

Insights from Massively Multiplayer Online Role Playing Games to Enhance Gamification in Education

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ABSTRACT

This paper presents the results of the study of a cohort of college graduate and undergraduate students who participated in playing a Massively Multiplayer Online Role Playing Game (MMORPG) as a gameplay rich with social interaction as well as intellectual and aesthetic features. Statistically significant differences among our participants' perception, sensation seeking, and satisfaction in relation to gameplay features are investigated. Our primary objective in this investigation was to look for certain aspects of game playing and sensation seeking that attracts a group of students to engage in long term gameplay online. Results support the majority of pre-planned hypotheses and show potential important considerations to take into account when developing gamified content for educational applications. Furthermore, the limitation of the data used in this study is presented and future directions to remove the current limitation and proliferate results through qualitative research into players' in-game social interactions. We suggest that finding similarities and underlying patterns of attraction among a diverse group of students could be beneficial in designing gameplay features to enhance student participation in the learning experience and improve learning performance.

Keywords: Gamification, Educational Technology, Serious Games, Sensation Seeking, Statistical Significance

1. INTRODUCTION

The present study is situated at the intersection of two conversations. On the one hand, scholars in game studies are researching the burgeoning world of video games, a genre that has penetrated two-thirds of United States households and now constitutes a \$10.5 billion industry [1]. On the other, many educators are exploring pedagogical uses of "serious games" [2][3][4] and even prospects for Gaming Across the Curriculum [5], guided by Gee's [6] dictum that "games are potentially particularly good places where people can learn to situate meanings through embodied experiences in a complex semiotic domain and meditate on the process." We believe *motivation* may be a fruitful concept for connecting these conversations and discovering beneficial lessons that may benefit each.

Game studies scholars have given much attention to the question of why people play video games and, in fact, have developed typologies [7][8][9] and scales [10][11] to gauge players' motivations. Drawing from these two conversations may help answer questions that are fundamental to each. For educators, the question is: What would motivate students to play serious games? For game designers, the question is: What motivates players to learn

the game?

This paper presents initial findings of a large-scale study of several factors that might have a significant impact on why different groups of people participate in playing video games. Our goal is to find common factors that contribute to human enjoyment, satisfaction, and continued interest in playing video/computer games. Such factors could, we believe, potentially be utilized in developing effective educational games.

Looking further ahead, we argue the concept of motivation may offer a bridge to exploring not only individual in-game learning but, ultimately, in-game *social* learning. Vygotsky [12] famously held that "human learning presupposes a specific social nature" so that students are "capable of doing much more in collective activity." Motivation and ego-involvement are recognized by many disciplines, from psychology to communication studies, as keys to social interaction—vital factors in explaining, for example, how people manage their identities and relationships [13], process messages and change attitudes [14], and make social judgments [15]. Such an investigation will ultimately require, as Ward [16] advocated, a new view that game worlds are "not simply as artifacts of the 'real' world but [are] emerging societies in their own rights."

2. LITERATURE REVIEW

Research on the pedagogical uses of computerized games is largely clustered within two literatures. One is the literature of education and technology. The other is found in rhetoric and composition studies, a discipline that has long been open to "reading" visual domains as "texts" and seeing in these domains spaces for composing rhetorical claims.

Juul [17] addressed the fundamental question—what is a game?—by holding that a game must have rules and variable outcomes which are quantifiable as positive or negative; and that players must expend effort and then experience real-life attachment to and consequences from the outcome. Liebman [18] further suggested that games can be used four ways in education: as vehicles to convey course content; as "texts" that students "read" and analyze through gameplay; as media in which students create their own games; and as an overall approach to pedagogy that incorporates "game-like motivational systems" into course and assignment design.

While the literature in composition studies focuses on the latter three methods—games as "texts" [19][20][21], as media for student compositions [22][23][24], and as an approach to course design [5][6]—the education and technology literature centers on use of games to convey

course material.

For example, researchers in [25] conducted a mixed-methods study with education major university students. Participants were able to detect embedded learning skills within the games and found the element of motivation important. However, while motivation was not found as a sufficient reason to use games in classroom, teachers found positive responses and peer modeling to be good factors in using game-based technology to deliver course contents.

A ‘Deal or No Deal’ game was used in [26] in an introductory statistics course with the goal of entertaining students’ understanding of the expected learning outcomes from the course. This alternative activity proves to enable instructors to introduce multiple concepts while efficiently assessing students learning and retention of the materials. Furthermore, repeated play of the game with which the students are familiar benefits students without making the activity tedious as perceived by students performing such tasks with traditional paper and pencil methods.

