2008

Measuring Enjoyment of Computer Game Play

Xiaowen Feng
DePaul University, xfang@cdm.depaul.edu

Susy Chan
DePaul University, schan@cdm.depaul.edu

Jacek Brzezinski
DePaul University, jbrzezinski@cdm.depaul.edu

Chitra Nair
DePaul University, cnair1@depaul.edu

Follow this and additional works at: http://aisel.aisnet.org/amcis2008

Recommended Citation
Feng, Xiaowen; Chan, Susy; Brzezinski, Jacek; and Nair, Chitra, "Measuring Enjoyment of Computer Game Play" (2008). AMCIS 2008 Proceedings. 306.
http://aisel.aisnet.org/amcis2008/306
ABSTRACT

This paper reports on the development of an instrument designed to measure the enjoyment of computer game play. Despite the enormous technological progress in the field of computer games, enjoyment of computer game play is still not a well-defined construct. Based on Nabi and Krmar's (2004) tripartite model of media enjoyment, a survey questionnaire was developed to measure computer game players' affective, behavioral, and cognitive reactions. Expert consultation, exploratory and confirmatory card sorting sessions were used to refine the instrument. A survey of computer game players was subsequently conducted to test the instrument. Reliabilities and construct validities were analyzed. Findings and their implications were discussed.

Keywords

Computer games, enjoyment, affect, behavior, cognition.

INTRODUCTION

Although computer game play has become a prominent form of entertainment, there have been few empirical studies on this topic. Prior research on computer games in behavioral science has focused mainly on the negative impacts of playing video games, e.g., addiction and violence (Anderson & Bushman, 2001; Anderson & Dill, 2000; Uhlmann & Swanson, 2004). A few IS studies have investigated factors contributing to user acceptance of computer games. Hsu and Lu (2004) incorporated the technology acceptance model (Davis, 1989) with social influence and flow experience when studying user acceptance of game playing. They find that social norms, attitude, and flow experience explain about 80% of user acceptance of game playing. Choi and Kim (2004) suggest that people continue to play online games if they have optimal experiences while playing the games.

A comprehensive framework for examining the interaction between player characteristics and game features is needed for a better understanding of the process of game play and its impacts on users. As a form of entertainment, the construct of enjoyment is central to such a framework. However, the extant measurements of enjoyment tend to be too simplistic, using only a few items (e.g., Ryan, Rigby, & Przybylski, 2006), or lacking construct validity and reliability of measures. The absence of a validated instrument has hindered large-scale IS research on computer game play.

The aim of our research is to develop an instrument to measure various aspects of the enjoyment of computer game play. In order to make this instrument applicable to a broad range of games such as traditional video games and games played on a computer, we define computer game play as play of computer-controlled games. The following sections discuss the underlying framework, scale development, and results of the initial testing of an instrument for measuring enjoyment in computer game play.

BACKGROUND LITERATURE

Prior research in the following allied fields was examined: computer game play, enjoyment, and affect.

Computer Game Play and Enjoyment
In several comprehensive studies, Sherry and his colleagues (Sherry, Desouza, Greenberg, & Lachlan, 2003) have enumerated a set of factors of video game uses related to gratifications. Their studies used focus group research and surveys of over 1,000 participants ranging in age from 10 to 24 years old. They have identified that five factors -- competition, challenge, social interaction, diversion, and fantasy -- could lead to a sense of gratification. Grodal (2000) explains that much of the fascination with video games can be attributed to the ability of players to control the game in terms of outcomes (i.e., deciding how the "plot" will unfold), the speed at which the game progresses, and mastery of the game or mastery over other players. Vorderer, Hartmann, and Klimmt (2003) have provided support for the idea that game play is more enjoyable when there are a variety of ways to solve a challenge offered in a video game. Agarwal and Karahanna (2000) propose a model of deep involvement with software. They analyze user intentions to use IT technology and emphasize the cognitive determinants.

