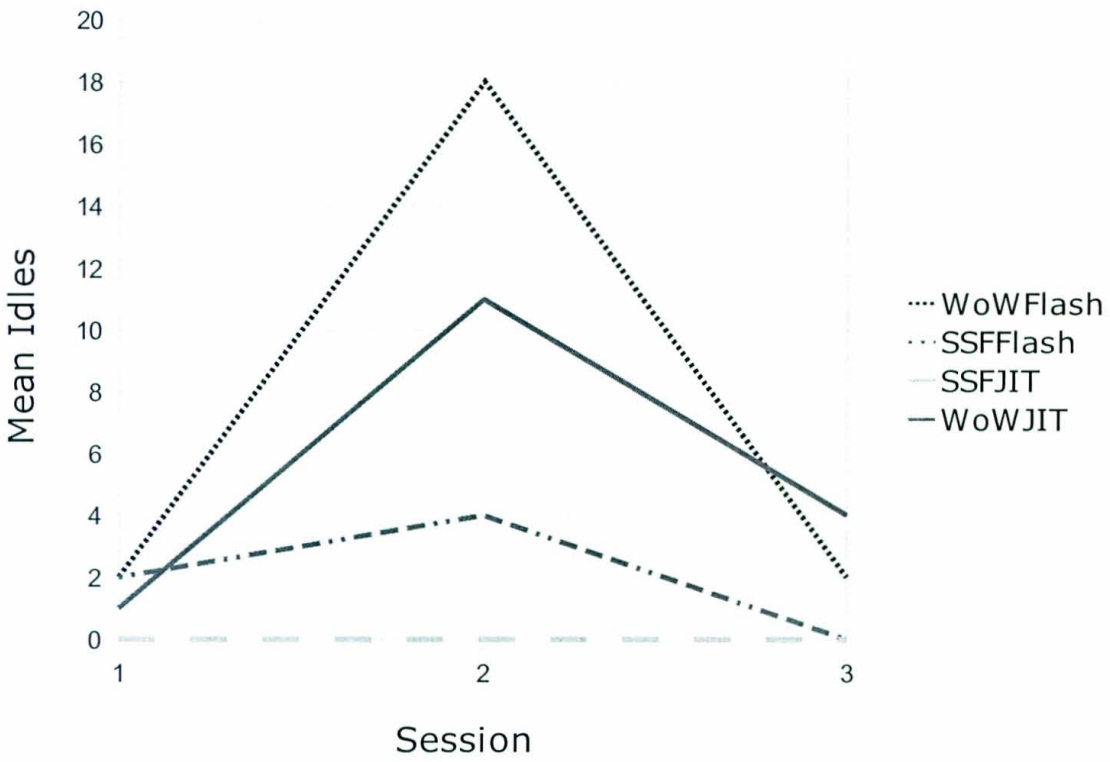

Figure 23. Idle times per session by tutorial.

As can be seen in Figure 23, both of the SSF modality tutorials incurred markedly fewer idle times per session than their visual counterparts. There is some evidence in these data to suggest that a difference in frequency of disengagement is effected by the change in the modality of the tutorial. In the idle times, there is little evidence

to suggest a difference between the strategies of instruction. The patterns above were consistent across the four participants in the pilot test; some idles in the first play, many idles in the second, and a marked lessening in idles during the third play. This curvature may suggest that the novice players in the pilot group tend to move from exploration, to frustration, to mastery. Observational data across all four participants showed higher mastery behaviours, such as managing inventory, skillfully executing quest objectives, less asking for help, and less disengagement. These observations suggest that the curvature of the idle times by session is due to an increase in mastery.

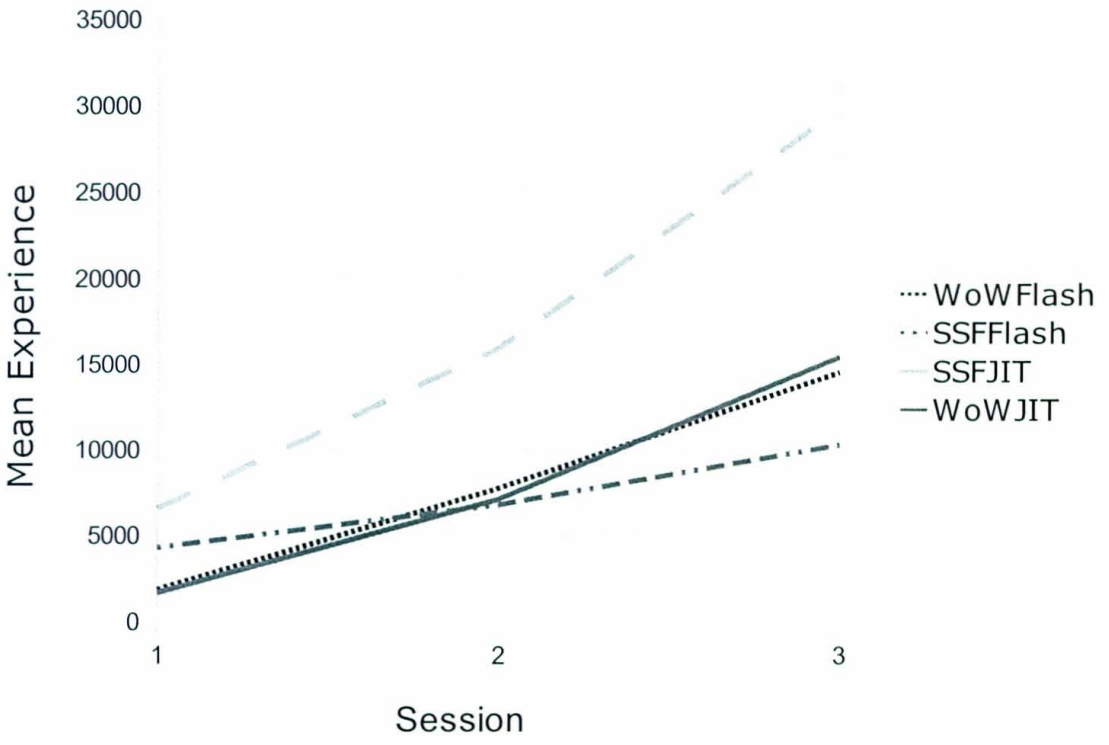

Figure 24. Experience points earned per session by tutorial.

Experience gain across sessions separated by tutorial is illustrated in Figure 24. While the SSF-JIT participant did emerge with the highest amount of experience, it is difficult to determine if this was a result of modifications to the modality and instructional strategy employed in the tutorials, or participant factors due to the small

sample size. While the remaining tutorials have less deviation, SSF-JIT is markedly different in both the rate of gathering of experience points, as well as the total experience points gathered. However, because the other three participants are so closely associated, this may indicate that the participant who had been randomly assigned to the SSF-JIT condition had previous knowledge of other types of games that added to her ability to gain experience. This was verified in qualitative observations and discussions, during which the participant talked about playing BORDERLANDS (2009), another RPG, though not an MMORPG, in which the gear-gathering system is somewhat similar. An attempt was made to gather a population with as little general game knowledge as possible, but particularly no knowledge whatsoever of MMORPGs. This may need to be more tightly controlled in future studies, though no current literature exists to suggest transfer of skill from one genre of game to another. From this aspect of the pilot data, there is insufficient evidence to suggest that the modality or method of instruction made a significant difference in players' mastery. The consistent upward sloping pattern visible across all conditions is due to the amount of experience required to advance to the next level

increasing with each successive level gained in WORLD OF WARCRAFT. As players gain levels, the amount of experience they gain per hour increases as well. It was assumed that all players in the field test would exhibit this pattern, as it is the result of an unalterable game mechanic present in WORLD OF WARCRAFT.

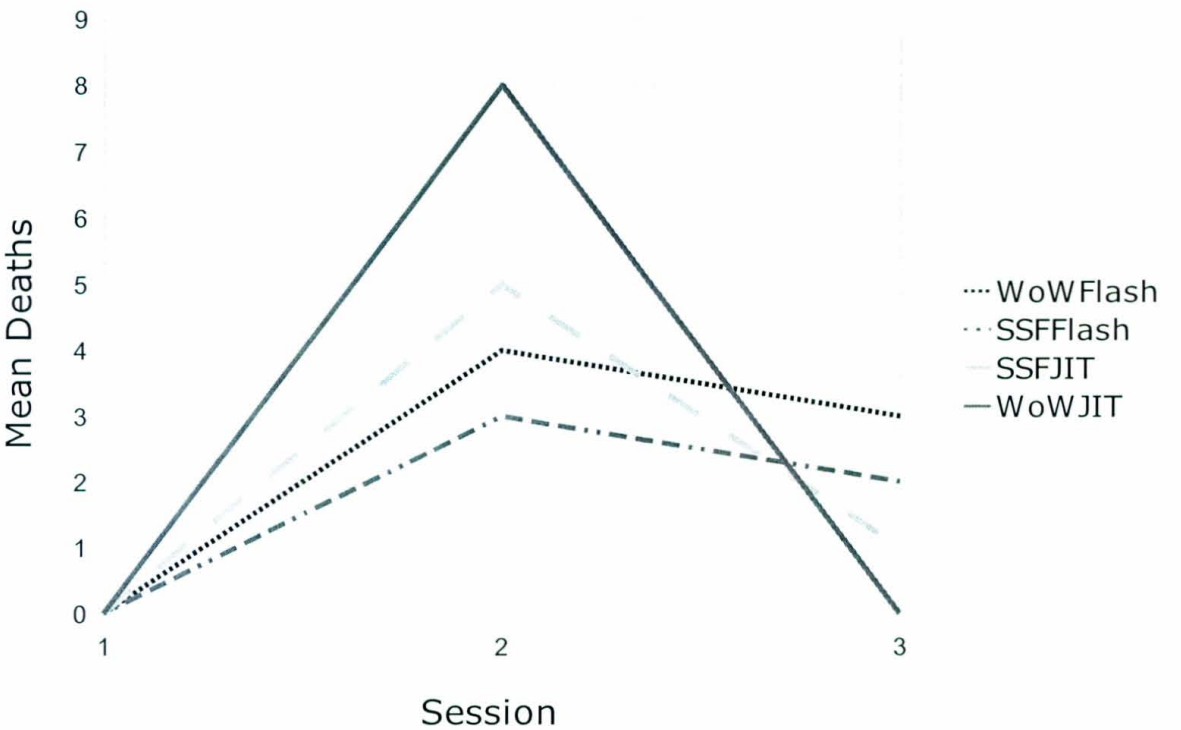

Figure 25. Deaths per session by tutorial.

