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RESEARCH ARTICLE

Motivational engagement and video gaming: a mixed methods study

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Abstract A mixed methods design was used to identify factors associated with motivational engagement in video gaming. Self-report instruments were administered to 189 video game players to assess goal orientations, affect, need for cognition, and perceptions of engagement and flow. Simultaneously, a sub-set of 25 participants were interviewed and results analyzed to identify patterns that influenced their propensity for gaming. Regression results revealed motivational engagement for gaming was related to gender, hours of play, task orientation, and socialization. Players indicated that gaming was socially captivating, fun, challenging but relaxing, and precipitated positive affect and cognition even when unsuccessful results were achieved. The negative consequences normally associated with task failure were not reported by participants to take place during gaming. We concluded transfer of motivational engagement in gaming for entertainment to educational contexts was unlikely to occur.

Keywords Motivation · Video gaming · Engagement

Video game players typically exemplify behavior that is intense, purposive, and goal-directed. Gamers exhibit adaptive motivation towards the gaming tasks in which they engage (Jones 1998, 1999; Klein and Freitag 1991; Malone 1981; O'Neil et al. 2005) and ardent gamers have been described as intrinsically motivated (Malone 1981; Wang et al. 2008; Warren et al. 2008), engaged (Garris et al. 2003), focused, and even pathological (Chou and Ting 2003). The deeply intrinsic nature of the gaming experience was investigated by Jones (1999) who claimed, "For better or worse, digitally rendered environments can be as, at times more, engaging than reality" (p. 327).

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Several studies have established relationships between gaming and learning (Barab et al. 2007; Hopelab 2006; Ito et al. 2008; Schrader and McCreery 2007; Squire et al. 2008; Warren et al. 2008) and results generally indicate knowledge gains associated with video game play. However, empirical studies investigating video gaming and motivation are less frequent (Ryan et al. 2006; Owston 2009; Schrader and McCreery 2007). In addition, research investigating variables related to engagement are typically reserved for academic settings. We believe the nature of video gaming represents an ideal context to investigate motivational engagement due to the focused attention and intrinsic motivation exhibited by game players (Wang et al. 2008).

The current study had two main methods and objectives. We interviewed 25 young adults and completed a content analysis of the interview transcripts to uncover what factors influenced their decision to play, the nature of their play, and their persistence in playing video games. Concurrently, we collected self-report data from a larger sample (which included our interview subjects) to assess goal orientations, the affective factors associated with gaming experiences, need for cognition, and perceptions of engagement and flow to determine the relationship with video game play.

First, we discuss research on motivation and video gaming. Next, we use a social-cognitive framework to explore the myriad of factors associated with motivation, engagement, and flow. We describe our research methodology, substantiate our analytical approach, and report results. We conclude with a discussion of how our findings might relate to transfer of engagement from gaming to the classroom, and provide suggestions for future research.

Motivation and gaming

We chose to focus on individuals playing multiple-level video games because these games are characteristically associated with high levels of engagement (Gee 2003). Multiple-level games become increasingly complex and challenging as a player progresses (Habgood et al. 2005; Garris et al. 2003) and are of particular interest because the escalating difficulty requires persistence, overcoming in-game obstacles, and application of strategies to be successful at accomplishing game objectives. We did not consider engagement in simulations and simulation games (see Gredler 1996, for the definition and classification). Simulation games have a goal of discovering causal relationships in a non-linear fashion. Further, unlike recreational games, simulations are designed for specific skill mastery, and therefore have well-defined achievable goals with predictable outcomes. These games are usually used for training, and the motivation to engage in simulation games is based on the need to learn more about a situation, or is required for training and non-discretionary (O'Neil et al. 2005). This is an important distinction because the motivation to engage in simulations used for training may be considered to be more extrinsic, while motivation to engage in games for entertainment is more intrinsic (Malone 1981; Wang et al. 2008). It is the perceived high levels of intrinsic motivation associated with recreational video games players that render them germane for investigating engagement.

Several motivational variables have been found to be associated with video gaming. Gamers experience positive affect, competence, enhanced self-esteem, vitality, and when successful, ascribe higher ratings of value to gaming tasks (Gee 2003; Ryan et al. 2006; Wang et al. 2008; Warren et al. 2008). In a series of studies assessing psychological need satisfaction (Ryan et al. 2006), video-gaming participants reported increased levels of decision making and autonomy when playing games, supporting self-deterministic views

of motivation. The studies led to the general conclusion that video games have "pull" (p. 348) or an attraction for the players.

Yee (2007) used a 40-item self-report inventory and employed exploratory factor analysis to assess several criteria associated with persistence in gaming. Three factors accounted for 55% of total variance: achievement, socialization, and immersion. Achievement was comprised of in-game goal attainment, mastery of game mechanics, and a competition component described as the desire to challenge and compete with others. The socialization factor included intrinsic interest in socializing with others, establishing meaningful relationships with other players, and attaining satisfaction from being part of a group effort. The immersion component described a discovery factor such as gaining awareness of facts unknown to others, interaction in a story line, and satisfaction with the ability to customize a within-game persona. The findings revealed that gaming participants possess desires to gain power, create rules, compete, interact, bond, create topical self-identification, and use the gaming environment to escape real-life challenges. Games may indeed provide some individuals with an "immensely compelling and rewarding experience" (Garris et al. 2003, p. 442) as players execute intentionality to explore, manipulate, and hopefully master their gaming environment (Gee 2003).

Engagement and video game playing

Academically, engagement is related to achievement, motivation, and task persistence (Shernoff et al. 2003), meaningful processing on achievement measures (Walker et al. 2006), and is a prerequisite for productive learning (O'Donnell et al. 2009). As the degree of cognitive engagement, or psychological investment in a task increases, longer retention of information results (Garris et al. 2003), and a greater willingness to complete interrupted tasks ensues (Zeigarnik 1938).

Depth of processing and the activation of problem-solving strategies are positively correlated with engagement (Bandalos et al. 2003; Corno and Mandinach 1983; Pintrich and De Groot 1990). Individuals who are cognitively engaged use self-regulation strategies to plan, monitor, and evaluate learning in an effort to reach their academic goals. Similarly, enhanced engagement is related to factors such as adaptive goal orientations, perceived value, and opportunity for choice (Fredricks et al. 2004; Higgins 2006).

Individuals with a conscious and an a priori willingness to approach a task in pursuit of a specific goal can be described as exhibiting *motivational engagement.* This aspect of engagement has been defined as a combination of interest, value, and affect (Linnenbrink and Pintrich 2003), or demonstrating regulation of motivation (Wolters 2003), a conscious awareness of motivation towards a particular activity. When determining if a task will be attempted, individuals make assessments contingent upon their interests and ability. The decision to engage involves an assessment of task importance and a commitment to complete the task at hand (Wolters 2003). The balance between interest and task challenge determines the *strength* of engagement. When perceived challenge and estimated ability are commensurate, increased task engagement is likely to occur (Shernoff et al. 2003). Tasks deemed too easy, or overly difficult, impede engagement (Csikszentmihalyi 1997). Similarly, engagement is predicated upon assignment of task value with higher value associations related to deeper engagement (Linnenbrink and Pintrich 2003; Wolters 2003). There is little debate that individuals demonstrating deep engagement have the willingness, commitment, and persistence to complete a task (Fredricks et al. 2004).

