Game Usability in North American Video Game Industry
Abstract

Competition is so fierce in the video game industry that the companies need to find different angles to make their games stand out from the crowd. Game usability provides one such angle, which can result in a better overall user experience.

The goals of this research were to find out what usability methods are used in North American video game companies, how the companies define the term “game usability”, and are they utilizing heuristic evaluation. The data was gathered by collecting survey answers from 59 North American video game companies.

The results indicated that usability is very important to the companies. Playtesting and observation were the most used evaluation methods, but the methods and the way they are used have not yet stabilized in most companies. The respondents emphasized the importance of intuition and the lack of frustration in their game usability definitions. The companies that utilize heuristic evaluation use their own heuristic lists to suit specific games.

Keywords
Game usability, playability, heuristic evaluation, game heuristics

Supervisor
University teacher, Mikko Rajanen, PhD.
Foreword

I really appreciate the effort my supervisor Mikko Rajanen put in to help me with this research. I would also like to thank all the companies for participating, as well as everyone else who helped with the thesis.

Juho Tapani

Oulu, October 30th, 2016
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1. Introduction

The popularity of video games has risen to new heights during the last decade, and it continues to grow with each passing year. A market research firm Newzoo who specializes in video games reports that the global revenue of the video game industry has just surpassed 100 billion US dollars. Even though children and teenagers still spend on average more time on video games than their elders, they only count for about 25% of the North American gaming population as the average gamer today has grown to be almost 35 years old. By revenue the video game industry has grown larger than the movie industry, but it’s still behind television due to TV’s unmatched advertising revenue of almost 200 billion USD (Statista, 2016).

Video game companies do not only compete with movies and television for the consumers’ attention, but with other video game companies as well (Pagulayan et al., 2003). There were more than 1200 companies that were considered for this research with many still left unnoticed, so it’s easy to realize the fierceness of the competition when each of these companies try to carve out a market share of their own in order to at least make a living.

In video games, the terms “usability” and “user experience” have become increasingly important, and research plays an important role in defining gaming related terms. There is some ambiguity in a lot of the gaming related terms, and having a common language would benefit both researchers and the video game industry. It is well known that games, like any other software, need to have good usability in order to achieve a great overall user experience. For more than a decade now, researches, for example Federoff (2002), Desurvire et al. (2004), Schaffer (2007), and Pinelle et al. (2008), have actively designed methods to evaluate games in order to improve their usability, because they see usability as one of the key elements in creating a masterpiece of a game (Bernhaupt, 2010).

Usability research is necessary to detect the most used usability methods and their effectiveness in the development process. Even under the same genre, different games can lead to completely different user experiences. Therefore, it’s important to identify the factors that make great games great and poor games poor (Kim, 2015). Furthermore, development of games can be costly, so having a game with superior usability instead of just focusing on graphics can provide a competitive advantage for the developer (Rajanen & Marghescu, 2006; Kim, 2015).

The concept of usability is from HCI (Human-computer interaction) field, and it was created to assess the performance and efficiency of user interfaces. There are various methods to evaluate usability, and even though some methods might be more efficient than others, no method is indisputably the best (Kim, 2015).

Usability is still a relatively young concept, so the definition of usability and different usability methods still change depending on who you ask (Kim, 2015). One of the goals of this research is to find some common elements on how companies define usability and usability methods in order to stabilize the terminology in the video game industry, making communication a lot easier.
1.1 Research questions and methods

The goal of this research is to determine how video game companies view usability and how they define it, if they conduct usability research, and what methods they use in their usability research. This is accomplished by finding answers to the three research questions:

- What usability methods are used in North American video game industry?
- How game companies have defined the term “game usability”?
- Are game companies utilizing heuristic evaluation?

A survey that addresses the three research question was created and sent to North American video game companies. The survey was made based on similar studies from 2012 by Rautio for Finnish video game companies, and 2014 by Nissinen titled “Game usability in Northern European game industry”. There were two main reasons to use the same survey. It was comprehensive in addressing the research questions and it allowed comparing the results between the two research areas.

Some minor changes were made to the survey. According to the supervisor of the thesis, not all Europeans were clear about what usability research means. Therefore, all mentions about usability research were changed to usability activities. The previous study didn’t include Mac or Linux as gaming platforms, so those were included in the survey when the first two companies mentioned those platforms in their answers.

The survey data was collected with a web application called Webropol, and descriptive statistics and content analysis was used to analyze the data. Both Webropol and SPSS were used in the analysis.

1.2 Scope of the study

The study focused on North America. As the definition of North America differs, it’s necessary to point out that this study only includes companies from The United States and Canada. So Greenland, Mexico and all offshore islands are excluded from this research.

The reason for choosing North America as the region was logical, since two similar studies have already been conducted, one for Finland (Rautio, 2012) and the other for Northern Europe excluding Finland (Nissinen, 2014). The combined results of both of these studies have been further analyzed and reported by Rajanen and Nissinen (Rajanen & Nissinen, 2015).

The term “video games” in this research means all games playable on screen of any kind. This research encompasses all genres and platforms.

1.3 Structure

The second chapter describes the North American video game industry in general. It also explains what traditional usability, game usability, and playability are, and how
these terms have been defined in earlier literature. The third chapter explains heuristic evaluation and game heuristics, and presents some examples of them. The third chapter also includes a summary of the previous literature about usability and heuristics. The fourth chapter presents the methods used in this research, and how the study was implemented. Some data of the surveys is presented there to show the distribution of the results. The fifth chapter includes a more detailed analysis of the results which are then discussed in the sixth chapter. The seventh chapter concludes the research, after which the survey and the cover letter for it can be viewed in the appendixes.

This thesis uses a similar framework to the 2014 study by Joonas Nissinen titled Game Usability in Northern European Game Industry. Therefore, this thesis uses a similar structure to the previous study in Northern European context in order to make it easier to compare the findings of these two studies.
2. Game industry and usability

This chapter presents a brief overview of the North American video game industry and how it has developed during the last few years. Some important companies are introduced, and statistics from both U.S. and Canada are presented in order to show the growth of the industry and its most recent reported stage.

Furthermore, this chapter presents some definitions of traditional usability. Traditional usability is explained in more detail with published material from a well-known usability expert Jacob Nielsen. Since traditional usability is better aimed at software development, this chapter uses earlier literature to find out how it differs from game usability. Finally, this chapter defines playability based on previous publications.

2.1 Overview of the North American video game industry

North America is in the center of the global video game industry. It hosts many of the largest video game publishers in the world such as Electronic Arts (EA Sports and Battlefield franchises), Activision/Blizzard (Call of Duty), Take-Two Interactive (Grand Theft Auto), Bethesda Softworks (Fallout and The Elder Scrolls), and Microsoft (Halo) (O’Donnell, 2015). North America is also home for the only competitive companies in the CPU and GPU market. AMD and Intel practically have a duopoly in CPU market as they together hold about 95% of the market share (Goettler & Gordon, 2011). Similarly, AMD and Nvidia have a duopoly in the high-end GPU market with Intel focusing on integrated and low-performance GPUs (Brodtkorb et al., 2013).

A consumer research published in 2015 by The Entertainment Software Association presented how far-reaching video game industry is in The United States. According to the study, 155 million Americans play video games; 80% of U.S. households own a device that is used to play games; 51% households own a game console, and 42% of Americans regularly play video games. In this case regularly means three hours or more per week. As the people that have played video games during the last few decades have kept on playing, the average age of a game player has risen significantly. Today the average American video game player is 35 years old. The female population has also grown a lot, and now 44% of American gamers are women. In 2003 U.S. game sales were about 7 billion USD. Despite the fact that a wider segment of the population is now buying games, the sales peaked in 2010 in little over 17 billion USD. During the last few years the sales have been balancing between 15 and 16 billion USD (Entertainment Software Association, 2015).

Despite of the sales peak in 2010 the direct employment from the video game industry has kept on rising. From 2009 to 2012 the annual growth rate of employment was 9.7%, and in 2014 there were 42 000 people directly employed by the video game industry. That’s over 10 000 more employees than in 2009 (Siwek, 2015).
The trends are similar north of the border. In Canada there were 20,400 people directly employed by the video game industry in 2014 which represents a 24% growth from the previous year. 19 million Canadians play video games which represents 54% of the population. 52% of Canadian gamers are male, and the average gamer is 33 years old (Entertainment Software Association of Canada, 2015).

We have seen a wide diversification of gaming platforms during the last decades. For example mobile, web, PC, Mac, and consoles, can all provide different user experiences, and different things are expected from different platforms. Despite their graphical limitations compared to PC, the industry has become more and more dependent on consoles during the last decade (Zackariasson & Wilson, 2012).

North America as a region is the leader of the global game industry. The majority of published games come from North America, and the biggest annual trade fair E3 is hosted in Los Angeles. Even though North America is the leader of the game industry, the region faces the same challenges as everyone else. Companies are often equally capable of acquiring the necessary base-level technologies, but the know-how to use them differs a lot (Zackariasson & Wilson, 2012).