As part of a larger project financed by the Social Sciences and Humanities Research Council of Canada (SSHRC) from 2008-11, researchers in [27] “examined the impact of an online educational game on cognitive learning”. Starting from the popular board game Parcheesi, an online game was created for a senior secondary school health education program. In comparing the subscale and total scores between males and females, no significant differences were found. This confirms that males and females can learn equally well in this setting.

Teoh in [28] examined the potential of simulation using Second Life (SL) in teacher education. It is worth noticing that simulations could be particularly relevant for special education teachers with students who have autism, Down’s syndrome, or ADHD—to help pre-service teachers identify and be more empathic toward inclusive teaching in their future classrooms [29].

Simulations such as SL provide a rich platform for learning and exploration that could be used as an extra credit option, a supplementary tool, or an enhancement to teaching because it is hands-on, visual, experiential, individualized, adaptable, and customizable; all principles of effective learning that parallel the simulated environment. In addition, SL has also led the way to other simulations development, such as Open Simulator [30], Open Cobalt [31], Kaneva [32], and Open Wonderland [33].

Means to enhance learning outcomes from playing serious games through the use of scripted collaboration in the game play are examined in [34]. As suggested in [34], “Gameplay for complex learning inherently is complex, and development requires expertise from both domain experts, pedagogical designers, text writers and software developers, [35] and [36]”.

The work conducted in [37] presents a simple interactive toolkit to deliver assignment contents to a class of biology students. This work showed that while an easy to use game could benefit students to interact with their coursework in a convenient, and efficient way, a successfully gamified content should take into account ways of communicating

with the audience in such a manner that the course content is not overwhelmed by the pervasiveness of the game features. Based on our investigation of the literature we are taking the next step of analyzing what factors play important roles in drawing different groups of population to engage with the contents.

We initiated a large-scale study of several factors which might have a significant impact on why different groups of people participate in playing video games. Our goal is to find common factors contributing to human enjoyment, satisfaction, and continued interest in playing. Such factors could potentially be utilized in developing group-specific or group-agnostic games to deliver educational materials and to improve participation and enjoyment while delivering needed services. Our initial findings of the study are presented here.

3. GAME CHOICE

The market based categorization of game genres in the current state of video games defines products into loosely organized categories which stem from similarities, in form, to prior well known releases [38]. In [38], the following genres are investigated, and we based our examination of a proper gameplay for our study based on this classification:

- **Simulation:** games are effectively “soft real-time simulations” [39] in that, a subset of real world is approximated and mathematically modelled while interaction is achieved by acquiring user input and producing human recognizable output. However, this genre specifically refers to the category of games that target sports and other real-life simulations such as dynamics of cities and communities.
- **Strategy:** divided into two categories of Real Time (RTS) and Turn Based (TBS), this genre targets player’s ability to approach a complicated scenario by strategizing solutions to achieve a desirable endgame by combining aggressive, semi-aggressive, and diplomatic means. Perhaps this genre is the least of all game genres concerned with cinematic and visual effects, but one of the most difficult for producing Artificial Intelligence (AI) agents.
- **Action:** as the name suggests, this genre is the most performative [38], and require the player’s physical and mental ability to coordinate effectively his/her sensory input with the mapping of actions available through the game’s User Interface (UI). This genre is further categorized into First Person Shooters (FPS) and Third Person Shooters (TPS).
- **Role-playing:** closely tied to the literary genre of fantasy [38], this genre gives the player control over their alternate self in the game by presenting a myriad of potential character transformations. Placed within the subtext of a specific culture, or the development of a certain community spirit, combined with the potential complexity of the contextualization of such transformative characteristics and roles could make this genre of gameplay a target rich environment for a large number of human-oriented applications, in education, cultural accommodation, community organizations, etc. With the development of

accessible and affordable internet connectivity, the RPG genre has taken a drastic turn in terms of accessibility and availability. Apperley postulates in [38] that, “Massively Multiplayer Online Role Playing Games (MMORPGs) blur the boundaries between games and community completely”, thus “MMORPGs should be conceptualized as a convergent technology.”

Based on the above categorizations of the video/computer games, and with the goal of finding suitable mediums for gamifying educational content, we selected a Massively Multiplayer Role Playing Online Game (MMORPG) called the Lord of The Rings Online [40] as the target game for this study. LOTRO is produced by Turbine Inc. and Warner Bros. Entertainment Inc.

LOTRO is one of the longest massively multiplayer online roleplaying games and has a very large online player pool. Moreover, there are a large number of online player communities comprising of active players. These communities help new players learn about the gameplay, address questions, and create a sense of culture and belonging to the LOTRO community, beyond just the playing of the game for entertainment purposes.

LOTRO communities are also active in diverse sets of activities such as player meet-ups, community events, and other active participation settings, which increases the footprint of the game as well as its impact on its players and the community at large.