Figure 25 illustrates the deaths per session incurred by the four pilot participants. Unlike in traditional games, death in an MMORPG is a part of playing. When a player dies, they are not presented with a "game over" screen, but must simply return to their body and continue playing, as previously illustrated. The lack of deaths in the first sessions is endemic to the game design; players start off in a very safe area, however, SSF-Flashcard and SSF-JIT seem to incur less overall deaths than their visual counterparts. This may indicate that auditory modality tutorials are more resilient to distraction and forgetting (Mann, 2008), thus preventing participants from performing injurious behaviours and dying. These findings are consistent with Mann's conclusions regarding overloading the auditory channel (Mann, 1997b). The similar curvature of data between groups is due to a mechanic present in WORLD OF WARCRAFT; as players gain experience, they reach a point where enemy monsters in-game become hostile – that is, they will attack players on sight. This is a deviation from the early points in the game, during which enemy monsters are passive, and will not attack players until they are attacked. Because of this, players incur the most deaths in their second session as enemies react to

them with hostility, and less deaths in their third session as they gain mastery and become more able to defend themselves. The rate of change is greater in the JIT groups than in the Flashcard groups. While this is only pilot test data, it may suggest that the JIT groups learned more quickly from mistakes than those using the flashcards.

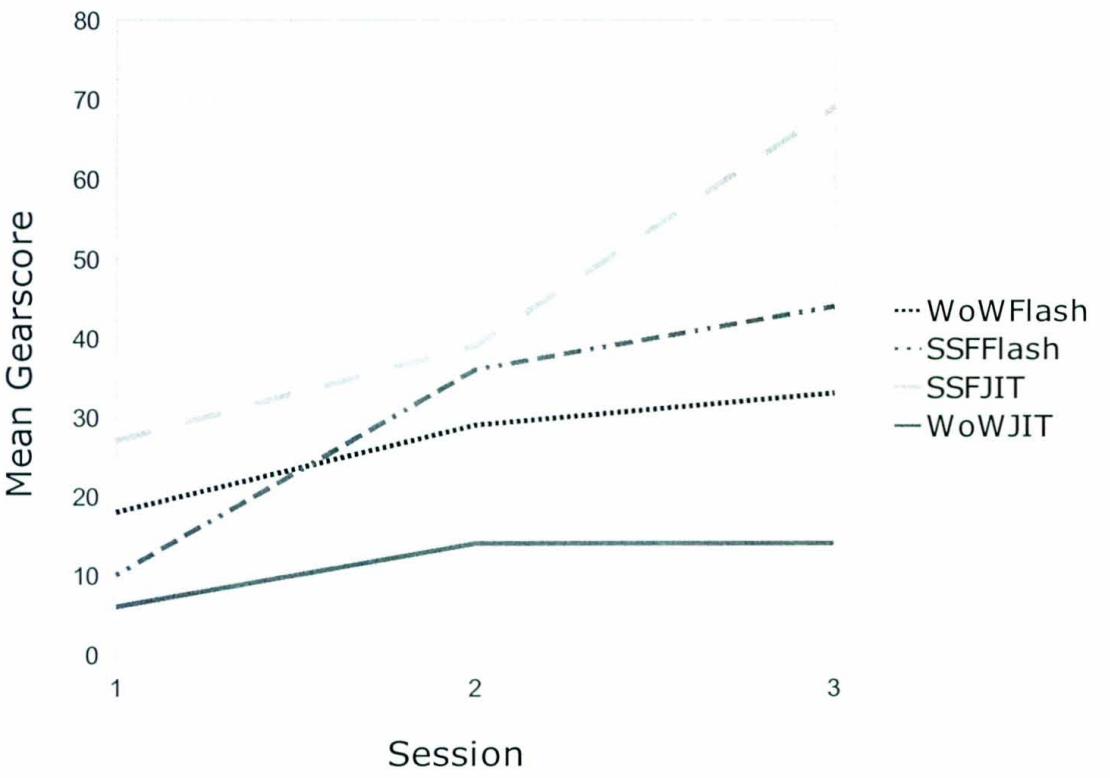

Figure 26. Gearscore per session by tutorial.

In Figure 26 the gearscore attained per session by group is illustrated. Gearscore is a measure of play mastery that is determined by adding together the individual item levels of pieces of "gear", or equipment that the character wears. Because item management is a mastery behaviour that results in less experience gained in a limited play time, gearscore must be considered along with experience points to get a clear picture of overall play mastery. In Figure 26, auditory modality has again made an apparent play difference. Both SSF-JIT and SSF-Flashcard not only had higher overall gearscores on completion, but the rate of change at which they increased their gearscore is also greater. The tutorials on how to find and acquire gear are consistent across all categories, and none of the participants were familiar with WORLD OF WARCRAFT's particular gear acquisition and rating system. This indicates a possibility that the participants were able to remember more of the tutorials than their visual counterparts in the remaining groups.

Engagement survey responses among the pilot test group showed similar results. Engagement scores are aggregated, as each question has a 1-4 Likert scale response. SSF-Flashcard showed the

highest aggregate engagement score (69.00), followed by WoW-JIT (52.00), SSF-JIT (49.00), and WoW-Flashcard (46.00). Motivation data was individualized between survey respondents and showed no emergent pattern related to the alteration of tutorial modality and strategy. Motivation data instead seemed to correlate with interview responses.

Survey responses, interview data, and post-test responses showed less emergent patterns than playdata collection. Interviews after the pilot test were created to interrogate the players' motivation as measured by the game motivations inventory. No patterns or thematic recurrences seemed to emerge, however. It is difficult to determine whether this is due to the lack of a meaningful effect, or because of the extremely small sample. Nevertheless, the pilot test data shows some emergent patterns in the playdata. Motivation data showed no significant link to modality or method of instruction, nor did post-test responses or delayed post-test attrition rates. Interview data seemed to strongly correlate with motivation responses in-game. That is to say, people with high social game motivations tended to report that they liked to be social in other activities. This was also true for

the other categories of motivational responses.

Delayed post-test data from the pilot test showed no significant difference in post-study interest in WORLD OF WARCRAFT, one participant continued to play the game from the WoW-Flashcard group. Thankfully, a 100% response rate to delayed post-tests for pilot test group members was achieved.

Limitations

Several limitations of this research became apparent during the pilot testing. They were rectified to the fullest extent possible before beginning the field test, however many of these are endemic to the research design, and not to the particular methods of implementation, programming, and so on. Limitations of the pilot testing will be discussed here, and overall study limitations are discussed in chapter seven.

Perhaps the most significant limitation that became apparent during the pilot testing was the absence of a professional Lua programmer. Lua is the language used by WORLD OF WARCRAFT for interface modifications, a group of modifications to which the tutorials

belong. Due to funding and budget issues, a professional programmer was not hired to create the new tutorials, and this left them relatively "buggy". Future studies might seek to enlist the skills of a professional computer science graduate with expertise in Lua programming. Despite this limitation, however, numerous bug fixes were made during the pilot testing procedures as previously described.

It also became apparent on several occasions that the situations in which the participants were playing WORLD OF WARCRAFT were somewhat contrived; a criticism levied against other game researchers, and against media learning research in general (Mann, 2008). One participant who could not find the map function openly stated that it would be unrealistic to assume that she would not ask her boyfriend or the people around her to show her where the map button was located on the screen. During the play sessions, participants were discouraged from talking to one another or to the researcher, taking away this level of realism. As a result, conclusions about novices' natural play may be difficult to draw, though that is not the intention of the study.

Though not a controllable limitation, it is unfortunate that an

unprecedented heat wave was also overtaking the city of the research at the time of the pilot testing. This made it uncomfortable for the participants in the pilot test. Discomfort may have had some effect on the outcome of the pilot test.

Finally, a limitation of participant factors became apparent. Some participants in the pilot test came to the group with different backgrounds in gaming than others. The study did not accurately control for past gaming experience in general, only for past MMO experience. Whether or not meaningful transfer occurs from one type of game (i.e. First Person Shooter) to WORLD OF WARCRAFT is currently unknown, however transfer from MMO to MMO has been shown to exist in certain circumstances (Taylor et al., 2011). Nevertheless, some participants seemed to have better mastery of the control scheme required of them immediately upon starting the game. That is to say, they oriented their hands in a position more evident of play mastery than some other participants. This included having one hand on the WASD keys and one on the mouse, typical of gamers, as opposed to placed on home row keys, typical of typists. A future study might use entry procedures that interrogate experience with all games,

not just MMOs.

Discussion

A marked difference between the four participants playing one of the tutorials, owing more to modality than to instructional strategy was observed between deaths, idles, and gearscore. There is also a marked difference in the experience gained category, however, it is difficult to grasp whether this is due to actual differences between participants due to the tutorials, or the effect of previous experience not volunteered on the part of that participant. It is also difficult to determine if the smaller effect due to instructional method is truly because of a lack of an effect, or because of programming errors. Despite these caveats, however, a large effect is seen between modality groups on playdata measures, even though the pilot test contained only four participants. These effects validate the feasibility of these new tutorial strategies and modalities by demonstrating a preliminary "difference".

