

# Evaluation of Video Game Interfaces

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**Abstract.** The interface is an essential part of every video game. However, research in the understanding of the modern game player's preferences is lacking. This paper reports the preliminary findings from the evaluation of a computer game user interfaces that determines specific user preferences.

**Keywords:** User Interface Evaluation, Video Game Design, End User Preferences.

## 1 Introduction

The game interface is an essential part of every video game. Regardless of how artistic, useable or functional the interface is, it remains the primary conduit of interaction for the game player. It is essential for game developers to understand the common problems associated with game interfaces as well as the analytical techniques used to solve them. However, little research has been carried out to understand the end user preferences. Game developers use personal preferences and creative programming techniques and tools to develop games with the hopes of successful market penetration. It is the purpose of this study to evaluate the interface of a video game to gain an understanding of the end user.

## 2 Background

Research has indicated that the following four methods of evaluation techniques are most commonly applied [1, 9, 10].

1. Cognitive Walk-through technique is a process that measures the usability of an interface by using a Cognitive Learning Model to evaluate the ease at which an interface can be learned.
2. Heuristic Evaluation technique involves employing use-ability experts to inspect interfaces. They use predefined criteria to evaluate the problems with the interface. This was found to be the most effective evaluation technique but it relies on the availability of an expert.

3. Pluralistic Evaluation technique is a process by which developers, users and experts do a walkthrough of the interface together. The advantage is that in this process is the diverse perspective involved in evaluation.
4. Formal Usability Inspections are a process where Human Factors Experts use a Cognitive Model of Task to evaluate interfaces. The advantage of this process is that the experts can do a walk-through more efficiently.

The literature has indicated that heuristic evaluation method are the most effective alternative to empirical testing. This technique is better at finding a larger percentage of design flaws in an interface, although its effectiveness relied heavily on the quality of the experts available [1, 7, 8, 9, 10]. The advantage of heuristics and reliance on experts was also found to be true in a study that compared cognitive walk-through and heuristic evaluation techniques using system designers and experts [7]. When comparing these two methods performed by experts, heuristics had a clear advantage, however, when using only designers to perform the evaluations both methods preformed equally.

Over the last two decades, other researchers have recognized the need to expand and modify heuristic evaluation approaches for video game interfaces. Modifying and creating new heuristic approaches had already been done in other cases. For instance, in one non game related study, the author examines enhanced heuristic evaluation techniques [10]. Heuristics criteria were combined and then analyzed for effectiveness. After comparing the results the most effective heuristics were noted. In another study, researchers [6] introduced Heuristic Evaluation for Playability (HEP), a heuristic evaluation created specifically for the evaluation of game-play. According to the findings, HEP was “reviewed by several playability experts and game designers.” A comparative study of the HEP method and end user observation revealed specific problems that could only be found through observation.

In a study about customizing evaluations for video games, Pinelle, et. al. divided video games into six different genres: Role-playing, Sports, Shooter, Puzzle, Strategy, Adventure [4]. Then they took twelve common use-ability problems found in 108 different reviews (eighteen for each type of video game genre) and mapped their occurrences to each genre. The common occurrences of usability problems for each genre were shown in radial charts. After finding problems common to specific genre, they discuss the implications that those problems could have on evaluation techniques.

In another study, researchers developed ten criteria for evaluating video game interface problems [5]. Initially five video game players with experience analyzing interfaces were recruited to evaluate a specific game using Heuristic evaluation criteria developed from their previous research. After evaluating the game by playing and using the given criteria the problems evaluators reported were recorded. The evaluators used a severity scale to classify the problems found. There was a significant overlap in reported problems but some evaluators found unique problems. This study did not take in account the engagement or fun factor of the game.

Research on video game interface evaluation suggests that a different type of evaluating criteria must be developed for evaluating interfaces in games. Our study

attempts to prove that a classification of game players based on their interface preferences is possible. This new classification of users could be used as criteria for evaluating interfaces.

### 3 Methodology

A windows-based gaming application called "Mayor City" was developed using both JAVA and JOGL under the Eclipse Platform specifically. In "Mayor City" the goal of a player is to build a road from one side of a three dimensional map to the other. The player starts with a small amount of seed money (used to build roads and buildings) and a zero population. Each "game" day the player receives income based and a percentage of the total income of all the money making buildings they have built plus a small base income. In order to build money making buildings the player must first build population buildings in order to meet the population requirements of the specific building.