2.2 Traditional usability

The term “usability” has been used in many different contexts, leading to different meanings and interpretations. That makes it difficult to define usability (Seffah & Metzker, 2004). Usually it’s defined by ease of use of a system and how well the system handles the tasks it was created to do (Holzinger, 2005).

Usability standards can be useful in giving guidelines to companies that lack experience in user-centered design, but they also provide credibility for the need to use methods to assure proper usability in their products. According to the study written by Nigel Bevan titled “International standards for HCI and usability”, usability standards can be categorized into four aspects:

1) The use of the product (effectiveness, efficiency and satisfaction in a particular context of use).
2) The user interface and interaction.
3) The process used to develop the product.
4) The capability of an organization to apply user-centered design (Bevan, 2001).

There are many different standards to explain usability from different angles, such as their scope, stakeholders, and phase (Marghescu, 2009). For the use of the product (1) International Organization for Standardization defines usability as a measurement of how well users can perform their tasks, emphasizing the importance of effectiveness, efficiency, and satisfaction in the process. According to the definition, effectiveness measures accuracy and completeness in users’ ability to achieve their goals. Efficiency is a measure of used resources in relation to accuracy and completeness. Finally, satisfaction is defined as being free from discomfort and having positive thoughts about the use of the product (ISO 9241-11, 1998).
In order to have standards more suited for user interface and interaction (2), the development process of products (3), and for organizations applying user-centered design (4), it has been necessary to create different usability standards. It serves no purpose to list every single usability definition in this research, but it’s important to realize that the definitions vary in order to serve all aspects of design, and they change as technology progresses (Bevan, 2001). Many of the usability definitions might be hard to understand, which is why it might be best to use material published by the highly cited author Jakob Nielsen when learning about traditional usability.

The lack of consistency in usability standards, terms, and definitions is also a consequence of experts building their own models from different perspectives without properly consulting one another (Abran et al., 2003). For one who evaluates software from an end-user perspective, things like learnability, efficiency, memorability, lack of errors, and satisfaction of use might be the key measures of usability (Nielsen, 1994). However, for example business managers might only be interested in the factors that aid in the productivity of their employees, and software developers might associate usability with internal attributes like design quality (Abran et al., 2003).

### 2.3 Game usability

The definitions of usability presented in the previous chapter, though useful for many games, have been created for productivity software. Because the function of games is to entertain and not aid the users’ productivity, game usability needs its own definition (Nissinen, 2014; Rajanen & Nissinen, 2015).

The topics of user research and usability are increasingly present in the field of game development. When players of a game are different from the developers or from the immediate target group, user research can be a beneficial tool in ensuring good usability for every user, thus making it possible for the game to have mass appeal. Both usability and user interface have great effect to the buying-decisions of many gamers (Rajanen & Marghescu, 2006). Adding other platforms to a game also means adding new input modes, which can easily cause usability problems to which user research might have answers (Isbister & Schaffer, 2008).

Traditional software usability methods can help decrease errors and failures to complete tasks, and improve user satisfaction (Cornett, 2004). Often in game development usability methods need to be modified to suit specific needs, but traditional usability methods are still an effective way to find problems, and they can work as suitable tools to understand the user (Fulton & Medlock, 2002).

Game usability is a completely separate issue from entertainment, engagement, and story. Game usability is often associated with user interface, which is why learnability, memorability, and understandability for example are also often thought as one of the key measures of game usability (Pinelle et al, 2008). The interface should be easy to use, efficient, and non-intrusive. Game usability problems are found using different inspection methods, for example heuristic evaluation and playtesting. A convenient user interface and overall game usability are vital for players to immerse themselves in to any game, and only after proper usability can players be truly engaged, be fully appreciative of the story, and be thoroughly entertained (Yue & Zin, 2009).
In video games, achieving immersion is essential for the players to fully enjoy a game. The players need to feel like they are actually present in the game world. For players to be immersed in a game, they have to reach a “flow state” (Brown & Cairns, 2004). In the context of gaming, “flow” can be considered as a state where players become energetically focused, creative, and their enjoyment reaches maximum levels (Csikszentmihalyi, 2000). Flow state can easily alter the players’ sense of time and even sense of self (Chen, 2007).

Being a relatively new and developing research area, there are many different definitions of game usability. Like mentioned in the previous chapter, traditional usability is defined as a measurement of how well users can perform their tasks, emphasizing the importance of effectiveness, efficiency, and satisfaction in the process. (ISO 9241-11, 1998). Additionally, a usable software needs to take users’ limited learnability and memory into account, and it has to be made ready for any errors the user might make. Many software usability methods are also applicable to game usability but it also includes much more than that. Certain games, like serious games, can be an exception but with most games a great overall user experience should be the goal in development, and therefore game testing, especially with mainstream games, needs to include qualities like flow and fun (Isbister & Schaffer, 2008).

Efficiency, effectiveness, and satisfaction are the key usability attributes of the ISO 9241-11 definition. It is true that games, like any other software, has to provide the user with an efficient and effective way to complete his tasks. However, when focusing on playability of games, satisfaction needs to come before efficiency and effectiveness, as the latter two measurements might not always even be applicable (Federoff, 2002).

Efficiency assumes that the least amount of resources used to complete a task is the best outcome. That certainly is the case with every productivity software but people play games for satisfaction, and if the game is completed too fast, the players likely won’t get as much entertainment as they should (Federoff, 2012). One of the goals for a game developer should be making a game that a user can keep on playing as long as possible (Bickford, 1997). One of the most common ways to increase time spent for a game is for example encouraging replayability by allowing different choices during the second playthrough, or by just simply adding a multiplayer mode (Frattesi, Griesbach, et al., 2011).

Effectiveness measures the accuracy and completeness of users achieving objectives (ISO 9241-11). This is a suitable measurement when the game has a clear path and objective, but nowadays many developers want to add free will to their games. This leads to an environment where the path is determined by the actions and choices that the player makes, making effectiveness sometimes a poor measure for game usability (Federoff, 2012).

Satisfaction is the only attribute of the ISO definition with which games can always be measured. Games are for entertainment, not for productivity, making satisfaction an essential part of their success. Satisfaction is created through fun, immersive gameplay, and compelling experiences (Federoff, 2002). Games provide entertainment by allowing us to escape reality. Games do this better than other forms of entertainment because games are participatory, and that’s what makes them the most immersive form of entertainment (Crawford, 1982). The
immersiveness of a game can be achieved by having an unnoticeable interface so that the player forgets he’s using a medium for his interactions. Compelling user experiences happen when the game offers a reasonable challenge, and the satisfaction from overcoming those challenges makes the whole experience fun (Federoff, 2002).

Usability is without a question a very important part of every game, but because usability itself is not enough for games to provide fun and enjoyable experiences (Järvinen et al., 2002), game mechanics and gameplay need to be evaluated too (Federoff, 2002).

The research by Pagulayan et al. (2003) also promotes the importance of user experience. The authors explain that traditional usability methods aren’t enough to determine the level of usability in a game, and the experiences and attitudes of the players also need to be measured. Ease of use, challenge, and pace are used as measurements.

According to Pagulayan et al. (2003), controls and interface that are easy to use are closely related to fun, and they describe ease of use as the gatekeeper of fun. Ease of use includes things like basic mechanics, tutorials and instructions, behavior of the camera, in-game interfaces, and learnable and intuitive controls (Pagulayan et al., 2003).

Although it’s easy to see the connection between ease of use and challenge, in this concept they are very different, since ease of use doesn’t mean that in-game tasks would be easy to overcome (Pagulayan et al., 2003). Like mentioned earlier in this chapter, reasonable challenge and the satisfaction from overcoming it make the game fun (Federoff, 2002). It’s the developers’ job to make sure that the challenge comes by designing well-calculated levels and obstacles, and not by having a poor interface or lack of communication of objectives. Challenge can be measured with attitude assessment methods (Pagulayan et al., 2003).

The third measurement presented by Pagulayan (2003) – pace – should be used to find out at which rate the game should present new challenges or other experiences to the player. Like challenge, it can be measured with attitude assessment methods. A suitable pace is necessary to keep the player engaged but also give him time to catch his breath in an action-packed game. Pace as a measure is not as strict as ease of use or challenge, since how a game should be paced depends for example on the genre and the developer’s vision of the gameplay experience.

Many other authors limit game usability to user interfaces, which include elements such as screens, displays, menus, and controls. Separate of game usability is gameplay, which includes the story, game mechanics, and interactions (Isbister & Schaffer, 2008; Korhonen & Koivisto, 2006; Desurvire et al., 2004). Still, game usability, gameplay, and different requirements concerning each game type and platform need to be addressed for the game to be a success (Isbister & Schaffer, 2008).
2.4 Playability

Playability can be an ambiguous concept, and the scientific community has come up with many definitions about it (Sanchez et al., 2009). In this chapter, a few definitions from previous literature are presented as well as some elements that make up playability.

What most clearly separates playability from usability, is that playability focuses directly on entertainment, and is not concerned about the same user interface issues as usability. When playing video games, entertainment outweighs productivity as the reason why people play games (Cowley, 2008). That is not to say that playability outweighs usability, because good playability is virtually impossible to exist with poor usability.