The function of the pilot test in this study was both to locate and remedy any reparable errors before the field test, but also served to

examine whether the amount of time allotted to each participant (ten hours) constituted sufficient exposure to the game, whether differences would be present between groups, and whether modality or instructional method made any noticeable difference in groups. These pilot results should not be generalized to the population, or even the field study group due to the small sample size, however, as this is a formative evaluation and not a formal experiment, these sizes are common. Differences between groups in gearscore, experience, deaths, idle times, and motivations are apparent in the pilot data. For this reason, no major research design changes were implemented for the field test.

Overall, it would seem that enough difference existed between the playdata performance of participants between groups to justify further study, and through this difference it would seem that the differences in the four tutorials are significant enough to effect a change in mastery. The field test continued to examine the differences effected by the new tutorial strategies and modalities for novices learning to play WORLD OF WARCRAFT, now with new revisions in effect. These revisions are discussed in the following chapter.

6. PHASE 3. THE FIELD TEST

Chapter six is a description of the field test in this formative evaluation of new tutorials for novice gamers. The field test is the third and final stage of the formative evaluation model followed throughout this work. The purpose of this study was not to find differences between treatment groups as in a traditional experiment, but rather to recommend improvements to the WoW-Flashcard tutorial found in WORLD OF WARCRAFT. Although the original intent of the validation stage of the Dick, Carey, and Carey (2011) model is a field test of the intended audience, experimental methods were used for validation in cases where more than one treatment was used (Mann, 1994) The field test chapter represents the third and final stage of the formative evaluation process described throughout this dissertation. The chapter begins by first presenting the revisions made to the three new tutorials following the pilot test undertaken in chapter five.

Revisions

Following the pilot test, several improvements were made to the new tutorials. Notes were gathered on bugs occurring in the pilot test, as well as notes regarding the inconsistency of versions across numerous testing machines. As a result of these observations, a single copy of each modification was placed on a clean machine, and completely stripped of all of the bugs located during the pilot testing. Due to the lack of a professional programmer, however, some of the bugs remained in the program. This arose as a significant limitation of this study. These relatively bug-free versions of the programs, complete with the recommended changes made by the subject matter experts, were loaded onto a new USB flash drive, and individually copied to each of the play computers at the internet cafe. Through this, each participant in the field test was guaranteed a consistent version with relatively few bugs or glitches.

Other less substantial changes were also made to the field test schedule. Tuesday morning was omitted from the field test to avoid server maintenance, a regular WORLD OF WARCRAFT event and appointment times were shifted to periods of the day during which

internet cafe times would still be available in the face of budget constraints (9am-12pm, 6pm-9pm, less commercially busy times of day).

Field Test Hypotheses

Following revisions to the instructional treatments based on the data collected in the quality reviews and pilot test, two hypotheses were developed as development goals for this stage of the formative evaluation. It is important to differentiate these "hypotheses" from traditional experimental research hypotheses, as the formative evaluation process is concerned with providing revisions and improvements to existing instructional materials, rather than strictly comparing the effects of one or more treatments on a dependent variable. The first development goal is confirmatory: that novice players playing WORLD OF WARCRAFT will perform better as evidenced by higher scores on measures of play mastery from the three new tutorials than from the WoW-Flashcard tutorial. Based on the data collected from the pilot test, it was hypothesized that modality would play a greater part in determining this effect than

instructional strategy. The first development goal was that based on pilot test observations, players using the SSF-JIT or SSF-Flashcard tutorials would perform better than players using the WoW-JIT or WoW-Flashcard tutorials. The second development goal stated that specifically, players using the SSF-JIT tutorial would perform better than players using any of the other tutorials, as observed in the pilot test. An exploratory question also guided the field study: How do novice gamers playing WORLD OF WARCRAFT learn from an SSF modality and just-in-time scaffolded instructional strategy, compared to those learning from an unaltered WORLD OF WARCRAFT tutorial interface employing a flashcard instructional strategy?

The research design compared both modality and instructional strategy with play data such as gearscore, idles, deaths, and experience, as well as engagement and motivation data, as in the pilot test. This was accomplished by performing independent samples *t*-tests. Once again, the intent of comparing the four tutorials was not specifically experimental. Rather, the comparisons were expected to reveal developmental differences in the instructional materials that would inform best practice in the future development of WORLD OF

WARCRAFT, and other digital game tutorials. The following table illustrates the design of the research.

Table 3
The factors and independent variables in the field test.

		Instructional Strategy	
		Just-in-Time Pop-Up (JIT)	Flashcard (Flashcard)
Modality	Temporal Speech Cues (SSF)	SSF-JIT	SSF-Flashcard
	Printed Information (WoW)	WoW-JIT	WoW-Flashcard

Participants

Participants were novice players of MMORPGs. An original group of 40 – 4 for the pilot test and 36 for the field test – was to be recruited. Due to funding and sampling limitations, however, this number was reduced (n = 16). While this is a significantly smaller number than originally intended, small sample sizes are common in educational research, particularly in multimedia (Mann et al., 2008).

Participants were briefed on the nature of the study, its goals and

objectives, and fully informed of all instruments and procedures to be used in conducting the study in accordance with Memorial University's Policy guiding research ethics. The participants were then randomly assigned to one of the four tutorials. Schedules for play time over 10 days for all participants were arranged, such that all participants would play through the introductory portion of WORLD OF WARCRAFT, aided by one of the four tutorials, for a total of ten hours across several sessions. The participants were asked to arrive at a local gaming and Internet cafe to play through the tutorials at their appointed time. During the play sessions, breaks were consistently offered to players every hour to eschew potential wrist, eye, and postural fatigue in accordance with WORLD OF WARCRAFT's instruction manuals and guides.

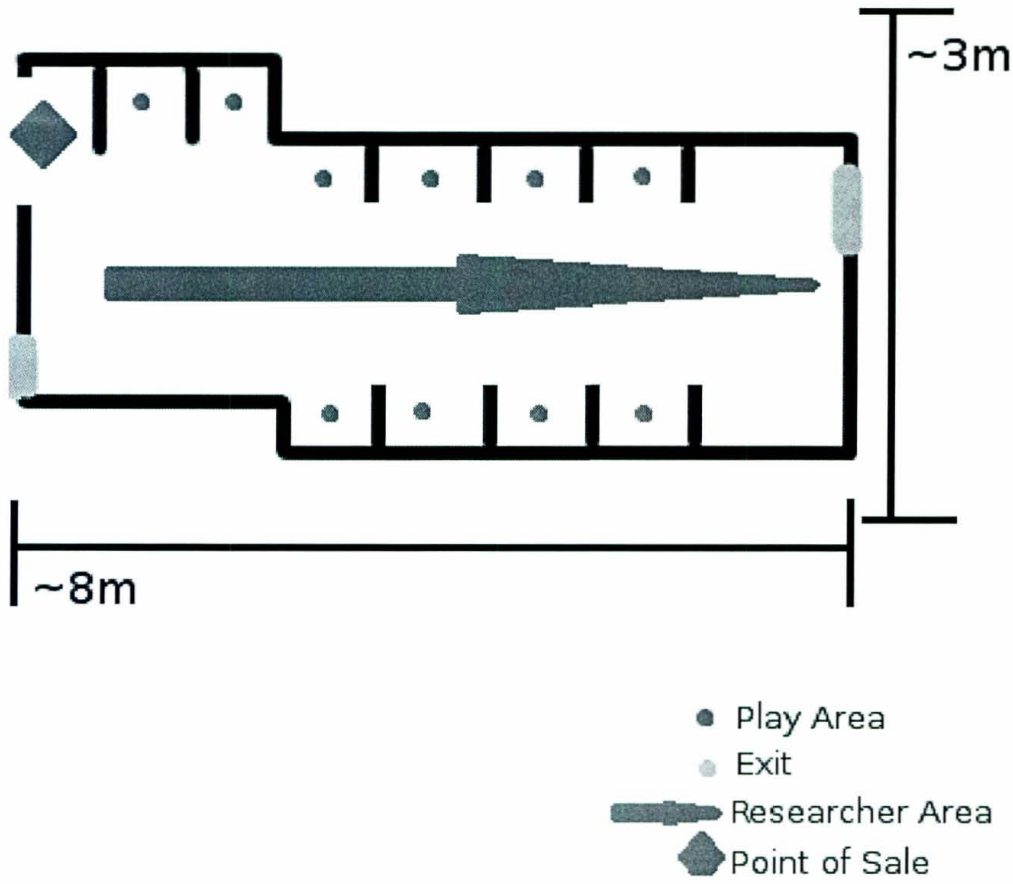

Figure 27. Layout of the gaming/internet cafe.

During their play, and as previously stated, participants were observed for idle time and disengagement through protocol analysis. At the end of the treatments, the participants were administered the exit survey and interview, and given a long-term delay survey six weeks later,

which was conducted on a secure website. The participants were re-contacted by email with an invitation to complete this survey; 9 of the 12 field study participants completed the delayed post-test survey.

At any time during the process of the study, participants were able to withdraw without prejudice, though none opted to do so. Personal information regarding the participants was collected only to verify their age, and was subsequently transcoded to pseudonyms, and the original portions of personally identifying data were removed from the survey forms and destroyed. The only people who had access to any data throughout the duration of the study were the research team.

Results

Based both on prior and current research (Jenson & de Castell, 2010; Taylor, 2007), it was expected that novice players participating in the field study would report increased mastery playing the game, and that players in the just-in-time and SSF categories would report higher still than those players in the flashcard groups. These assumptions were expected to become evident in play skill, motivation, and engagement data.

Overall, results were very similar to the pilot test. The following section will explore the results in greater detail. First examined are the idles, deaths, gearscore, and experience gathered during play in direct comparison to the graphs presented in the previous chapter in an attempt to determine what effect the four tutorials had on play mastery.

Participant data.