Fig. 1. Mayor City

The following elements were added to the game to measure the player's preferences:

1. The game input consists of a mouse menu interaction and corresponding keyboard controls. Any action in the game that can be done by mouse can also be done by the keyboard.

2. There are two parts of the interface that swap location during play. The first part is the side menu, which swaps from left side to right side at random. This menu allows the user to select a picture of the building that they are planning to build. The second part is the game text. The text on the top bar displays both the population and the funds and the bottom bar displays the game timer. These elements swap location at random.
3. The entire interface changes color between a cyan background with black text and blue background with white text.
4. In "Mayor City" the sky darkens and brightens according to the time of day. The color of the sunsets and sunrises vary randomly between red and green.

A demographic and end user preference survey was developed. This survey instrument was pilot tested. A Microsoft Access database was developed to implement this survey.

## 4 Procedure

Permission was sought from the Institution Review Board at the SUNY Brockport prior to the start of this study. Subjects were recruited from undergraduate programs at SUNY Brockport. Subjects were informed of their rights and their ability to cease participation at any time. Once they accepted that agreement, they were presented with the Ishihara color blind test to test for normal color vision. If they passed the test, they would be presented with the images that would comprise the study itself. Subjects were then allowed to play the game for as long as they wanted. Each player was provided with a basic game play instruction document as well as verbal instructions and help as needed. After the conclusion of the game, the subjects were asked to fill out our demographic and game response survey in the Access Database application. (For the complete set of questions, please email the author.)

## 5 Results

Data was collected from 24 undergraduate subjects of from SUNY Brockport. There were 11 females and 13 male students of various disciplines who spoke English as their primary language. On average, these participants indicated that they had been browsing the Internet for approximately 5 years. They further indicated that they spent an average of 5 hours a day working on their computers of which an average of 2 hours was spent on the Internet.

The participants were asked to complete a binary scaled questionnaire to gauge their interface preferences. For example, participants were asked to respond to the question "Which contrast scheme did you prefer" using binary scale. The table below shows the responses from the 24 participants.

The results indicated that there were no clear preferences for specific user interface features with the exception of Mouse versus Keyboard preferences. Surprisingly, the majority of the users preferred the use of the Keyboard which was not in tune with the literature findings. The results did not indicate any obvious gender preferences as both male and female participants showed almost similar interface preferences features.

**Age Ranges**

18 to 20	21 to 24	25 to 30	31 to 35	36+
8	12	1	1	2

**Gender**

Male	Female
13	11

**Preferred Text Contrast**

Dark text on bright background	Bright text on dark background
13	11

**Preferred Control Interface**

Mouse	Keyboard
1	13

**Preferred Menu Background Color**

Cyan	Blue
6	18

**Preferred Sunset Sky Color**

Green	Red
12	12

**Preferred Sunrise Sky Color**

Green	Red
11	13

**Preferred Side Menu Location**

Right-side	Left-side
17	7

**Preferred Date Text Location at Bottom**

Yes	No
17	7

**Preferred Population and Funds Text Location at the Top**

Yes	No
10	14

## 6 Conclusions

This is a preliminary investigation of evaluation techniques of video game interfaces. The findings of this study have indicated that there is clearly a need for further research of evaluation techniques. The end users in this study showed no obvious preferences with the exception of the Keyboard and Mouse. The results indicated that changing interface features, such as color and menu positioning did not affect the end users.

The results from the study are not surprising given the generally high level of familiarity with computer based gaming that the end users indicated. The enormous diversity of computer games available to the end user has ensured that their gaming experience levels are high. The literature confirms these findings.

## 7 Future Work

This study is far from complete. This report is the first of a series of on-going studies that are examining evaluation techniques in the development of gaming user interfaces. The next step would be to reevaluate the questionnaires for to correct any deficiencies. It would be interesting to observe whether the results can be replicated on a larger sample size. Mayor City game could be further enhanced to add more tasks and more interface options. In addition, this study should be replicated a different demographic such as children or older adults to gauge their interface preference.

The literature for best evaluation practices is inconclusive. An interesting methodology would be the use of eye tracking to help researchers analyze end user cognition patterns. This pattern recognition could be extended to other demographics, such as children and older adults. The study could be replicated using users of other cultures. These findings would be of great interest to game developers as they seek to further the reach of video games by understanding the preferences of end users.

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