Different authors have different opinions on playability and its elements. Järvinen et al. (2002) focus more on control mechanisms and gameplay, arguing that intuitive controls are an important factor when achieving the flow experience. Brown & Cairns (2004) also state that invisibility of controls is mandatory in order to achieve total immersion. Kücklich & Fellow (2004) promote the ability to use more time to play a game, making replayability an important piece of playability. Egenfeldt-Nielsen et al. (2016) simply state that a game has good playability when it’s easy to use, fun to play, and it’s challenging.

Like many others (e.g. Pinelle et al., 2008) Sánchez et al. (2009) have used the ISO 9241-11 standard to make their own definitions. In their definitions, Sánchez et al. (2009) promote the importance of effectiveness, efficiency, satisfaction, enjoyment, and entertainment as key attributes of playability. Like mentioned earlier in this research, efficiency and effectiveness are poor measurements for games if they are defined in the same way than in traditional usability. Sanchez et al. (2009) took this into consideration, merged efficiency and effectiveness, and redefined effectiveness as “the time and resources necessary to offer players a fun and entertaining experience whilst they achieve the game’s various objectives and reach the final goal”.

According to Sánchez et al. (2009) playability is based on usability, but the definition of playability is not as narrow as the definition of usability. They argue that while fun and entertainment are important characteristics of playability, the concept includes many other player experience attributes.

Sánchez et al. (2009) use seven attributes to characterize playability:

1) **Satisfaction** – Gratification or pleasure received from playing a game.
2) **Learnability** – Player’s ability to understand and master the game’s mechanics and interactions.
3) **Effectiveness** - “The time and resources necessary to offer players a fun and entertaining experience whilst they achieve the game’s various objectives and reach the final goal.”
4) **Immersion** – Game’s ability to be believable and directly involve the player in the virtual world.
5) **Motivation** – Encouraging the player to perform tasks. Promoting self-improvement, curiosity, and environmental diversity.
6) **Emotion** – Making the game stimulate real feelings in the player
7) **Socialization** – Set of game attributes, elements, and resources that promote the social dimension of the game experience in a group scenario.

The viewpoint of Sanchez et al. (2009) is in line with the definition by Fabricatore et al. (2002) who also think playability to be the concept of usability applied to videogames, and the possibility to understand and control the game makes good playability. Usability can’t be improved by non-functional elements like better graphics, because having a game that looks great won’t succeed if players don’t understand the game or for some reason can’t play the game properly. Figure 2 (Fabricatore et al., 2002) illustrates a hierarchical structure of important playability concepts in action videogames. It’s very important to realize that this figure is aimed specifically towards action games, so while it’s not applicable to all genres it gives an idea about the elements to which focus on when trying to maximize the playability of a game.

![Diagram](image)

**Figure 2.** Determinants of the playability in action videogames (Fabricatore et al., 2002).

In this figure, the most important issue is Entity, which is another word for all player-controlled and non-player-controlled characters, like the main character and its enemies. Scenario, the setting where the action takes place, is the second most important issue determining the playability of an action game. Goals are the third main issue of playability. Each game has a main goal and often also secondary goals somehow tied to the main goal (Fabricatore et al., 2002).
3. Heuristic evaluation and game heuristics

This chapter explains heuristic evaluation mostly according to Jakob Nielsen’s publications. Because of the limitations of Nielsen’s heuristics, different game heuristics from several authors are presented. Finally, summary of the previous research concludes this chapter.

3.1 Heuristic evaluation

In heuristic evaluation a small set of evaluators examine a user interface and compare it against usability principles called heuristics in order to find usability problems. Heuristic evaluation is a usability inspection method, although it differs from other methods by being less formal. One of the benefits of heuristic evaluation is that it’s extremely cost-efficient, making it usable even with low-budget projects (Nielsen, 1994).

In the heuristic evaluation process each evaluator inspects the interface individually. After doing the inspection alone, the evaluators can communicate with each other and compare their findings. The inspection is done individually in order to ensure independent and unbiased findings. Based on how the evaluation is executed the evaluators can either report their findings in a written form or by verbally explaining them to an observer while going through the interface. Written reports add to the workload of the evaluators, but having a formal record of the findings can be beneficial later on. Taking an observer as a part of the evaluation process is more expensive, but it has the positive effect of taking some of the workload off from the evaluators. Using an observer can make the process faster as he only needs to understand and organize the notes given by the evaluators instead of combining longer reports from each evaluator. The observer can also work as an assistant to the evaluators, for example helping in the use of an unstable prototype or explaining certain aspects of the interface to non-expert evaluators (Nielsen, 1994).

Even though having more evaluators is obviously more expensive, multiple evaluators will find more usability problems than a single one. Also, different people see different problems, so adding more evaluators makes the process more effective. There are some usability problems that almost anyone could see, but on the other hand there are problems that only few can see, and sometimes the hardest-to-find usability problems are found by those that otherwise don’t find a lot of problems. While some evaluators might be better than others, it doesn’t mean that they are better every single time (Nielsen, 1994). Nielsen (1994) recommends using three to five evaluators because multiple evaluators find more problems than a single person, but when you add more evaluators than necessary, the additional information gained drops with each additional evaluator and it’s not worth the invested time and money.

Nielsen’s (1994) heuristics promote the need for the system to give constant feedback to the user. The system should minimize mistakes done by the user, and clearly mark exits to leave unwanted states. It is also important to have consistency throughout the system,
not allowing the user to mix up words, situations, or actions. Nielsen’s (1994) heuristics recommend minimizing the user’s memory load, offering shortcuts to frequent actions, and hiding irrelevant information. Additionally, each error the user causes should result in a clear error message, explaining the user if there is anything he can do to fix it (Nielsen 1994).

Heuristic evaluation can be conducted in various stages of development. The closer a development process gets to the end, the more expensive it is to fix any problem that might present itself. Therefore, it’s wise to do the heuristic evaluation early and catch the major problems as soon as possible. Doing the evaluation early can avoid user testers running to disruptive errors, freeing their time to look for the harder-to-find problems. Heuristic evaluation is a cheap, easy, and fast way to find usability problems, so using it in multiple stages of development is recommended. Software development is usually an iterative process, so when in each iteration a software is updated, heuristic evaluation can find new problems. Heuristic evaluation is only one usability evaluation method, and no single method is enough to find every usability problem (Isbister & Schaffer, 2008).

Heuristic evaluation is mostly used to evaluate the interface design of websites and productivity software but it can be useful for games as well (Federoff, 2002). Inspired by Nielsen’s heuristics different heuristic lists have been made for games (e.g. Federoff, 2002; Desurvire et al., 2004; Schaffer, 2007; Pinelle et al., 2008) to address more than just interface issues.

3.2 Game heuristics

The main usage of heuristics is to evaluate websites and software interfaces but they can also be used as guidelines to create and evaluate a usable game. Better understanding of usability principles would provide game developers benefits as it has for software developers. Some companies do not use formal evaluation techniques because they believe them to increase costs. In short term that is true, but considering the whole life cycle of development, formal evaluation methods often save time and money by catching major problems early on when fixing them is easier (Federoff, 2002).

Federoff (2002) compared Nielsen’s heuristics with game design heuristics that she had identified from literature. According to Federoff, most of Nielsen’s heuristics can be used to analyze game interface but they are not suitable for analyzing gameplay. Federoff’s research resulted in her creating a list of 40 heuristics. These heuristics are grouped into three categories: interface, game mechanics and gameplay. Federoff’s list has worked as a launching pad for subsequent research regarding game development (Federoff, 2002).

The report by Desurvire et al. (2004) took advantage of previous research, and presented a list of heuristics that was based on productivity and playtesting heuristics for video games. This list came to be known as Heuristic Evaluation for Playability (HEP). The authors divided the heuristics into four categories: Gameplay (problems and challenges the user faces), Game story (plot and character development), Game mechanics (interaction with environment), and Game usability (interface and elements to interact with the game). According to the authors, the heuristic list for playability is best used in early phases of development, and user studies should be used to find specific problems once they have already been found with HEP. This should avoid
expensive design problems. The authors emphasize that no matter how well developers think they understand the game and its players, human behavior is always unpredictable to some extent, making user testing essential in every project (Desurvire et al. 2004).

A generalization of the HEP was needed in order to make the heuristics applicable to other game genres. The follow-up study conducted in 2009 by Desurvire & Wiberg refined the list to Heuristics of Playability (PLAY) that can be used even earlier in development when design changes cost less. The usefulness of HEP was limited, but PLAY could be modified for each specific game. PLAY can also be used to help in usability and playability research during development. The heuristics were based on HEP and further influenced by discussions with major game companies such as Activision, Microsoft, and Relic. The heuristics were divided into several categories, for example: Gameplay, Game/Story Immersion, and Usability/Game Mechanics (Desurvire & Wiberg, 2009).