All participants were novices, not experienced in playing MMORPGs. As in the pilot test, participants' play data through high and low mastery behaviours. High mastery behaviours included gearscore and experience gathered, whereas low mastery behaviours included idle times and deaths. These factors were analyzed via independent samples *t*-tests for significance and effect size.

An interesting additional aspect of player demographics when conducting research in virtual worlds is the character data, or the race and demographic information about the avatar, as opposed to the participant. In WORLD OF WARCRAFT, each player can choose a race, and a class, which will slightly change how the game is played. In

order to eschew debate over whether experience gathered, or other playdata was affected by avatar class or race difference, statistics about players' characters are presented in Table 4:

Table 4
Frequency table, all participants, character class.

Class	Frequency	Percent
Druid	1	6.2
Hunter	3	18.8
Mage	1	6.2
Paladin	1	6.2
Rogue	3	18.8
Shaman	2	12.5
Warlock	2	12.5
Warrior	3	18.8

Table 4 illustrates a reasonably normal distribution of character classes chosen. This is positive, because different classes have different playstyles, and differences in data could therefore be attributed to such a variation. Character race choice also demonstrated roughly similar proportions. Interestingly, only 3 players chose to create characters whose sex did not match their own.

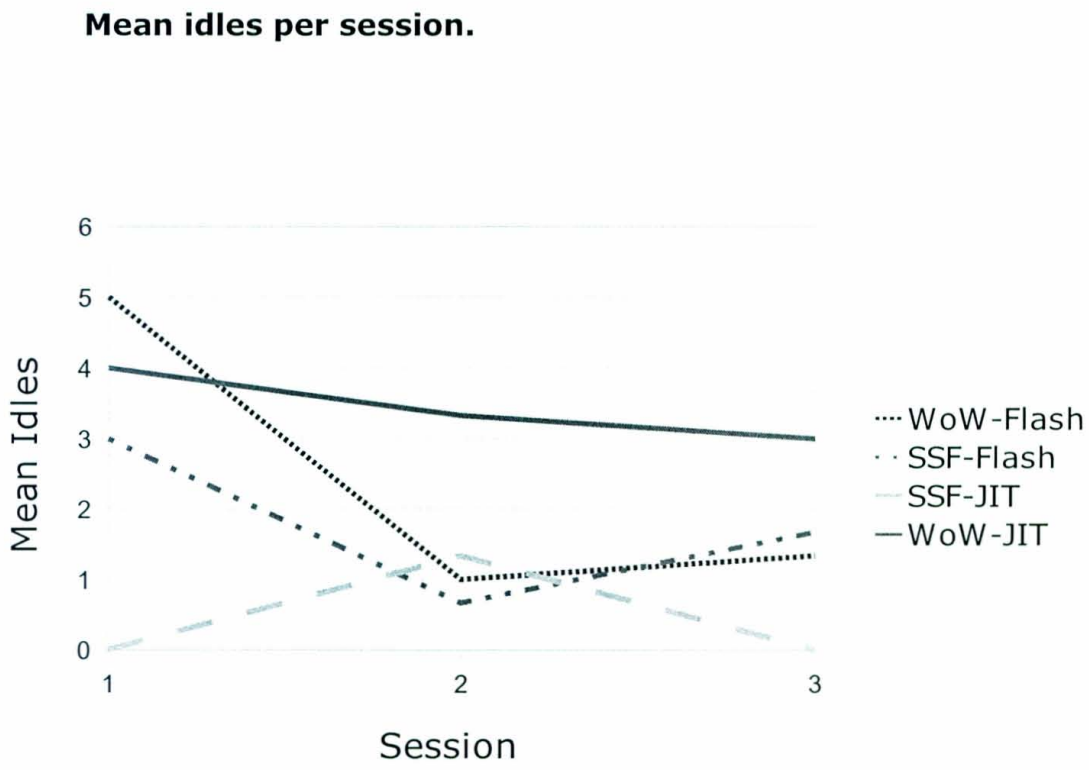

Figure 28. Mean idles per session by group.

As gameplay progressed it became evident that SSF-JIT appeared to produce the fewest mean idles compared to the other groups. SSF modality played a greater role in this apparent change, by determining a greater gross number of idles across sessions than did instructional strategy. In Figure 28, it can be seen that the WoW (visual) modality groups incurred many more idles on average than

their SSF counterparts, a sign of lower overall game mastery.

Table 5
Data analysis – Mean Idles

	t	*df*	*p*	η^2
Modality	2.05	10	.07	.295
Strategy	-0.16	10	.88	.003

The independent samples *t*-tests of both modality and strategy were not statistically significant, though idles by modality did however approach significance at $p = .07$ with an η^2 of .295. It is therefore fair to assume that the *n* of 3 contributed to a lack of power in the statistics. The results however suggestive, cannot be generalized.

Mean deaths per session.

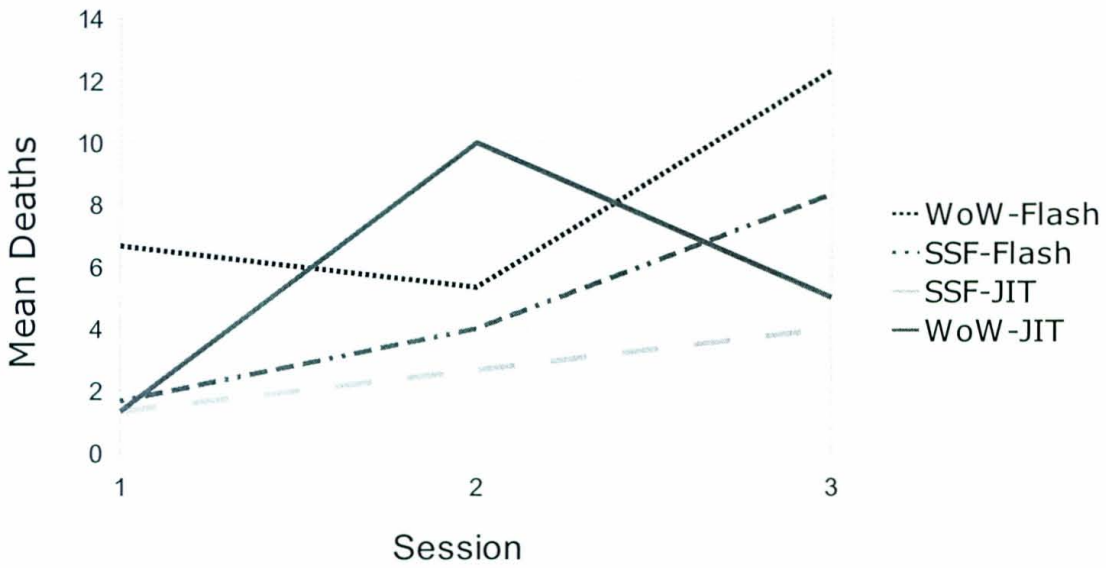

Figure 29. Deaths per session by group.

Differences between groups as measured by deaths were not statistically significant. Figure 29 illustrates the mean deaths per session between groups, which show no apparent pattern. Oddly, deaths in the flashcard method groups seemed to increase as time went on, possibly suggesting that these players did not absorb enough content to move into mastery behaviours as the play sessions went on. The independent samples *t*-test contained in Table 6 examines mean

deaths for significance:

Table 6
Data analysis – Mean Deaths

	t	*df*	*p*	η^2
Modality	1.65	10	.13	.212
Methodology	-1.17	10	.27	.123

Again no clear pattern emerges in deaths per session. It is unlikely that modality or instructional strategy played a part in determining the total number of deaths.

Gearscore per session by group.

During the pilot test, it seemed that the modality of the instruction played some role in overall gearscore. In the final test data instructional strategy played some role as well, however small. It appears that the JIT groups emerged with higher overall mean gearscores than their flashcard counterparts, but failed to yield statistical significance.

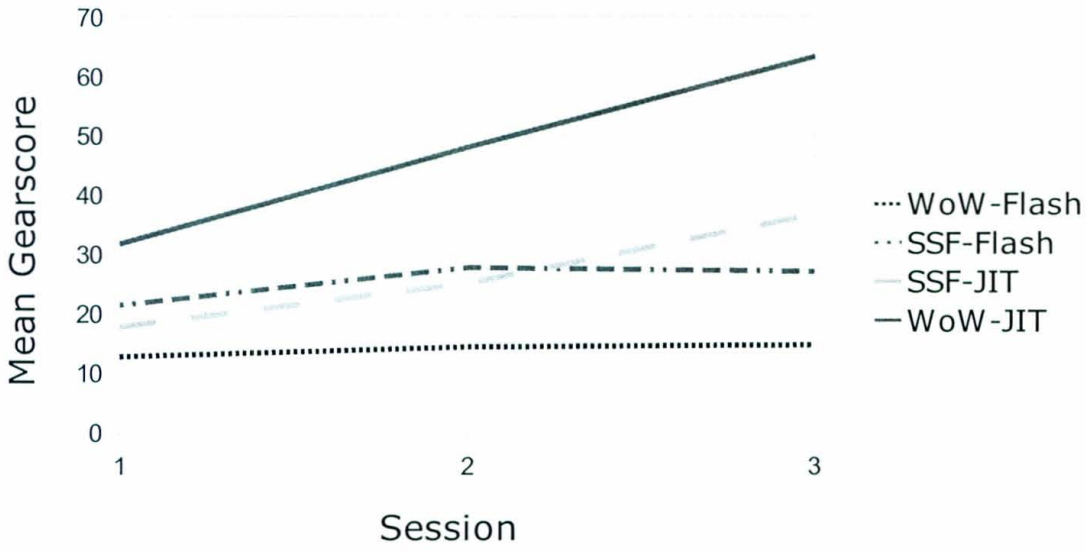

Figure 30. Gearscore per session by group.

While the JIT groups appear to emerge with higher overall scores, the differences are not statistically significant.