For example, LOTRO has an active facebook page with more than 300,000 followers on its English page and active tweeter and Pinterest accounts, with a total of over 22 Million fans. Community relations of the LOTRO developer’s hosts routine in-game, and off-game, activities such as hobbit runs, festivals, and other social events, as well as charitable events to raise funds for Extra-Life¹.

To investigate the cultural as well as social aspects of online game playing for the purpose of extracting useful patterns of social and intellectual gameplay helpful for gaging gamified educational content, we believe that LOTRO communities and player will afford us a large, diverse and engaged set of players for the purpose of this research.

Gameplay

In LOTRO players take the role of a character from four races; Man, Elf, Hobbit, or Dwarf. Each player can take a specialty from the nine designated classes, Burglar, Captain, Champion, Guardian, Hunter, Lore Master, Minstrel, Rune Keeper, and Warden. Some of the classes are available to all races (Minstrel, Guardian, and Hunter), while others are limited to a subset of the races, e.g. Rune Keepers are playable by Dwarves and Elves while Captain is only playable by the race of Men.

Players will be deployed to the middle-earth on one of the available game servers with two located in Russia; Fornost

¹ - As of the time of this writing, the LOTRO’s Extra Life fundraising even has raised over \$42,000 for the Children’s Miracle Hospital Networks.

and Mirkwood, and all others located in North America [41]. Once in game, players will have the option of completing “Epic quests” designed as a part of the main story, or non-story, “Regional”, “Raid”, “Class”, and “Fellowship” quests.

Game Selection Rationale

As a part of this study, we investigate such components of digital gameplay as character development, physical and fantastic settings, gameplay, visual and aesthetic components of the gameplay, as well as the social aspects. Our study is focused on finding features that are perceived commonly within or differently between different groups of participants, with the goal of developing guidelines to effectively design interactive gamified educational material.

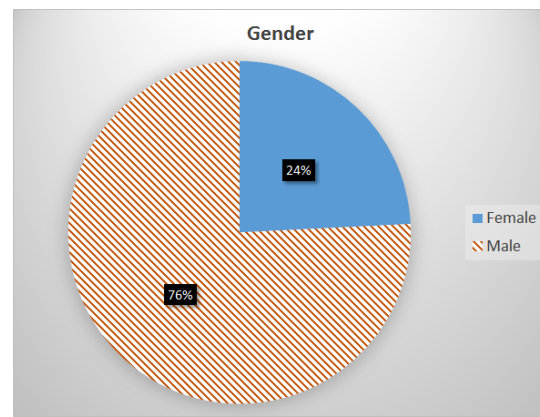


Figure 1- Participants' gender classification.

As such, LOTRO will be a suitable medium to engage students in a social setting with the goal of performing specific tasks which require critical thinking, problem solving, social interaction, and other competencies that an educational setting targets. Furthermore, players who engage in MMORPGs such as LOTRO will help us understand what aspects of this genre draws them to play the game and what components of sensation seeking are most important for this target population.

4. RESEARCH METHOD

A large number of graduate and undergraduate students were recruited among students at the University of Houston-Victoria and were tasked to play the Lord of the Rings Online™, over short, medium, and long durations of time.

In [45], we presented some preliminary results of our investigation including a sample set of 50 participants. Since then, we have doubled our sample size from both undergraduate and graduate programs, for a more reliable descriptive statistical analysis. The descriptive statistics that follow include the larger sample size, but for comparison we also present an overview of the analysis of our a priori preplanned hypotheses over the smaller sample size [45].

Participants

The participants in the study were 72 (76%) male and 23 (24%) female students (Figure 1). These students were both from undergraduate (80%) and graduate (20%) programs actively enrolled at the University of Houston—Victoria (Figure 2).

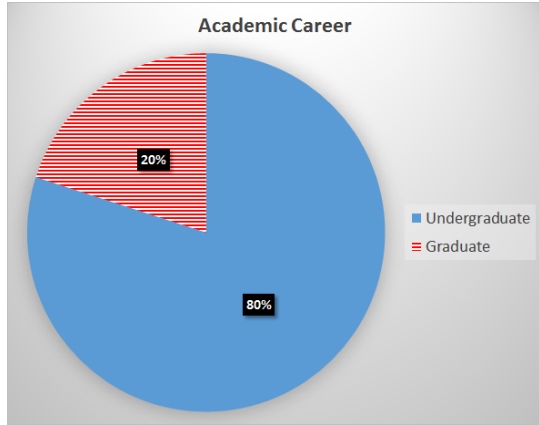


Figure 2- Participants' academic career.