Pinelle et al. (2008) introduced game usability heuristics usable with early and functional game prototypes. Their list included ten heuristics that were based on problem categories such as inconsistency, lack of customization, AI problems, and lack of training or help. According to the authors, previously published game heuristics by for example Federoff (2002) and Desurvire et al. (2004) focused too much on engagement and fun, and didn’t consider enough usability. The game heuristics by Pinelle et al. (2008) were meant to help developers to avoid common usability problems. In order to make the heuristics helpful, the authors also described how problems with each heuristics could be avoided.

White paper by Schaffer (2007) includes heuristics along with screenshots from games for easily understandable presentation. The heuristics are divided into three categories: General (make the game intuitive), GUI (what should and should not be displayed), Gameplay (easy to understand what is happening in a game). The paper works as a helpful guide for game design, but iterative usage of various methods is necessary to catch more usability problems (Schaffer 2007).

The work by Koeffel et al. (2010) was influenced by Sweetser and Wyeth (2005), as they also wanted to integrate heuristics into game design and use them to evaluate user experience. The authors did not want to focus only on user experience or usability, but rather focus on all aspects of games since problems anywhere affect the overall user experience. The framework by Koeffel et al. (2010) consists of three categories: Gameplay/Game story, Virtual interface, and Device-specific heuristics for tabletop games. Five games from different genres were selected for the heuristic evaluation and the results were compared to scores from game review sites to see if user experience could be determined with heuristics (Koeffel et al. 2010).

It is worth noting that some heuristics can be open for interpretations, and conflicting game heuristic lists can cause confusion for the evaluators (White et al., 2011). In order to avoid confusion, game heuristics need to consider the genre, because players expect certain elements, for example controls, to remain similar from game to game, as long as they belong to the same genre (Livingston et al., 2010). In addition to the more general heuristics already mentioned in this chapter, there are heuristics designed specifically for particular video game genres. The genres presented here are educational games, MMORPG, mobile, new genre, real-time strategy, serious games, and social network.

The heuristics by Omar & Jaafar (2010) presented playability heuristics for educational games. They came up with 34 heuristics that were grouped into five categories deemed
important to evaluate educational games: Interface, Pedagogical, Multimedia, Content, and Playability. The follow-up study from the same authors in 2011 improved upon their previous work by presenting a tool (AHP_HeGES) to help evaluation during development. The methods of these studies are not validated (Omar & Jaafar, 2010).

Song & Lee (2007) focused on Massively Multiplayer Online Role-Playing Games (MMORPG), identified 18 usability issues, and presented recommendations regarding those issues. The usability issues in the study were defined as scenarios that precluded continuing play or caused delays due to confusion. Players are especially prone to quit a game if frequently done actions cause frustration. During game development it’s essential to battle against those factors that make the user to quit early (Song & Lee, 2007).

Korhonen & Koivisto (2006) has focused on heuristics for mobile games. The first set of heuristics was created by doing mobile context analysis, and reviewing of Nielsen’s heuristics and game design guidelines. However, the resulting heuristics were quite general and failed to give answers to many playability issues. Therefore, the heuristics were re-evaluated and categorized into Game usability, Mobility, and Gameplay. The game usability heuristics focus on controls and interface. The mobility heuristics are about the mobility of the game. The game should be designed so that it reflects the freedom that mobile devices provide. Gameplay is the most important factor determining the user experience. The gameplay heuristics are very general and applicable to any game regardless of the platform (Korhonen & Koivisto 2006).

Papaloukas et al. (2009) introduced a set of heuristics aimed at new genre video games. The new genre games include games that are played with unique equipment, such as Nintendo Wii, or are part of a general software category like social networking platforms. Ten heuristics were created and a brief explanation about how to solve each problem was presented (Papaloukas et al. 2009).

Sweetser et al. (2012) introduced heuristics for designing and evaluation of real-time strategy games. The authors used the GameFlow model by Sweetser & Wyeth (2005) to structure the heuristics. The 2012 research provided much more detailed heuristics with 165 heuristics gathered into several categories, for example Immersion, Feedback, and Challenge. (Sweetser et al. 2012).

Macleod (2015) created heuristics for serious games. He analyzed 20 heuristics from which the following heuristics rose above all others:

- Fidelity - Realistic feel of the game should be a priority
- Fog of war - The game should limit players’ knowledge about the game world
- Games master - Gameplay needs to be managed (e.g. by an instructor) to ensure that it remains on track and relevant to the educational goals of the game
- Realistic and consistent storytelling
- Reflection - The game should allow time to reflect gameplay and outcomes.
- Briefing and backstory - Briefing can provide motivation and context for players and help them relate gameplay to organizational and training objectives (Macleod, 2015).

Paavilainen (2012) presented design and evaluation heuristics for social network games named “SoPlay heuristics”. They include ten main heuristics: Accessibility, Interruptability, Continuity, Discovery, Virality, Narrativity, Expression, Reciprocity, Sociability, and Competition. Each of the main heuristics have sub-heuristics, and the
sub-heuristics have descriptions explaining them. In his 2012 publication, the author
called the sub-categories as a work-in-progress, but the heuristics still work as an
inspiration for design and evaluation, as well as a description for social network games
(Paavilainen, 2012).

3.3 Summary of the previous research

Other researchers still actively cite the early 90s’ publications from Jakob Nielsen. Not
only has Nielsen laid the foundation for further usability research, his usability
principles and heuristics are still used even today. Still, many different definitions for
usability exist in order to cater to different needs and different design aspects (Rocha,
2012). Definitions vary even between productivity software (Bevan, 2011), so
obviously they differ even more when talking about game usability.

Some researchers, for example Pinelle et al. (2008), prefer a more traditional definition
of game usability. They emphasize the importance of learnability as well as the ability
to control and understand a game. A few others (Desurvire et al., 2004; Korhonen &
Koivistio, 2006; Laitinen, 2008; Pinelle et al., 2008) promote the traditional definition,
emphasizing the importance of interfaces, controls, and interaction. Isbister & Schaffer
(2008) argued that flow and fun are essential measurements of game usability. Many
others (Federoff, 2002; Järvinen et al., 2002; Pagulayan et al., 2003; Papaloukas et al.,
2009) support this view, arguing the importance of entertainment and satisfaction.
Nevertheless, usability as a term is not broad enough to cover all issues related to game
development; therefore, the term “user experience” would be better suited to discuss the
needs of gamers in a more comprehensive way (Federoff, 2002). Separately defining
traditional usability, game usability, and playability is still necessary because the
methods used in development are determined by which aspects of design need to be
evaluated (Nacke, Drachen et al. 2009).

There are many definitions of playability as well. Fabricatore et al. (2002) argue that
playability is the concept of usability applied to videogames, and the possibility to
understand and control the game makes good playability that cannot be improved with
non-functional elements such as graphics. Järvinen et al. (2002) along with Nacke,
Drachen et al. (2009) see it as a suitable measure for design and evaluation, serving as
guidelines to implement game elements. Kücklich & Fellow (2004) have a different
approach to playability. They argue the importance of using more time to play a game,
saying that the longer time a game is able to provide enjoyment the better. Sanchez et al.
(2009) explain though, that playability is based on usability but the definition of
playability isn’t quite as narrow. They argue that fun, entertainment, and many other
player experience attributes are essential characteristics of playability.

Heuristic evaluation has been present for decades now in software development. It’s a
cost-efficient tool to evaluate user interfaces by comparing interfaces to usability
principles called heuristics (Nielsen, 1994). Heuristic evaluation is mostly used to
evaluate interfaces of websites and productivity software (Federoff, 2002). Although
useful, heuristic evaluation is only one usability evaluation method, and no single
method is enough to find every usability problem (Isbister & Schaffer, 2008). Inspired
by Nielsen’s heuristics, they have been applied to games as well (e.g. Federoff, 2002;
Desurvire et al., 2004; Schaffer, 2007; Pinelle et al., 2008).
Better understanding of usability principles would provide game developers benefits, but some companies still believe that formal evaluation techniques cost more – a false belief especially in the long run. Many different game heuristic lists have been created because Nielsen’s heuristics don’t address gameplay enough (Federoff, 2002). Federoff (2002), Desurvire et al. (2004 & 2009), Pinelle et al. (2008) as well as Koeffel et al. (2010) all created heuristics lists with a slightly different focus that were meant to be applicable to various game genres. Schaffer’s white paper (2007) works still as an easily understandable collection of heuristics and solutions where heuristics are explained with screenshots from games. Some authors have focused on a specific genre when creating heuristics: Korhonen & Koivisto (2006) for mobile games; Song & Lee (2007) for MMORPG; Papaloukas et al. (2009) for new genre games; Omar & Jaafar (2010) for educational games; Sweetser et al. (2012) for real-time strategy games; Paavilainen (2012) for social network games; and Macleod (2015) for serious games.
4. Research methods and implementation

This chapter describes the used research methods and describes how the study was implemented. Some general information is presented from the collected data.

4.1 Research methods

Descriptive statistics

In this study, descriptive statistics are utilized to describe and summarize the data collected from the questionnaire. Descriptive statistics along with graphics analysis form the basis of the quantitative analysis in this study. Descriptive statistics are simply meant to describe what the data shows, providing manageable and easily readable descriptions of the data (Trochim, 2006a). In this research, descriptive statistics and graphics analysis were used to present the collected data from the survey questions excluding the open questions.