How is motivational engagement related to video gaming? The research on gaming and motivation describes gamers as individuals that display intense affect, passion, and focused attention (Wang et al. 2008). According to Jones (1998), engagement in gaming is "the nexus of intrinsic knowledge and interest and external stimuli that promote initial interest in, and continued use of a computer-based learning environment" (p. 205). The intrinsic interest can be a powerful catalyst motivating the individual to complete a task. Malone (1981) developed an explanatory model of computer gaming and contended games were intrinsically motivating due to the inherent challenge, curiosity, and fantasy within the context of the game. Major components of the model included uncertain outcomes with variable difficulty levels, meaningful goals, informative feedback, sensory curiosity, and a novel but not unpredictable outcome.

Sustained engagement in gaming appears to be related to the relationship between individual skill and game complexity (Malone 1981). When gaming, individuals often experience in-game obstacles that may challenge skills and ultimately result in the decision to disengage with the task due to difficulty. However, some gamers exemplify vigorous pursuit and ongoing persistence (Garris et al. 2003), which leads to a sustained involvement described as "persistent reengagement." (p. 454) such as returning to a game that repeatedly produces frustration or losing as an outcome. The decision to continue to play may be related to the ability to control the gaming environment, a factor that has been found instrumental in the motivational pattern of gamers (Ryan et al. 2006). Labeled the achievement principle by Gee (2003), even those with limited skills have the ability to control their success by adjusting skill levels. The resultant engagement is a catalyst for accomplishment as "The larger the short-term costs, the stronger the personal resistance and if overcome, the stronger the engagement" (Higgins 2006, p. 447).

Another possible explanation for the motivational engagement shown by gamers may be the pursuit of pleasure. Gaming, if perceived as pleasurable, may cultivate a hedonic valence which reflects factors such as the degree of happiness, cheerfulness, sociability, and satisfaction attributed to the experience (Chou and Ting 2003). The strength of engagement is accelerated based upon the value associated with the task and the intensity of attraction to the task (Higgins 2006). As intensity increases, individuals become increasingly engaged and may experience a high degree of emotional arousal (Csikszentmihalyi and LeFevre 1989) related to the perception of pleasure.

The gaming participant appears to be primed to achieve a state of optimal experience known as *flow* (Chow and Ting 2003; Csikszentmihalyi and LeFevre 1989). Individuals reporting flow indicate that task-related challenges and requisite skills are compatible; capabilities are stretched, and probabilistic goal-directed outcomes increase the likelihood of learning new skills and elevating self-esteem due to anticipated success (Jones 1998; Kiili 2005). Success with goal-directed behavior delivers immediate feedback, increasing emotional involvement (Csikszentmihalyi 1990, 1997), and induces positive feelings (Kowal and Fortier 1999). The positive affect, in turn, leads to increased enthusiasm, drive, alertness, interest, and joy (Konradt et al. 2003) described as the "momentary subjective experience" (Rathunde 2001, p. 15). In a recent study, Wang et al. (2008) found gaming promoted flow dispositions through passion, challenge–skill balance, action–awareness merging, and clear goals: many of the same factors used to describe deep engagement. In summary, gaming is an ideal context to investigate motivational engagement due to existing research that intimates gaming promotes intrinsic motivation, positive affect, and many aspects of the flow experience. Given the relationship between the flow experience and positive classroom outcomes such as increased interest and school identification

(Shernoff et al. 2003), more information regarding motivational engagement should be of significant value to both researchers and practitioners.

Current study

As the popularity of video games has grown (Entertainment Software Association 2008), the empirical evidence concerning motivation and engagement by video game players has not followed (Garris et al. 2003; Gee 2003). Thus, we recorded, analyzed, and assessed the perceptions of individuals who played video games for at least five hours per week, with the objective of identifying what factors contributed to motivations and persistence in game playing.

We used a concurrent triangulation mixed-method design which is useful for researcher(s) who, "want to directly compare and contrast quantitative statistical results with qualitative findings or to validate and expand quantitative results with qualitative data" (Creswell and Plano Clark 2007, p. 62). Our approach was in the positivist tradition as we used qualitative sources with a non-interpretive approach and supplemented our qualitative findings with descriptive and correlation data. We administered four self-report measures, analyzed the results, and conducted a regression analysis in conjunction with participant interviews to determine what aspects of gaming and what motivational variables were influential on engagement in video gaming. Our study was designed to answer three specific research questions,

1. What factors do individuals consider when deciding to engage in video gaming?
2. What aspects of the experience contribute to consistent reengagement?
3. What are the significant motivational variables associated with video game play?

Answers to these questions are important as more extensive knowledge concerning motivational engagement may assist in designing adaptive instruction and pedagogy, and ultimately impact learning in the classroom. We predicted video game players to exhibit high degrees of task orientation, flow, and engagement in their pursuit of video game goals. Finally, we sought to provide evidence, if any, as to the transfer of motivational engagement or knowledge in gaming for entertainment to other contexts, such as classroom learning.

Method

Participants and design

Study participants were student volunteers participating for extra class credit from undergraduate and master degree-level education courses (average college education was 3.57 years) at a large southeastern university. We used students from dual education levels to determine if the amount of education influenced gaming frequency. Participants were 77.9% Caucasian; 12.1% Hispanic; 4.2% African-American; 3.6% Asian; and 2.2% were not classified. The total population of 189 was 75.3% female with an average age of 24.4 years who reported playing video games an average of 9.61 hours per week ($M = 13.39$, $F = 8.35$). The recruitment process included two methods; the posting of written announcements via bulletin boards and classroom visits that included one of the researchers reading a transcript of the written solicitation. The announcements emphasized

the researchers' interests in learning about player preferences and opinions associated with video game play. All participants completed the instruments described below. We used purposeful selection to interview a subset of volunteers ($M = 16$, $F = 9$). Our target population was highly engaged video game players, thus participants were included in the interview phase if they reported playing video games involving strategy or problem-solving, played five or more hours per week, and were available for a 30-minute interview. The "5-hour" per week interview criterion was an arbitrary cut-off designed to represent relatively regular and frequent game play.

The study design incorporated two empirical methods. We employed qualitative methods to collect and analyze interview data in order to create a coding structure, taxonomy of domains, and comparative conclusions to uncover the antecedents of gaming motivation and engagement, and understand the persistence to play in the face of obstacles. Our quantitative analysis was used to identify unique variance among individual difference factors and the motivational variables of goal orientation, success factors, need for cognition, and the affective factors related to gaming. A regression analysis provided data to illuminate the unique contributions of each quantitative variable. Methodologically, quantitative and qualitative results were equally weighted to obtain complementary data using the convergence model (Creswell and Plano Clark 2007) with the intention of integrating results to inform plausible conclusions.

Instruments

An instrument titled *Video Game Play* assessed habits and attitudes toward gaming. This instrument was a modification of a similar instrument developed by Chou and Ting (2003) that was used to measure subjective assessment of flow and engagement in cyber gaming. The instrument is a compilation of 7-point scales (1 = disagree strongly, 7 = agree strongly), which individually measure cyber addiction, salience, concentration, playfulness, time distortion, telepresence, and flow. Alpha values in the original instrument indicated satisfactory measure of each construct with a range between .79 and .93. We modified the wording of the measure to transform the items from a focus on Internet interactions to a concentration on video gaming. Items such as "I feel disappointed whenever I need to stop playing video games", and, "Given a choice I prefer video games to other leisure activities", were representative of the measure. Chou and Ting's validation study of the instrument revealed stability and the instrument was effective at measuring engagement in Internet activities and flow, thus justifying use of a modified version in the current study. Aggregate scores and scores for each subscale were measured and analyzed by summing respective item totals. Cronbach's alpha for the instrument was .96 indicating a high level of internal consistency.

