Designing a game for improving reading motivation
Abstract

Reading skills are an important asset in the modern society. However, the reading skills of western 15-year old students have been on the decline for several years and especially the attitudes towards reading have greatly diminished. The goals of this thesis is to study the improvement of reading motivation through games and to identify what kind of features should such a game include. A fully functional "persuasive" point and click adventure game was developed for this purpose, utilizing guidelines from earlier research on persuasion, with an assumption that reading motivation can be improved through games. The background literature includes behavior change support systems, persuasive technology and serious games. The game was then tested and evaluated with a specific target group of eight ice hockey playing school children, by using semi-structured interviews, adjective card test and an affect grid. The results of this thesis include a set of persuasive game development guidelines designed to improve reading motivation and a persuasion strategy for game development process.

Key words
persuasive systems design, persuasive technology, serious games, behavior change support systems, reading motivation
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1. Introduction

This thesis was started in August of 2013, by collaboration with the Pucks and Books project at the University of Oulu. The Pucks and Books project is a part of the Reading Enthusiasm program, which strives to find ways to improve the reading motivation of Finnish school children. According to the European PISA 2009 (Programme for International Student Assessment) research, the enthusiasm towards reading has been dwindling steadily in recent years and the ongoing trend might have severe repercussions, if not addressed properly.

According to the PISA 2009 research, improving reading motivation and reading skills is an important part of education as has effect on the learning process in general. Reading skills are also an important asset in the modern society. The PISA 2009 research shows that the development of good reading skills is especially important for young children, as good linguistic abilities are beneficial in education and employment later in life. However, the results of the research show that up to 15% of the 15 year old students in OECD (Organization for Economic Co-operation and Development) countries have poor reading skills, which may have negative effect in later studies and work opportunities.

While the overall reading skills in OECD countries have been in decline over the past years, according to the results of PISA 2009, so are the attitudes towards reading. According to Knulst (2003) the children in western countries read less and less. The decline in reading attitudes is also confirmed in the PISA 2009 research, as 37% of participants in OECD countries stated that they don't like to read for their own enjoyment. In Finland, 19% of 15 year old girls and even 47% of boys made the same statement. Verboord & Rees (2003) note that children's attitudes toward reading are decreasing because of increased orientation toward audiovisual stimuli.

With these statistics as a background, this thesis started as an effort to find new ways to motivate school children in reading. More specifically, the Pucks and Books project dictated that the target group was to be 15-16 year old boys who play ice hockey as a sport. The presumption was that the children of this age already play a lot of computer and video games, so one plausible and novel method of improving reading motivation was identified in the games genre. According to Manninen (2011), computer and video games can function as a tool for learning and in fact, games allow for natural, intuitive and activating situations for learning. Also, according to Mitchell & Savill-Smith's (2004) report on the use of computer games for learning, games are an engaging platform for learning that can be also used for building motivation.

It is justifiable to assume that reading motivation can be improved through games. Therefore, the research question of this thesis is "what kind of features should a game for improving reading motivation include?" This is examined through using design science research methodology. A fully functional game for improving reading motivation was designed and evaluated in order to find out which features are useful.

A literature review was made prior to this thesis, in order to find out whether similar games have been researched in the past and to find out guidelines for the game development phase. The most crucial references from three related fields of research were used directly in building the set of game development guidelines. There was only
one piece of directly related research on improving reading motivation through games found, so in the end the game was developed mostly with features from the fields of behavior change support systems, persuasive technology, and serious games.

The game Hockey Zombies - Escape from the Arena, and the persuasion strategy for its development phase are the main contributions of this thesis. The game and the persuasion strategy behind it both help to provide answers to the research question and can be reused in future research. The game was developed over the course of fall 2013 and evaluated with the target group right after the development phase, in December 2013. The results are displayed and discussed at the end of this thesis. The game Hockey Zombies - Escape from the Arena is an open source project and was also developed further over the course of spring 2014.

This thesis contains seven chapters. The second chapter, after the introduction, is about the theoretical background for this study. It begins with the sole directly related study by Lucero, Zuloaga, Mota, and Muñoz (2006) and continues with the fields of behavior change support systems, persuasive technology, and serious games. Chapter three describes the research method used to conduct this thesis. Chapter four describes the development and features of the game Hockey Zombies - Escape from the Arena. Chapter five describes the evaluation of the results, followed by discussion in chapter six and conclusion in the final chapter.
2. Previous research on developing a game for improving reading motivation

There is a shortage of directly related literature regarding improving reading motivation through games, as only one such study was discovered (Lucero et al. 2006). Other related literature was found in areas of behavior change support systems (BCSS), persuasive technology and serious games. Out of these, BCSS was chosen as the primary approach for the game development process of Hockey Zombies - Escape from the Arena.

This chapter describes the theoretical background of this study, beginning with the study by Lucero et al. (2006) in subchapter 2.1. Subchapter 2.2 addresses behavior change support systems, highlighted in the figure below (Figure 1). BCSS are followed by persuasive technology in subchapter 2.3 and serious games in subchapter 2.4.

![Figure 1: Theoretical background for Hockey Zombies - Escape from the Arena.](image)

In the final subchapter of the theoretical background, the practical results from these categories are brought together in the form of process and persuasive game development guidelines.
2.1 Papelucho

According to Lucero et al. (2006), watching processed information functions as a drawback to the children's personal process of developing imagination. This functions as an important initiative to search for ways to motivate children to read. Lucero et al. approach this problem in form of an educational game, Papelucho. Papelucho is also the name of the main character of the game, based on a Chilean fictional literary character. The game is directed towards children and its main purpose is to improve their motivation to read and write through different activities in the game.

The conceptual framework (Figure 2) behind Papelucho consists of three parts: Gardner's Multiple Intelligences theory (Gardner 1999), the persuasion component, in which they use mainly Fogg's (2002) research principles for creating persuasive technology, and the fictional character Papelucho, who is assumed to make it easier for them to reach and appeal to the children.

![Figure 2: Lucero et al (2006) theoretical framework for their persuasive game.](image)

The conceptual framework of Lucero et al. (2006) will be discussed more by going through each of them, starting with the background theory behind their game.

**Gardner's Multiple Intelligences theory**

Gardner's Multiple Intelligences (MI) theory (Gardner 1999) is a constructivist approach to intelligence that divides intelligence into different modules. The MI theory claims the existence of seven separate human intelligences. The linguistic intelligence is the ability to communicate through language in all its forms and the logical-mathematical intelligence involves the scientific capacity to analyze problems logically and to do mathematical operations. The musical, bodily-kinesthetic and the spatial intelligences are connected with the arts, music and spatial shapes and patterns. The final two intelligences are social intelligences: the interpersonal intelligence and the intrapersonal intelligence, which deal with understanding intentions, motivations and desires of other people and ones capacity to discern different personal feelings. (Lucero et al. 2006)

Having a background theory that supports persuasion and adoption of new behavior appears to be a considerable approach to creating games for the improvement of reading motivation. Lucero et al. (2006) use the MI theory by incorporating different learning activities in the game that represent the different separate human intelligences in the MI theory.
**Persuasion with Papelucho**

With the MI theory taken into account, Lucero et al. attempt to integrate it into Fogg's (2002) study of computers as persuasive technologies and implement their strategy of motivating students with different cognitive skills and weaknesses. Fogg's (2002) research of persuasive technology will be discussed in detail later on in this paper. Lucero et al. also refer to another metaphor, teaching as persuasion, which is another line of research of persuasion that is connected to the use of persuasion as a pedagogical tool for teaching and creating training products that motivate students to acquire knowledge and skills. According to Lucero et al. the goal of teaching as persuasion is to change other's behaviors, judgments and positions on a subject by appealing to reason and emotion.

Papelucho, the popular Chilean fictional character from a book saga, according to Lucero et al. (2006) is used in their software product to connect the children to the real-world environment. Lucero et al. (2006) use three principles from Fogg (2002) to motivate children to read: similarity, tailoring and credibility. Similarity is achieved by using Papelucho as a character that children would think was similar to them (Papelucho is roughly the same age as the target group) and motivates/persuades them more easily. Second, tailoring is used in expectation that children would pay more attention to the conveyed messages when Papelucho uses the same language as children would use. Thirdly, Papelucho represents children in a believable way in the eyes of children, teachers and parents.

Credibility is also targeted by using a circus metaphor as an interface for the children where they can decide whether to practice reading, writing or creating a product in the game. Each act of the circus, or a section of the game, represents one of Gardner's (1999) intelligences. Children can read texts in a session that takes place at the roof, under a starry sky (Figure 3), or write on a subject that Papelucho proposes randomly and helps along the way or craft a paper origami.

![Figure 3: Persuasive interfaces for reading (starry sky) and writing (magicians hat) acts (Lucero et al. 2006)](image)

The paper origami crafting is performed in a "preparing the circus act" metaphor, guided in a step-by-step fashion that optionally links the user to the real world by
offering to print out a 1-page manual that can be followed at home to create a real, physical paper origami. Lucero et al. (2006) refer to the last activity as "creating a product" that drives from the bodily-kinesthetic module of Gardner's (1999) Multiple Intelligences. Persuasive elements are also found in giving praise to the user for completing a task and giving the option to not only doing the reading activity within the game but also printing the text on paper and taking it home (Lucero et al. 2006).