Hoffman and Novak (1996) present a model of flow in computer–mediated environments. The flow model involves “positive affect,” “exploratory behaviors,” and “challenge/arousal,” which could be considered as elements of enjoyment. A stream of recent studies has used the flow model to interpret and understand user experience during game play (Aderud, 2005, 2006; Jegers, 2007; Sweetser & Wyeth, 2005; Wan & Chiu, 2006). Flow is widely considered to have eight elements: concentration, challenge, skills, control, clear goals, feedback, immersion, and social interaction.

Affect

Enjoyment of computer game play pertains to the affective state of the player. For some years now, researchers studying affect have debated about a series of issues related to the structure of consciously experienced affective states. Positive and negative affect have consistently emerged as two dominant and relatively independent dimensions (Diener, Larsen, Levine, & Emmons, 1985; Russell, 1980, 1983; Stone, 1981; Watson, Clark, & Tellegen, 1984; Zevon & Tellegen, 1982). To fill the need for measuring these two dimensions with rigor and ease, Watson and Clark (1988) developed two 10-item mood scales that comprise the Positive and Negative Affect Schedule (PANAS). Recent research has also investigated the affective responses during game play. Chumbley and Griffiths (2006) have found that skill and in-game reinforcement characteristics significantly influence a number of affective measures, most notably excitement and frustration. Other researchers used physiological responses to objectively evaluate a user’s experience with entertainment technology (Hazlett, 2006; Mandryk, Inkpen, & Calvert, 2006).

THEORETICAL FRAMEWORK

Little theoretical work exists regarding enjoyment of computer game play. Prior research on computer game enjoyment mainly focuses on user experience during game play. Findings from these studies do not address the measurement of player’s subjective perception of enjoyment. In this study, Nabi and Krcmar’s (2004) model of media enjoyment from the field of communication research is used as the theoretical basis for our research on computer game enjoyment. The media enjoyment model has been widely cited in communications research. As computer game play resembles media consumption in many aspects, it is reasonable to borrow a theory in this relevant field as the first step towards building a theoretical base for computer game play. Furthermore, in order to measure enjoyment of computer game play, it is necessary to identify the contributing factors of enjoyment. The tripartite media enjoyment model (Nabi & Krcmar, 2004; hereafter referred to as tripartite model in this article) provides a conceptually sound and easy-to-operationalize framework defining enjoyment in three dimensions: affect, cognition, and behavior (Figure 1). The affective dimension of enjoyment focuses largely on empathy, positive and negative moods. Specific affective states, such as horror, sadness, and suspense, could also be considered to feed this component. The cognitive dimension of enjoyment focuses primarily on judgments of game characters' actions, though other judgments, like general enjoyment as attitudes toward story assessments (e.g., perceived realism, story coherence, message quality) or more personal evaluations (e.g., relevance, similarity) could also be included in this category. Finally, the behavioral dimension of enjoyment is logically connected to selective exposure in terms of the player's viewing intent as well as behaviors during viewing, including the act of viewing itself. Nevertheless, this conceptual model has not been validated with empirical evidence.
Based on the tripartite model of media enjoyment, our study proposes that enjoyment of computer game play could be measured by these three contributing constructs: affect, cognition, and behavior.

**INSTRUMENT DEVELOPMENT PROCESS**

In this study, we adopt the instrument development method suggested by Moore and Benbasat (1991) which consists of three stages. The first stage is item creation. Its purpose is to create pools of items for different constructs. The next stage is scale development. The basic procedure is to have panels of judges to sort items from the first stage into separate categories based on the similarities and differences among items. In the final instrument testing stage, the instrument is tested through a few rounds of surveys.

In the following sections, we will discuss the four stages involved in the instrument development for computer game play enjoyment: initial development, expert consultation, scale development, and instrument testing. The first two stages resemble the “item creation” stage in the Moore and Benbasat (1991) approach.