An 18-item *Goals Inventory* (Roedel et al. 1994) used a 5-item scale (1 = always false, 5 = always true) and measured the extent of subject motivation and the degree of performance or learning orientation towards gaming. Goal orientation assesses causal attributions as to why individuals pursue tasks, and can help determine the degree of intrinsic and extrinsic motivation of an individual (Wolters and Yu 1996). Our measure retained the fundamental item construction of the parent instrument, but we made small modifications to the wording to focus the items specifically on video gaming. Test–retest reliability of the instrument revealed $r = .73$ for the learning goals subscale and $r = .76$ for the performance goals subscale, with Cronbach's alpha at .85 and .75 for the learning and performance subscales respectively. The psychometric properties and prevalent use of this instrument reflects its validity for assessing individual intrinsic and extrinsic motivation for

engagement in activities as well as the nature of goal commitment. Scores on the goal scale were determined by summing item totals and items negatively worded were reversed coded. Cronbach's alpha for the instrument in the current study was .73, indicating an acceptable level of internal consistency.

Participants completed the *Need for Cognition* (NFC) an 18-item single scale instrument, (Cacioppo and Petty 1982) designed to evaluate subject interest and propensity towards engagement in cognitively demanding activities such as puzzles and problem-solving tasks. The instrument used a 5-item scale (1 = extremely uncharacteristic, 5 = extremely characteristic), with scoring determined by an aggregate scores on all items, which accounted for negatively worded items by reverse scoring. We used this measure unaltered, as it appeared to parallel the construct of complexity hypothesized to be a motivational factor in video gaming. The reliability and validity of this scale has been well established and previous applications have revealed high levels of stability with Cacioppo and Petty (1982) reporting a Cronbach's alpha coefficient, of. 90. For our study, we calculated the reliability to be .87, indicating the instrument reliability is nearly consistent with the original validation study.

Perceptions of achievement and confidence for gaming were assessed by the 13-item *Success for Gaming scale,* which is a modified form of the Task and Ego Orientation in Sport Questionnaire (TEOSQ) (Duda 1989) that used a 5-item scale (1 = strongly disagree, 5 = strongly agree). We slightly modified the wording of some of the items of this measure to focus subjects' attention toward video gaming as they completed the questionnaire. The TEOSQ contains two subscales: a seven-item ego orientation (extrinsic motivation) subscale and a six-item task orientation (intrinsic motivation) subscale. Items for the task orientation subscale (e.g., "I do my very best", "I work really hard"), center on feelings of success when experiencing improvement and mastery, while items for the ego orientation (e.g., "I'm the best," "I can do better than my friends"), subscale center on performance relative to others. Research examining the internal consistency of the TEOSQ has revealed acceptable levels for both the task and ego subscales (Chi and Duda 1995; Duda et al. 1991) with Cronbach's alpha values of between .71 and .77 reported for the task scale, and values of .80 to .87 reported for the ego scale. Thus, the TEOSQ provides a useful foundation on which to develop an activity-related scale and was determined appropriate to assess the competitive aspects of gaming. Scoring was determined by the aggregate scores on the task and ego subscales. Cronbach's alpha for the instrument was .90 indicating the overall instrument had a high level of internal consistency.

Procedures

All participants completed a demographic survey to determine the frequency and type of video game play and to ascertain their age, gender, race, college major and the number of mathematics, science, and computing courses completed. The demographic survey provided comparative data, which permitted us to determine if differences existed based upon individual characteristics. Students then completed the four instruments, in the order described above. Those individuals meeting the interview criteria were informed the study required a 30-minute interview, and those expressing interest were subsequently scheduled to participate in the interview process in a private office of one of the researchers. Interviews were conducted within one week of the initial classroom visits. Interview subjects were instructed not to discuss the interview protocol with fellow students.

Interview protocol

We developed an open-ended interview protocol consisting of 12 questions to learn about participant descriptions, perceptions, and behaviors associated with video game play. The interview protocol was researcher designed, using contentions supported by research (Gee 2003; Malone 1981; Ryan et al. 2006; Yee 2007) and our knowledge of video gaming as a guide for question development. We were seeking to gather data that would explain why participants were motivated to choose to play video games, the types of games in which they choose to engage, why they would select a specific genre over others, their behaviors and perceptions related to the tasks associated with video gaming, and the nature of their engagement and motivation for gaming. The interview protocol was structured to provide about 20–30 minutes of interviewer and subject discourse.

A semi-structured interview format was used with the intent of inducing interpretive questions. Merriman (1998) describes interpretive questions as a "check on what you think you are understanding, as well as provide an opportunity for yet more information, opinions, and feelings to be revealed" (p. 78). Thus, the structured interview questions were viewed as prompts that could be extended if the interviewer determined that additional information, elaboration, or clarification was needed. Upon entering the room, a brief explanation of the interview process was provided to the participants. All interviews were digitally recorded to allow for transfer and storage to a computer to ensure accurate review and transcription. An independent transcriber was employed to transcribe the results from individual interviews.

Coding methodology

We used a three-phase process to categorize and analyze our interview data. In Phase I, we developed a conceptual and coding scheme using a priori and emergent qualitative techniques (Creswell 2003; Miles and Huberman 1994). We used this method to determine first-level coding and summarize data, then as means to create general categories from the full data set. In Phase I, we agreed that three a priori data categories were warranted based upon literature descriptions of video game players as being actively focused on goals and thoughts, cognitively and affectively immersed in their activity, and socially engaged in a community (Gee 2003; Ryan et al. 2006).

The Phase I coding scheme centered exclusively on the content of the interview protocol, focusing primarily on the following questions: (a) what factors were instrumental in the decision to play video games?; (b) what motivational factors influenced continued game play in the face of difficulty and obstacles?; and (c) what influenced the decision to re-engage or abandon prior gaming objectives. The coding methodology, in all phases, was based upon participant responses communicated during the interview process. Data coding and analysis occurred simultaneously as the interview data were reviewed.

As we analyzed the interview transcripts in Phase I, it became apparent that it made sense to classify participants' responses based upon motivations and cognitions before, during, and after the gaming experience. The categorization was based upon the emergence of regularities (Lincoln and Guba 1985) described by participants. Interviewees commented about precursors and conditions leading to their motivation to play video games, what motivated them during the gaming process and their thoughts after gaming, which we determined as motivating their decisions to continue or abandon game play.

The consistent pattern of responses resulted in coding of the data into a social-cognitive framework with cognitive, affective, and social qualifiers to categorize the data and create the initial coding matrix.

We coded data this way for three reasons: (a) participants revealed video game play was motivated by specific goals which were task directed; (b) a social orientation was often communicated by participants as their motivation for playing games; and (c) specific strategies were used to achieve their game-directed goals. The articulation of motivation that related to how participants planned to game, what they were thinking and doing during the game, and how they evaluated the gaming context mirrored phases of self-regulatory behavior (Zimmerman 2000). Although self-regulation models vary, almost all models emphasize a social component that indicates task-related behaviors and strategies are contextually influenced and guided by social interaction, a close parallel to the gaming experience described by participants during the interview process.