**Evaluation and results**

While the user group of their study (N=50) consisted of children from four different schools, with children from both urban and rural backgrounds, Lucero et al. (2006) have found that the qualitative results based on comments made by the children and the experimenters during the evaluations were overall positive. The children were drawn to the audiovisual experience of the software due to its attractive illustrations, animations and original music. Lucero et al (2006) had two research questions: "do children feel motivated to use our software?" and "are children able to create a product (i.e. building an Origami figure) regardless of differences in age (i.e. between 8 and 11 years of age), cognitive strengths and weaknesses, and socio-cultural background with the help of our software?" The initial results and the answers to their research questions were overall positive, although the only method of evaluation was a qualitative questionnaire.

The results Lucero et al (2006) received were that the children were enthusiastic towards the software and started asking questions such as "where is he [Papelucho] from?" and "Where does he live?" Lucero et al. (2006) claim that their approach of motivating children in a credible and connected to the real world made sense for both children from the city and rural areas. As for their second research question, the children were able to understand and follow the process of building the origami figure with only a few of them experiencing some problems. According to Lucero et al. (2006) the results show that the software was able to motivate children to read, write and perform the proposed activities in an enthusiastic way. They continue on with the results: "Our results show how by integrating principles from Persuasion together with theories such as Gardner's in educational software, audiences with age, sex, social, economic, and cultural differences can be reached using the same software and can help us motivate children, and others, to read". (Lucero et al. 2006)

The research of Lucero et al (2006) provides a practical strategy for making a game designed for improving reading motivation. This strategy forms the underlying structure for the game development guidelines described later in this chapter.
2.2 Behavior change support systems

The concept of behavior change support systems is a recent, design-oriented take in the field of persuasive technology research. This chapter discusses BCSS and their relevance for this thesis. BCSS contribute a significant resource for this thesis as they provide persuasive guidelines (28 in total) and a process-oriented guideline for the game development phase. BCSS and their relevance for the game development phase will be addressed in this chapter by first discussing BCSS and their background theories in general and then moving on to more specific areas such as the Outcome/Change matrix and the Persuasive Systems Design model.

According to Oinas-Kukkonen and Harjumaa (2009), changing behavior means changing person's response to an issue. The change in behavior is backed by multiple behavior change-related theories, of which two prominent theories stand out as relevant for improving reading motivation. The full list of these theories can be found in appendix 1 (appendix 1).

The self-efficacy theory dictates that individuals who perceive themselves as capable of taking action also do so. This happens through vicarious experiences, social models, social persuasion, reducing stress reactions and altering the negative emotional tendencies and self-beliefs. The social cognitive theory is about observing others performing a behavior. This can influence the person's belief in their own ability to complete tasks or reach goals. These two theories are included in the game development guidelines described later in this chapter.

According to Oinas-Kukkonen (2012), behavior change support systems can be web-based applications, mobile, ubiquitous or traditional information systems that deal with persuasion and influence. Oinas-Kukkonen (2012) mentions such areas for BCSS as healthcare (i.e. obesity, smoking, hazardous drinking, diabetes, insomnia, stress, asthma and so forth), adopting greener energy behaviors or sticking to exercise programs, with the Nike+ Web Service as an example of a persuasive system designed to increase user exercise behavior.

Behavior change support systems disconnect themselves from coercion and deception as persuasive methods, as Oinas-Kukkonen and Harjumaa (2008) state in their definition of BCSS: "computerized software or information systems designed to reinforce, change or shape attitudes or behaviors or both without using coercion or deception". Oinas-Kukkonen (2012) further defines behavior change support systems as follows: "A behavior change support system (BCSS) is a sociotechnical information system with psychological and behavioral outcomes designed to form, alter or reinforce attitudes, behaviors or an act of complying without using coercion or deception" (Oinas-Kukkonen 2012).

When designing and evaluating a system designed for behavior change, Oinas-Kukkonen (2012) suggests the use of the Outcome/Change (O/C) matrix. The O/C matrix (Table 1) can be used to analyze the intended change of behavior the system is supposed to elicit (Langrial, Stibe, and Oinas-Kukkonen 2013).
Table 1. Outcome/Change design matrix (Oinas-Kukkonen 2012).

<table>
<thead>
<tr>
<th></th>
<th>C-Change</th>
<th>B-Change</th>
<th>A-Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>F-Outcome</td>
<td>Forming an act of complying (F/C)</td>
<td>Forming a behavior (F/B)</td>
<td>Forming an attitude (F/A)</td>
</tr>
<tr>
<td>A-Outcome</td>
<td>Altering an act of complying (A/C)</td>
<td>Altering a behavior (A/B)</td>
<td>Altering an attitude (A/A)</td>
</tr>
<tr>
<td>R-Outcome</td>
<td>Reinforcing an act of complying (R/C)</td>
<td>Reinforcing a behavior (R/B)</td>
<td>Reinforcing an attitude (R/A)</td>
</tr>
</tbody>
</table>

The intended changes in the matrix are called C-, B-, and A-changes, listed in ascending order of difficulty. A C-change simply means that the user complies by executing the targeted behavior. A B-change builds on this, as it means the user's behaviors change. An A-change means to influence the user's behavior and also attitude in full, thus being the most difficult change to elicit (Langrial, Stibe, and Oinas-Kukkonen 2013). Improving reading motivation, for example, would be an A-change for an unenthusiastic user not accustomed to reading.

The three potential, successful and voluntary outcomes of persuasion in the matrix are the formation, alteration or reinforcement of attitudes, or complying. A forming outcome (F-outcome) means that a pattern of behavior which didn't exist before takes place, such as abstaining from substance abuse. Eliciting reading motivation can also be thought to fit in this category, if the user is not at all motivated towards reading in the first place.

An altering outcome (A-Outcome) means changes in behavior, such as decreasing the amount of drinking or an increase in exercise behavior (such as reading). A reinforcing outcome (R-Outcome) is the reinforcement of attitudes or behaviors, resulting in resistance to change. A F-outcome is more likely to emerge than an A-outcome in many cases, whereas reinforced attitudes and behavior (R-Outcome) are the most resistant as time passes. Langrial, Stibe & Oinas-Kukkonen (2013) exemplify these outcomes as follows: "For instances, consider formation of a behavior (F/B), e.g. start going to gym, altering of a behavior (A/B), e.g. reduce or quit smoking (A/B), or reinforcement of a attitude (R/A), e.g. continuing to resist smoke cravings".

To summarize, the O/C matrix is a framework for analyzing the intended change of a BCSS. It can be used both in the design and evaluation phase of such a system. While it is a useful tool by itself, it addresses only a part of the design phase of a BCSS. The O/C matrix is also utilized in the Persuasive Systems Design model, which is more about the actual design phase of a BCSS.

The Persuasive Systems Design Model (PSD) is a means for the design and evaluation of BCSS (Oinas-Kukkonen, 2012). The PSD model (Figure 4) consists of three phases: understanding key issues behind persuasive systems, analyzing the persuasion context and the design of system qualities (software implementation). The end result of these phases is the behavior and/or attitude change of the user.
Figure 4: The PSD Model (Oinas-Kukkonen and Harjumaa 2009).

The three phases of the PSD model are each divided into smaller steps and categories. These will be introduced in order, starting with the first one, which consists of seven different postulates. In the first phase of the PSD model, *understanding key issues behind persuasive systems*, Oinas-Kukkonen and Harjumaa (2009) define seven postulates for persuasion that are common for all behavior change support systems, shown in the table below (Table 2).

**Table 2. Postulates behind persuasive systems (Oinas-Kukkonen and Harjumaa 2009).**

<table>
<thead>
<tr>
<th>Postulate</th>
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<tbody>
<tr>
<td>1. Information technology is never neutral.</td>
</tr>
<tr>
<td>2. People like their views about the world to be organized and consistent.</td>
</tr>
<tr>
<td>3. Direct and indirect routes are key persuasion strategies.</td>
</tr>
<tr>
<td>4. Persuasion is often incremental.</td>
</tr>
<tr>
<td>5. Persuasion through persuasive systems should always be open.</td>
</tr>
<tr>
<td>6. Persuasive systems should aim at unobtrusiveness.</td>
</tr>
<tr>
<td>7. Persuasive systems should aim at being both useful and easy to use.</td>
</tr>
</tbody>
</table>

These postulates contribute to the game development phase as a checklist for persuasive features, but are not included in the actual set of guidelines. According to Oinas-Kukkonen and Harjumaa (2009), the seven postulates should be understood in full before proceeding to the second phase of the PSD model, analyzing the persuasion context.

The second phase of the PSD model, *analyzing the persuasion context*, is divided into three steps: the intent, the event and the strategy. First off is **The Intent**. The O/C matrix is implemented in this phase in order to analyze the intended outcome/change of the system (Oinas-Kukkonen and Harjumaa 2009). According to Langrial, Stibe and Oinas-Kukkonen (2013), analyzing is crucially important and the O/C matrix should be vigilantly employed in both designing and evaluating a BCSS.

The second step in the model after analyzing the intent is **The Event**. The event refers to the use and user context. Whether it is quitting substance use or adopting a greener lifestyle, use and user context should be taken into consideration when designing the persuasive software. According to Oinas-Kukkonen and Harjumaa (2009), one of the most essential things to analyze is understanding the user's goals, past performances and the current progress towards achieving them.

In the third and final step of the second phase, **The Strategy**, it is crucially important to implement a correct strategy for persuasion, particularly when choosing a direct or indirect route for persuasion (Oinas-Kukkonen and Harjumaa 2009). According to Oinas-Kukkonen and Harjumaa (2009) a direct route for persuasion has turned out to be
the more enduring of the two, especially when the user is already motivated. However, direct and indirect routes of persuasion can act simultaneously and both strategies may be supported through numerous software features. (Oinas-Kukkonen and Harjumaa 2009)

After the three phases of the second part comes the final and perhaps the most crucial part of the PSD model, *Design of system qualities*, which is discussed next.