Survey research

Survey research can be in any form that includes the researcher to ask questions of respondents. It can be for example a paper-and-pencil feedback, one-on-one interview, or a web-questionnaire as in this study (Trochim, 2006b). Web-questionnaires were chosen because there were over a thousand companies considered for this study, and interviewing would have taken too much time considering the tight schedule of the study.

Content analysis

In content analysis, the material is inspected and summarized, keeping an eye on both similarities and discrepancies. It is a form of text analysis where the text can be for example books, diaries, interviews, or speeches. Generally, the goal of content analysis is to formulate a summarized description that binds the results into a wider context of the phenomenon. In this study, content analysis was done in three phases. First, all data deemed irrelevant is removed. Second, similarities and/or differences are examined from the remaining data and classified into categories. Third, essential data is sorted and categories summarized.

4.2 Implementation

North American video game developers were searched from two websites. Canadian companies were found from candevs.ca and U.S. companies from gamedevmap.com. The Canadian website included lists of developers and their email addresses. If the email address wasn’t included, it was acquired from the developer’s website or by contacting the company via their Facebook account. Gamedevmap.com includes links to over a thousand U.S. game companies. Email addresses were first searched from their websites, and if there were none, the company was contacted via their Facebook
The limiting factors in acquiring the email addresses were that especially larger companies don’t usually have a public email address, and they don’t allow everyone to send them a private message on Facebook.

The survey was finally sent to 802 companies. This number excludes the companies that were originally in the list, but were removed for different reasons, for example having an invalid email address or having quit development. Also, one company replied that they are not a game company.

The survey was created with a web application called Webropol at www.webpropolsurveys.com. A link to the survey was sent to all companies along with a cover letter (Appendix A) on February 8th, 2016. During the following two weeks, 26 companies completed the survey. On February 22nd, a reminder letter (Appendix B) was sent to all companies that had yet to submit the survey. During the following two days, 24 more companies completed the survey. A third and final reminder letter was sent on March 8th to which 9 more companies answered during that week. That gives a total of 59 submitted surveys.

The survey (Appendix C) was based on previous studies by Janne Rautio (2012) and Joonas Nissinen (2014). According to the supervisor of the thesis, not all Europeans were clear about what usability research means. Therefore, all mentions about usability research were changed to usability activities. The previous study didn’t include Mac or Linux as gaming platforms, so those were included in the survey when the first two companies mentioned those platforms in their answers. The survey consists of a section that all companies answer, and separate sections to companies that conduct usability activities and to companies that do not. In short, companies that don’t conduct usability activities are asked “why”, and those who do are asked “how”.

4.3 Received data

59 companies out of 802 submitted the survey which equals a response rate of 7.4%. Most often it was the CEO that completed the survey but a lot of different people in different roles also submitted the survey. Some other titles of the employees who completed the survey were for example president, developer, designer, producer, art director, marketing coordinator, community manager, COO, CFO, and many others.

![Location of the company](image)

**Figure 3.** Location of the companies.

From the 59 companies that submitted the survey, there were 15 Canadian and 44 American companies. From the 802 companies, approximately 280 were Canadian, which equals a response rate of 5.4% for the Canadian companies. The response rate for Americans was 8.4%.
Figure 4. The size of the companies.

Majority of the companies that answered the survey had only a handful of employees. The reason for it was that the survey was not sent to many big companies since most of them don’t have public email addresses, and getting in touch with anyone but support staff is often quite difficult. Still a few larger companies submitted the survey. The one company with more than 100 employees that completed the survey actually has thousands of employees.

Figure 5. Platforms to which the companies develop games.

The majority of the companies develop games for PC and mobile devices. Playstation 4 was more popular in this study compared to its main rival Xbox One. A little over third of the companies develop games for Playstation 4. Two companies mentioned “Web” in their open answers. Web was overlooked when providing possible platforms to the
companies, so it is possible that some companies have answered for example “PC” when their actual platform is Web.

![Figure 6. Types of games the companies make.](image)

Just like in the study done with the North European companies by Nissinen (2014), action and puzzle games were the most popular among the developers, followed by strategy and arcade games. First Person Shooter (FPS) and Massively Multiplayer Online (MMO) games were among the least popular genres. 7 (12%) companies develop sports games and 18 (31%) companies develop simulation games, which are big numbers compared to the North European study.
5. Results

This chapter presents the answers collected from the survey that was answered by 59 North American video game companies. There are three subchapters, each covering one of the research questions:

1. What usability methods are used in North American video game industry?
2. How game companies have defined the term “game usability”?
3. Are game companies utilizing heuristic evaluation?

5.1 Usability activities and used methods

<table>
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<th>Importance</th>
<th>Total</th>
<th>Average</th>
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<tr>
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<td>0</td>
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<tr>
<td>Somewhat important</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Important</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>Very important</td>
<td>43</td>
<td>4.68</td>
</tr>
</tbody>
</table>

Figure 7. Importance of usability in games.

The first question of the survey asked the companies how important they think usability is in games. As presented in Figure 7, the importance was measured on a scale from 1-5. 72.9% of the respondents felt that usability is very important, and 22% said it to be somewhat important. Only 3 respondents from 59 were undecided, and nobody answered usability to be not important. The average value of all respondents was 4.68. The average score of those companies that do and do not conduct usability activities, were 4.74 and 4.2 respectively. So, companies that conduct usability activities view them to be more important compared to those who do not.

Figure 8. The importance of usability in games and productivity software
In one of last questions of the survey, the respondents were asked again about the importance of usability on a scale from 1-5, but this time for both games and productivity software. The results were very similar compared to the first question of the survey (Figure 4) but a few respondents gave a more positive answer. The average score for usability’s importance in productivity software was 4.78 and for games 4.8.

Figure 9. Reasons for not doing usability activities

Even though companies said usability to be important, nine companies did not conduct usability activities. Most of them thought usability activities to be too expensive or too time consuming. Some didn’t have enough experience to do it, and only one thought it’s not worthwhile to do usability activities. Additionally, some companies mentioned that they are “not a large enough studio to spend resources on dedicated usability staff” or that they haven’t completed their first product yet. Interestingly the majority of the companies in this study not conducting usability activities were not among the smallest companies. There were 24 companies in the whole study that had five employees or less, but from the nine companies that did not do usability activities there were only three.
Figure 10. The companies’ view of the sufficiency of their usability activities.

Whether the companies conduct usability activities or not, the majority of them thinks they don’t do it enough. 20% of the companies agreed at least a little that they do enough usability activities, but only two companies answering “strongly agree” shows that the companies feel that there is room for improvement. The other company that strongly agreed them doing enough usability activities is a company that doesn’t conduct usability activities, so some sort of misunderstanding has probably happened in that case, since that company also thought usability to be very important in games. The average score of the companies for this question was 2.46 on a 1-5 scale.

Figure 11. How companies view the usefulness of their usability activities.
The companies that do not conduct usability activities were excluded from Figure 11. The majority of the companies clearly think usability activities to be useful in development. 20% of the companies were not sure about their usefulness, but no one disagreed about the usefulness of usability activities. Mostly the company itself conducts the usability activities, but 10 companies answered the publisher to be in charge of usability activities. The reason for using different usability activities varied a lot. Some companies wanted to know what makes the users frustrated and quit the game. Some focused generally on design and playability improvements. Others were concerned for example about bugs, gameplay and user interface issues, game mechanics, and intuitiveness. The one word that kept repeating itself from answer to answer was “intuition”. One of the most important things for the companies seems to be to make the game intuitive in all possible aspects.

![Figure 12](image)

**Figure 12.** Usability methods and techniques the companies use.

Playtesting was the most used method among the respondents, as every single one of them playtests their products. 84% (42/50) of the companies also used observation for testing. The next most common answers were usability testing (54% of the companies), focus groups (46%), questionnaires (44%), interviews (40%), and thinking aloud (40%). No company chose eye-tracking as an option, but one did mention it in the open answer along with head and motion tracking. Only a few companies used pluralistic walkthrough or empirical guidelines. In the open answer, one company said to be doing peer testing, which could actually be included in many of the options. Although it was a company with five employees or less that used the least amount of methods while the largest company used the most methods, there was not a clear correlation between the number of methods used and the size of the company.

In addition to the question seen in Figure 12, the survey asked the companies if they apply any methods of their own. 13 companies answered to this question. Many of those answers were just to clarify their usage of the methods found in Figure 12. One company said they “beta test with expert players and consult expert players”. Another
company liked to “compare playtests of different types of players and see what was different between their experiences”. One company said that they “have someone play on a PC version of the game, and if they run into a particularly difficult area for the person we will edit and reload the game to test the new revision”. One company said to be using playtesting and questionnaires but not having a formal process.