The following example illustrates the Phase I coding process. Subject 1_9_21 was asked, "Why do you play video games" and responded with, "It is a recreation, but, um, I enjoy—I enjoy thinking." We examined the response and determined that the primary motivation for playing was to engage in a pleasurable activity accompanied with an expectation of cognitive challenge. Our interpretation was based on the participant's use of the words "recreation" and "thinking", combined with the inferences to the pleasurable nature of the activity as evident by the use of the term "enjoy." We concluded this analysis by classifying this response as reflective of the planning phase in the cognitive domain (see Table 1).

In Phase II, we created smaller categories from the Phase I data set by cluster coding. We intended to categorize participant language that targeted motivational antecedents, the degree and strength of engagement, evaluation of playing outcomes and experiences, and explanations for gaming preferences. Initially, each researcher coded the data individually. After individual coding, each researcher exchanged coded data to determine agreement. Codes that were ambiguous, similar in meaning, or not agreed upon between researchers were reviewed to create a single code. For example, one researcher coded the statement, "It's a way for me to sort of slow down" as "chillin", a term used by several game players, the other researcher coded this same term as "escapism". After discussion the code "relaxation" was designated to represent the comment. Inter-rater reliability for cluster coding was .96.

Table 1 Phase I coding matrix

Phase	Antecedent/before/planning	Monitoring/during/control	Reflection/after/evaluate
Cognitive	Why game? Can I do it? Will I excel? (fun, socialize, chill, achievement)	Why do I quit, or change goal? (Challenge, learning, need for cognition, exploration)	What did I accomplish? (Progress, confidence, achievement, regression)
Affective	How am I feeling? (Bored, numb, excited)	Do my feelings change? (Elevating, flow, fantasy, escape, frustrated)	How am I feeling now? (content, flowed, happy, frustrated, chilling)
Social	With whom do I game? (Solo, dyads, group, online)	What does the task promote? (Bonding, competitive, aggressive, role play, dislike, aversion)	What social goal has been reached? (Trash talking, bragging, recognition, escapism, chilling, bonding, companionship)

Codes were clustered into categories based upon the model developed in Phase I. Thus, after Phase I coding, in Phase II each researcher reviewed the interview transcripts again and coded the motivations expressed by the participants. For example, participant 1_10_19_H indicated, "When you finally learn it, you know, you feel good about yourself, you feel pretty positive about it." During Phase I, we coded this statement in the affective domain because of the expression of positive feelings. The statement was also classified in the reflective phase as individuals were evaluating their post-game performance. In Phase II, we clustered this code in the self-efficacy category. We chose this category because the participant was expressing feelings of being positive and motivated due to the satisfaction of reaching a gaming goal, which in turn was related to a positive self-evaluation. Table 2 lists the coding frequency according to the social-cognitive framework with cognitive, affective, and social qualifiers, with all unique codes identified in Phase II listed under the "code" column.

Phase II motivations, in turn, were analyzed for frequency and similarity of response to identify condensed categories, such as gaming for community, gaming for competitive reasons, gaming for cognitive stimulation, or gaming for recreation. Additional major categories were created for reasons not to game, or to abandon the gaming process. We continued the coding process until the 133 codes extracted from the 421 pages of transcripts were saturated, resulting in 19 individual codes for reasons for gaming, 31 codes representing experience during gaming, and 21 codes representing outcomes of the gaming process.

Table 2 Phase II coding matrix

Phase	N	Domain	N	Code	N	Code (cont.)	N	Code (cont.)	N
Antecedent	42	Cognitive	73	Addiction	1	Disengage	3	Preference	1
Monitoring	62	Affective	31	Affective	1	Engagement	19	Realism	1
Reflection	29	Social	27	Bored	1	Equality	1	Reality	1
		Cognitive/ affective	1	Challenge	4	Escape	5	Reasons	4
		Social/ cognitive	1	Challenge/disengage	1	Fantasy	1	Reengage	1
				Challenge/engagement choice	1	Feelings	1	Regressive	1
				Challenge/transfer	1	Flow	7	Reject	1
				Challenge/flow	1	Fun	4	Respect	1
				Cheating	1	Goal	9	Satisfaction	3
				Chill	2	Gratification	1	Self-efficacy	3
				Choice	1	Identification	1	Simplicity	1
				Community	2	Interest	1	Social	3
				Competition	6	Knowledge	4	Strategy knowledge	1
				Confidence	1	Novelty	1	Summary	2
				Control	9	Overcoming obstacles	1	Termination	1
				Control/engagement	1	Pathological	1	Transfer	3
				Control fantasy	1	Perseverance	1	Vividness	1
				Curiosity	3	Perseverance	1		

The purpose of Phase III coding was to generate the main themes for our analysis. To determine main themes related to Phase II data, we identified patterns that triangulated the self-report data. Independently, we analyzed the data coded in Phase I and II with the objective of identifying participant communication of indicators related to the primary research questions. We analyzed the language seeking to find evidence of motivation for gaming, potency of engagement, persistence, perseverance, and flow, the basis of our research questions.

The outcome of Phase III coding provided evidence for the higher-order themes presented in our results. Coded data were analyzed in conjunction with correlating factors from the self-report instruments. The instrument data were used as a means to validate the appropriateness of the data identified during the coding process. In addition, the higher-order themes identified from the interview and self-report data were used to specify our regression analysis. Finally, we created a matrix of merged themes to support the overall interpretation of the data.

Results and analysis

We present our results through a merged analysis of the qualitative and quantitative findings. Our *quantitative* data analysis included preliminary *t*-tests to determine if race, years of education, number of math, science, or computer courses, or age, influenced hours of play and years of play. No significant differences were observed on these variables. Means and standard deviations for each study variable are reported in Table 3.

A stepwise linear regression (Pedhazur 1997) was conducted to determine which self-report instrument variables were predictive of engagement. The dependent variable in the regression equation was engagement, based on the total participant score on the *Video Game Play* measure (Chou and Ting 2003). The analysis began with an examination of correlations between the dependent and independent variables (see Table 4). This analysis revealed six of the independent variables were significantly correlated with the measure of engagement. We first entered the hours of play predictor into the regression model, followed by the indicators of task scores (Roedel et al. 1994), ego scores, gender, plays with others, and need for cognition. The selection and order of entry of variables was determined by qualitative findings and significant bivariate correlations among measures.