The final phase in the PSD model consists of four categories: **Primary task support**, **Dialogue support**, **Perceived system credibility** and **Social influence**, which illustrate the functional and nonfunctional requirements of a BCSS (Oinas-Kukkonen and Harjumaa, 2009). Each part of the final phase, the design of system qualities, contains seven guidelines that aim to improve the persuasive potential of a system.

Ten of the total number of 28 guidelines stand out as highly relevant for this study: they are selected as the most promising guideline candidates for use in developing a game designed to improve reading motivation. **Tailoring** enhances the persuasive qualities of a system by providing tailored information to the potential needs, interests, personality, usage context and other factors relevant to a user group. **Personalization** means the system offers personalized content or services to the user, which improves its persuasive powers. **Praise** can make the user more open to persuasion by providing praise via words, images, symbols or sounds. **Similarity** suggests that users are more easily persuaded if the system reminds them of themselves in some meaningful way. **Rewards** are used to reward the target behavior. **Social support** can be used to improve the motivation to perform the target behavior by enabling the users to compare their performance with the performance of others. **Suggestion** improves the persuasive capabilities of a system by providing direct or indirect suggestions toward the target behavior. **Liking** means a system with an appealing look and feel is more likely to be more persuasive. By offering public recognition for the user, a system can increase the likelihood that the user will adopt a target behavior. **Credibility** means that a system with truthful, trustworthy, unbiased and fair qualities will be more persuasive.

These guidelines are gathered to a set of persuasive guidelines for game development at the end of this chapter, together with example requirements and example implementations for the game Hockey Zombies - Escape from the Arena. The full list of the total number of 28 guidelines can be found in Appendix 4. The guidelines themselves provide answers to the research question of this study: "what kind of features should a game for improving reading motivation include?", together with the process-oriented guideline the PSD model offers. However, it is worthwhile to see what the preceding field of persuasive technology (Fogg, 2002) has to offer in addition to these guidelines.

### 2.2 Persuasive technology

Persuasive technology is a field of research originally started by Fogg (2002) which predates Oinas-Kukkonen's behavior change support systems. While BCSS and persuasive technology share many overlapping characteristics, Fogg (2002) has laid many ground rules for persuasion, some of these also incorporated in the Lucero et al. (2006) study. Therefore it is relevant to discuss these ground rules in this study. According to Fogg (1999, 2002), the focus of persuasive technology is on planned attitude or behavior change resulting exclusively from human-computer interaction (HCI), which he divides into three roles via the functional triad (Figure 5).
Figure 5: Persuasive computing technologies and their functional roles (Fogg, 2002).

The Functional Triad can be interpreted as a classification of three "basic ways that people view or respond to computing technologies". Computers as tools increase capability by making the target behavior easier to perform, guiding people through a process or providing calculations, data and measurements that motivate. Computers as social actors create relationship by rewarding with positive feedback, modeling a target behavior or attitude or by providing social support. Finally, computers as a medium provide experience by allowing people to explore cause-and-effect relationships, providing people with vicarious experiences that motivate or by helping to rehearse a behavior. Persuasion can be triggered through these three channels, discussed next, starting with computers as tools. (Fogg, 2002)

According to Fogg's (2002) research, computing technologies as tools can increase user's ability to perform a target behavior. Fogg (2002) identifies seven types of persuasive technology tools: reduction, tunneling, tailoring, suggestion, self-monitoring, surveillance and conditioning. These guidelines are highly significant for the theoretical background of this thesis as they provide answers to the research question: "what kind of features should a game for improving reading motivation include?" and direct tools for the game development phase. The seven types of persuasive technology tools are listed, defined and exemplified in a simple manner by Ian Bogost (2007) Table 3.
Table 3: Seven types of persuasive technology tools (Bogost 2007).

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>Reduction</td>
<td>&quot;Using computing technology to reduce complex behavior to simple tasks&quot;, exemplified by the capitoladvantage.com website, which simplifies political participation by presenting a user with contact information for all of his elected officials based on zip code input.</td>
</tr>
<tr>
<td>Tunneling</td>
<td>&quot;Leading users through a predetermined set of actions, step by step&quot;, illustrated by the registration of electronic payment systems on many websites</td>
</tr>
<tr>
<td>Tailoring</td>
<td>&quot;Providing information relevant to individuals to change their attitudes or behaviors or both&quot;, as by scorecard.org, which provides information about polluting institutions local to a user based, again, on zip code input.</td>
</tr>
<tr>
<td>Suggestion</td>
<td>&quot;An interactive computing product that suggests a behavior at the most opportune moment&quot;, such as a roadside speed-monitoring radar systems, which display a driver's speed as he passes.</td>
</tr>
<tr>
<td>Self-monitoring</td>
<td>&quot;A type of tool that allows people to monitor their attitudes or behaviors to achieve a predetermined goal or outcome&quot;, for example, digital heart-rate monitors.</td>
</tr>
<tr>
<td>Surveillance</td>
<td>&quot;Computing technology that allows one party to monitor the behavior of another to modify behavior in a specific way&quot;, such as Hygiene Guard, a system that monitors hand washing in the retail service industry.</td>
</tr>
<tr>
<td>Conditioning</td>
<td>&quot;A computerized system that uses principles of operant conditioning to change behaviors&quot;, such as Telecycle, an exercise bike which, when pedaled to a target speed, clarifies the image on a television screen in front of the cycle.</td>
</tr>
</tbody>
</table>

To continue with the second category in the functional triad, computing technologies can play a role as a social actor. According to Fogg (2002), people often respond to interactive technologies as though they were dealing with a living being and the feedback can make the user feel motivated and praised. When functioning as sensory media, computing technology can persuade people by providing compelling experiences, particularly when dealing with simulations and interactivity. (Fogg, 2002)

While computers can persuade as social actors, tools and medium, Fogg & Tseng (1999, 2002) remind that in order to be truly persuasive computers need credibility. Lucero et al. (2006) highlighted the importance of credibility, so it is relevant to consider credibility as an important guideline also for this study. Fogg & Tseng (1999) define credibility as believability. These can be divided into trustworthiness and expertise, which are perceived qualities (Figure 6). Computer credibility has effect on persuasion especially when the system acts as a knowledge source, instructs or tutors users, acts as decision aids, reports measurements, runs simulations or renders virtual environments. (Fogg, 2002)

Figure 6: Computer credibility (Fogg 2002)

The 8-step design process (Figure 7) is a process framework for developing persuasive systems, similar to the PSD model. In fact, the 8-step design process can be interpreted as an alternative process guideline for the PSD model as it provides a practical set of
rules for developing a persuasive system. The process holds within a total of eight steps designed to produce persuasion in the final product: choosing a simple behavior to target, choosing a receptive audience, finding what is preventing the target behavior, choosing an appropriate technology channel, finding relevant examples of persuasive technology, imitating successful samples, testing and iterating quickly, and expanding on success.

![Diagram of the eight-step design process for persuasive systems design (Fogg 2009).](image)

**Figure 7:** Eight-step design process for persuasive systems design (Fogg 2009).

In the case of creating a reading motivation improving game, utilizing the first step of Fogg's (2009) process, *choosing a simple behavior to target*, the target behavior would obviously be improving reading motivation. Fogg (2009) recommends reducing large, vague goals into simpler and measurable parts, such as the reducing overall goal of diminishing a health care company's employee stress levels into having them stretch for 20 minutes a day. Such an approach could be taken into consideration also in the process of creating a reading motivation improving software.

The second and third step in Fogg's (2009) design process are *choosing a receptive audience* and *finding what prevents the target behavior*. In the case of creating a game for improving reading motivation the second step is also locked in. As for the third step, it is important to find out what could be the reason in student's lack of motivation to read. Lucero et al. (2006) state that in the current electronic-visual era children are much keener on browsing the internet, playing computer games and watching television and consuming other already-processed information rather than reading a book. This would require more research and according to Fogg (2009), pinpointing the causes of people not performing the target behavior is crucially important.

In step four of Fogg's (2009) design process, *choosing a familiar technology channel*, the obvious and already decided channel for persuasion is creating a game. According to Fogg (2009) the channel should be familiar to the target user group as it almost never works for the user group to simultaneously learn a new channel and adopt a new behavior.
In step five, finding relevant examples of persuasive technology, Fogg (2009) proposes to search at least nine parallel examples in total: three that achieve a similar behavior, three that reach a similar audience, and three that use the same technology channel as the design team's. In the literature search of this thesis only one example (Lucero et al. 2006) strives to improve reading motivation. One could stretch the search to include other types of motivation-increasing persuasive software, as they are plentiful. As for the other six examples, ones that target the same user group and use the same technology channel, finding relevant reference should prove to be less exhaustive but still requires insight, as Fogg (2009) has found out: "When a design team examines a successful example, the team must be able to identify the “secret sauce” – the special ingredient that makes the example effective".

The next step in Fogg's (2009) persuasive design process is imitating successful examples found in step five. According to Fogg (2009), rather than starting from scratch, a more reliable method is to imitate what's already working (on Facebook, Amazon, video games, etc.) and adapt those successful approaches to the target audience and behavior. According to Fogg (2009), the design team should not be afraid to mimic something that's already working: in later steps there are opportunities to innovate and be unique in many ways.