**Initial development**

In the first stage, an initial version of the instrument was developed based on the tripartite model of media enjoyment. The tripartite model suggests three constructs of enjoyment: affect, cognition, and behavior. Brainstorming sessions of a research team were held to create items for these three constructs. The research team consists of faculty members and doctoral students with diverse background. All of them conduct IS research and some of them are frequent game players. Based on prior research (Compeau, Higgins & Huff, 1999; Nabi & Krcmar, 2004; Watson & Clark, 1988), the team developed the first version of the instrument with 66 items to measure enjoyment of computer game play -- 33 items for affect, 21 items for cognition, and 12 items for behavior.

**Items on affect.** In the tripartite model, the affective dimension focuses largely on empathy, the moods (positive and negative), and specific affective states (e.g., horror, sadness, and suspense). Prior research (Diener, Larsen, Levine, & Emmons, 1985; Russell, 1980, 1983; Stone, 1981; Watson, Clark, & Tellegen, 1984; Zevon & Tellegen, 1982) suggests that affect has two dominant and distinct dimensions: positive and negative affect. Items were created for the positive and negative affect based on the scale presented in two prior studies (Barrett & Russell, 1998; Watson & Clark, 1988). Thirty-three items were created so that there would be sufficient items for elimination in the subsequent stages.

**Items on cognition.** The cognitive component of the tripartite model focuses primarily on judgments of game characters’ actions, though other judgments, like general enjoyment as attitudes toward story assessments (e.g., perceived realism, story coherence, message quality) or more personal evaluations (e.g., relevance, similarity) could also be included in this category. However, this construct is very broad and seems to be the least defined construct among the three. Twenty-one items were created for cognitive reactions.
Items on behavior. The behavioral component in the tripartite model is related to selective exposure in terms of the player's viewing intent as well as behaviors during viewing, including the act of viewing itself. The research team focused on behaviors during game play and developed 12 items to measure this construct.

Expert Consultation

In the second stage, 20 professional game designers and developers were contacted by email to review the initial pools of items. These designers and developers represent leading firms in computer game software industry, such as Electronic Arts, Sony Entertainment, Midway Games, Media Options, Microsoft XBOX, High Voltage, and Namco. These experts were asked to provide feedback on the first version of the instrument. They were presented all the items and asked to make a choice out of three options (keep, revise, or drop) for each item. Out of 20 experts we contacted, six responded and provided detailed comments. Their feedback included recommendations to keep or delete items from the instrument and suggestions to rephrase or add specific items. Subsequently, several new items were added to the instrument and a few items were rephrased. Overall, the experts’ feedback was positive and no item was removed. They generally agreed with the content of the instrument and recommended a number of wording changes. In a few instances they proposed additions of items covering narrowly defined aspects of enjoyment. For example, a suggestion was made to add items that investigate specific behavioral aspects, i.e. whether players talk during the game using voice over Internet Protocol (IP) as opposed to talking to a person sitting in the same room. After reviewing the expert responses six items measuring behavioral aspects were added. These items focus on issues related to how players perceive the difficulty level of the game. These changes led to the second version of the instrument containing 72 items.

Scale development

The goals of this stage are twofold: to assess the construct validity of the scales being developed and to identify any particular items that may still be ambiguous. In this stage, we performed both exploratory and confirmatory card sorting procedures.

Exploratory Card Sorting

The exploratory card sorting procedure was intended to assess the construct validity of the scales and to elicit any unknown constructs and new items. In order to achieve these goals, judges were asked to independently sort the cards with items and to label them using their own terms instead of predefined categories. In the focus group session following card sorting, judges discussed why they categorized the items in certain ways, what new items might be used to measure enjoyment, and any problems with the current items. This exploratory card sorting procedure is different from the scale development procedure employed by Moore and Benbasat (1991). In their sorting procedure, judges were required to sort items into predefined construct categories which were based on well-established prior research. Because tripartite model adopted for this study was first introduced in an allied field and not yet empirically tested for computer game play, we added the exploratory sorting procedure to discover any new constructs of enjoyment in addition to affect, behavior, and cognition.