Table 3 Descriptive statistics

	Mean	SD	Observed range	Possible range
Variable				
Years of college education	3.57	1.75	1.00–13.00	n/a
Age	24.28	6.19	19.00–50.00	n/a
Mastery orientation	41.12	4.98	24.00–53.00	11.00–55.00
Performance orientation	13.33	3.20	4.00–20.00	4.00–20.00
Need for cognition	61.81	11.08	33.00–84.00	18.00–90.00
Ego scores	18.78	5.58	6.00–30.00	6.00–30.00
Task scores	26.80	5.21	7.00–35.00	7.00–35.00
Engagement	96.80	43.13	45.00–187.00	45.00–225.00
Plays with others	2.69	1.18	0.00–5.00	0.00–5.00
Hours of play	2.70	4.81	0.00–33.00	0.00–∞

Table 4 Correlations

Measure	1	2	3	4	5	6	7	8	9	10	11
1. Gender[a]	–	−.012	−.069	.065	.114	−.113	−.086	−.110	−.335**	−.110	−.387**
2. Years of education		–	.341**	.123	−.010	.150*	−.034	.005	−.057	−.088	−.062
3. Age			–	.157*	.002	.261**	−.194**	.039	.000	−.109	−.041
4. Mastery orientation				–	.129	.355**	.084	.476**	.071	.266**	.096
5. Performance orientation					–	−.017	.365**	.175*	.085	.039	.040
6. Need for cognition						–	−.120	.167*	.168*	.196**	.313**
7. Ego scores							–	.411**	.264**	.226**	.244**
8. Task scores								–	.266**	.345**	.198**
9. Engagement									–	.338**	.501**
10. Plays with others										–	.365**
11. Hours of play											–

* Correlation is significant at the 0.05 level (2-tailed)

** Correlation is significant at the 0.01 level (2-tailed)

[a] Gender was coded such that 0 = female, 1 = male

Table 5 Results of multiple regression analysis predicting engagement

Predictor variable	$R^2\Delta$	B	*SE* B	$F\Delta$	*df*	$p\Delta$
Hours per week	.251	3.213	.640	61.375	1,183	.001
Gender	.029	−16.594	6.656	7.291	1,182	.008
Play with others	.022	5.256	2.518	5.613	1,181	.019
Task scores	.016	1.044	.545	4.355	1,180	.038

Based upon beta coefficients the most accurate predictor of video game engagement was the number of hours played per week, followed by playing with others, with gender, and ego scores contributing the least, but still significantly to the overall model (see Table 5). Ego scores and need for cognition scores were dropped from the analysis due to lack of significant *F* change to the overall regression model. Males were almost twice as likely to be engaged in gaming as females, making gender a significant indicator of video gaming engagement.

Frequency percentages indicating participant responses to the dependent measure, *Video Game Play* (Chou and Ting 2003), are presented in full in Table 6. Frequency sums were also tabulated for the *Goals Inventory* (Roedel et al. 1994), the *Need for Cognition* scale (Cacioppo and Petty 1982), and the *Success for Gaming* scale (Duda 1989), and the highlights are reported below by infusing within our overall results.

We used comparative analysis (Miles and Huberman 1994) as the theoretical framework to guide our *qualitative* data analysis. The combination of a priori and emergent coding used in the analysis was consistent with the accepted procedures and theoretical approaches typified by a comparative analysis of qualitative data (Creswell 2003) and described earlier. We supplement our analysis with text quotes and descriptive data to support the matrix of merged themes specified in Table 7.

The decision to engage

Our first research question asked: *What factors do individuals consider when deciding to engage in video gaming?* Analysis revealed three main reasons; escapism and fun, social connectivity, and the achievement of task-related goals through control. Almost universally (84%), participants reported an a priori objective of playing video games with the intent and expectation of having fun or relaxing. The most frequent reason cited for engaging in game play was to escape from daily routines such as school or work. Individuals communicated descriptions such as "passing time", "vegging", and "chillin", colloquial equivalents of escapism. One participant stated:

> I think the majority of people use video games as their way to relax, get away from the world, like get away from your problems. Like alright, right now I'm in the game. I don't have to worry about the bills I have to pay; I don't have to do anything or my family problems or anything like that.

Participants stated gaming was a diversion to relieve stress and in many cases fostered feelings of well-being and accomplishment. The full sample results from the Video Game Play measure (Chow and Ting 2003) partially supported interview findings as 20% of participants indicated playing video games to "relieve feelings such as anxiety or depression". However, this phenomenon increased to almost one-half (48%) for individuals playing games five hours or more per week (5+).

Table 6 Response percentages—video game play measure (Chou and Ting 2003)

	Disagree strongly	Disagree moderately	Disagree slightly	No opinion	Agree slightly	Agree moderately	Agree strongly
1. I feel disappointed whenever I need to stop playing video games	38.9	11.9	6.5	16.8	17.8	7.6	0.5
2. When playing video games I tend to play longer than I originally intended	24.3	8.6	5.4	8.1	17.3	18.4	17.8
3. Sometimes I lie to family or friends to conceal how often or long I play video games	69.7	4.9	5.4	10.3	7.6	1.6	0.5
4. I need to play video games with increasing amounts of time in order to achieve satisfaction	57.3	12.4	8.1	14.6	4.9	2.7	0.0
5. I continue to play video games even when spending too much money for online fees	81.1	3.2	1.1	11.9	1.6	0.5	0.5
6. I repeatedly make unsuccessful efforts to cut back or stop playing video games	68.1	8.1	2.2	16.8	2.2	1.6	0.5
7. Playing video games is the most meaningful activity in my life	91.9	2.2	0.5	4.9	0.5	0.0	0.0
8. I feel preoccupied with video games and anticipate my next playing session	73.5	7.6	4.9	5.9	7.6	0.5	0.0
9. I have been deeply involved in playing video games	58.4	8.1	2.7	6.5	12.4	7.6	4.3
10. I play video games to escape problems or relieve feelings such as anxiety or depression	58.9	7.6	3.8	9.2	15.1	3.2	2.2
11. I am always totally fascinated with the game when I am playing video games	42.7	5.9	8.6	15.1	17.3	8.1	2.2
12. I am always totally absorbed in the game when I play video games	30.8	11.9	7.0	11.4	22.7	11.9	4.3
13. I am always absolutely focused on the game when I play video games	27.0	8.6	10.3	13.0	2.2	13.5	5.4
14. My attention is always highly concentrated when playing video games	25.0	7.6	13.0	10.3	25.0	9.8	9.2
15. I experience the highest happiness when playing video games	60.5	15.1	6.5	11.9	4.3	1.6	0.0

Table 6 continued

	Disagree strongly	Disagree moderately	Disagree slightly	No opinion	Agree slightly	Agree moderately	Agree strongly
16. I experience the highest excitement when playing video games	56.2	15.7	7.0	11.9	6.0	2.7	0.0
17. I experience the highest hopefulness when playing video games	64.9	9.7	7.0	13.5	3.8	1.1	0.0
18. I experience the highest satisfaction when playing video games	60.0	13.0	7.6	13.5	4.9	1.1	0.0
19. I experience the highest amusement when playing video games	49.2	11.4	9.7	12.4	10.8	6.5	0.0
20. I experience the highest enjoyment when playing video games	54.6	9.2	7.6	14.1	11.4	3.2	0.0
21. I experience the highest control when playing video games	56.2	9.7	8.6	15.1	5.9	4.3	0.0
22. I experience the highest relaxation when playing video games	48.6	9.7	10.8	11.4	12.4	6.5	0.5
23. I experience the highest sense of achievement when playing video games	56.2	9.7	10.3	10.8	10.8	1.6	0.5
24. Time goes by very quickly when playing video games	16.2	4.3	4.9	9.7	28.6	16.8	19.5
25. I tend to lose track of time when playing video games	23.2	2.7	7.6	12.4	21.1	15.1	17.8
26. I tend to block out the world when playing video games	40.0	9.7	11.4	12.4	11.9	7.0	7.6
27. I tend to forget where I am when playing video games	63.8	11.4	8.6	10.8	4.9	0.5	0.0
28. I am in a trance when playing video games	62.2	7.0	5.9	9.2	13.0	1.1	1.1
29. I strongly feel that myself is inside the virtual world when playing video games	63.8	12.4	2.7	13.0	6.5	0.0	1.1
30. I feel that the virtual world in video games is more real than the real world	82.7	6.5	1.1	9.2	0.5	0.0	0.0
31. I feel that the virtual world in video games is more important than the real world	86.5	3.2	2.2	8.1	0.0	0.0	0.0
32. I feel that the virtual world in video games is more challenging than the real world	79.5	6.5	3.8	8.6	0.5	1.1	0.0