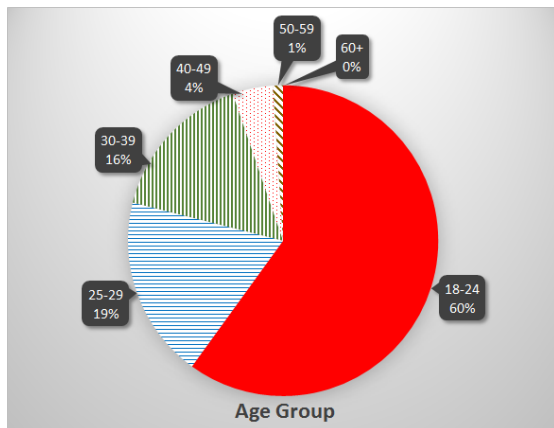


Figure 3- Participants' age group.

Participants' ranged in age from 18 to 59. Sixty percent of the participants were 18-25, 19% were 25-30, 16% were 30-39, 4% were 40-49, and 1% were 50-59 (Figure 3).

The sample was diverse with 11% African American, 9% Asian, 25% Hispanic, 1% Native American, and 54% Caucasian (Figure 4).

Figure 5 shows a breakdown of the overall number of hours that participant spend in the LOTRO game for the duration of this study. 57% of the participants spend a relatively short amount of time in the LOTRO game, while 22% spent a relatively large amount of time (over 10 hours per week) in the game. 21% of the participants were assigned to play LOTRO with a medium amount of time spent in the game.

Materials and Procedure

Students participated in the study as part of computer science research project. Participants completed a 54-item

game characteristics survey based on game characteristics identified by Wood et al. in [42] and by Yee et al. in [43]. Participants also completed the 18-item Gaming Motivation Scale (GAMS) [44].

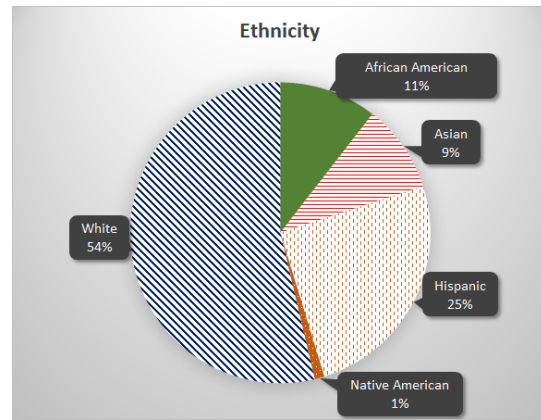


Figure 4- Participants' ethnicity classification.

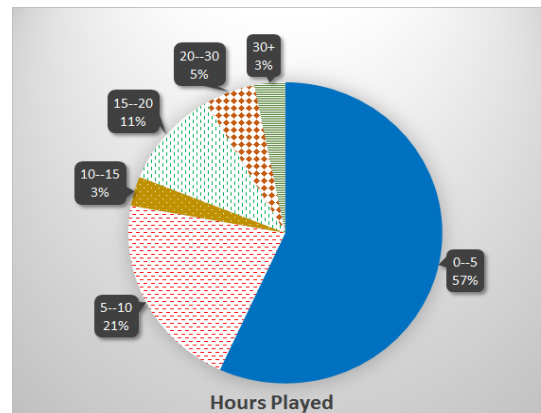


Figure 5- Breakdown of the number of hours of LOTRO play time.

The GAMS is comprised of six subscales of 3-items each – Intrinsic motivation: desire to perform an activity for itself, Integrated regulation: engaging in an activity out of choice that is now a coherent part of the organization of self, Identified regulation: behavior emitted out of choice based on its perceived meaning or its relation to personal goals, Introjected regulation: regulation of behavior through internal pressures like anxiety and guilt which implies partial internalization, External regulation: corresponds to extrinsic motivation, and Amotivation: similar to learned helplessness [44].

Research indicates that the GAMS has adequate levels of validity and reliability [44]. The game characteristics survey contained a 5-point Likert scale from “not important at all” to “extremely important” for each question and the GAMS contained a 7-point Likert scale from “I do not agree at all” to “very strongly agree” for each question.

Research Design

The research design implemented in this study was quasi-experimental. The quasi-independent variables were gender, age partition: 18-25 vs. Over 25, and degree:

undergraduate vs. graduate. The dependent variables were apriori (prior) pre-planned comparison of survey characteristic items and GAMS items as well as GAMS subscales excluding the Amotivation Scale which was missing an item when participants completed the GAMS. A priori planned comparisons were made using one-way independent-measures analyses of variance (ANOVAs).

Research Hypotheses

Prior to the study, there were 10 apriori pre-planned comparisons anticipating statistically significant differences, and 2 apriori pre-planned comparisons anticipating no statistically significant differences.