1) Sorting Procedure

Game players were recruited as judges from students who took classes in computer gaming in a university in the Midwestern region of the US. All of them have been playing computer games for many years. Each item in the second version of the questionnaire (72 items) was printed on an index card. The cards were shuffled into decks in random order for presentation to participants. Participants were instructed to sort those cards into categories and label them independently from other participants. They were allowed to create as many categories as they would like to. At the end of each card sorting session, a focus group discussion session was held to gather feedback about the instrument. During group discussion, participants brainstormed what items could be added to the instrument and which items should be revised.

2) Inter-Rater Reliabilities

An overall measure, hit rate, of both the reliability of the classification scheme and the validity of the items was developed for this research. The hit rate was defined as the percentage of judges who correctly placed an item into the “target” construct. The higher the hit rate, the higher the degree of inter-judge agreement for an item.

3) Sorting Results

Sixteen judges participated in the exploratory card sorting sessions. They created 43 categories. The three faculty members in the research team then coded these categories in two steps. First, they independently placed/coded these categories into the three target constructs: affect, cognition, and behavior. If a category didn’t fit any target construct, it would be coded as a special category “unknown.” In the second step, the research team met, brainstormed, and finalized the coding. As a result, four out of the 43 categories were placed into the “unknown” group. This “unknown” group includes the following labels:
“Misc.,” “Physical and Emotional reactions,” “Questions with multiple locations,” and “Random.” Because these categories didn’t seem to converge on a new construct, they were excluded from further analysis. The coding result was used as the basis for subsequent data analysis.

<table>
<thead>
<tr>
<th>Construct</th>
<th>Range</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Affect</td>
<td>0.07 ~ 0.53</td>
<td>0.40</td>
</tr>
<tr>
<td>Cognition</td>
<td>0.13 ~ 0.73</td>
<td>0.45</td>
</tr>
<tr>
<td>Behavior</td>
<td>0.13 ~ 0.47</td>
<td>0.32</td>
</tr>
</tbody>
</table>

Table 1. Hit Rates from the Exploratory Card Sorting

Table 1 shows the range and average hit rates of the three constructs. Most of the items about affect seemed very robust and received reasonable hit rates (> 0.40) among different judges. Only one item, “My body is activated or alerted when playing this game,” received a low hit rate of 0.07. Based on the hit rates and participants’ comments, seven items with the highest hit rates (0.47 ~ 0.53) were retained for the confirmatory card sorting in the next step and the rest of items were eliminated from the instrument.

Items about cognition were causing more confusions than those for the other two constructs despite their seemingly high hit rates (Range: 0.13 ~ 0.73; Average: 0.45). A major problem was noted during data analysis: the items seemed diverging in different directions. The judges created 19 different labels (out of 43) for items in this category alone. After a close examination of these items, two possible explanations emerged. First, most of the items didn’t clarify that they were concerned about the judgment of game characters’ actions. Secondly, some items were related to the cognitive processes during the game play. These items deviated from the original definition in the tripartite model. In order to rectify these two problems, eight items were revised to adhere to the definition used in the tripartite model. All of the eight items were rephrased as either “Playing this game or interacting with its character(s) (verb)…” or “The activities in this game or the actions of its character(s) are …” to focus on the judgment of the game characters instead of the player.

Items about behavior had hit rates ranging from 0.13 to 0.47. The biggest problem noted in reviewing focus group discussions was the language of expression used in the items. The researchers tend to use formal wording but game players are more likely to use informal expressions. For example, one of the items for behavior is “I curse when playing this game.” The word “curse” is seldom used by a game player. Instead, they use “swear”. To make the items conform more to the languages used by game players, six items about behavioral reactions were revised and retained.

The 21 remaining items from the exploratory card sorting sessions formed the third version of the instrument.