In step 7: test and iterate quickly Fogg (2009) underlines the importance of testing the software rapidly and repeatedly, with variations created in step six. A series of rapid tests, ideally by measuring target behavior, will teach more than a single large test. According to Fogg (2009), the design team may go back and forth with steps five and six at this point in the process with the goal of running quick tests and to continue learning. Once success has been found on a small scale, the design team can move on to step 8: expanding on success. In the final step of Fogg's (2009) design process the team should vary only a few attributes from step 7, proceeding systematically with building on what's working. (Fogg 2009)

The 8-step design process for persuasive technology provides answers to the research question of this study, "what kind of features should a game for improving reading motivation include?" with a process-oriented take. It identifies the essential development steps in making a game designed for improving reading motivation, whereas the PSD model is more generic. The 8-step design process, along with the other guidelines in Fogg's (2002) research, act as a framework for the game design guidelines and will be readdressed at the end of this chapter.

2.3 Serious games

A game for improving reading motivation could also be considered as a serious game. Serious games are defined in the Wikipedia (http://www.wikipedia.org/) as games designed for a primary purpose other than pure entertainment. According to Djaouti, Alvarez, Jessel and Rampnoux (2011), the concept of serious games was first introduced by Abt (1987) in his book "Serious Games", where he introduces the concept of games that have other purposes than entertainment. Sawyer and Rejeski (2002) define serious games as the hybrid child of non-entertaining, serious purpose of learning and the technologies of computer and video game industry. Susi, Johannesson & Backlund (2007) follow suit in their report on the Serious Games Initiative (seriousgames.org):

“The Serious Games Initiative is focused on uses for games in exploring management and leadership challenges facing the public sector. Part of its overall charter is to help forge productive links between the electronic game industry and
projects involving the use of games in education, training, health, and public policy.” (Susi et al. 2007)

According to Michael & Chen (2005) serious games are games with education and "its various forms" as its primary goal. Furthermore, serious games can extend the ways and procedures of traditional learning by combining video games with education.

Serious games is a broad concept with multiple overlapping fields, such as e-learning (Haythornthwaite and Andrews 2007), game-based learning (Breuer and Bente 2010), edutainment (Breuer and Bente 2010), and digital game-based learning (Prensky 2007). Although related to persuasion, the game applications from these fields have their focus on learning and not so much on motivation and behavioral change. However, Yusoff, Crowder and Gilbert (2009) have designed a conceptual framework for serious games that provides guidelines also compatible with designing a game for improving reading motivation: capability, instructional content, intended learning outcomes, serious game attributes, learning activity, reflection, games genre, game mechanics and game achievements. These are listed and exemplified in the table below (Table 4).

**Table 4: Conceptual framework components for serious games (Yusoff et al. 2009).**

<table>
<thead>
<tr>
<th>Capability</th>
<th>Capability refers to the cognitive, psychomotor, and possibly affective skills which the learner is to develop as a result of playing the game.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instructional content</td>
<td>The instructional content is the subject matter that it is intended that the learner should learn. The detail of the actual subject matter to learn, or the type of content that the learner learns, could be an exhaustive list.</td>
</tr>
<tr>
<td>Intended learning outcomes</td>
<td>Learning outcomes are the goals to be achieved from playing the serious game. An intended learning outcome is a particular combination of capability and subject matter. For example, the learner should be able to recall the date of the battle of Hastings or should be able to analyze whether a particular bird is a raptor.</td>
</tr>
<tr>
<td>Serious game attributes</td>
<td>Game attributes are those aspects of a game which support learning and engagement and were identified from a literature review of behaviorist, cognitive, constructivist, educationist, and neuroscience perspectives.</td>
</tr>
<tr>
<td>Learning activity</td>
<td>Learning activity is the activity designed to keep the learner engaged and learning in the game world. The deep involvement or immersion by the learner depends on the effective design of these activities.</td>
</tr>
<tr>
<td>Reflection</td>
<td>Reflection is where the learner thinks about the purpose of the learning activities that have been undertaken, and decides the strategy to apply during the next activity. Reflection should take place within the game without letting the learner step out of the game world, and this can be done by offering reflection activities within the game. Garris et al. (2002) have stated that the reflection activity can be included within the game by providing a description, an explanation of why this activity is chosen, a discussion of the errors made by the learner, and some corrective suggestions.</td>
</tr>
<tr>
<td>Game genre</td>
<td>Game genre is the type or category of the game played. Genres range from “beat-em-ups”, through open-world sandboxes, to strategy games, and simulation. More recently game designers have developed serious games adopted for learning purposes according to games genres.</td>
</tr>
<tr>
<td>Game mechanics</td>
<td>Game mechanics and game rules define the details of the game. If the game genre is a Real Time Strategy (RTS), for example, then it may require game mechanics of resource management and territory control. The desired learning activities and required instructional content influence the selected game mechanics in order to design a better game that will suit a particular style of learning, a particular target learner, or a particular set of intended outcomes.</td>
</tr>
<tr>
<td>Game achievement</td>
<td>Game achievement is the level of learner achievement in playing these games. This achievement can be indicated by the game scores, total amount of resources or assets collected within the game, or time taken to achieve game goals. In addition, it gives the pleasure of reward to the learner, and also serves a purpose of learner assessment. The learning activities can be modified based on the student’s achievements and progress in the game.</td>
</tr>
</tbody>
</table>

These guidelines are readdressed at the end of this chapter, although concepts such as game genre, game mechanics, reflection and capability function in the background as a foundation for the actual persuasive guidelines.
2.5 Persuasion strategy for Hockey Zombies - Escape from the Arena

This subchapter describes the persuasive strategy to be used in the game development phase of Hockey Zombies - Escape from the Arena. First, ice hockey was selected as the persuasive genre for the game to target the specific user group of young ice hockey players, targeting similarity, credibility and liking. The persuasive elements contain the process guidelines and the persuasive game development (PGD) guidelines. These are backed up by considering two behavior change related theories behind BCSS (Figure 8).

![Figure 8: Persuasion strategy for the game development phase.](image)

There are two sides to the persuasive elements. The first part is process guidelines, containing the PSD model from behavior change support systems and the 8-step design process from persuasive technology (Figure 9).

![Figure 9: The process guidelines for the game development phase.](image)

The game development team decides what parts of the frameworks and how they will be used as process guidelines in the development phase. The practical results of the game development process can be found in chapter four.

The second part of persuasive elements is the actual PGD guidelines, which can be used as requirements specifications in the game development phase. The list of ten guidelines follows the footsteps of Lucero et al. (2006) by including guidelines from the works of
Fogg (2002), Oinas-Kukkonen (2009) and Yusuf et al. (2009). They are chosen as the most likely candidates to work with the target behavior of improving reading motivation: tailoring, personalization, praise, similarity, rewards, social support, suggestion, liking, recognition and credibility. They are listed in the table below with example requirements and example implementations on the right (Table 5).

Table 5: Persuasive guidelines for the game.

<table>
<thead>
<tr>
<th>Guideline</th>
<th>Example requirement</th>
<th>Example implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Tailoring</td>
<td>Information provided by the system will be more persuasive if it is tailored to the potential needs, interests, personality, usage context, or other factors relevant to a user group. (Fogg, 2002)</td>
<td>System should provide tailored information for its user groups. System is designed for the user group of ice hockey juniors by including ice hockey related concepts, narrative and context.</td>
</tr>
<tr>
<td>2. Personalization</td>
<td>A system that offers personalized content or services has a greater capability for persuasion (Oinas-Kukkonen, 2009)</td>
<td>System should offer personalized content and services for its users. User can choose a personalized #jersey number, team and name for the character in the game.</td>
</tr>
<tr>
<td>3. Praise</td>
<td>By offering praise, a system can make users more open to persuasion. (Oinas-Kukkonen, 2009)</td>
<td>System should use praise via words, images, symbols, or sounds as a way to provide user feedback information based on his/her behaviors. Praise and applause in the form of ice hockey related imagery, symbols and sounds.</td>
</tr>
<tr>
<td>4. Similarity</td>
<td>People are more readily persuaded through systems that remind them of themselves in some meaningful way. (Oinas-Kukkonen, 2009)</td>
<td>System should imitate its users in some specific way. Ice hockey related terms, slang and concepts are used throughout the gameplay.</td>
</tr>
<tr>
<td>5. Rewards</td>
<td>Systems that reward target behaviors may have great persuasive powers. (Oinas-Kukkonen, 2009, Yusuf et al. 2009)</td>
<td>Encourage learner and keep motivated. Negative reward as punishment within the game may also contribute to learning. Game achievements, encouragement or additional scoring for solving puzzles/completing tasks.</td>
</tr>
<tr>
<td>6. Social support</td>
<td>System users will have greater motivation to perform the target behavior if they compare and share their performance with the performance of others. (Oinas-Kukkonen, 2009)</td>
<td>System should provide means for comparing performance with the performance of other users. Liking, sharing &amp; other social media integration.</td>
</tr>
<tr>
<td>7. Suggestion</td>
<td>Systems offering fitting suggestions will have greater persuasive powers. (Fogg, 2002)</td>
<td>System should suggest that users carry out behaviors during the system use process. Suggestion towards reading an important text excerpt leading towards a solution to a puzzle. Suggestive encouragement towards reading in general.</td>
</tr>
<tr>
<td>8. Liking</td>
<td>A system that is visually attractive for its users is likely to be more persuasive. (Oinas-Kukkonen, 2009)</td>
<td>System should have a look and feel that appeals to its users. Ice hockey themed visual look.</td>
</tr>
<tr>
<td>9. Recognition</td>
<td>By offering public recognition for an individual or group, a system can increase the likelihood that a person/group will adopt a target behavior. (Oinas-Kukkonen, 2009)</td>
<td>System should provide public recognition for users who perform their target behavior. The most elite ice hockey players (examples), read books, therefore the user should read books as well.</td>
</tr>
<tr>
<td>10. Credibility</td>
<td>A system that is viewed as trustworthy has increased powers of persuasion. (Fogg, 2002, Oinas-Kukkonen, 2009)</td>
<td>System should provide information that is truthful, fair and unbiased. Credible information within the game about ice hockey, including the story, narrative and factual information.</td>
</tr>
</tbody>
</table>
Finally, two selected background theories behind BCSS are taken into consideration in the game development phase: the self-efficacy theory and the social cognitive theory. The background theories were chosen following the strategy of Lucero et al. (2006) and their use of Gardner’s MI theory and provide a background agenda for the game development phase (Table 6).