Table 7
Data analysis – Mean Gearscore

	t	*df*	*p*	η^2
Modality	0.37	10	.72	.014
Methodology	1.71	10	.12	.230

The findings illustrated in Table 7 suggest that neither modality nor instructional strategy as operationalized in this study played a significant role in determining between-groups gearscore.

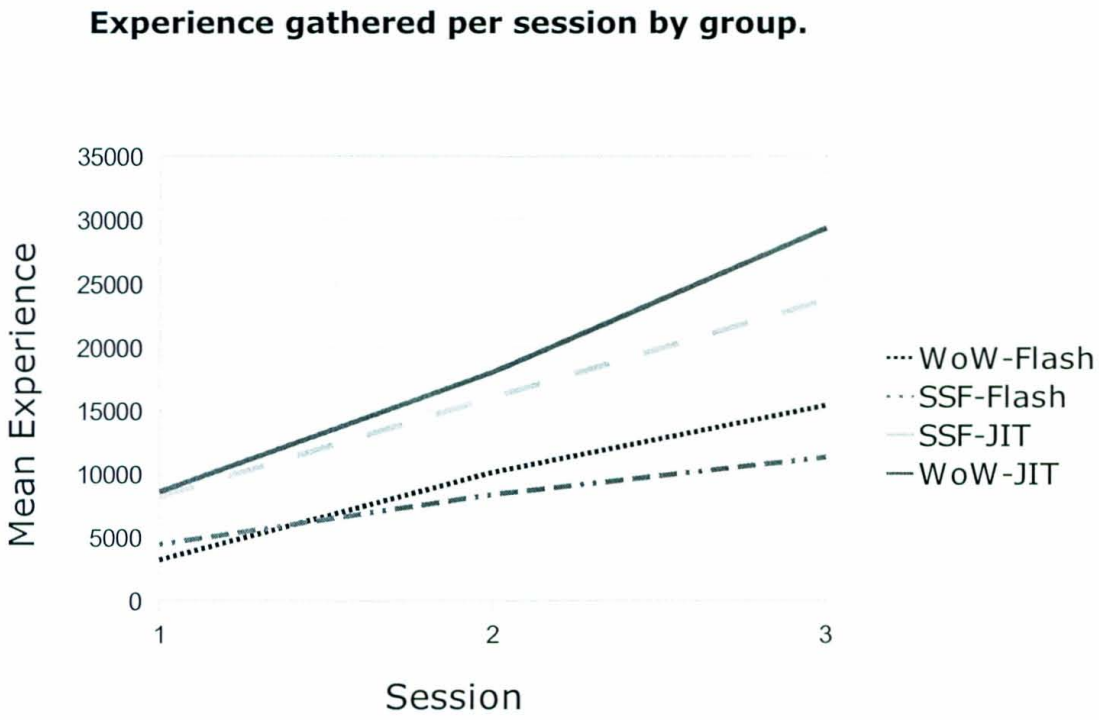

Figure 31. Experience gathered per session by group.

In the pilot test, it appeared that SSF-JIT earned higher experience points per session, and greater total gathered experience

than all other groups. Figure 31 illustrates that not only did SSF-JIT continue to gather more experience points per session, but that WoW-JIT also gathered a significantly increased number of experience points. This might suggest that the JIT method of instruction does not interrupt players and allows them to more readily gather experience points, a behaviour evident of significant play mastery.

Table 8
Data analysis – Mean Experience

	t	*df*	*p*	η^2
Modality	0.55	10	.59	.029
Strategy	1.67	10	.04	.221

Table 8 illustrates that there is a significant correlation between strategy and experience gathered. Strategy is a variable transcoded for 1 = Flashcard, 2 = JIT. Modality did not play a significant role in altering the amount of experience gained across limited play sessions. This may indicate that strategy of instruction plays a greater role in play mastery, at least by this measure, than modality.

Playdata at a glance.

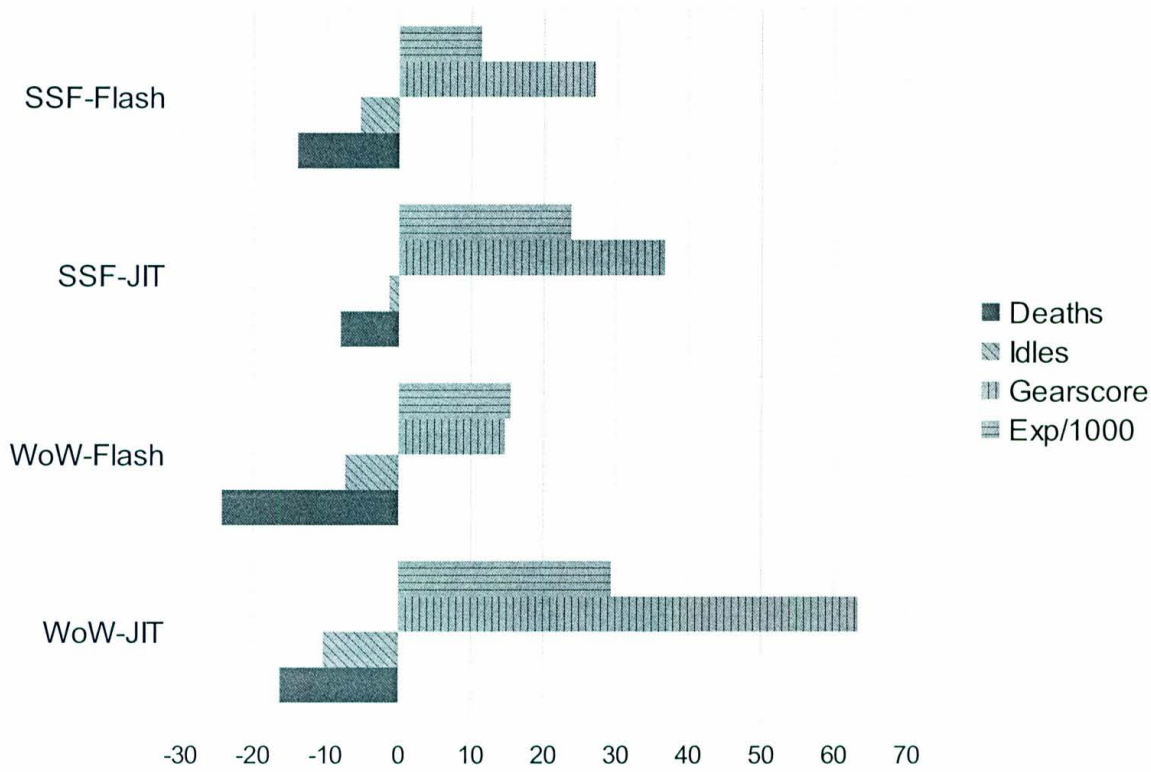

Figure 32. Playdata at a glance.

Figure 32 illustrates the performance of players in the SSF-JIT tutorial modality and strategy groups. It can be seen here that SSF-JIT participants incurred extremely few idles and deaths, and yet gained a large amount of experience and gearscore. When taken together,

these illustrate increased play mastery.

A near significant difference present in the effect of SSF modality modification of tutorial content within WORLD OF WARCRAFT on player idle-times. There also seems to be a low-to-moderate effect between instructional strategy and experience points gathered while playing, as well as modality and deaths.

Engagement data.

Data on player engagement was also gathered as part of the study. This was accomplished by administering a Game Engagement Questionnaire that can be found in Appendix A. The following correlation analyses and independent samples *t*-tests explore the significance of the engagement findings between-groups.

Table 9
Data analysis – Mean Engagement

	t	*df*	*p*	η^2
Modality	0.32	10	.75	.001
Methodology	2.59	10	.03	.694

The data contained in Table 9 illustrates that strategy of instruction played a statistically significant role in player engagement, while modality did not. This raises interesting questions about the nature of game engagement as a measure, as significant correlations between player idle times and modality of instruction would seem to indicate a greater level of what educators typically refer to as "engagement", and the type of engagement measured by the questionnaire. Nevertheless, consistent with the development goals outlined for the field test of these new tutorials, it is clear that player engagement was heightened when a just-in-time instructional strategy was presented as an alternative to the WoW-Flashcard tutorial.

Motivations for play.

Player motivations were assessed after playing through the sessions by using the Yee motivation inventory included in Appendix B. These motivation questions can be broken down into categories, which are illustrated in Appendix F. The data in Table 10 examines between-groups one-way ANOVAs for player motivations as affected by group, modality, and instructional strategy.

Table 10
Data analysis – One-way, between groups ANOVA by group, strategy, and modality.

		df	*F*	*SS*	*p*
Socialization Motivations	By Group	3.000	4.908	223.333	.032
	By Strategy	1.000	1.325	40.333	.276
	By Modality	1.000	2.781	75.000	.126
Achievement Motivations	By Group	3.000	4.447	212.333	.041
	By Strategy	1.000	4.662	108.000	.056
	By Modality	1.000	1.988	56.333	.189
Exploration Motivations	By Group	3.000	1.205	72.917	.368
	By Strategy	1.000	1.146	24.083	.310
	By Modality	1.000	1.473	30.083	.253

Escapism Motivations	By Group	3.000	3.395	258.000	.074
	By Strategy	1.000	9.575	225.333	.011
	By Modality	1.000	0.368	16.333	.558
Grief Play Motivations	By Group	3.000	1.096	54.250	.405
	By Strategy	1.000	0.572	10.083	.467
	By Modality	1.000	0.818	14.083	.387

Table 10 illustrates that only instructional strategy seems to approach significance in altering player motivations. Motivations by strategy of instruction, however, approaches significance in affecting achievement play motivation (p = .057), and escapism motivations were found to be significant (p = .011). This finding may provide further evidence that instructional fading offered fewer interruptions by showing that escapism, a potential measure of immersion and engagement with the game system, as well as achievement oriented behaviours are increased when a minimally invasive strategy is

employed. Table 11 provides an overview of the descriptive statistics for all of the quantitative analyses described in this chapter.