Confirmatory Card Sorting

The goals of confirmatory card sorting are to assess the construct validity of the instrument resulted from the prior exploratory card sorting and to attempt to identify any possible ambiguous items. To achieve these goals, judges were asked to sort the various items into predefined construct categories. This step is similar to the technique used by Moore and Benbasat (1991).

1) Sorting Procedure

Twenty-three experienced game players were recruited to perform the confirmatory card sorting procedure in two sessions. Prior to sorting the cards, participants were given the definitions of the three categories: affect, cognition, and behavior. These definitions were used to sort the items. A detailed example illustrating the sorting process was also provided. The third version of the instrument containing 21 items was used in these two sessions. Participants were instructed to sort the cards into the three predefined categories. Each card could only and must be placed in one of the three categories.

2) Inter-Rater Reliabilities

Three different measurements, Kappa score, placement ratio, and hit rate, were computed to assess the reliability of the sorting conducted by judges for the confirmatory card sorting. Cohen’s Kappa (Cohen, 1960) was used to measures the level of agreement among all the judges in categorizing items. As suggested by Moore and Benbasat (1991), no general authority exists with respect to required Kappa scores and scores greater than 0.65 would be considered acceptable.
Placement ratio, as used in the Moore and Benbasat’s study (1991), was computed to measure both the reliability of the classification scheme and the validity of the items. This method analyzes how many items are placed in the target construct by judges. In other words, because each item is included in the pool explicitly to measure a particular underlying construct, a measurement is taken of the overall frequency with which all judges placed items within the intended theoretical construct. The higher the percentage of items placed in the target construct, the higher the degree of inter-judge agreement. Scales based on categories that have a high degree of “correct” placement of items within them can be considered to have a high degree of construct validity, with a high potential for good reliability scores.

Hit rate was also computed to determine the percentage of judges who correctly placed an item into the target construct. This measurement was also used in the prior exploratory card sorting step.

3) Sorting Results

<table>
<thead>
<tr>
<th>Construct</th>
<th>Cohen’s Kappa (Average)</th>
<th>Placement Ratio</th>
<th>Hit Rate (Average)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Affect</td>
<td>0.69</td>
<td>0.89</td>
<td>0.91</td>
</tr>
<tr>
<td>Cognition</td>
<td>0.70</td>
<td>0.73</td>
<td>0.74</td>
</tr>
<tr>
<td>Behavior</td>
<td>0.71</td>
<td>0.78</td>
<td>0.78</td>
</tr>
</tbody>
</table>

Table 2. Inter-Judge Agreements from the Confirmatory Card Sorting

Table 2 presents the results of the three measurements of inter-judge reliabilities. Specifically:

The affect construct had an average Kappa score of 0.69, a placement ratio of 0.89, and an average hit rate of 0.91. All the items in this construct received a hit rate greater than 0.70. These results indicate that items were generally placed as they were intended and scales for this construct demonstrated construct validity with a high potential for very good reliability coefficients.

The cognition construct had an average Kappa score of 0.70, a placement ratio of 0.73, and an average hit rate of 0.74. However, a closer examination revealed that one item, “Playing this game or interacting with its character(s) gives me a sense of accomplishment,” had a very low hit rate of 0.15. After consulting with some game players, it was noted that they usually wouldn’t express their success this way. Therefore, this item was removed from the instrument. After its removal, the average hit rate of the cognition construct rose to 0.82. Overall, the items in this group were generally placed as they were intended and scales for this construct demonstrated construct validity with a high potential for very good reliability coefficients.

The behavior construct had an average Kappa score of 0.71, a placement ratio of 0.78, and an average hit rate of 0.78. However, it was noted that one item, “As soon as this game was over, I could not wait to play it again,” had a very low hit rate of 0.20. This item was removed from the instrument. After its removal, the average hit rate of this construct rose to 0.89. Overall, the items in this group were generally placed as they were intended and scales for this construct demonstrated construct validity with a high potential for very good reliability coefficients.

Based on the above results of the confirmatory card sorting, two items were removed from the third version of the instrument.