Table 6 continued

	Disagree strongly	Disagree moderately	Disagree slightly	No opinion	Agree slightly	Agree moderately	Agree strongly
33. I feel that the virtual world in video games is more satisfying than the real world	80.0	5.4	3.8	9.7	1.1	0.0	0.0
34. When playing games, I feel like I am a real character in the virtual world	72.4	5.4	3.2	9.7	5.9	1.6	1.6
35. Video games provide me with endless surprising experiences	44.3	11.4	11.4	15.1	12.4	3.2	2.2
36. I burn with curiosity when playing video games	51.9	7.0	8.6	14.6	12.4	3.8	1.6
37. I thirst for more information about video games	59.5	8.6	4.9	14.1	11.9	1.1	0.0
38. I crave the availability of new video games	58.9	7.6	4.9	14.1	10.8	2.2	1.6
39. I spend endless hours playing video games to improve my skills of playing	61.1	8.1	5.9	12.4	9.2	1.6	1.6
40. I appreciate unique experiences when playing video games	39.5	10.8	3.2	13.5	20.0	5.9	7.0
41. I am willing to invest in better facilities/equipment and software to play video games	58.4	7.6	5.4	10.3	8.1	4.3	5.9
42. I play video games alone	38.4	3.8	4.3	8.6	23.8	13.1	8.1
43. I play video games with others	17.3	2.7	2.7	10.8	23.2	20.0	23.2
44. I have much in common with other video game players	42.2	15.7	6.5	17.8	7.6	5.9	3.8
45. Given a choice I prefer video games to other leisure activities	60.0	13.0	9.2	9.7	4.9	2.7	0.5

Fun

Most interview participants indicated they approached gaming under the auspices of fun; however, different motivations were associated with reaching the "fun" objective. A few students consumed by the daily challenges of school, viewed gaming as a method to engage in cognitively challenging situations. For example, one participant indicated, "It is a recreation, but, um, I enjoy—I enjoy thinking. I enjoy thinking, I enjoy learning, I like strategy-type games that let me really think my way through something." The Need for Cognition survey (Cacioppo and Petty 1982) supported the desire for cognitive challenge as 71% of participants indicated they "like to have the responsibility of handling a situation

Table 7 Matrix of merged qualitative and quantitative themes with text data quotes

Quantitatively significant	Qualitative themes		
	Socialization	Self-efficacy	Flow
Playing with others	• …you actually feel a little better when you're playing your friends that you know you beat them • A fun thing to do with my friends	• The games you play with other people, you want to be the best you can be • Like a lot of people see me as a good gamer, you know	• Usually if I'm playing at night I play a lot longer, 'cause I lose track of time • You feel like you've become part of the game
Hours of play	• I like playing, like, my friends…then we actually have competition days • It's more fun when there's—you can have someone with you around or playing against them or playing with them	• When you finally learn it, you know, you feel good about yourself, you feel pretty positive about it • I want to get that achievement so the gamer score comes up. I just tell myself, just do one more, one more, one more	• Usually just totally engrossed. I'll often zone out and think about different aspects of the game • Cause I know I could get involved in the game and—and then forget about other stuff that I have to do
Task orientation	• Like a lot of people see me as a good gamer, you know • I actually prefer playing just someone that's way better than I am, so I can see exactly what are they doing	• If I see a new strategy or tactic that works, I will try to make it work over and over again • I like something I can build the strategy over the course of several hours	• It's that competitive edge when you get your endorphins flowing, your juices flowing, you see that you've got a good play going and you're, ah, that's it, you start living, you start reliving your heyday

that requires a lot of thinking" and 69% would "rather do something that is sure to challenge their thinking abilities". Almost 90% were most satisfied "when working hard to achieve something" according to the Goals Inventory measure (Roedel et al. 1994).

Socialization

Nearly two-thirds (66%) of participants played video games with others. However, the goals and motivations surrounding socialization varied broadly and were derived in several ways. One participant stated, "It is a fun social way to interact with people" while in contrast, fierce competition drove others, "Oh it's just fun. You can talk smack a little bit, trash-talk." A few individuals reported gaming as an opportunity to be isolated, yet others deliberately structured social activities around gaming, planning family or friend time for gaming, or scheduling gaming nights.

Goals

Reaching in-game goals was frequently reported as a motivation to play games and corroborated by the general pattern observed from the Goals Inventory (Roedel et al. 1994). The regression analysis confirmed interview results as task orientation was a significant predictor of engagement. The Goals Inventory indicated 89% of the full sample always or usually were "very determined to reach gaming goals", while 91% indicated that "sticking with a challenging task was rewarding". One participant stated, "I want to get that

achievement…I just tell myself, just do one more, one more, one more.", while another stated, "because I enjoy the thrill of, you know, completing something".

Control

A dominant and recurring engagement factor related to gaming was the control individuals perceived either physically, cognitively, or emotionally. Players indicated during interviews the ability to control their gaming characters, the gaming environment, such as handheld controls, and the degree of challenge, were important motivations to play a video game. For example, one participant stated, "You control the pace and you kind of decide where to go and what to do, so, um, it's kind of like acting it out." Another participant indicated control was more important than winning, "You can win, although I'm not so much looking for winning as—watching the control factor of it." The perception of control was exacerbated as playing time increased as over 48% of the 5 + players agreed with the statement, "I experience the *highest* degree of control when playing video games" according to the Video Game Play measure (Chow and Ting 2003). In addition, our interview data suggested when the degree of control was accompanied by positive results; participants experienced enhanced engagement due to increased self-efficacy, a ubiquitous criterion in sustained and repeated engagement in many domains (Linnenbrink and Pintrich 2003).

Maintaining momentum

Our second research question was: *What aspects of the experience contribute to consistent reengagement*? Analysis revealed the social context of gaming, the degree of adaptive game control related to challenge and experimentation, and positive affect associated with gaming contributed to persistence in play.

Social contexts

Our data revealed socializing to be a prevailing reason for continuing interest in video gaming. This finding was confirmed by our regression analysis which indicated playing with others was a significant predictor of motivation to play video games. Our interview data revealed some participants used the gaming context to foster relationships and promote friendly competition among acquaintances, family, or friends. Some of our participants clearly admitted they would *not* play video games if not for the persuasion of others and the social aspect of gaming. Other players leveraged the social nature of gaming to boost their skills and self-esteem. One participant stated, "I actually prefer playing someone that's way better than I am, so I can see exactly what are they doing." Bonding with others was a particularly strong motivation to continue. According to one participant, gaming "…brings communities together, with young and old playing alike."