![Bar chart showing usability methods considered for future use.](image)

**Figure 13.** Usability methods considered for future use.

From the 35 companies that didn’t already use filmed play sessions, 10 answered it to be a possible future method for them. 17 companies already used data logging, and 9 companies are going to try it in the future. Questionnaires was the third most popular answer for future methods. 22 companies already used them, and 8 companies are going to do it in the future. Cognitive walkthrough was the least likely future method, followed by observation and thinking aloud. One company mentioned that they don’t know the meaning of cognitive or pluralistic walkthrough, so there is a slight possibility that certain options lack answers because the companies don’t know the meaning of the methods or they use different terminology.
Figure 14. Application of usability methods.

75% of the companies agreed at least partly that they use their own versions of available usability methods, and only one company disagreed a little.

Figure 15. Stabilization of usability methods.

The average score for this claim was 3.05 which points to undecidedness in the matter. Almost a third of the companies were undecided while the majority either somewhat disagreed or somewhat agreed with the claim. This was by far the most neutral result of all the claims, and the fact that only five companies chose the most extreme options, emphasizes the undecidedness of the companies about this claim.
From the 50 companies that conduct usability activities, 26 test and evaluate their products in all three stages of development. Production phase was the most common time for the companies to test and evaluate their products. Only two companies didn’t do it during production. One of them did it only during pre-production and the other only during post-production.

In the companies participated in this study, games are mostly tested with alpha and beta versions of a game. First playable version was almost as popular choice. 17 (34%) companies use competitors’ products for testing and only 12 (24%) use a paper prototype or similar pre-production method.
Figure 18. Test subjects the companies use in their usability testing.

In the companies, test subjects are mostly friends and acquaintances or employees of the company. This might be characteristic for smaller companies that represent the majority in this study. The largest company in this study (over 3500 employees) only uses players from the target group as test subjects. Other answers included for example expert players locally and globally, Youtube and Twitch streamers, Expo/trade show attendees, and industry advisors.

5.2 Defining game usability

Figure 19. The companies’ view of the aspects of game usability.
The companies mostly feel that game usability consists of user experience, controls, and user interfaces. The majority of the companies think that the level of challenge, game mechanics, gameplay, and flow are also important pieces of game usability. Fun was the least chosen option but 61% of all the companies answered it to be an important aspect of game usability. A couple of the companies added accessibility and onboarding to be important aspects as well. There were no major differences between the companies that conduct usability activities and those who do not.

The respondents were also asked to give their own definitions of game usability. 46 of 59 companies gave their own definition. Here are some of the answers:

- “Making as much of the player interaction from launch to play as intuitive as possible with as little need for explicit "explanation" as possible.”
- “How smooth and frictionless, intuitive, and painless the interaction is. There's a linear correlation between usability and experience.”
- “The ability for a game to be enjoyed by a player without impediment.”
- “Measurement of friction the player feels between using the game controls/UI and experiencing the fun/interesting aspects of the game.”
- “The ease and comfort by which players of all types behave in accordance with the designer's intent.”
- “Game is easy to pick up and navigate. Information is presented in an effective, intuitive, non-intrusive manner.”
- “How easily and efficiently the player can navigate his way through, and access the options and features of the game.”

There were a lot of great definitions, some more general, and some more focused on a specific genre. Most of the definitions were similar to each other at least in some aspects, and the following words were the key factors of the usability definitions: intuitiveness, immersiveness, minimal frustration, logic, transparent interface, understandability, learnability, memorability, efficiency.
Figure 20. Claim about the role of user interfaces in game usability.

Almost 63% of the companies strongly agreed that game usability’s goal is to develop more easily understandable user interfaces, and 29% of the companies somewhat agreed with this claim. Although the role of user interfaces is clearly seen as important, it not as important as controls (Figure 21) or user experience (Figure 22).

Figure 21. Claim about the role of controls in game usability.
Game usability’s function in developing proper controls was important according to the companies, since no one disagreed with the claim. 95% of the companies either somewhat agreed or strongly agreed with the claim.

![Graph](image)

**Figure 22.** Claim about the role of user experience in game usability.

Correlating with the results seen in Figure 19, the companies put great value in user experience. 76% of all the companies strongly agreed that game usability’s goal is to find problems in user experience. This was the most positive result of these claims.
Figure 23. Claim about the role of playability in game usability.

The companies didn’t agree quite as strongly with this claim, but 54% of all the companies still did. Seven companies were undecided, which might point to undecidenedness just like the option states, but also to the possible ambiguity of the term “playability”. Only three companies disagreed with this claim.

Figure 24. Claim about the role of challenge in game usability.
This was the claim that the companies disagreed with the most. 11 (19%) companies either somewhat disagreed or strongly disagreed with the claim. However, 43 (73%) companies agreed at least a little that game usability’s goal is to find the appropriate challenge.

The results for this claim are much like the results for the claim about the role of playability. 34 (58%) companies strongly agreed and 14 (24%) companies somewhat agreed the claim. Only five companies disagreed and six were undecided.

**Figure 25.** Claim about the role of fun in game usability.
5.3 Heuristics

Figure 26. Reasons for the companies not to use heuristics.

From the 50 companies that conduct usability activities, 14 (28%) of those use heuristic evaluation, although only ten companies mentioned it earlier in the survey (Figure 12). The most common reason for not using heuristic evaluation was that the companies didn’t know the method. From the 36 companies that do not use heuristic evaluation, 20 (56%) companies said they don’t know the method. Not knowing how to use it was the second most common answer. A few companies thought that it’s not worthwhile or it’s too time consuming. Only one company thought it to be too expensive.
Figure 27. How many people are conducting the evaluation.

Heuristic evaluation is mostly done with three employees, but smaller companies might use only one evaluator. Three companies used four employees for the evaluation, and no one used more than that.

Figure 28. Who performs the heuristic evaluation.

Heuristic evaluation is mostly handled by the companies’ own employees. Three companies use outside experts to conduct the evaluation, and one company uses real end-users to perform their heuristic evaluation. The role of the employees that perform heuristic evaluation varied a lot. From 14 answers, there were 13 different roles, although some of the roles could be comparable to each other, because in smaller companies employees need to handle more just one role. Some of the answers included founder, lead designer, head of production, testing manager, user researcher, lead developer, programmer, and employees external to the project with knowledge in user experience.
Four of the 14 companies that use heuristic evaluation, use Nielsen’s heuristics. Ten companies use their own list to do the evaluation. Two companies gave an open answer but the other one only elaborated on their answer for “own list” and the other answer could be considered as eleventh answer for companies using their own lists.

11 out of 14 companies that use heuristic evaluation, use it because it’s an effective way to find problems. Nine (62%) companies use it because it reduces problems and/or their severity found in later testing. According to the respondents, time and money were not major concerns. One company answered that they use heuristic evaluation “as an additional catch-all”.

Figure 29. Heuristic lists that the companies use.

Figure 30. Reasons to use heuristic evaluation.
Figure 30. The companies’ thoughts about existing heuristic lists.

The clustered bar chart in Figure 30 shows the thoughts of the companies about five different claims concerning heuristics. Half of the companies disagreed with the claim that heuristics are too general. Only three (21%) companies agreed with the claim and four (29%) companies were undecided. Nine companies (64%) felt that the heuristic lists they use are comprehensive enough, and only one company disagreed with that claim. 12 (86%) companies agreed at least a little that there isn’t a single comprehensive heuristic list, and the remaining two companies were undecided. No one disagreed with next claim either. 11 (79%) companies agreed that different game genres should have their own specialized heuristic list. The remaining three companies were undecided. Ten (71%) companies agreed that they need to make a new heuristic list for every new game, three companies disagreed at least a little, and one company was undecided.
6. Discussion

In this study, nine companies did not perform usability activities. Six of those companies said them to be too expensive to do. As mentioned previously in this research, it’s a false belief that formal usability evaluation techniques cost more, as the long term benefits will eventually surpass the short term costs (Federoff, 2002). Some smaller developers could argue that they don’t have the necessary skills to calculate those costs (Federoff, 2002; Rajanen, 2011; Bias & Mayhew, 2005), or the lack of resources forces them to cut corners. That’s hardly a valid argument however, since development with the lack of evaluation and testing can’t result in a game that would meet its full potential (Rajanen, 2011). Consequently, the game won’t sell as well and the company makes less money (Rajanen & Marghescu, 2006).

Based on the answers, the lack of manpower doesn’t always seem to be a proper excuse not to do usability activities. Some companies that had five employees or less used as many as ten different methods to test and evaluate their games, and there wasn’t a clear correlation between the number of methods used and the size of the company. There is no denying though that having more employees makes evaluation easier, and in this study it was the small company that did the fewest activities while the largest did the most.

The companies in this study usually use their own applied versions of usability methods rather than follow pre-written instructions step-by-step. The methods and the way they are used have not yet stabilized for many of the developers, which is understandable for small and young companies still experimenting and trying to find the best methods and the ways to use them. Companies need to aim for stabilizing their methods in order to make the evaluation process more efficient. Let’s take the biggest participant of this study for an example, a company responsible for some of the most critically acclaimed games ever. Even though they might need to tweak their methods and create new heuristic lists to suit different games, the methods and the way they are used essentially remain the same.