Table 11

Descriptive statistics for quantiative analyses.

Variable	*n*	$\overline{X}$	*S*
Total Idles	12	6.1	5.3
Total Deaths	12	15.7	10.5
Final Gearscore	12	35.4	32.0
Final Experience / 1000	12	20.0	14.8
Social Motivations	12	17.3	5.6
Achievement Motivations	12	21.2	5.6
Exploration Motivations	12	22.3	4.6
Escapism Motivations	12	30.7	6.5
Grief Motivations	12	10.3	4.1
Engagement	12	101.8	27.8

Interview data.

Exploring interview responses for particularly high escapism motivations, phrases consistent with research on immersion and 'flow' (Donaldson, 2011) frequently occur. Statements such as *"zone out", "autopilot", "get right into it", "let it flow", "forget about time"*, and *"use all of my attention"* were common and recurring. One participant specifically mentioned escapism as a motivation for play without being prompted. This statement suggests that the scaffolded method of instructional design, which provided just-in-time instruction and fading tips as players gained mastery, seemed to have a significant effect on players' motivation. This finding has implications for the design of tutorials for digital games, and their use in education.

Examining the interview responses for those participants who reported high achievement/power motivations, much of the same can be seen. Recurring themes indicated that players found it *"satisfying"* to kill things or to deal large amounts of damage. This is consistent with research conducted by Jenson and de Castell (2008), who found that novice players eventually gain strong power and damage motivations. For example, the participants stated: *"shoot and kill! I*

get like a high from it, hahaha!", "It's nice to be able to go into an area and kill something in like three whacks...", and *"maybe I want to be badass, really. Just wanted to dominate, kill as many things as I could. Anything I could hack at I would. And I like to gather things from their corpses".* A particularly interesting power/achievement motivation comment was *"like... if... It's like I get this sense of powerfullness [sic] that I don't get in real life... basically if you're stronger in the game you'll get voted up as party leader and get invitations and stuff like that...".* This statement further demonstrates gained play mastery, and also illustrates that when provided the opportunity, novice players can and do perform new behaviours as their game mastery increases, consistent with Jenson and de Castell (2008, 2010), who found that novice players eventually articulate dominant or powerful motivations for play as mastery increases.

In interview responses, JIT and Flash groups did not significantly differ in their tone or recurring themes despite showing a very near significant (p = .056) difference in survey responses. Perhaps this is a limitation of the methodology, in that participants were not able to "find the words" necessary to articulate heightened power motivation,

or perhaps the ability to discern such small differences cannot be accurately illustrated with such a small sample.

Post test data.

Post test data did not suggest increased playership or motivation in any meaningful way. Only 9 of 12 respondents completed the delayed post test and almost 100% of those who did reported that they no longer play WORLD OF WARCRAFT. Only one participant, in fact, continued to play. Similarly, only one person reported having remembered a significant (negative) event in the last 30 days regarding the game. These data indicate that it is unlikely that modifications to the tutorial interfaces, of any kind, have a significant impact on continued playership or in increasing permanency of involvement/interest in the game.

7. CONCLUSIONS AND DESIGN RECOMMENDATIONS

Chapter seven contains a discussion of the outcomes and results of the formative evaluation in greater detail than in the previous chapters. Conclusions and comparisons to previous research are made, limitations of the study are discussed, and future directions and implications arising as a result of this work are explored.

Discussion

A problem was identified in the ability of novice players to gain mastery in contemporary digital games. In response to this, a needs assessment known as the D.E.C.L. (Mann, 2006) was performed, and the tutorials of over thirty contemporary games were examined. This needs assessment interrogated the effectiveness of the tutorials within these games. It was decided that based on prior research on learning from media (Mann, 2009; Mayer, 2010), as well as considerable debate about novice play (Jenson & de Castell, 2010; Jenson et al., 2011), alterations to the tutorials might elicit change in player engagement and motivations toward the game, as well as player skill level as

illustrated by play mastery behaviours. Instruments were sought to measure these differences (Brockmyer et al., 2009; Yee, 2006, p. 2), and Lua language modifications were made to WORLD OF WARCRAFT. Three new tutorials, SSF-Flashcard, SSF-JIT, and WoW-JIT, as well as the default WoW-Flashcard, were formatively evaluated using the Dick, Carey, and Carey (2011) model.

The developmental goals for the field study assumed that a greater level of play skill, as evidenced through altered motivations for play and greater play mastery, would be present in the SSF-JIT group than any of the others. While this did not strictly hold true, it was found that the SSF-JIT group incurred fewer idles, gathered more experience, and had slightly altered motivations for play. Modality seemed to have a greater effect on play mastery, while instructional strategy had a greater effect on motivations for play.

Consistent with research on contemporary digital games, participants in the study reported high levels of power and achievement motivations and were able to achieve significant play mastery by the end of the play sessions (Jenson & de Castell, 2008, 2010). In fact, as the players moved from the initial to final play

sessions, mastery behaviours began to become evident, and in-game behaviours began to shift from exploration and disengagement, to fighting back and slaying monsters, consistent with past research (Jenson & de Castell, 2010; Jenson et al., 2011). This can be seen in the curve of deaths by session illustrated in Figure 25. As players gained mastery, they began to learn to fight back when attacked instead of fleeing: a behaviour that frequently leads to death in WORLD OF WARCRAFT. This illustrates not only increased play mastery, but also willingness to dominate non-player characters and monsters as verified by interview responses.

In accordance with the field test's first development goal, *players using the SSF-JIT or SSF-Flashcard tutorials will perform better than players using the WoW-JIT or WoW-Flashcard tutorials*, participants in the SSF-JIT category had the fewest idles and deaths, and a similar amount of gearscore and experience (measures of play mastery) to the WoW-JIT group. The WoW-Flashcard group, as expected, performed the worst in all measures of play mastery: a significant finding. While the JIT instructional strategy was found to have an effect on play motivation and reported "flow"

(Csikszentmihalyi, 2008) behaviours, and to alter other play-mastery characteristics such as experience gathered, the SSF modality was found to significantly affect idle times. The combination of the two seems to be complimentary, in that SSF-JIT was not outperformed by WoW-JIT on playdata measures.

The exploratory question guiding the field test: *how do novice gamers playing WORLD OF WARCRAFT learn from an SSF modality and just-in-time scaffolded instructional strategy, compared to those learning from an unaltered WORLD OF WARCRAFT tutorial interface employing a flashcard tips pop-up instructional strategy*, was concerned with exploring the differential effects of in-game tutorial system instructional design modifications on novice learners. While some expected results arose from this, such as lowered idle and disengagement times in the face of auditory instruction, consistent with Mann (2008), some unexpected results were also found. Fading the instruction had an effect on players' ability to become immersed in the game as evidenced both quantitatively and qualitatively by their reported escapism play motivations, and the repeated presence of flow-evident (Csikszentmihalyi, 2008) language in their interview

responses. Interestingly, the altered escapism motivations and subjective reporting of "zoning out" did not correlate with increased engagement as measured by the game engagement questionnaire. This may suggest that engagement as measured by the game engagement questionnaire, and engagement as it is typically measured in education may not correlate meaningfully, or that the game engagement questionnaire needs to be re-evaluated.

Limitations of the Study

Several significant limitations became apparent during the process of the research, and have been mentioned throughout this work. They are described here in greater detail.

Small sample size.

The study's small sample size impairs its external validity considerably. Because only four participants are present in each group, giving a total *n* of sixteen divided between the pilot group and the field test, the results cannot be considered authoritative, and must be considered in context. That said, formative evaluations typically

employ small sample sizes, as the purpose of the evaluation was not to strictly compare the effect of one variable on another, but rather to provide meaningful design recommendations for educational materials. Future studies might seek to replicate this design with a much larger sample. To facilitate this process, the source code for the modifications and new tutorial strategies and modalities is included in Appendix J for the benefit of future researchers.

Lack of professional programmer.

A significant limitation of this study was the lack of a professional programmer. Because of the lack of a full-time, professional Lua programmer, the researcher was responsible for not only learning to program in Lua, but writing the three modifications in the language. There are undoubtedly some bugs and glitches that survived the pilot test and expert review. While the glitches and bugs were only experienced by players in the pilot test, this does limit the future application of the program until it is significantly improved. This also limits the internal validity of the study by causing the instrument to be less precise than would otherwise be possible.

Recruitment issues.

It became apparent during the recruitment process that the intended forty participants would be very difficult to recruit. Not only did it become impossible to find a mixed-sex sample, as nearly 100% of the males approached had played an MMORPG, the resulting entirely female sample was not free of difficulties. While it is not troublesome to locate women who have not played WORLD OF WARCRAFT, it is problematic to expect them to want to play it for ten hours in an internet cafe with very little compensation. Initially, no money was offered to participants. After securing generous funding from Distance Education and Learning Technologies, and the Faculty of Education, Memorial University, a small honorarium was offered to participants. After this, recruitment numbers increased significantly. Future researchers might take this into account when attempting to recruit novice game players for long play-sessions. Compensation for time becomes necessary. This compensation, however, may also have detracted from the validity of the study, in that participants were being paid to be present, and thus may have approached the study with lower interest in gaming than they otherwise might have.

Further compounding recruitment issues during both pilot testing and the field test was that a sufficiently rigorous entry procedure was not employed in this study. While the participants in the study had ubiquitously not played WORLD OF WARCRAFT or other MMORPGs, they did have varying backgrounds of level of playership in gaming, game-playing history, level of interest in games, and so on. While no evidence exists that transfer can occur from one game to another, the variability of play-styles and play-mastery before the intervention of the various software modifications suggests that some difference exists that was not adequately captured by selecting participants based on previous MMORPG experience.

Logistics.