Instrument Testing

General

The next stage of the development process was an email survey testing the instrument. The first goal of this test was to assess the reliability of the scales. Cronbach’s Alpha values were used in the reliability assessment. The second goal of this test was to ensure the construct validity. Factor analysis was used as the assessment technique.

Survey Procedure

We conducted an online survey testing the fourth version of the instrument containing 19 items resulted from the confirmatory card sorting procedure. The survey was posted on the Web and it had three sections. The first section presented general information about the survey and purpose of the research. If the respondent was not a game player, the survey asked him/her to stop. To proceed, the respondent must provide his/her name and email address. The second section asked the respondents to provide background information related to computer game play and to choose a game that they would evaluate in the survey. The third section listed the 19 items covering affect, cognition, and behavior. The order of items was
randomized. The respondent was asked to answer each and every item in this section based on the game selected in the second section. An email invitation was sent to all the students in a college at a university in the Midwest region of the US. In the email, a direct link to the survey on the Web was provided. Only game players were qualified for this survey. Each person was only allowed to respond to the survey once. Three-hundred-and-seven responses were received and used in the data analysis. Before the formal data analysis, each participant’s name, email address, and background information were checked to enforce these requirements.

Survey Results

Table 3 shows survey respondents’ background information.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
</tr>
<tr>
<td>Male (%)</td>
<td>85.3</td>
</tr>
<tr>
<td>Female (%)</td>
<td>14.7</td>
</tr>
<tr>
<td>Age</td>
<td></td>
</tr>
<tr>
<td>Mean (Years)</td>
<td>26.8</td>
</tr>
<tr>
<td>Std.</td>
<td>7.87</td>
</tr>
<tr>
<td>How long have you been playing computer games?</td>
<td></td>
</tr>
<tr>
<td>Mean (Years)</td>
<td>14.6</td>
</tr>
<tr>
<td>Std.</td>
<td>6.47</td>
</tr>
<tr>
<td>Every time when you play computer games, how many hours on average do you play?</td>
<td>2.4</td>
</tr>
<tr>
<td>Std.</td>
<td>1.26</td>
</tr>
<tr>
<td>How often do you play computer games?</td>
<td></td>
</tr>
<tr>
<td>Daily (%)</td>
<td>37.5</td>
</tr>
<tr>
<td>Weekly (%)</td>
<td>44.3</td>
</tr>
<tr>
<td>Monthly (%)</td>
<td>9.1</td>
</tr>
<tr>
<td>Seldom (%)</td>
<td>9.1</td>
</tr>
</tbody>
</table>

Table 3. Respondents’ Background Information

Moore and Benbasat (1991) suggested that in early stages of research, reliabilities of 0.50 to 0.60 would suffice. Thus, the target level of minimum reliability was set in the 0.60 to 0.70 range. The correlation of items within each scale (henceforth item-item), the corrected item-to-total correlations (henceforth item-scale), the effects on Alpha if the item were deleted, and the item standard deviation scores were used to determine which items were candidates for deletion from the scale. Candidate items include those with low item-item and item-scale correlations or items which would raise the Alpha if deleted, or items which showed low variance. Factor analysis with VARIMAX rotation was also conducted to assess construct validity. The rotated factor matrix was examined for items which either did not load strongly on any factor (<0.30), or were too complex (which loaded highly or relatively equally on more than one factor). These items were candidates for elimination.

Based on the result of the Cronbach Alpha and factor analyses, two items from affect construct, two items from behavior construct, and four items from cognition construct were removed from the scale. Table 4 presents the Cronbach Alpha values of the remaining 11 items.