The majority of the companies in this study thought that game usability consists of user interfaces, controls, user experience, level of challenge, game mechanics, gameplay, flow, and fun. Some would isolate user interfaces, controls, and user experience as usability issues, and the rest as gameplay issues.

46 companies gave their own usability definitions in the survey. From the key words of those definitions and the frequency of their use, a new game usability definition can be formulated: “The extent to which a game allows the user to complete his tasks with intuition and minimal frustration.” This means that the user doesn’t have to infer or think too much to acquire the information he needs to complete certain tasks. Other key words from the definitions that the companies gave are closely related to this definition, such as transparent interface, learnability, memorability, efficiency, and immersiveness.

The results of this study are quite similar compared to the study done with the North European companies (Nissinen, 2014), but there are some differences too. The companies in both regions agree equally strongly about the importance of usability in games. The expensiveness of usability activities was the main reason for not doing them
in either of the regions. For the North American companies time consumption was another big reason for not doing usability activities, while in Northern Europe that was a concern only for one company. In both studies, only a minority of the companies thought that they do enough usability activities. The North American companies have found usability activities to be slightly more useful compared to their North European counterparts. In both regions, playtesting and observation are the most used usability methods. Three of the North American companies use pluralistic walkthrough while none of the North European companies uses it, and three of the North European companies use eye-tracking while none of the North American companies uses it. In the North European companies, focus groups was the most popular method considered for future use in addition to methods already in use, but only a few North American companies chose the same option. In North America, filmed play sessions, data logging, and questionnaires were considered the most for future use. In both regions, the companies use their own applied versions of the usability methods, but they are undecided whether the methods and the way they are used have stabilized. In Northern Europe, games are mostly tested with alpha versions but in North America, testing happens most often with both alpha and beta versions. In Northern Europe, companies have a wider range of people testing their games. Their least likely test subjects were players from the target group, which 68% of the companies still choose to test their games. In North America, random people were the least likely test subjects, an option that is still used by half of the companies.

When defining game usability, the companies in both regions again gave very similar answers with a few exceptions. User interfaces, controls, and user experience were seen as the three most important aspects of game usability in both regions. The only real difference between the regions when choosing the aspects of game usability was that unlike the North European companies, most of the North American companies think “fun” is an important aspect as well. The definitions that the companies gave for game usability are quite similar in both regions, and words like intuitiveness, learnability, immersiveness, and a transparent interface are common key words with the regions.

For the claims about the goals of game usability, the answers in both regions were again very similar. The companies agreed that the goal of game usability is to develop clearer user interfaces and controls, and also to find problems regarding user experience and playability. 18% of the North American companies disagreed with the claim that the goal of game usability is to find an appropriate level of challenge, while only 9% of the North European companies disagreed with it. The North European companies were however so undecided about this claim that 73% agreed with it, while the same figure for the North American companies was 76%. From the North European companies, 17% disagreed with the claim that the goal of game usability is to reduce barriers for fun, while only 10% of the North American companies disagreed with it.

For the companies that conduct usability activities, the main reason for not using heuristic evaluation is that they don’t know the method. Only one company claimed that heuristic evaluation is too expensive. From all the companies that participated in this study, 14 of them use heuristic evaluation. The study done with the North European companies (Nissinen, 2014) included only four companies, so further research is necessary if we should compare the results between the regions in more detail regarding heuristic evaluation. In the North American companies, heuristic evaluation is mostly done with three people, but in four companies it’s done with only one person. From the North European companies, two evaluated with one person, and one company used six or more people. In both regions, companies’ own heuristic lists are mostly used in the evaluation, but a few companies use Nielsen’s heuristics as well. Also, companies in
both regions use mainly their own employees to do the evaluation, although three of the North American companies use outside experts as well.

Reducing problems and their severity found in later testing was an important reason to use heuristic evaluation in both regions. For the European companies, minimal time consumption was seen as an equally important reason. For the North American companies, time consumption wasn’t an issue, and the biggest reason for using heuristic evaluation was that it’s an effective way to find problems.

The North American companies in this study did not agree with the claim that heuristics are too general, but the North European companies slightly agreed with the claim. The companies in both regions agreed that the heuristic lists that they use are comprehensive enough, and that there isn’t a single comprehensive heuristic list. Also, the companies in both regions agreed that different game genres should have their own specialized heuristic list, although the North American companies agreed much more strongly about this claim. The North European companies disagreed with the claim that they need to make new heuristic list for every new game, whereas 10 out of 14 the North American companies agreed with the claim.
7. Conclusion

This research studied the usability activities of North American video game companies as well as their views and attitudes about game usability. This was accomplished by sending the companies a survey that provided answers to the three research questions:

- What usability methods are used in North American video game industry?
- How game companies have defined the term “game usability”?
- Are game companies utilizing heuristic evaluation?

The results of this study show that North American video game companies see usability to be very important in games, but some companies don’t do usability activities because they believe them to be too expensive, too time consuming, or they lack the expertise to do it. Most of the companies that do not conduct usability activities now, will do them in the future. Therefore, this research should prove to be beneficial especially to those companies by bringing up for example multiple usability methods and the most important aspects of usability. The companies that already use some usability methods can still benefit greatly from the results of this study. The feedback from the companies expressed that the survey alone helped them to become more aware of what kind of usability testing can be done and how important it is to their operation. They also commented that the survey made them want to do more to confront usability in a more structured way, therefore acting as a wakeup call as outlined in the usability literature (Schaffer, 2004).

Playtesting and observation are the most used usability methods, but even the smallest companies can use more than ten different methods to evaluate their games. The main reasons for usability activities for the companies was to find out what causes the player to become frustrated, and making the game as intuitive as possible in all aspects of the game. The game usability definitions that the companies provided were analysed and the most used key words were used to create a new game usability definition: “The extent to which a game allows the user to complete his tasks with intuition and minimal frustration.” There are already various game usability definitions available. However, a single definition can’t be perfect in encompassing every usability aspect, therefore based on the results of this study, the importance of intuition and minimizing frustration need to be emphasized.

28% of the companies in this study that perform usability activities, use heuristic evaluation mostly by making their own heuristic lists to suit different games. Companies use heuristic evaluation mainly because it’s an effective way to find problems, and it reduces problems in later testing. The main reason for not using heuristics is simply that companies are unaware of this method or don’t know how to use it. There were more than three times as many companies in this research that use heuristic evaluation than there was in the study done with the North European companies (Nissinen, 2014), making further research regarding heuristic evaluation necessary if we are to compare the results between the two regions in more detail.
The results of this study were mostly similar to the North European study. Companies in both regions give a high value for the importance of usability. They use the same methods with their own personal touch, and they even define game usability in very similar ways. There were only a few minor differences between the two regions, for example the North European companies having a wider set of audience to test their games. Comparing the results about heuristics to the North European study is not that useful, because there were only four North European companies that used heuristic evaluation. Nevertheless, the companies in both regions seem to use rather their own heuristic lists and their own employees to do the evaluation.

In addition to providing information to video game companies, this study can help other researchers to pinpoint the area of their own researcher, whether it’s usability methods, heuristics, problems in terminology, or other game usability and video game related topics.

There were some limitations in this study. The biggest one was the lack of responses from large companies, which was expected. Larger companies might have been able to include to this research by doing interviews instead of a questionnaire, but the schedule of the research didn’t really allow doing that. One respondent commented that early on in the survey, there should have been explanations of the usability methods, because they might use a specific method but not call it by the name that it was represented in the survey.

This research has now been done for Finland in 2012, Northern Europe excluding Finland in 2014, and North America in 2016. Central Europe or Asian countries could be studied next, and Japan alone would be an interesting study as it hosts some of the world’s largest video game companies.
References


Koeffel, Hochleitner, Leitner, Haller, Geven & Tscheligi (2010) Using heuristics to evaluate the overall user experience of video games and advanced interaction games.


Appendix A. Cover letter for they survey

Hi,

I’m doing research for my thesis titled “Game usability in North American video game industry”. The purpose of the research is to find out what usability methods gaming companies use to improve the quality of their games, and what role usability has in their game development. In order to gather this data, I have created a questionnaire to which you’ll find a link at the end of this message.

The name of the respondent or the company will NOT be published. Every company’s answers to the questionnaire are greatly appreciated as each answer makes the results of the research more accurate. Even if you don’t do usability research your answers will be beneficial to the study. I hope you will find 10-15 minutes to complete the questionnaire, and help me complete my thesis and provide useful information to the gaming industry.

The research is made for the Department of Information Processing Science in University of Oulu, Finland. The survey has been sent to about 800 North American video game companies.

It takes about 10-15 minutes to complete the questionnaire, and basically anyone in the company can do it. However, to get the most accurate results possible I’d recommend the person/persons most familiar with the company’s usability activities to complete the questionnaire.

Thank you for your cooperation!

Researcher:
Juho Tapani
juho_tapani@hotmail.com
Department of Information Processing Science
University of Oulu
Appendix B. Reminder letter for the survey

Hi,

During February I have sent a questionnaire (link at the end of this message) to North American game companies asking about their usability activities (for example playtesting, observation, and cognitive walkthrough). Some companies have already submitted the questionnaire but many more are still needed for the research to be valid. The purpose of the research is to find out what usability methods gaming companies use to improve the quality of their games, and what role usability has in their game development.