Memorial University currently has no lab accessible to students with the number of high-powered gaming machines necessary to perform the experiments. Due to this limitation, it was decided that a local Internet and gaming cafe would be used as a site for the research.

Structural factors were also an issue. One of the largest of these

was the weekly maintenance period undertaken by Blizzard Entertainment, the publishers and developers of WORLD OF WARCRAFT. WORLD OF WARCRAFT goes down once a week on Tuesdays from approximately 4:00AM until approximately 4:30PM (Newfoundland Standard Time), though this time varies, and in several cases postponed the pilot test groups. Because of the pilot test delays, the final study's appointments were adjusted to avoid Tuesday entirely. Another persistent structural problem in the pilot testing was computer trouble and version control between machines. Because the machine on which the new tutorials were initially developed was not used by the participants in the pilot test, and several modifications to the tutorials were made following the pilot test, there were participants using versions that had not yet been bug fixed until a consistent version was installed across machines. This did not persist to the Internet cafe in the field study because a final version was put onto a USB drive and installed on all of the machines. Future researchers attempting this kind of study should seek version and bug tracking software, such as Subversion, to prevent multiple instances of the same program being inconsistent across testing groups.

Practical Implications of the Study

Statistically significant results were present in the reduction of idle-time through changing the modality of instruction from stochastic visual cues to auditory cues delivered via the SSF method of instructional design (Mann, 2008). These results may suggest that future game studies researchers, educators, and game designers might consider implementing in-game instructional systems and tutorials using an auditory modality delivered via such an instructional method. Furthermore, this may demonstrate continued evidence for the use of digital games for learning and teaching, as current multimedia learning literature already strongly advocates the use of sound in instruction (Mann, 2009; Mayer, 2010). This work provides additional evidence that auditory traces are more resistant to interference, and less likely to be forgotten (Mann, 2006). A new finding is that these auditory cues also seem to cause less disengagement from an otherwise unfamiliar task in novice learners when compared to visual cues, which in this study resulted in increased mastery behaviours in-game.

Conclusion

This study found results that agree with previous researchers, and new results that have not yet been elucidated elsewhere. For example, it was clear in this study that auditory cues were more durable and resistant to misinterpretation and forgetting than visual cues (Mann, 2006). Furthermore, split attention caused poor results in the WoW-Flashcard group, which overloaded the visual channel, consistent with Mayer (2010) and others. The participants were found to have domination and mayhem motivations during final play sessions and post-play motivation interviews. This disagrees with previous researchers who have questioned the nature of female motivation and competitiveness (Graner Ray, 2004), when one considers the all-female sample. These findings also provide evidence that expert status is a strong indicator of digital game play habits (Jenson et al., 2011). Novel to this research is the discovery that shifting from a visual to auditory modality increased play mastery significantly, and that instructional strategy plays a significant role in determining player motivations. These results present interesting implications for not only the design of tutorials for digital games, but also for educators who

may now be able to meaningfully select digital games for learning and teaching based on their tutorial designs.

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Appendix A:

Glossary of Terms

Digital Game

Digital game refers to an electronic game of any kind played on any personal electronic device, such as a computer, video game console, or handheld mobile device. Often simply called video games, digital games encompass a wide variety of media, genres, goals, and purposes. Games for entertainment are the most commonly known, including both core or "triple-A" games – those published by a publisher (Nieborg, 2011), independent games (Kavli, 2011), and casual games (Trefry, 2010). Less commonly known are games as art (Poremba, 2010), serious games (R. Clark, 2007), and augmented reality games (Ebner & Schiefner, 2009). WORLD OF WARCRAFT (2008), the game employed in this study, is a triple-A digital-role playing game.

Digital Role-Playing Game

A digital role-playing game is a type of digital game in which the player

takes on the role of a character in a story being told. Role-playing games specifically stress character development and story progression, and make use of several game mechanics to overcome narrative obstacles, (Harrigan, 2010; Susaea et al., 2010; Watcharasukarn, Krumdieck, Green, & Dantas, 2010). Some examples of contemporary Digital Role-Playing Games include FINAL FANTASY XIV (2010), and THE LEGEND OF ZELDA: OCARINA OF TIME 3D (2011). The Digital Role-Playing Game under consideration in this thesis is WORLD OF WARCRAFT (2008).

Appendix B:

The Game Engagement Questionnaire, Taken from Brockmyer et al (2009)

1=Strongly Disagree, 2=Disagree, 3=Neither Agree nor Disagree, 4= Agree, 5= Strongly Agree

While playing World of Warcraft ...

1. I lose track of time

   1 2 3 4 5

2. Things seem to happen automatically

   1 2 3 4 5

3. I feel different

   1 2 3 4 5

4. I feel scared

   1 2 3 4 5

5. The game feels real

   1 2 3 4 5

6. If someone talks to me, I don't hear them

   1 2 3 4 5

7. I get wound up

1 2 3 4 5

8. Time seems to kind of stand still or stop

1 2 3 4 5

9. I feel spaced out

1 2 3 4 5

10. I don't answer when someone talks to me

1 2 3 4 5

11. I can't tell that I'm getting tired

1 2 3 4 5

12. Playing seems automatic

1 2 3 4 5

13. My thoughts go fast

1 2 3 4 5

14. I lose track of where I am

1 2 3 4 5

15. I play without thinking about how to play

1 2 3 4 5

16. Playing makes me feel calm

1 2 3 4 5

17. I play longer than I meant to

1 2 3 4 5

18. I really get into the game

1 2 3 4 5

19. I feel like I just can't stop playing

1 2 3 4 5

Appendix C:

The Game Motivations Questionnaire: Taken from Yee (2006)

1=Strongly Disagree, 2=Disagree, 3=Neither Agree nor Disagree, 4= Agree, 5= Strongly Agree

While playing World of Warcraft ...

1) I find myself having meaningful conversations with others

1 2 3 4 5

2) I usually don't chat much with group members

1 2 3 4 5

3) I have made some good friends in the game

1 2 3 4 5

4) I find myself soloing a lot

1 2 3 4 5

5) I like to say funny things in group/guild chat

1 2 3 4 5

6) I talk to my friends in the game about personal issues

1 2 3 4 5

7) Friends in the game have offered me support when

I had a real life problem or crisis

1 2 3 4 5

8) I am an effective group leader

1 2 3 4 5

9) I would rather follow than lead

1 2 3 4 5

10) I like to feel powerful in the game

1 2 3 4 5

11) Doing massive amounts of damage is very satisfying

1 2 3 4 5

12) I constantly try to set and reach goals

1 2 3 4 5

13) I can't stand those people who only care about leveling

1 2 3 4 5

14) It's very important to me to get the best gear available

1 2 3 4 5

15) I try to optimize my XP gain as much as possible

1 2 3 4 5

16) I'm fascinated by the game mechanics, and love charts

and tables

1 2 3 4 5

17) I research everything about a class before starting the character

1 2 3 4 5

18) Class-balancing or realm-balancing issues do not interest me

1 2 3 4 5

19) This game is too complicated

1 2 3 4 5

20) I like wandering and exploring the world

1 2 3 4 5

21) I would make maps if they weren't available

1 2 3 4 5

22) I have learned things about myself from playing the game

1 2 3 4 5

23) I understand real-life group dynamics much more after playing the game

1 2 3 4 5

24) I like the escapism aspect of the game

1 2 3 4 5

25) I like to be immersed in a fantasy world

1 2 3 4 5

26) Playing the game lets me vent and relieve stress from the day

1 2 3 4 5

27) Playing the game lets me forget some of the real-life problems I have

1 2 3 4 5

28) I like to try out new roles and personalities with my characters

1 2 3 4 5

29) The way I am in the game is the way I am in real life

1 2 3 4 5

30) People who role-play extensively bother me

1 2 3 4 5

31) I like the feeling of being part of a story

1 2 3 4 5

32) I make up stories and histories for my characters

1 2 3 4 5

33) I like to manipulate other people so they do what I want them to

1 2 3 4 5

34) I like to dominate other characters/players

1 2 3 4 5

35) I like to taunt or annoy other players

1 2 3 4 5

36) I scam other people out of their money or equipment

1 2 3 4 5

37) I beg for money or items in the game

1 2 3 4 5

38) It's important to me to achieve things with as little help from other people as possible

1 2 3 4 5

39) It's just a game

1 2 3 4 5

40) I am uninterested in player-killing

1 2 3 4 5

Appendix D:

Reliability Loading for Motivation Test (Yee 2006)

Relationship α = .76	I find myself having meaningful conversations with others	0.57
	I have made some good friends in game	0.58
	I talk to my friends in game about personal issues	0.79
	Friends in the game have offered me support when I had a real life problem or crisis	0.74
Manipulation α = .73	I like to taunt or annoy other players	0.63
	I like to beg for money or items in the game	0.46
	I like to dominate other characters/players	0.65
	I like to manipulate other people so they do what I want [...]	0.59
	I scam people out of their money or equipment	0.61
Immersion	I like to try out new	0.59

α = .63	roles and personalities [...]	
	People who role-play extensively bother me	0.53
	I like the feeling of being part of a story	0.46
	I make up stories and histories for my characters	0.63
Escapism α = .62	I like the escapism aspect of the game	0.59
	Playing the game lets me forget some of the real-life problems I have	0.65
	Playing the game lets me vent and relieve stress [...]	0.52
Achievement α = .67	It's very important to me to get the best gear available	0.61
	I try to optimize my XP gain as much as possible	0.59
	I like to feel powerful in the game	0.53
	Doing massive amounts of damage is very satisfying	0.46
Lead	I am an effective group leader	0.68
	I would rather follow than lead	-0.7

Learn	I have learned things about myself from playing the game	0.5
	I understand real-life group dynamics much better after playing [...]	0.58
Solo/Group	I find myself soloing a lot	-0.58
	It's important to me to achieve goals with as little help [...]	-0.55

Appendix E:

Delayed Post-Test, from Yee (2006)

1. Gender: Male Female
2. Age: _____
3. Occupational Status:
   - I am working full-time
   - I am a full time student
   - I work part time, and/or am student part time
   - I am a stay-at-home mom/dad
   - I am unemployed
   - I am retired
4. Marital status:
   - Single
   - Engaged/Married
5. Do you have children? Yes No
6. Did someone introduce you to the game?
   - No, I read an ad or found out on my own.
   - My romatic partner (boy/girl-friend, fiance/e,

husband/wife) introduced me to the game.