- H1: There will be a statistically significant difference by gender on the question “How important to you is physical feedback in a game?” because males and females may respond to physical feedback differently with males more favorable to physical feedback or activities.
- H2: There will be a statistically significant difference by gender on the question “How important to you is shooting enemies (targets, etc.) in a game?” because males seem to gravitate more toward aggression or violence than females.
- H3: There will be a statistically significant difference by gender on the question “How important to you is character development over time in features such as dexterity, strength, and intelligence?” because character development may be more important to one gender or the other.
- H4: There will be a statistically significant difference by gender on the question “How important to you are fantasy settings in a game?” because one gender may spend more time imagining than the other.
- H5: There will be a statistically significant difference by gender on the question “How important to you is different endings (ending options) in a game?” because novelty may be more important to one gender than the other.
- H6: There will be a statistically significant difference by age group (18-25 vs. Over 25) on the question “I play computer (video) games because it is an extension of me.” since younger participants have grown up with pervasive computer video games.
- H7: There will be a statistically significant difference by degree (undergraduate vs. graduate) on the question “I play computer (video) games because it is an integral part of my life.” since undergraduates are likely to have more free time than graduate students.
- H8: There will be a statistically significant difference by degree (undergraduate vs. graduate) on the question “I play computer video games because it is an extension of me.” since undergraduates are younger and grew up with computer games.
- H9: There will be a statistically significant difference by degree (undergraduate vs. graduate) on the question “How important to you are sophisticated Artificial intelligence (AI) in a game?” because undergraduates rely more on the ability of the game non-player characters to assist and compete.
- H10: There will be a statistically significant difference by gender on the question “How important to you is

building alliances in a game?” because females appear to be more social and relationship-oriented than males.

- H11: There will not be a statistically significant difference by gender, degree, or age group on the question “How important to you are collecting things (e.g. objects, keys, chalices, components) in a game?” because collecting is a universal attribute for gaming participants.
- H12: There will not be a statistically significant difference by gender, degree, or age group on the question “How important to you is multiplayer communication in a game?”
- H13: There will be a statistically significant difference by gender, age or degree on the GAMS subscales because there were differences by gender, age, and degree on some individual GAMS questions.

5. RESULTS AND DISCUSSIONS

We present the results of this study in two categories; i.e. descriptive statistics and Analysis of H1-H13 Hypotheses.

1) Descriptive Statistics

Here we presents the descriptive statistics from a number of significant questions taken from game characteristics survey. The questions are categorized into Social Interaction (Q.1-3), Intellectual Interaction (Q. 4-8), Mediation (Q. 9-12), Gameplay Dynamics (Q. 13-15), and Aesthetics (Q. 16-21) and shown in Table 1.

The scale of the ratings on these questions were “not important at all”, “somewhat unimportant”, “neutral”, “somewhat important”, “extremely important”, and “I don’t know”. For our analysis, the “not important at all” and “somewhat unimportant” answers are grouped as “Unimportant”, the “somewhat important” and “extremely important” answers as “Important” and the other two answers as “Neutral”.

Social Interaction: An important component of enhancing student performance is to facilitate students’ social nature in engaging them with the educational content. There have been studies on the role of social media tools in learning to promote a more student-centered course [46]. Although these studies target new technologies and their effects on education, they do not evaluate students’ perception of social aspects of digital games directly.

We were interested in the question of how our participants rated the importance of “multiplayer options” and “multiplayer communications” within a game, as well as the importance of having a “Local Area Network (LAN)” option while playing the game. As such, we outlined three questions to evaluate student gamers’ expectations of social components of the target game along the aspects of option, communication, and local proximity.

Figure 6 shows the results of our survey on the questions pertaining to social interactions aspects of gameplay. 75% of the participant rated multiplayer communications in a game to be an important factor. 72% considered having a multiplayer option in a game to be important, while 57% considered LAN options as an important factor.

Table 1. Game characteristics questions relevant to our study

No.	Question
Q1	How important to you is multiplayer communication in a game?
Q2	How important to you is multiplayer option in a game?
Q3	How important to you is multiplayer Local Area Network (LAN) option in a game?
Q4	How important to you is solving puzzles in a game?
Q5	How important to you is fulfilling a quest in a game?
Q6	How important to you is skill development in a game?
Q7	How important to you are skill levels in a game?
Q8	How important to you is character development over time in features such as dexterity, strength, and intelligence in a game?
Q9	How important to you are speaking characters in a game?
Q10	How important to you is it that a game is based on a story?
Q11	How important to you is rapid absorption in a game?
Q12	How important to you is narration in a game?
Q13	How important to you is collecting things in a game?
Q14	How important to you is sophisticated AI in game?
Q15	How important to you is rapid advancement of player in a game?
Q16	How important to you are realistic sound effects in a game?
Q17	How important to you is background music in a game?
Q18	How important to you are sound and graphics settings in a game?
Q19	How important to you is the ability of the player to customize the actual physical properties of a character in a game?
Q20	How important to you are high quality realistic graphics in a game?
Q21	How important to you are cartoon-style graphics in a game?