The companies that complete the questionnaire will have access to the results of the research. Companies that have already answered the questionnaire have mentioned the survey helping them realize for example new usability testing methods, so hopefully completing the questionnaire and viewing the final results will be beneficial for you as well.

Based on the previous answers the questionnaire shouldn't take more than 10 minutes of your time, and anyone familiar with the companies usability activities can do it. I'm hoping to get the answers as soon as possible, so I can start the long process of analyzing the results and finish the research during this spring. Your answers will be anonymous.

You'll find a link to the questionnaire at the end of this message. I sincerely hope to have your cooperation.

Researcher:  
Juho Tapani  
juho_tapani@hotmail.com  
Department of Information Processing Science, University of Oulu
Appendix C. Questionnaire

Game usability in North American video game industry

It takes about 10-15 minutes to answer the questionnaire. This survey is part of a research for the Department of Information Processing Science in University of Oulu, Finland. Answers will be processed anonymously and confidentially. More info: juho.tapani@hotmail.com

How important is usability in games in your opinion?

1  2  3  4  5
Not important at all Very important

Do you conduct usability activities in your company?

Do you evaluate and test the usability of your games alongside other testing and development? Do you possibly apply some usability methods and techniques, like usability testing, heuristic evaluation, observation, etc.

Yes
No

8% completed

Answering “No” to the question “Do you conduct usability activities in your company?” leads to page 2/12. Answering “Yes” leads to page 3/12.
Game usability in North American video game industry

(2/12) Reasons not to do usability activities

Why don’t you do usability activities? *
   You can choose multiple options:
   [ ] Too expensive
   [ ] Too time consuming
   [ ] Not enough expertise
   [ ] Don’t think it is worthwhile
   [ ] Other: __________________________

Are you going to do usability activities in the future? *
   [ ] Yes
   [ ] No
   [ ] Maybe

After this page, the user is redirected to page 10/12.
(3/12) Methods

What usability methods and techniques do you utilize in your company for conducting usability activities?
- Heuristic evaluation
- Cognitive walkthrough
- Phased scenario
- Usability testing
- Playtesting
- Focus groups
- Interviews
- Questionnaires
- Empirical guidelines
- Think aloud
- Observation
- Filmed play sessions
- Eye tracking
- Data logging
- Other: [ ]

Are you going to try some new methods or techniques in the future? Are there some methods or techniques in addition to the current ones that will be utilized in the future concerning usability research?
- Heuristic evaluation
- Cognitive walkthrough
- Phased scenario
- Usability testing
- Playtesting
- Focus groups
- Interviews
- Questionnaires
- Empirical guidelines
- Think aloud
- Observation
- Filmed play sessions
- Eye tracking
- Data logging
- Other: [ ]

Do you apply any methods of your own? Are there some methods that aren't on the previous lists? Do you perhaps use some methods or techniques that you have developed yourself?

[ ]
Game usability in North American video game industry

(4/12) Methods

Who is in charge of the usability activities?
Who actually performs the testing and evaluation?
- Company, itself
- Publisher
- External company
- Other: 

In which stage of production do you test and evaluate usability?
- Pre-production
- Production
- Post-production

With what is game usability-tested?
What version of the game do you test and evaluate?
- Paper prototype of similar
- Working prototype
- First playable version
- Alpha version
- Beta version
- Release version
- Competitor's product
- Other: 

What are you trying to find out with your usability activities?
Here you can write freely about the goals of your usability research.

250 characters remaining

What methods are in use in different phases of the development?

400 characters remaining

33% completed
Game usability in North American video game industry

(5/12) Methods: Usability testing
If you don’t use usability testing, you can skip this page

Who arranges the usability testing?
- Company itself
- Publisher
- External company
- Other: 

Who in the company arranges the usability testing?
Person(s) role/title.

150 characters remaining

Who are the test subjects?
- Company employees
- Friends and acquaintances
- Random people
- Players from the target group
- Other: 

What kinds of tasks are given to the players?
- Structured tasks
- Open-ended tasks
- Other: 

< Previous  Next >

41% completed
(6/12) Methods: Usability testing

Where do you test?
In what kind of place is the usability testing conducted? (offices, conferences, homes, etc.)

250 characters remaining

What are you looking for in usability testing?
What kind of data is collected and what are you observing? Do you collect qualitative or quantitative data? Are you paying more attention to people's behavior or to success rate, number of errors, etc.

400 characters remaining

Answering “No” to this question leads to page 8/12. Answering “Yes” leads to page 9/12
(8/12) Reasons not to use heuristic evaluation

Why don't you use heuristic evaluation?

☐ Don't know the method
☐ Don't know how to use it
☐ Don't think it is worthwhile
☐ Existing heuristic lists don't suit our games
☐ Didn't produce good results previously
☐ Not enough people to do it
☐ Too time consuming
☐ Too expensive
☐ Other

Any other reasons for not using heuristic evaluation?

250 characters remaining

Are you going to use heuristic evaluation in the future? *

☐ Yes
☐ No
☐ Maybe

After this page, the survey continues on page 10/12.
(9/12) Methods: Heuristic evaluation

Who does the heuristic evaluation?
- Company employees
- Outside experts
- Other: [ ]

Whose task is to perform heuristic evaluation inside the company?
What is the person(s) role/title.

150 characters remaining

How many people are conducting the evaluation?
- [ ]

What heuristic list is used for the evaluation?
- Nielsen's heuristics
- Melissa Federoff's heuristic list
- Desurvire, Caillen & Tooh (Heuristic Evaluation for Playability)
- Korhonen, Kahvisto Nokia's Heuristics
- Pinelle, Wong & Starch heuristic list
- Own list
- Other: [ ]

Why are you using heuristic evaluation?
- It's cheap
- It's an effective way to find problems
- It's easy to use
- It's not too time consuming
- It reduces problems and/or their severity found in later testing
- Others are also using it
- Other: [ ]

What do you think about the existing heuristic lists? *

<table>
<thead>
<tr>
<th>Heuristic list(s) we use are comprehensive enough</th>
<th>Strongly disagree</th>
<th>Somewhat disagree</th>
<th>Undecided</th>
<th>Somewhat agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heuristics are too general</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>There isn't a single comprehensive heuristic list</td>
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<td></td>
</tr>
<tr>
<td>Different game genres should have their own specialized heuristic list</td>
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</tr>
<tr>
<td>We need to make a new heuristic list for every new game</td>
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</tr>
</tbody>
</table>

[< Previous  Next >] 75% completed
(10/12) The concept of game usability

What aspects do you think the concept of game usability consists of? ~
Choose the alternatives that in your opinion are affected by game usability and that you examine when talking about game usability.

- The level of challenge
- Fun
- Controls
- User experience
- User interfaces
- Game mechanics
- Gameplay
- Flow
- Other: [ ]

How would you define game usability?

200 characters remaining

Previous  Next →
### (11/12) Thoughts about usability

**What do you think about the following claims?**

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly disagree</th>
<th>Somewhat disagree</th>
<th>Undecided</th>
<th>Somewhat agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Usability is important in productivity software</td>
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</tr>
<tr>
<td>Usability is important in games</td>
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<tr>
<td>Usually we use our own applied versions of the usability methods</td>
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<tr>
<td>Our usability methods and the way we use them have stabilized</td>
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<tr>
<td>We do enough usability research</td>
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<td></td>
</tr>
<tr>
<td>Usability research has been useful</td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

**What do you think about the following claims concerning game usability? The goal of game usability is to...**

<table>
<thead>
<tr>
<th>Goal of game usability</th>
<th>Strongly disagree</th>
<th>Somewhat disagree</th>
<th>Undecided</th>
<th>Somewhat agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Develop more easily understandable user interfaces</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reduce barriers to fun</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Develop more understandable controls</td>
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<td></td>
</tr>
<tr>
<td>Find the appropriate level of challenge</td>
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<td></td>
</tr>
<tr>
<td>Find problems in user experience</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Find problems in playability</td>
<td></td>
<td></td>
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</tbody>
</table>

91% completed
(12/12) Respondent's information

On what platform do you make games?

- PC
- Handheld game consoles
- Mobile devices
- Xbox One
- PlayStation 4
- Wii / Wii U
- Other: [ ]
- Mac
- Linux

What type of games do you make?

- Action
- Adventure
- Action-adventure
- Arcade
- Fighting
- FPS
- MMO
- Puzzle
- Racing
- RPG
- Shooter
- Simulation
- Sports
- Strategy
- Other: [ ]

The size of your company

Approximately the number of employees you have.

3 or less

Company is located in

If your company has operations in both countries, choose one as the primary location

- Canada
- USA

Your title/role in the company

[ ] characters remaining

Name of the company

This information is only for monitoring the received answers and it won't appear in the thesis or in any other place.

[ ] characters remaining

Feedback and suggestions:

[ ] characters remaining

Submit