- A friend introduced me to the game.
- A family member (excluding spouse) introduced me to the game.

7. I spend about _____ hours each week playing the game.
8. I have played the game for 10 hours continuously or more:

   Yes No

9. Do you play the game with a real life romantic partner? (boy/girl-friend, fiance/e, husband/wife)?
   - No, I don't play with a romantic partner.
   - Yes, but we're seldom grouped.
   - Yes, and we're sometimes grouped.
   - Yes, and we're almost always grouped.
10. Do you play the game with a family member?
    - No, I don't play the game with a family member.
    - Yes, but we're seldom grouped.
    - Yes, and we're sometimes grouped.
    - Yes, and we're almost always grouped.
11. I've told personal issues to online friends which I have never

told anyone in real life:

Yes No

12. I would consider myself addicted to the game:

Yes No

13. Some of my friends in the game are comparable to or better than my real-life friends:

Yes No

14. I have physically dated someone who I first met in the game:

Yes No

15. The most rewarding/satisfying experience I've had in the past 7 days was:

Something that happened in the game

Something that happened in real life

16. The most rewarding/satisfying experience I've had in the past 30 days was:

Something that happened in the game

Something that happened in real life

17. The most annoying/infuritating experience I've had in the past 7 days was:

Something that happened in the game

Something that happened in real life

18. The most annoying/infuritating experience I've had in the past 30 days was:

Something that happened in the game

Something that happened in real life

19. Do you feel that your ability to mediate or resolve in-group tension in real life has improved from your experiences in the game?

- It hasn't helped my real life abilities at all.
- It has helped my real life abilities a little.
- It has helped my real life abilities a lot.

20. Do you feel your ability to persuade other people in real life has improved from your experiences in the game?

- It hasn't helped my real life abilities at all.
- It has helped my real life abilities a little.
- It has helped my real life abilities a lot.

21. Do you feel your ability to inspire and motivate other people in real life has improved from your experiences in the

game?

- It hasn't helped my real life abilities at all.
- It has helped my real life abilities a little.
- It has helped my real life abilities a lot.

22. Have your experiences in the game helped you in taking on leadership roles in real-life or improved your leadership skills?

- My experiences in the game haven't helped me at all in real life.
- My experiences in the game have helped me a little in real life.
- My experiences in the game have helped me a lot in real life.

Appendix F:

Research Overview and Timeline

Step 0 – May/June
No Duration
- Recruit participants

Step 1 – Early-Mid June
Approximately 1 Week in Duration.
- Conduct formative evaluation.
- Make software changes accordingly.
- Begin to draft formative evaluation document. (Dick, Carey, Carey, etc.)

Step 2 – Late June – Early July
Approximately 1.5 Weeks in Duration
- Conduct research (at Local Internet Cafe)
- Conduct protocol analyses.
- Conduct exit survey (GEQ, 2009)
- Conduct exit interviews (Yee 2006)

Step 3 – July-August
6 Weeks in Duration
Wait for 6 week delay
Begin data tabulations and analysis

Step 4 – August
2 Weeks in Duration
- Conduct delayed surveys (GEQ, Yee)

Step 5 – September
Begin writeup.

Appendix G:

Grouping for Motivation Questionnaire Yee (2006)

1) Socialize

a. Conversation

i. I find myself having meaningful conversations with others.

ii. I usually don't chat much with group members.

b. Relationship Formation

i. I have made some good friends in the game.

ii. I find myself soloing a lot.

c. Humor

i. I like to say funny things in group/guild chat.

d. Support

i. I talk to my friends in the game about personal issues.

ii. Friends in the game have offered me support when I had a RL problem or crisis.

e. Leadership

i. I am an effective group leader.

ii. I would rather follow than lead.

2) Achieve

a. Power-Seeking

i. I like to feel powerful in the game.

ii. Doing massive amounts of damage is very satisfying.

b. Goals

i. I constantly try to set and reach goals.

ii. I can't stand those people who only care about leveling.

c. Accumulate

i. It's very important to me to get the best gear available.

ii. I try to optimize my XP gain as much as possible.

3) Explore

a. Mechanics

i. I'm fascinated by the game mechanics, and love charts and tables.

ii. I research everything about a class before starting the character.

iii. Class-balancing or realm- balancing issues do not interest me.

iv. This game is too complicated.

b. Cartographer

i. I like wandering and exploring the world.

ii. I would make maps if they weren't available.

c. Self

i. I have learned things about myself from playing the game.

d. Group

i. I understand real-life group dynamics much more after playing the game.

4) Escape

a. Escape

i. I like the escapism aspect of the game.

b. Immersion

i. I like to be immersed in a fantasy world.

c. Vent

i. Playing the game lets me vent and relieve stress from the day.

d. Withdraw

i. Playing the game lets me forget some of the real-life problems I have.

e. Role-Play

i. I like to try out new roles and personalities with my characters.

ii. The way I am in the game is the way I am in real life.

iii. People who role-play extensively bother me.

f. Story-Teller

i. I like the feeling of being part of a story.

ii. I make up stories and histories for my characters.

5) Grief

a. Manipulate

i. I like to manipulate other people so they do what I want them to.

b. Dominate

i. I like to dominate other characters/players.

ii. I am uninterested in player-killing.

c. Deception

i. I scam other people out of their money or equipment.

d. Annoyance

i. I like to taunt or annoy other players.

6) Misc

a. I beg for money or items in the game.

b. It's important to me to achieve things with as little help from other people as possible.

c. It's just a game.

Appendix H: SME Communications

Nis Bojin, Game Design SME:

Is the content accurate & up-to-date?

I don't think any of the mods detract from the gameplay experience anymore than most tutorials out there. But overall found the Flashcard version to respond more to what i was thinking i needed to know at any given moment than the JIT iteration (although based on the names, you'd think i have it backwards...which i might? hmm). It just seemed more contextually relevant on the whole to what i was doing rather than to what i was supposed to be doing. Being told what one should be doing too often makes a player think that whatever they ARE doing is somehow incorrect or inappropriate when really you'd rather have reinforcing tutorial elements that tell you what you just did and how useful it was in a given context. Of course that principle doesn't apply to all genres.

For different types of games, admittedly, different numbers of prods are necessary if the experience is intended to be necessarily active (as

opposed to exploratory etc.) or given that there will be a definite curve for which a player needs to prepare as soon as possible to see a chance of success. RTSs for example tend to aggressively guide you through an extremely complex tree of construction and deployment, which is pretty much the central family of actions around which the game solely pivots.

In an MMO and similar open worlds, it's more of just having an awareness of the basic elements--the ill-mastery of which isn't necessarily going to result in an losing condition for the average player. But again, this type of responsive rather than directive tutorial approach works better for MMOs of the WoW variety simply because they have extremely flat difficulty curves when compared to other genres, not to mention entirely different business objectives privileging retention over agony--especially in the early game (not that these are mutually exclusive, but the latter can certainly diminish the former rather quickly in the early going).

Does it present a consistent perspective?

Again, for any sort of game that promotes open world exploration and 'finding your own way', I'd say responsive tutorials would be commensurate with those aims. The more a player seeks out, the more they find out about what it is they've done and a little more about what they can do. Directives deflate that experience to some degree in an MMO environment.

That said, the objectives of a game like an MMO which typically goes through roughly three stages of maturity (nascence, balanced stratification, elitism), will likely change depending on what season the game finds itself in. Games in their twilight are now very much more about getting players into the experience right away to catch up to veterans and participate in high level content, which to me would suggest that a tutorial would likely change to meet those needs. In this case a tutorial then becomes less about what a player wants or needs and more about what a designer wants or needs from their player,

predicting their behavior and providing them what they think will be essential in retaining a player in a game's current stage.

Everquest did (and is still doing) a lot of that stuff, which would make me wonder if/how their own tutorial/newbie indoctrination process has changed over time. Their 2009 talk at GDC was literally all about re-educating and escalating newbies to maintain an active critical mass in their game, which meant changing their early game strategy drastically. Kind of scummy, but also indicative yet again that financial models have an exceedingly salient role in the way in which players are educated in these games. I digress though, clearly.

Are examples, practice exercises, & feedback realistic & accurate?

Sure

Is the pedagogy consistent with current instructional theory?

Tutorials for Digital RPGs

Well instructional theory isn't really my forte, but heavy responsive tutorial feedback that imply a breadth of options to be explored in a yet-to-be-mapped out semiotic domain rather than a sequence of directives that overtly pre-construct the ostensible limits of those domains i'd say is in-line with serious game design principles insofar as promoting the internalization of lessons about the game world in which one is participating (ala Rieber, Kafai, Gee etc. etc).

Is the instruction appropriate to the audience?

Who is the audience? Beginners to just WoW? Beginners to MMOs? Beginners to games in general? What would you say?

FOLLOWUP

The audience here is specifically beginners to MMORPG who are female.

FOLLOWUP

I suppose it's appropriate to beginners to specifically MMOs, but wouldn't say to females (or any gender for that matter) in particular.

Dr. Nick Taylor, Instructional Designer:

Appendix I:

Permanent Link to WoW Flashcards

Because of the enormous size of the flashcards, please contact me for a copy at mmw22@psu.edu.

Appendix J:

Permanent Link to Source Code for Tutorials

Because of the enormous size of the source code, please contact me for a download link at mmw22@psu.edu.