Challenge

Our interview data suggested that participants perceived the degree of challenge to be important to their sustained engagement. Participants felt the degree of task difficulty was at least partially within their control. When asked about how levels of difficulty were determined, one participant stated, "You gotta fail at least a couple times or once in order

for it to be difficult. If you just breeze through it and you don't fail, that's really not too fun." Enjoyment of challenge was usually or always experienced by 66% of survey participants according to results on the Goals Inventory (Roedel et al. 1994).

Conversely, when participants encountered challenges deemed insurmountable they often avoided or abandoned the game. Participants indicated gaming was "fun and complicated but if it's too complicated to pick up on fairly quickly I get disinterested." However, games that were too easy also did not promote engagement. One participant indicated, "I'll have to find a way to increase the challenge or I'll start to lose interest in the game, another stated, "if the game is too easy, I mean, I don't even play it". Thus, controlling *optimal* levels of challenge appeared to be closely related to sustained engagement.

Flow

A heightened sense of awareness, a key component of flow, was reported by several participants. One individual indicated, "When I'm playing the game, like, I'm at ease. I'm not, I'm not really, it's not really though. It's a surreal experience sometimes." Others expressed a "degree of separation" from the real world when being grossly engaged in video games and losing a sense of time. Coding revealed terms such as "engrossing", "being honed in", "endorphins flowing", and "forgetting about the other stuff I have to do." A loss of a sense of time, another key component of the flow experience was reported by 54% of the full sample and by 89% of the 5 + participants according to the Video Game Play measure (Chow and Ting 2003).

Positive affect

One of the most commonly cited reasons for persistence were the cognitive contentment and positive affect associated with gaming achievements. Participants felt gratified by their accomplishments, which in turn enhanced their self-efficacy for future game play. One stated, "It's worthwhile to keep going because I know I am getting better and I see progression." Another claimed, "It gives me a type of sense of some fulfillment, some type of sense of, um, accomplishment." In turn, successful "performances" result in accentuated positive emotions and descriptions of being satisfied and happy, for example one participant stated, "When you finally learn it, I mean, you know, you feel good about yourself, you feel pretty positive about it."

Perseverance

The ability to experiment and having multiple chances to reach game objectives appeared to contribute towards sustained play. Interview data indicated that participants frequently tested different game strategies such as using "cheat codes," or trying new strategies to overcome in-game obstacles. One of the primary reasons communicated for experimentation was the lack of long-term consequences of failure. Interview participants made it clear that gaming lives could easily be regenerated by resetting or trying again. Results from the Goals Inventory (Roedel et al. 1994) revealed 54% of respondents would persevere, "even when I am frustrated by a task". One participant indicated:

> It's like an addiction like, one more round. I have—I have to pass this level, so, one more time—one more time, and that's it." And, "If I'm doing really poorly

sometimes I'll keep playing because I want to, um, fix it before I get off. Um, but then also, if I'm doing really well, I want to continue that, um, before I get off, you know."

Participants did not communicate negative associations with failure or succumbing to obstacles, perhaps due to the ability to experiment with new approaches as task perseverance ultimately led to success for many players.

Continued commitment

Four factors contributed to sustained engagement: socialization, physiological satisfaction, achievement motivation, and an appealing gaming environment. Outcomes of game play motivated by socialization included competitive conversation, recognition from friends, and peer admiration. During interviews, individuals expressed pride in game-related achievements, regardless if played against a real-live opponent, or the virtual equivalent. Normative comparisons were reported with individuals focusing upon beating their own previous achievements or moving up the "scoring ladder" against themselves or others. Participants completing the Success for Gaming scale (Duda 1989) indicated 46% agreement with the statement "I can do better than my friends". This percentage increased to 63% for the 5 + group suggesting video gaming provided a context for demonstrating superiority of accomplishments, and a forum to receive recognition for gaming feats.

Physiological satisfaction

Almost unanimously, upon reflection participants described video gaming as conducive to fun, relaxation, stress reduction, or escape. For example, one participant indicated, "When I'm done with playing it, I'm ready to go into the real world again, doing my homework assignments and I think it's a moment of happiness, a moment of—ya, a moment of separating yourself from—from all distraction." Another participant contended the experience allowed them "to shut off the other parts of my thinking."

Achievement

Participants felt good, as one claimed to achieve a "sense of some fulfillment, some type of sense of, um, accomplishment." Some of our interviewed participants attributed the positive feelings to the gradual progression in task difficulty that led to reported increases in self-efficacy. "If it's an adaptive game and I have confidence- my confidence gets better." Another participant enjoyed "the thrill of, you know, of completing something." The feelings described are similar to those of hedonistic value (Higgins 2006) as participants perceived the outcomes of video gaming as pleasurable, interest provoking, and promoting feelings of superiority.

Context

Vividness, stimulating graphics, and intriguing story lines were described by participants as influential factors in continued play. These descriptions reflected the "momentary subjective experience" (Rathunde 2001, p. 15) whereby attention, concentration, and the positive evaluation of the experience are related to contextual changes in the game. These comments lend empirical support to the "multimodal" contentions of Gee (2003, p. 108)

and the immersive qualities described by Yee (2007), which suggested that heightened levels of engagement are associated with the aesthetically pleasing game designs, enrapturing participants and fostering attentiveness.

Alternatively, reports of disengagement with video gaming were associated with the participants' perceptions of poor game design, inferior game graphics, and predictability. Most participants shared expectations that games should utilize brightly colored graphics, leading edge technology, and elements of spontaneity to be engaging. Many indicated interest in only one type of genre of game and stated they would not play a game that wasn't within their area of interest.

Transfer

Lastly, based on our interest in transfer of engagement from gaming to other contexts, we asked all participants, "Do you learn anything from playing games?" Existing research supports the proximal transfer of skills as a result of playing video games (Gee 2003; Pelletier 2005; Pelletier and Oliver 2006) and some evidence exists for distal transfer (Warren et al. 2008). Participants indicated knowledge acquisition in some domains, such as learning statistics related to sports games, but answers varied broadly from learning advanced strategic knowledge to gaining nothing at all. A few participants claimed accelerated ability in logic, critical thinking, and the development of creative ideas, while most rejected the possibility that any meaningful learning occurred. One participant summed it up for us stating, "Like as much as you might learn something when you go to a movie." None of the participants indicated that learning was a goal of the video gaming process. However, tacit learning frequently infiltrated the gaming experience. As one participant concluded:

> So, whether or not I can learn anything I'm not sure, but it is—it's not a mindless process. You have to really be thinking about some of the things you're doing. I guess I'm saying that just in improving your critical thinking skills, really.

Summary of results

Our interview data suggested that players participate in video gaming to fulfill recreational, social, and esteem needs. The strength of motivational engagement was in part influenced by the gamers' perceived ability to control the gaming process and the perception that there were few consequences to failure when gaming.

Survey data from the Success for Gaming survey (Duda 1989), the Goals Inventory (Roedel et al. 1994) and the Video Game Play inventory (Chou and Ting 2003) supported interview results. Large percentages of individuals reported that gaming induced feelings of contentment, satisfaction, and accomplishment. Much of our survey data indicated that achieving task-related goals was an important objective, and outcome, of the process of video gaming. Survey results also corroborated the interview data, which indicated that gaming was an opportunistic context to socialize, but also provided an occasion to achieve competence in a challenging, yet controllable and supportive environment.

Data from our regression analysis indicated hours of play was the most important predictor in the decision to engage, followed by gender, the ability to play with others, and task orientation. Together these four variables explained 31.8% of the variance associated with engaging in video games. Table 7 was developed to illustrate the merged findings

from all data sources and includes specific comments that were instrumental in the development of our conclusions.