**Table 6:** Background theories for the game development phase.

<table>
<thead>
<tr>
<th>Theory</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-efficacy theory</td>
<td>Individuals who perceive themselves as capable of taking action also do take action; strengthening the sense of efficacy happens through vicarious experiences, social models, social persuasion, and reducing people’s stress reactions and altering their negative emotional propensities and misinterpretations of their physical states</td>
</tr>
<tr>
<td>Social cognitive theory</td>
<td>Observing others performing a behavior influences the perceptions of individual’s own ability to perform the behavior, i.e., self-efficacy, and the perceived expected outcomes</td>
</tr>
</tbody>
</table>

The actual implementations of the entire persuasion strategy is discussed in chapter four, after first taking a look at the research method of this study in chapter three.
3. Research method

This chapter describes the Design Science Research methodology (DSR) that was used for this thesis and referenced in the development phase of the software artifact. The development of the software artifact itself is described in chapter four. In subchapter 3.1 the utilization of DSR is described, regarding this thesis and the game development process. Subchapter 3.2 describes the time line of the game development, along with the interviews and questionnaires that were conducted. The interviews, questionnaires and data analysis methods are described in more detail in subchapter 3.3.

3.1 DSR in information systems research

According to Hevner et al. (2004) there are two paradigms that characterize much of the research in Information Systems discipline: behavioral science and design science. Of these two the design-science paradigm aims to create new and innovative artifacts in order to extend the human and organizational boundaries. According to Hevner et al. (2004) both of these paradigms are inseparable and complementary to each other and should be used accordingly in IS research.

In design science, IT artifacts are created and evaluated to solve organizational problems. Such artifacts are represented, according to Hevner et al. (2004), "in a structured form that may vary from software, formal logic, and rigorous mathematics to informal natural language descriptions". The artifacts can also include social innovations, new properties of technical, social, and/or informational resources, or any designed object with an embedded solution to an understood research problem (Peffers et al. 2006, 2008). In the scope of this thesis, the organizational problem is whether reading motivation can be increased through gaming and what kind of features should such a game include to reach its goal. The organizational problem is solved by starting a game development project, creating the game (with persuasive features leading to the improvement of reading motivation) and in the end evaluating it.

Hevner et al. (2004) portray the relations between environment, IS research and knowledge base in their framework for IS research (Figure 10). The environment describes the problem space with the phenomena of interest, which in the case of this particular study is reading motivation in the target group and whether it can be improved by playing a game. The knowledge base contains the theories, foundations and methodologies, through which IS research is accomplished, which was explained in the previous chapter. The persuasive guidelines and persuasive process guidelines are a concrete example of the knowledge base. Research rigor is accomplished by applying these existing foundations and methodologies appropriately and relevance is manifested when the business needs (research questions) are answered through research. Design science research addresses the building and evaluation of artifacts using an iterative approach, making continuous additions to the knowledge base and simultaneously providing applications to the business needs of the environment. (Hevner et al. 2004)
Figure 10: Information Systems Research Framework (Hevner et al. 2004)

In relation to the Information Systems Research Framework Hevner et al. (2004) have designed seven guidelines for successful design science in IS research. These are addressed in order below, together with explanations on how these guidelines have been followed through this study.

1. **Design as an artifact:** Design science research should produce a viable artifact, be it a construct, a model, a method or an instantiation. The construct is in this particular case is the game being developed.

2. **Problem relevance:** The objective of design-science research is to develop technology-based solutions to important and relevant business problems. The problem the game is trying to solve is whether reading motivation can be improved through gaming in general and what kind of features are useful in this endeavor. This is relevant concerning the decline of reading skills and reading enthusiasm reported in the PISA 2009 study.

3. **Design evaluation:** The utility, quality, and efficacy of a design artifact must be rigorously demonstrated via well-executed evaluation methods. The utility, quality and efficacy are demonstrated in a rigorous manner via carefully planned preliminary interviews, questionnaires and evaluations conducted with the target audience.

4. **Research contributions:** Effective design-science research must provide clear and verifiable contributions in the areas of the design artifact, design foundations, and/or design methodologies. The contribution of the game being developed is that it is among the first of its kind in the field of games designed for improving reading motivation, with future research on it taken into account. Also, the persuasion strategy developed for this study is valuable for future studies.

5. **Research rigor:** Design-science research relies upon the application of rigorous methods in both the construction and evaluation of the design artifact. The game development project has utilized the cutting-edge frameworks for persuasive design and a careful analysis in the field has been conducted prior to the start of the project, providing guidelines for the game development team. Evaluations are conducted rigorously enough for this study, using video and audio recordings for semi-structured
interviews, data analysis methods and game testing sessions and an affect grid to evaluate and measure game user experience. The data analysis methods are described later in this chapter.

6. Design as a search process: The search for an effective artifact requires utilizing available means to reach desired ends while satisfying laws in the problem environment. The design of the game is by default a search process as there are virtually no games in existence trying to improve reading motivation through persuasion. However, some limitations apply due to the case-nature of the design. The target group is very limited (school children with an ice hockey background) and the evaluations had to be conducted during school days. The target group was included in the game idea development process by having them choose from three possible game genres to continue development with. This is described in detail in chapter 3.2

7. Communication of research: Design-science research must be presented effectively both to technology-oriented as well as management-oriented audiences. This thesis is trying to communicate the results of this study for both of these audiences by explaining in detail the development process of the game for technology-oriented audiences and then analyzing the results in layman terms for the management-oriented.

The most important of these seven guidelines, according to Peffers et al. (2008), is that the research must produce an "artifact created to address a problem" that should be relevant to the solution of an unsolved and important business problem.

3.2 Timeline of events

The timeline of events for this game development project starts in the beginning of summer 2013 (Figure 11). There were already a few preliminary discussions between the Pucks and Books project and members of the Department of Information Processing Science (TOL), but it was still uncertain if this thesis would include designing a fully functional game product. However, in August 2013, using the Project II course for game development purposes became an option and the first ideas for the game were put on paper. The Project II is a course for master's level students at TOL which includes participating in an IT project unique to each course.

Figure 11: Timeline of the game development project.

From the start, the purpose of the game remained the same: to improve reading motivation with persuasive software (game). The target audience and test group for the game was school children who play ice hockey (ages 15-16). The target group was dictated by the Pucks and Books project, which had been doing previously some reading motivation research with the same target group.

The Project II course started in September 14th with a kick-off meeting with participants from TOL and the Pucks and books project. The scope and objectives for
the project (developing a game) were laid out for group of five students (including myself) taking part in the project which started its game design and development work the next day.

I provided the first drafts of the game design ideas which were then elaborated by the project team and later approved by the Project II steering group (September 20th). These ideas were presented straight to the target audience at test session 1 (Table 7). Two schools were selected to participate in this study, the schools of Karjasilta and Pateniemi. The reason behind choosing these two schools is that the school of Karjasilta is a sports oriented school with several ice hockey playing children, while the school of Pateniemi was already collaborating with the Reading Enthusiasm program and also had some ice hockey playing children willing to participate in this study.

The first test session consisted of group interviews and questionnaires at the school of Karjasilta, September 30th, to get an idea on which one of the game concepts would be the best candidate for future development. The questionnaires were thought to be a convenient and fast method of gathering data for the purposes of selecting a game for development.

**Table 7: Test sessions for game development and evaluation.**

<table>
<thead>
<tr>
<th>Session</th>
<th>Date</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test session 1</td>
<td>30th September 2013, Karjasilta</td>
<td>Game concepts, questionnaires</td>
</tr>
<tr>
<td>Test session 2</td>
<td>16th December 2013, Karjasilta</td>
<td>Game test sessions, interviews, adjective cards, affect grid</td>
</tr>
<tr>
<td>Test session 3</td>
<td>17th December 2013, Pateniemi</td>
<td>Game test sessions, interviews, adjective cards, affect grid</td>
</tr>
</tbody>
</table>

After the group interviews and questionnaires at session one, the game concept behind Hockey Zombies - Escape from the Arena became a clear winner with the most votes on willingness to play the game and the highest points in total (3.57, on a scale from 1 to 5, while the two other genres scored 3.0 and 2.61).

The hard work of the game development phase started in October 2013, after the idea for the game was locked in. The game development phase along with the game features are described in detail in chapter four. The game development phase was moderated according to the Project II course practice. Three steering group meetings were held: one in the beginning of the project (8th October), one in the middle (13th November) and the final steering group meeting (13th Jan 2014), which accepted and ended the project.