<table>
<thead>
<tr>
<th>Construct</th>
<th>Cronbach’s Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Affect (5 items)</td>
<td>0.73</td>
</tr>
<tr>
<td>Behavior (3 items)</td>
<td>0.76</td>
</tr>
<tr>
<td>Cognition (3 items)</td>
<td>0.60</td>
</tr>
</tbody>
</table>

Table 4. Cronbach’s Alpha Values

Factor analysis with VARIMAX rotation indicates that four factors had eigenvalues greater than 1.0. Results are presented in Table 5. Factors 2 and 4 emerged as two clean clusters. All items within the behavior construct were highly loaded on factor 2 (>0.60). All items within the cognition construct had high loadings on factor 4 (>0.30). However, the affect construct was
strongly loaded on both factors 1 and 3. This is not surprising because the multidimensionality of Affect has long been recognized in prior research (Diener, Larsen, Levine, & Emmons, 1985; Russell, 1980, 1983; Stone, 1981; Watson, Clark, & Tellegen, 1984; Zevon & Tellegen, 1982).

<table>
<thead>
<tr>
<th>Item</th>
<th>Factor 1 (Affect)</th>
<th>Factor 2 (Behavior)</th>
<th>Factor 3 (Affect)</th>
<th>Factor 4 (Cognition)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I feel unhappy when playing this game. (Affect)</td>
<td>.506</td>
<td>-.115</td>
<td>.557</td>
<td>.006</td>
</tr>
<tr>
<td>I feel worried when playing this game. (Affect)</td>
<td>.171</td>
<td>-.086</td>
<td>.469</td>
<td>.022</td>
</tr>
<tr>
<td>I feel happy when playing this game. (Affect)</td>
<td>.670</td>
<td>.024</td>
<td>.086</td>
<td>.202</td>
</tr>
<tr>
<td>I feel exhausted when playing this game. (Affect)</td>
<td>.120</td>
<td>-.257</td>
<td>.493</td>
<td>-.075</td>
</tr>
<tr>
<td>I feel miserable when playing this game. (Affect)</td>
<td>.554</td>
<td>.030</td>
<td>.587</td>
<td>-.024</td>
</tr>
<tr>
<td>I talk to myself when playing this game. (Behavior)</td>
<td>.029</td>
<td>.657</td>
<td>-.146</td>
<td>.162</td>
</tr>
<tr>
<td>I make loud comments even if nobody is around when playing this game. (Behavior)</td>
<td>.054</td>
<td>.799</td>
<td>-.007</td>
<td>.032</td>
</tr>
<tr>
<td>I swear when playing this game. (Behavior)</td>
<td>.039</td>
<td>.673</td>
<td>-.119</td>
<td>-.033</td>
</tr>
<tr>
<td>Playing this game or interacting with its character(s) makes me more intelligent. (Cognition)</td>
<td>.181</td>
<td>.035</td>
<td>-.243</td>
<td>.364</td>
</tr>
<tr>
<td>The activities in this game or the actions of its character(s) are respectable. (Cognition)</td>
<td>.084</td>
<td>.031</td>
<td>.025</td>
<td>.951</td>
</tr>
<tr>
<td>The activities in this game or the actions of its character(s) are decent. (Cognition)</td>
<td>.138</td>
<td>.066</td>
<td>.047</td>
<td>.470</td>
</tr>
</tbody>
</table>

Table 5. Results of Factor Analysis

CONCLUSION

This paper reported the development of an instrument designed to measure the enjoyment of computer game play. This research created an overall instrument to measure enjoyment, behavioral and cognitive reactions of playing a computer game. The creation process included surveying known existing instruments of affect, creating new items for behavior and cognition, and then undertaking an extensive scale development process. It is believed that the method of developing the scales provides a high degree of confidence in their content and construct validity. The result is a parsimonious, 11-item instrument, comprising three scales, all with acceptable level of reliability. This instrument makes it possible to conduct a large-scale survey to assess players’ perceptions of enjoyment of a particular computer game.

Nevertheless, this study still has a few limitations as the first one in the computer game field. It only covered three types of reactions contributing to enjoyment: affective, behavioral, and cognitive as proposed by Nabi and Krcmar (2004). There might be other reactions reflecting enjoyment. Future research should continue to investigate what factors contribute to enjoyment.

REFERENCES