Discussion

Our analyses lead to three main conclusions; engagement in video gaming satisfied socialization needs; the perceptions of control and challenge were associated with engagement; and the cognitive and affective outcomes of gaming typically resulted in feelings of satisfaction, accomplishment, and contentment. The real-life interaction supplied by video games provided a platform for players to display mastery and receive social recognition for their gaming accomplishments. Although at times tacit, socialization was a catalyst to play, and was highly instrumental in our participants' decision to sustain gaming, even in the face of lackluster results. In summary, these findings are consistent with existing research (Malone 1981; Gee 2003; Ryan et al. 2006, Yee 2007), yet add new evidence concerning what factors are meaningful to promote engagement.

The merged evidence from our data suggested the antecedents of engagement were dictated by a predetermined interest in gaming, which was evidenced by the strong effects for gender and hours of play. Pre-gaming decisions, such as the type of game and genre, were found to be important indicators of engagement. Females were far less inclined to engage *because* the task was video gaming. Participation by females was reported as secondary to satisfying socialization needs. Thus, we contend the significant contribution of gender to the results and differential engagement based upon the type of game implies that engagement is domain specific, and suggests that transfer of engagement to educational contexts may not occur.

A second new finding is the empirical confirmation of a significant task orientation by video game players. Interviews revealed game players were intensely goal directed, adaptive, and resourceful, persevering in an attempt to meet game targets. The Zeigarnik effect (1938) posited that a delay in achieving goals as a result of obstacles (e.g. in-game death) promotes the intensity of engagement while elevating the value of a positive goal such as surviving to the next round. If a gamer believes goal attainment is possible, the intensity of effort associated with overcoming obstacles to meet the goal is increased, and the value of the targeted goal is elevated (Higgins 2006) thus strengthening engagement.

Surprisingly, survey data indicated neither mastery or performance goal orientations, nor ego goals were predictors of engagement. This finding may have resulted from the competing motivations of gaming participants having strong needs for achievement, but equally substantial goals of positive perceptions from peers, which were met through socialization. The high positive correlation between task and ego goals, and mastery and performance orientations, supports the contention that engaged players have specific entertainment and gaming objectives, but also have a demonstrative need for recognition and self-valuation as well.

Our results represent a conundrum for researchers who speculated that video gaming is a context for academic learning and opportunistic pedagogy. Our evidence suggested that games are unlikely to fulfill instructional expectations (Gee 2003; Shelton and Wiley 2007) unless a direct relationship exists between the game and the learning context. Participants did not perceive, nor enter into video gaming with an educational intention. Engagement in video games for socialization, and not learning is consistent with findings of a recent 3-year ethnographic study on the use of digital media and games conducted by the University of Southern California and University of California, Berkeley (Ito et al. 2008). Although

our gamers clearly acknowledged the growth of explicit gaming content knowledge, this knowledge was exclusively focused on game methodology or the acquisition of information needed to achieve game goals. Our results support video gaming as a domain specific opportunity for learning, confirming previous research (Barab et al. 2007; Hopelab 2006; Schrader and McCreery 2007; Squire et al. 2008; Warren et al. 2008). Our game players did not indicate learning as a motivation to participate, nor did they indicate that their gaming knowledge transferred to real-life situations. However, it is important to note that players may tacitly acquire skills during video gaming such as creativity, deductive reasoning, testing hypotheses, and collaborative ability, factors positively related to achievement (Kiili 2005; Owston 2009).

Last, engagement was sustained even when gaming results were unsuccessful. Higgins (2006) described the intensity of a motivational force as due to "opposing an interfering force while moving towards a positive target" (p. 439). Our evidence suggested gamers may strive towards overcoming any deterrent that might impede progress towards their goals. Since individuals reported conquering the game as a positive outcome, then the strength of motivational engagement may increase as the obstacles are overcome and progress is made toward intended targets. We posit this engagement is due to individuals' perceived ability to control their environment and proceed upon a determined course of action. Without the ability to remove obstacles, the motivation to attain goals is diminished.

In many ways, engagement in video gaming may replicate the pleasurable associations reminiscent of childhood play. Involvement is active, failure is forgiven, and mistakes are expected. Rathunde (2001) recounted, "As every parent knows, children's engagement in exploring the environment is perhaps the prototypical instance of flow in that the child is fully concentrated and oblivious to most distractions" (p. 18). We believe gaming provides a rekindling of the unconditional positive regard many children experience when they learn new tasks. Gaming provided a pleasurable experience while, concurrently, offering the opportunity to gain skills, make mistakes, and receive positive feedback through scaffolding, facilitating many aspects of the flow experience. Failed experience was rarely associated with remorse, and the control aspect of gaming was very meaningful for participants. Players experimented and took risks to achieve goals, which in turn cultivated flow and enhanced the strength of motivational engagement.

Gaming participants appear to experience a different context for developing skills than those associated with real-world classrooms. The gaming context is a recreational forum designed to provide entertainment. Many traditional learning environments are competitive, evaluative, and unforgiving to those that do not achieve**.** Thus, we believe there is limited transfer of motivational engagement between the context of recreational gaming for entertainment and most current educational domains due to vast contextual differences. In light of our research questions, it is important to caution others that the motivational engagement exhibited when game playing is associated with entertainment and will be difficult to transfer to contexts such as a classroom. Brophy (2004) commented upon student motivation and indicated we can expect students to find academics meaningful, "…however we cannot expect them to view these activities as "fun" in the same sense they experience recreational games and past times as fun." (p. 1).

We do, however, encourage researchers to empirically test new methods and models of pedagogy that replicate the video gaming experience described by our participants. Many positive perceptions of the video game context such as the ability to control choices, receive instant feedback, and foster social collaboration parallel descriptions of emerging and transformational classrooms that promote digital literacy (Greenhow et al. 2009).

Cloning the adaptive gaming environment by giving students the perception of control and the ability to test solutions without consequence may serve as an innovative pedagogical and research model to empirically test what types of choices, how much control, and what levels of collaboration are conducive to engagement and possible learning.

Limitations

In light of our findings, some limitations should be considered. First, we took a general view of video gaming. We included individuals that engaged in any type of video game play given the assurance that problem-solving and strategy skills were embedded into their gaming activities. Due to the specificity of motivational engagement, it is possible different results may have been observed if a focus on a particular genre of games was used such as in the methodology employed by Yee (2007). Second, the variable nature of the exogenous variables associated with video gaming needs further exploration. In our study, gender was highly influential in the engagement decision and is in contrast to reported demographic prevalence (Jones 2003). It is unknown what other individual differences factors might preclude individuals from considering a task and confound our ability to measure motivational engagement.

Third, we used a sample of self-selected student volunteers seeking course extra credit. In our sample, only 24% of the overall participants were male, while 64% of the interview volunteers were male which may have influenced the findings. We also only recruited college education majors, which is a unique group of individuals. We may have found different results if we studied high school students, other college majors such as business or engineering or other groups within the general population. The perceptions of different populations would be an excellent direction for further research. Lastly, we advocate future researchers place a greater emphasis upon empirical methods which employ precise measurement beyond self-report to truly understand under what circumstances motivational engagement can be described, quantified, and potentially transferred to other domains.

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