The game development phase continued until the middle of December 2013, when the evaluation test sessions and interviews with the finished game took place. The game test sessions with the target group (test sessions 2 & 3, 16th and 17th of December) were held with the same group that participated with the selection of the game genre. A total number of eight school children of the target age group participated in the evaluation game test sessions and interviews. The interviewing and evaluation methods are described in the next subchapter. The evaluation of the game itself is described in detail later, in chapter five.
3.3 Interviewing and evaluation methods

As mentioned in the time line above, a total of three sessions with the target audience were held in total. This subchapter describes the three interviews, evaluation methods and data analysis methods in detail.

**Test session 1.** The first session with the target audience was held in the beginning of the project to gather information on what kind of a game the children would like to play most, a question which nobody of the game development team could speculate accurately on their own. The session was held in an unofficial manner to make the situation feel more relaxed for the group of 23 children, of which one was not willing to participate. It is also to be noted that while target group was present, they were not isolated officially from the rest of the class, which was thought to make the situation feel more natural to the participants. The target group's comments and questionnaire answers were isolated from the rest of the answers afterwards. The first test session with its results leading to the actual game development is readdressed in chapter four.

The first test session was conducted in a semi structured manner, beginning with a short introduction of the project and a demonstration of all three different genre candidates for the game. The game concepts for this phase are described in chapter four. The target audience was encouraged to throw in comments and ideas anywhere between and during the demonstrations. The whole session was recorded (audio), which proved to be useful. The random comments thrown in by the audience were as useful in the end as the more formal questionnaires they filled in after the discussion. The questionnaire itself was designed after the guidelines by Sudman and Bradburn (1982) and contained both open questions and check box selections concerning reading and gaming habits, in addition to the evaluation (both open comment box and a scale from 1-5, with 1: not interested at all, 5: interested a lot) of the game genre ideas. The questionnaire form can be found in Appendix 3.

**Test sessions 2 & 3.** Sessions two and three, the evaluation and game testing sessions with the finished game, took place near the end of the project, in December. Both of these sessions were virtually identical although they took place in two different schools, Karjasilta and Pateniemi. The second session included children that took part in the first session and were already familiar with the concept while the third session had new participants from a different school. Four children from the target groups were selected for each of these sessions, which would begin with by playing the game one person at a time. The game sessions were recorded with two cameras: one for the game screen with hand movements over the device and one from a distance, showing the player's gestures and emotions. One person from the development team would also keep track of the game and manually transcribe every action of the player. The game transcripts were fulfilled later by watching the video recordings and the following data was recorded: game interactions of the player, subjective notes of what the player is doing, any significant gestures or body language, any comments or questions from the player and comments from the game test moderator.

**The adjective card test.** After the game session was over the participant was moved to another table, with 36 different adjectives written on cardboard pieces. The adjective card user experience test was modified from Sunnari, Arhippainen, Pakanen and Hickey (2012) to better measure the user experience of playing a game designed to increase reading motivation.

The data from the adjective cards was analyzed through counting the number of each adjective picked and tagging each of them with a sign indicating whether the adjective was picked in a positive or negative fashion regarding the game experience. The
comments made by the test user while picking the adjectives were recorded and analyzed through searching for anything related to reading, reading motivation or the persuasive attempts within the game. The adjective card test with its evaluative results is readdressed in chapter five.

The affect grid test. After the adjective card test, the participant was moved to another location for interviewing while the next one was beginning to play the game. First, the participant filled an affect grid (Colomo-Palacios, Casado-Lumbreras, Soto-Acosta and García-Crespo 2011), modified to suit game experience measurement, with one of the axes representing reading motivation or reading excitement and the other representing overall game excitement. The affect grid score was analyzed by comparing the rating and comments of each user and the total average score of the affect grid with the data gathered from the interviews to see whether they correlate or if there is any inconsistencies.

Interviewing. The interviews were semi-structured and unofficial except that the conversation was recorded and later transcribed. The interview transcripts were also used to gather interview data into a table, to be used as an asset in evaluation. The table can be found in chapter 4.3.2 (Table 9).

The interview data transcripts were analyzed by counting all of the positive and negative comments about reading, reading motivation, what he reads, whether the game genre is interesting, whether he would like to play a similar game, whether the interviewee liked or disliked the game, game character, game world or other essential aspects of the game regarding persuasion. The number of hidden books found in the game and how the test user found them was also analyzed. Some of the interview questions had to be asked directly, such as whether the game world or other features of the game seemed credible or believable. These were counted with subjective gestures and voice tonality taken into consideration.

The open-ended interview question list for sessions two and three, designed after Barriball, & While (1994) and Hirsjärvi and Hurme, 1988), can be found in Appendix 4. The interview transcriptions can be found in Appendix 5. The results of these last two evaluative sessions, along with the descriptions of the affect grid and the adjective card test, are discussed in detail in chapter five, Evaluation of the game.

Video recording. The game session data was analyzed using different methods for the game test session transcripts and the interview data. The game test sessions were transcribed manually on the spot and later fulfilled from video recordings into excel form, noting chronologically every game interaction, gestures and body language and the verbal comments made by the user or session moderator. Every action the player was making was then complemented with subjective notes with what the player was doing, for example reading or reading a text transcript for a long time. An example of the game transcripts is shown in the figure below (Figure 12).
Figure 12: Beginning of game transcript 1 from Karjasilta.

The game session transcript was utilized in the evaluation phase by comparing it to the test session video recordings, in order to find any relevant evaluative information that was not already transcribed. The transcript worked also as a powerful tool for analyzing game events and player actions, such as reading time, dragging and dropping, solving a problem, getting stuck or asking the moderator for clues. Also whether the test user was able to finish the game in time and the amount of clues communicated by the test session moderator was recorded.

All of the evaluative data results from sessions two and three are presented in chapter five. The next chapter readdresses the data from the first interview session in form of three different game concepts, of which one was chosen for the game development phase.
4. Construction of Hockey Zombies - Escape from the Arena

This chapter describes the development of the game *Hockey Zombies - Escape from the Arena* (Lätkäzombit - pako hallista). Subchapter 4.1 describes the project team and project phases. Subchapter 4.2 describes the game development process and the use of the process guidelines that were described in chapter two. The PGD guidelines and their implementation is described in the final subchapter 4.3, which also describes the game with its features.

4.1 Project team and Project phases

The project development team constituted of five members, each of them masters level students at TOL, University of Oulu: Toni Käkelä, Eino Keskitalo, Eetu Mansikkamäki, Topi Leinonen and Martti Similä. The game development team's roles in the project are presented in the table below (Table 8).

Table 8: Game development team roles.

<table>
<thead>
<tr>
<th>Name</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toni Käkelä</td>
<td>Game design, script, project manager</td>
</tr>
<tr>
<td>Eino Keskitalo</td>
<td>Game design, coding, music, sounds, art</td>
</tr>
<tr>
<td>Topi Leinonen</td>
<td>Lead coder, game design</td>
</tr>
<tr>
<td>Eetu Mansikkamäki</td>
<td>Lead coder, game design</td>
</tr>
<tr>
<td>Martti Similä</td>
<td>Game concepts, game design, lead artist, persuasion specialist, steering group member</td>
</tr>
</tbody>
</table>

The game development project had six main phases: starting of the project, concept, planning and implementation, research and ending. In the beginning of the concept phase the project team oriented themselves into game conceptualizing in the concept phase. Initially, we had three game ideas (from earlier research, done by me during summer 2013) worthy of future development and started to work on those. These game concepts were then presented to the Project II steering group and accepted.

The game concepts included three potential candidates for further development, each fitted into the ice hockey genre, drawn by Eino Keskitalo (Figure 13). The first concept was a quiz game that would incorporate reading and searching information to a basic quiz game. The second game concept was titled as a text-rich hockey point and click adventure game. Last was a social reader platform, which incorporates gamelike and social features into reading, such as commenting, liking, and competition.
After the first interview session for game concepts (which was described in chapter 3.3), the adventure game idea seemed to hold the most potential. Our (somewhat tacit) tagline became “text-rich games are comparable to literacy”, and we quite quickly came up with a limited set of game mechanics, that would allow us to present the player with puzzles to solve and amusing short prose to read. After Toni completed the base script, based on group brainstorming, the writing and finer structure of the game evolved during the project hand-in-hand with actual implementation.

The implementation started immediately after conceptualizing and planning, in October 2013. Generally the development followed the team's understanding of game development processes, and the planning done in September turned out to be adequate. The development team had only a few setbacks, mainly due to the lack of communication. The implementation of the persuasion strategy in the game features was not emphasized enough at the start of development but the team caught up fairly quickly and managed to make the deadline for the final product, at 16th of December (the first test sessions with the target group).

4.2 Process guidelines for the game

Two process frameworks from background literature were selected for use in the game development: The Persuasive Systems Design (PSD) model (Oinas-Kukkonen 2012) and the 8-step design process (Fogg 2009) for persuasive systems. Neither of these was selected to be followed to the letter, rather than to utilize their most suitable parts for the case at hand. This subchapter describes how these two processes were followed during the game development phase.

The 8-step design process for persuasive systems was more straightforward and easier to understand by the game development team than the PSD model. However, the PSD model had at least as much background influence as the other framework so it has to be included in this chapter. First, the 8-step process and how it was implemented will be addressed below.

The first two parts of the 8-step design process for persuasive systems (Fogg 2009) are choosing the target behavior and choosing the audience. These were selected in beforehand by the Pucks and Books project. The target behavior is to increase reading motivation of the user. This was divided into just "reading" and increasing the motivation to read during the first phases of the project, as the two often go hand in hand. The target audience was male students around the age of 16 that play ice hockey as a sport.
The third part of the 8-step design process for persuasive systems (Fogg 2009) is "What is preventing the target behavior?". This was addressed in the first phases of development by having a user questionnaire and a casual interview with the target group.