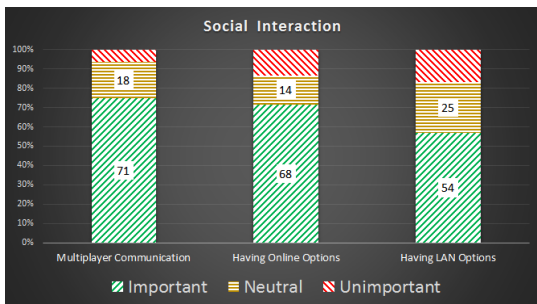


Figure 6- Social Interactions Results.

Intellectual Interactions: To evaluate how users intellectually interact with a game, we selected questions which relate how users consider advancing their persona and their ability to interact with the game world as well as challenging their critical thinking and problem solving skills. These questions evaluate how important users consider things such as solving puzzles, fulfilling quests, developing useful game skills, advancing their skills throughout the game storyline and character development in game. The importance of these aspects of a game could prove useful in educational games by including these concepts and aspects alongside the contents of the educational materials to increase student engagement.

As shown in Figure 7 a strong majority of the participants rated all of the individual questions within the intellectual interactions category of the survey as important. The strongest majority was about the skill and character

development. 88% rated skill development as an important factor, 87% rated having skill levels important, and 86% rated means of character development an important factor in engaging with a game. 77% of the participant considered having puzzles to solve and quests to fulfill as being important and engaging factors in a game.

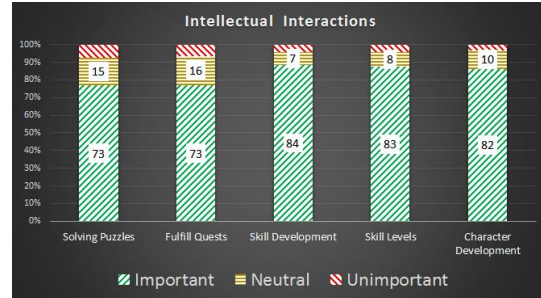


Figure 7- Intellectual Interactions in Game.

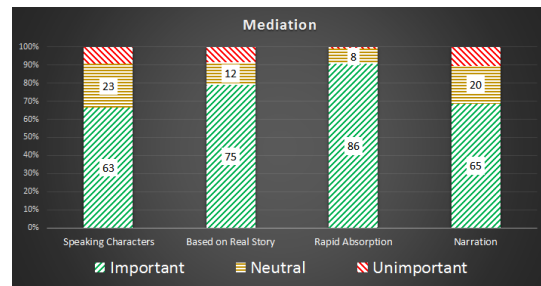


Figure 8- Mediation Results.

Mediation: To engage participants in a fulfilling and satisfactory gameplay requires elements of conveying a coherent and appealing storyline. This will be an important aspect in a gamified educational application as most educational content can be easily formatted into a game-like medium of delivery. In this category, we asked the participants about how important they rate speaking characters and narration, storyline, and speed of absorption.

Figure 8 shows the results of the study of the mediation category. The strongest majority (91%) of our participants rated rapid absorption into the game as an important factor. 79% of the participant rated an underlying story important, while narration and speaking characters were considered to be important by 68% and 66% of the participants, respectively. This shows that while auditory concepts may not be as important as the means of rapid absorption and underlying storyline, they are important factors in engaging students with the contents of the educational game, nonetheless.

Gameplay Dynamics: An important difference between a gamified educational application and the traditional pen-and-paper or even the current state of online education is the fact that the students' experience could be developed and modified in a non-linear format. Games have the ability to engage the player sensory and cognition in a number of layers. As such three factors could be potentially interesting to investigate if an educational content is to be integrated into a game for delivery.

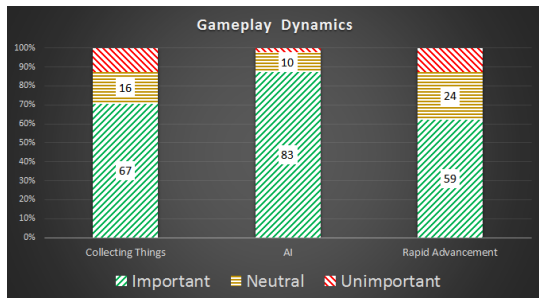


Figure 9- Results of Gameplay Dynamics.

Students' progress and performance is an important feature in student evaluation. Gameplay features perfect to be tied to students' performance and progress is their ability to acquire game items (tokens, badges, etc.) and to have a tangible feedback about their advancement in the game. Finally, students' interaction with the game and the

delivery of the gamified content could be impacted by endowing the educational material certain levels of intelligent behavior. This will fall under the realm of Artificial Intelligence (AI), and as such player's perception of the AI will be an important gameplay feature to investigate.