The fourth part of the process framework is choosing the technology channel. While the technology channel was preselected as a game implemented with HTML5 and Javascript optimized for iPad mini, the genre of the game was understood to be equally as important.

In the first interview session with the target audience, the point & click adventure game was the clear winner with an average of 3.57 total grade (on a scale from 1 to 5) over 3.0 for quiz game and 2.61 for social reader. Over 70% of the participants (N=22) were willing to try the point & click adventure game, followed by just over 42% for the quiz game and 33% for the social reader (Figure 14). The participants were also asked to indicate features for a good game and ironically reading took only a single vote. Competition (85%), problem solving (76%) and story (52%) were the most popular among the participants, which were afterwards noted to go along very well the point & click adventure genre.

![Figure 14: Game concept evaluation questionnaire results.](image)

The fifth and sixth parts of the 8-step process are relevant examples found and imitating successful examples. Finding relevant examples was proven difficult as only one example directly related to improving reading motivation was found, the Chilean Papelucho, a reading game for children (Lucero et al. 2006). Other examples were identified in the fields of BCSS, persuasive technology, and serious games. These examples provided enough information to design a set of persuasion guidelines for the development phase, which are described in chapter 4.3.

In addition to these, since the game was to be a point & click adventure, the game development team took notice of the successful adventure games of the golden age of computer games, such as The Secret of Monkey Island (1990). These games are rich
with dialogue and story, so it was natural to accommodate past adventure games as successful examples even though they are not strictly directed to improving reading motivation (although they very well might do so, nevertheless).

The last two parts of the 8-step design process (Fogg 2009) for persuasive systems are **test and iterate quickly** and **expand on success**. Mid-project tests and iterations are described in chapter 4.3 and the final evaluation is in chapter 5. The last two parts of the process framework are also considered to be continuing with the future research made on the software artifact.

The **PSD model** (Oinas-kukkonen 2009) was nearly discarded as a development framework in the beginning of the development process. However, when brought to larger-scale terms, the PSD model begins to resemble the 8-step model: it begins with understanding the key issues behind persuasive systems, then analyzing the persuasion in context and designing the system, leading to behavior/attitude change. When going in further, these three steps hold within a lot of common with the 8-step model and Fogg's (2002) persuasive technology in general.

**The intent** is a part of the PSD model that describes what kind of a change in behavior is targeted. In the case of trying to improve reading motivation the game development team found out that they are dealing with forming an attitude (we were assuming that motivation goes hand in hand with attitude) (F/A) or altering an attitude (A/A) and reinforcing it (R/A), or an A-change in general, the most difficult change of the three. This however reminded the development team that affecting the attitude towards reading might be equally as important, i.e. making the game fun in a credible way would help make affecting reading motivation of the user easier.

**The event** in the PSD model refers to the use and user context and the technology platform. This was partly synonymous to some parts of the 8-step process, but forced the development team to ponder questions such as how does the touch screen interface of the Ipad mini affect reading, gameplay, problem solving and so on and how does the average ice hockey playing child deal with these issues.

**The strategy**, the third category in the PSD model's second step, is about the proper route for persuasion. Usually this means choosing either the direct or the indirect route, or something in between (both of them can act simultaneously). The development team felt that both of these routes should be taken, however it should be avoided to exaggerate direct persuasion as the target group (or anyone) might not take it seriously.

The PSD model proved to be a solid tool for designing persuasive elements into a game, however the most of its contributions lie within the third step of the model, **design of system qualities**. Most of the persuasion guidelines which were gathered for the development of the game stem from either this step and/or Fogg's (2002) persuasive technology. These guidelines will be addressed in the next chapter.
4.3 The persuasive design guidelines of Hockey Zombies - Escape from the Arena

The persuasive design guidelines for persuasive game features, listed in chapter two, were gathered from related literature in order to make it easier for the game development team, as most of the team was not familiar with the subject of persuasive technology or behavior change support systems. The persuasion guidelines were meant to serve as thumb rules only and the plan was not to implement every single step in them. The implemented persuasive design guidelines are best described by first taking a look at the game itself. This subchapter describes the game in subchapter 4.3.1 and addresses the implemented persuasive design guidelines in subchapter 4.3.2.

4.3.1 Game description

As the title of the game, Ice Hockey Zombies - Escape from the Arena, suggests, the objective of the game is to escape from a barraged locker room located in the depths of an ice hockey arena. The game begins with a start screen which features the player running away from a group of seemingly malicious zombies (Figure 15). The game will start by pressing the start button on the right ("aloita" in Finnish).

![Game start screen](image)

**Figure 15:** Game start screen.

After starting the game the user will be prompted to choose a jersey number (Figure 16). This feature will affect the gameplay later on in the game by providing personalized content related to the chosen jersey number.
After choosing the jersey number the game will start with an opening intro, which shows the player approaching an ice hockey arena (the location of the game) infested with zombies and entering a locker room. The locker room itself is the first location in the actual gameplay (Figure 17). The bottom part of the screen shows an area for the inventory and the main character, who reacts to gameplay actions by gestures and commentation through a lot of text.

The game contains a total number of five rooms, all of which contain different items the player can pick up and use in order to solve puzzles. Eventually (the game takes usually
about 15-30 minutes to solve for the average user) the player manages escaping the locker room and avoiding being eaten by zombies. As the game strives to affect the player's motivation towards reading the game offers something to read whenever the player makes an action. Most of the clues for the puzzles are offered through reading and even when the clues are visual the main character usually makes a funny comment about it the player can read.

However, just having a lot of text to read doesn't make the game persuasive. In the next chapter the persuasion aspect of the game is addressed through the persuasive guidelines that were utilized in the game design and development phase.

4.3.2 Game features and the PGD guidelines

At the start of the development phase the team had a set of ten PGD guidelines to work with, listed in chapter 2.5, Table 5. These guidelines along with their implementation status are described in Table 9. Following afterwards, the guidelines are discussed in more detail with explanations for each implemented, partially implemented or not implemented guideline.
Table 9: Implemented persuasive guidelines for the game.

<table>
<thead>
<tr>
<th>Guideline</th>
<th>Example requirement</th>
<th>Implementation status</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Tailoring</strong></td>
<td>Information provided by the system will be more persuasive if it is tailored to the potential needs, interests, personality, usage context, or other factors relevant to a user group.</td>
<td>Implemented</td>
</tr>
<tr>
<td><strong>2. Personalization</strong></td>
<td>A system that offers personalized content or services has a greater capability for persuasion</td>
<td>Implemented</td>
</tr>
<tr>
<td><strong>3. Praise</strong></td>
<td>By offering praise, a system can make users more open to persuasion.</td>
<td>Implemented</td>
</tr>
<tr>
<td><strong>4. Similarity</strong></td>
<td>People are more readily persuaded through systems that remind them of themselves in some meaningful way.</td>
<td>Implemented</td>
</tr>
<tr>
<td><strong>5. Rewards</strong></td>
<td>Systems that reward target behaviors may have great persuasive powers.</td>
<td>Partially implemented</td>
</tr>
<tr>
<td><strong>6. Social support</strong></td>
<td>System users will have greater motivation to perform the target behavior if they compare and share their performance with the performance of others.</td>
<td>Not implemented</td>
</tr>
<tr>
<td><strong>7. Suggestion</strong></td>
<td>Systems offering fitting suggestions will have greater persuasive powers.</td>
<td>Implemented</td>
</tr>
<tr>
<td><strong>8. Liking</strong></td>
<td>A system that is visually attractive for its users is likely to be more persuasive.</td>
<td>Implemented</td>
</tr>
<tr>
<td><strong>9. Recognition</strong></td>
<td>By offering public recognition for an individual or group, a system can increase the likelihood that a person/group will adopt a target behavior.</td>
<td>Partially implemented, the idea of public recognition reversed</td>
</tr>
<tr>
<td><strong>10. Credibility</strong></td>
<td>A system that is viewed as trustworthy will have increased powers of persuasion.</td>
<td>Implemented</td>
</tr>
</tbody>
</table>

The first persuasive guideline, **tailoring**, was considered as one of the most important because the target user group of the game was so restricted. The importance of tailoring was also confirmed by the initial interviewing session with the target users. They tended to prefer ice hockey related themes and almost all of them mentioned the EA Sports NHL series games when asked about what kind of games they like to play.

Tailoring is presented throughout the game in many ways. First of all, the plot line, narrative and the game environment are highly ice hockey related. The addition of zombies into the mix was also a tailoring decision, based upon the assumption that the end users would consider it amusing. Most of the intercontextuality within the game is also tailored to fit the user group.
The second persuasive guideline, **personalization**, is presented in the game first by offering the player to choose a personalized jersey number (Figure 18). This affects gameplay so that the player can find a personalized jersey hanging on a wall and being able to read a personalized quote from Wikipedia depending on what jersey number they have chosen (jersey number selection shown in Figure 16). The plan was to also implement the option for naming the player and selecting a favorite team, which would have affected the narrative and gameplay but this was discarded due to the limited scope and timeline of the project.

**Figure 18:** The player finds a personalized jersey.

Third guideline, **praise**, is implemented throughout the game. Most often, the main character congratulates the player after solving a puzzle or entering a new room. The game contains three hidden books that lead to praise when found (Figure 19). These books are not necessary for completing the game, but they act as rewards, which is fifth persuasive guideline on the list. During the development phase, custom praising for finding the books after actually reading the clues and not just randomly clicking on the screen was designed, but because of the game engine limitations, it was not possible to track whether the clues were read before finding the books.