As shown in Figure 9, a strong majority of the participants (87%) rated Artificial Intelligence as an important gameplay aspect. 71% rated the ability to collecting objects and 62% rated rapid advancement as important features in a game.

Aesthetics: With recent advances in both hardware and software technologies, computer/video games have the ability to engage and to draw players to the game world like never before. As such, game aesthetics is another important feature to explore, from both visual and auditory design perspectives.

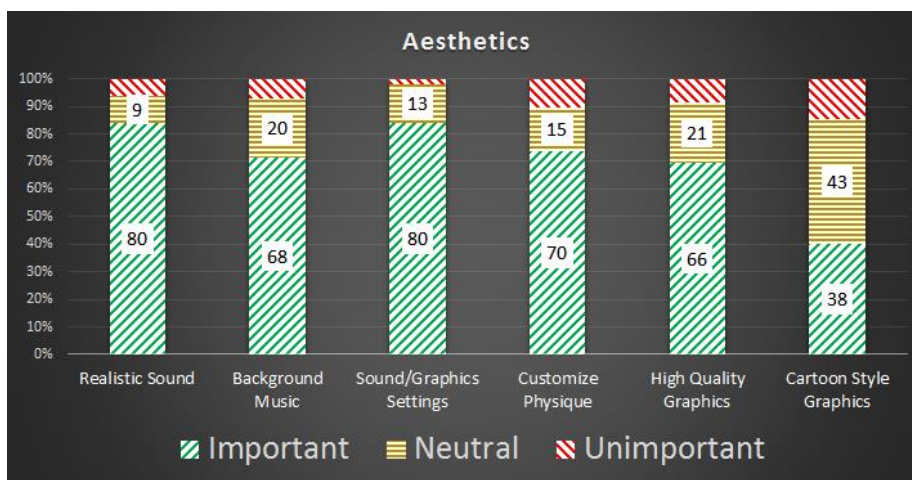


Figure 10- Evaluation of Aesthetics of the game.

To evaluate players perception of game aesthetics we asked our participants about how important it is to them that a game has realistic and high quality sound and graphics, that these settings are customizable, that players having the ability to customize their game character, and that the game provides background music.

Figure 10 shows the results of our users' evaluation of the importance of aesthetic features of a gameplay. 85% of the participant rated the question of sound and graphics settings in a game as important. A same majority of the participants (85%) also consider having realistic sounds in a game as an important feature. 73% of the players consider the ability to customize their game characters physical attributes as an important feature. 72% and 69% of the users considered background music and high quality graphics, respectively, as being important, while only 40% of the players favored cartoonlike graphics in a game.

As we expected realistic graphics is considered to be important, but the audio and realistic music and sound is also a very important feature in a game if the goal is to

deliver an engaging and satisfactory experience to the game players or the users of a gamified educational application.

As shown in the above sections, all five categories of Gameplay, Aesthetics, Mediation, Social Interaction, and Intellectual Interaction are perceived as important features of a game if it were to be viewed favorably by the target population. This will be quite important in developing game content for applications in education as maintaining the interest of the target population could be essential in the success of the delivery of educational content.

2) Univariate Analyses for Hypotheses H1 - H12

The analysis of the H1-H13 Hypotheses are repeated here from [45] for convenience. At the time of the analysis of the H1-H13 hypotheses we had a sample size of about 50 participants.

Female participants scored significantly higher ($M = 4.50$, $SD = .52$)² than male participants ($M = 3.44$, $SD = .96$), $F(1, 44) = 13.11$, $p < .001$, $\eta^2 = .23$ on the question "How

² M: Mean, SD: Standard Deviation

important to you is physical feedback in a game?"

Female participants scored significantly higher ($M = 4.50$, $SD = .67$) than males ($M = 3.65$, $SD = 1.12$), $F(1, 44) = 6.07$, $p < .018$, $\eta^2 = .12$ on the question "How important to you is shooting enemies, (targets, etc.) in a game?"

There was no statistically significant difference by gender on the question "How important to you is character development over time in features such as dexterity, strength, and intelligence?" $F(1, 44) = 3.69$, $p = .06$.

There was no statistically significant difference by gender on the question "How important to you are fantasy settings in a game?" $F(1, 44) = 3.93$, $p = .054$. However, the difference by gender did closely approach statistical significance with $p = .054$ instead of $p = .05$.

Female participants scored significantly higher ($M = 4.33$, $SD = .65$) than male participants ($M = 3.29$, $SD = 1.19$), $F(1, 44) = 8.15$, $p < .007$, $\eta^2 = .16$ on the question "How important to you is different endings (ending options) in a game?"

The 18-25 age group ($M = 5.18$, $SD = 1.27$) scored significantly higher than the Over 25 age group ($M = 4.20$, $SD = 1.79$), $F(1, 45) = 4.86$, $p < .03$, $\eta^2 = .01$ on the question "I play computer (video) games because it is an extension of me."

Undergraduates scored significantly higher ($M = 4.67$, $SD = 1.74$) than graduate students ($M = 3.36$, $SD = 1.78$), $F(1, 45) = 5.47$, $p < .024$, $\eta^2 = .11$ on the question "I play computer (video) because it is an integral part of my life."

Undergraduates scored significantly higher ($M = 5.27$, $SD = 1.18$) than graduate students ($M = 3.57$, $SD = 1.79$), $F(1, 45) = 14.89$, $p < .001$, $\eta^2 = .25$ on the question "I play computer (video) games because it is an extension of me."

There was no statistically significant difference by degree on the question "How important to you are sophisticated Artificial Intelligence (AI) in a game?" $F(1, 44) = .09$, $p = .77$.

There was no statistically significant difference by gender on the question "How important to you is building alliances in a game?" $F(1, 44) = .86$, $p = .36$.

There was no statistically significant difference by gender [$F(1, 44) = 2.62$, $p = .11$], degree [$F(1, 44) = .51$, $p = .48$], or age group [$F(1, 44) = 2.79$, $p = .10$] on the question "How important to you are collecting things (e.g. objects, keys, chalices, components) in a game?"

There was no statistically significant difference by gender [$F(1, 44) = .73$, $p = .40$] or degree [$F(1, 44) = 2.46$, $p = .12$], but there was a statistically significant difference by age group with the 18-25 age group scoring significantly higher ($M = 4.42$, $SD = .70$) than the Over 25 age group ($M = 3.75$, $SD = 1.21$) on the question "How important to you is multiplayer communication in a game?" $F(1, 44) = 5.62$, $p < .022$, $\eta^2 = .11$.

3) *Multivariate Analysis for Hypothesis H13*

There was no statistically significant difference by gender or age, but there was a statistically significant difference by

degree on the five subscales of the GAMS, $F(5, 36) = 2.71$, $p = .03$, $\eta^2 = .27$. Undergraduate participants scored significantly higher ($M = 13.90$, $SD = 4.16$) than graduate participants ($M = 9.64$, $SD = 4.97$) on the Integrated regulation GAMS subscale, $F(1, 45) = 13.41$, $p < .001$, $\eta^2 = .25$. Undergraduates also scored significantly higher ($M = 13.82$, $SD = 3.82$) than graduates ($M = 10.93$, $SD = 3.93$) on the Identified regulation GAMS subscale, $F(1, 45) = 7.45$, $p < .009$, $\eta^2 = .16$. Lastly, undergraduates scored significantly higher ($M = 9.57$, $SD = 4.01$) than graduates ($M = 8.36$, $SD = 4.07$) on the Introjected regulation GAMS subscale, $F(1, 45) = 5.19$, $p < .028$, $\eta^2 = .11$.

The above results support our anticipated outcomes for hypotheses H5-H8, H11, part of H12, and part of H13.

There were two hypotheses (H1 and H2) with results contrary to our expectations for pre-planned comparisons. We had anticipated that males would score significantly higher on the questions of "How important to you is physical feedback in a game?" and "How important to you is shooting enemies (targets, etc.) in a game?" than female participants. However, female participants scored significantly higher than male participants on both of these questions. We can attribute these results to either the limitation of our current data, to the reversal of gender roles in role-playing virtual environments, or to an unknown factor which needs more investigation and study.

6. CONCLUSIONS AND FUTURE WORK

This paper presented the data and the results of a study which investigates gameplay factors that impact immersion and satisfaction perception of video/computer games on a target student population. Our goal is to identify contributing features in drawing students to participate in the gameplay and to establish guidelines in effectively developing gamified educational content.

Based on our findings, we targeted five major aspects of engaging gameplay to help with efficient, and satisfactory delivery of educational contents in gamified educational application pertaining to mediation, gameplay, aesthetics, and social and intellectual interactions.

A future direction for our research is to study the contents of the participants' interaction within the game with other players as well as the Non Player Characters (NPCs). We will be specifically performing interaction process analysis as well as comparing socioemotional with task-oriented communications, quantitatively. Furthermore, we will plan to perform ethnography and discourse analysis to investigate the development of communities and cultures in game, qualitatively, to establish guidelines for development of successful gamified educational contents.

Plans are underway to develop our first gamified educational material for a college level certification program. The finding of this study will be utilized in the process of developing the games and merging the educational materials within the game-like mediums to facilitate learning and to improve student performance.

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