**Figure 19:** Hidden book textual clue leading to praise.
The fourth guideline on the list, similarity, has also great impact on the game. All of the narrative and storyline are written using ice hockey related terms and slang in order to make the game more persuasive to the end user group. The main character is also a rough caricature of the usual ice hockey playing junior with similar attitudes and opinions on things. The hidden books are also all somewhat ice hockey or zombie related, which hopefully increases the probability that the player would actually get interested in reading them.

The fifth guideline, Rewards, is a powerful tool for targeting a desired behavior, this being the improvement of reading motivation in this case. A lot was planned during the design and development phase: game achievements, rewarding and encouragement for solving puzzles or completing tasks, and additional scoring system which would reward the player if he/she got enough points when completing the game. However, most of these were discarded due to time limitations. The three hidden books serve as a reward when completing the game. The game displays a congratulatory message and a status of the amount of hidden books found (Figure 20). After the completion of the game, the player can still click on the rewarded books to see a short summary on what they contain.

The sixth guideline, social support, was discarded after the game genre was locked in. The game design is a single-player experience, which reasoned the development team not to add liking, tweeting or any other social media activity into the midst of the game. However, adding a sharing option after completing the game was considered, but it was left for future development.

The seventh guideline, suggestion, was implemented through the use of narrative. The main character, being already familiar to the player through similarity, suggests toward reading in general in both direct and indirect routes, which are key persuasion strategies. The main character also suggests the player towards reading some important text excerpts containing a clue to a puzzle. The development team thought it would be
appropriate to include also suggestion towards similar textually rich adventure games, but it was not implemented in the game.

**Liking**, the eight persuasive guideline, means that the look and feel of the game is appealing to the end users. This was implemented by having an ice hockey themed visual look. The game environment and the main character (a fictional member of the user group) are also designed to be appealing and likable.

The ninth guideline was only partially implemented. **Recognition** does not work literally with the single player experience type of game, so it was revised by the game development team by reversing the idea of public recognition. The game development team had the following logic: (some of) the most elite ice hockey players read books, therefore the user should read books as well. The game contains a couple of factual references to ice hockey players who like to read and one fictional reference to a player. It was noted by the development team that including more confirmed references to ice hockey players who read a lot would be beneficial.

The last guideline is one of the most important. **Credibility** was considered by the development team to be one of the top tier guidelines in order to achieve persuasion. Through painstaking research into the world of ice hockey the game development team managed to saturate the game with credible, trustworthy fact and fiction about ice hockey.

Nevertheless, whether credibility (or similarity, or each of these guidelines) is achieved, is up to the end user. The next chapter, Evaluation, will show how the game was perceived through two documented test sessions with the end users.
5. **Evaluation**

This chapter describes the evaluation phase that took place almost immediately after the game development phase. Some of the data from the first interviewing session was also used in the evaluation phase, but the rest was gathered in December 2013 during two subsequent days at two different schools, Karjasilta and Pateniemi. The evaluation sessions consisted of four main areas, which are described chronologically in this chapter: the game test sessions, which are described in subchapter 5.1, the adjective cards, used for recording the game user experience of the test group, in subchapter 5.2, the interviews in chapter 5.3 and the affect grid, which was used to analyze the user experience of playing and reading text in the game, in subchapter 5.4. Finally, subchapter 5.5 presents other results not fitting into previous categories, including some from the pre-development phase questionnaires.

### 5.1 Game test sessions

The test sessions two and three had eight participants, four at the school of Karjasilta and four at the school of Pateniemi. Each participant of the game test group would first play the game, then take the adjective card test and then move on to be interviewed and answering the affect grid test.

**Game difficulty.** All of the game test participants were able to finish the game in the time limit, which was set for 15 minutes due to the time schedule of the evaluation sessions. In the case of player getting stuck in the game, the moderator would give time for the player to solve the problem by themselves and eventually give some clues on how to advance. Four out of eight participants needed clues for solving the game puzzles in order to finish the game and three players needed some help using the game interface, such as dragging and dropping items on top of each other.

**Reading in the game.** The game transcripts and video recordings show that all of the players read most of the text in the game, although there is probably difference in the reading speed of each player. None of the players skipped any of the longer texts in the game, although some players did some skipping but returned afterwards to them to read them in full.

**Game playability.** Some of the elements in the game were used rarely, such as the DNA-analyzator, which is used to analyze game items and areas. Especially using the DNA-analyzator on top of inventory items seemed almost non-existent for some participants, who were also confused about dragging and dropping other inventory items on top of each other and in some point of the game needed help doing this.

** Gestures and body language.** The gestures of the participants were surprisingly non-informative regarding reading, aside from smiles and chuckles, when reading a joke made by the game character or in the narrative of the game. The game, with its lot of reading, was fun to the test participants. This is also confirmed by looking at the adjective card data, which is described in the next subchapter.
5.2 The adjective cards

After the initial game test session the participant was asked to choose words from an array of 36 adjectives in total, half of them positive and the other half negative. The adjective card user experience test was modified from Sunnari, Arhippainen, Pakanen and Hickey (2012) to better measure the user experience of playing a game designed to increase reading motivation. The adjective cards used for this test are shown in the figure below (Figure 21).

Figure 21: Adjective cards for evaluating the game user experience.

The participant was asked to choose five words describing the game. The negative words were arranged to the right and the positive ones to the left. The participant was also asked to give a short explanation for each word chosen, which was also video recorded and transcribed. The results from the adjective card test is shown in the table below (Table 10), with the notion of whether the adjective chosen was meant as positive or negative, expressed by the participant.
Table 10: The user experience results from the adjective cards.

<table>
<thead>
<tr>
<th>User</th>
<th>+/-</th>
<th>Adjective card</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participant 1</td>
<td>1 +</td>
<td>Engaging</td>
<td>I wish I could've played a little longer.</td>
</tr>
<tr>
<td>(Pateliemi)</td>
<td>2 -</td>
<td>Difficult to use</td>
<td>In the beginning it was difficult, couldn't move forward.</td>
</tr>
<tr>
<td></td>
<td>3 +</td>
<td>Interesting</td>
<td>It was interesting, wonder how the story would continue...</td>
</tr>
<tr>
<td></td>
<td>4 +</td>
<td>Novel</td>
<td>In a positive way different than other games.</td>
</tr>
<tr>
<td></td>
<td>5 +</td>
<td>Fun</td>
<td>It was a fun game, with the narrative and all, and the game jersey with the information splash, otherwise fun as well.</td>
</tr>
<tr>
<td>Participant 2</td>
<td>1 -</td>
<td>Complex</td>
<td>Had to try things many times.</td>
</tr>
<tr>
<td>(Pateliemi)</td>
<td>2 -</td>
<td>Unpredictable</td>
<td>Didn't really know what to do in the beginning.</td>
</tr>
<tr>
<td></td>
<td>3 +</td>
<td>Easy to use</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>4 +</td>
<td>Engaging</td>
<td>It was nice.</td>
</tr>
<tr>
<td></td>
<td>5 -</td>
<td>Difficult to use</td>
<td>Difficult to use, like there was no explanations on how to...</td>
</tr>
<tr>
<td>Participant 3</td>
<td>1 +</td>
<td>Entertaining</td>
<td>It was like so... entertaining.</td>
</tr>
<tr>
<td>(Pateliemi)</td>
<td>2 +</td>
<td>Unpredictable</td>
<td>Didn't know what happens next.</td>
</tr>
<tr>
<td></td>
<td>3 +</td>
<td>Easy to use</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>4 +</td>
<td>Engaging</td>
<td>It was nice.</td>
</tr>
<tr>
<td></td>
<td>5 +</td>
<td>Fun</td>
<td>-</td>
</tr>
<tr>
<td>Participant 4</td>
<td>1 +</td>
<td>Fun</td>
<td>I don't know. The music was fun.</td>
</tr>
<tr>
<td>(Pateliemi)</td>
<td>2 +</td>
<td>Easy to use</td>
<td>Easy to play, no difficult buttons.</td>
</tr>
<tr>
<td></td>
<td>3 +</td>
<td>Interesting</td>
<td>Had to get out of there, it was good</td>
</tr>
<tr>
<td></td>
<td>4 +</td>
<td>Entertaining</td>
<td>Could have played more.</td>
</tr>
<tr>
<td></td>
<td>5 +</td>
<td>Exciting</td>
<td>It was kind of exciting, good, nice, not boring.</td>
</tr>
<tr>
<td>Participant 5</td>
<td>1 +</td>
<td>Fun</td>
<td>Well, reading the text stuff was pretty funny.</td>
</tr>
<tr>
<td>(Karjasilti)</td>
<td>2 +</td>
<td>Visually pleasant</td>
<td>It was nice to play, the game was pretty good.</td>
</tr>
<tr>
<td></td>
<td>3 +</td>
<td>Easy to use</td>
<td>Easy to use, clear and easy.</td>
</tr>
<tr>
<td></td>
<td>4 +</td>
<td>Entertaining</td>
<td>Entertaining, it was nice to play and like entertaining.</td>
</tr>
<tr>
<td></td>
<td>5 -</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Participant 6</td>
<td>1 +</td>
<td>Interesting</td>
<td>It was like you didn't really know, something surprising would appear. Positively.</td>
</tr>
<tr>
<td>(Karjasilti)</td>
<td>2 -</td>
<td>Unclear</td>
<td>Sometimes it was unclear.</td>
</tr>
<tr>
<td></td>
<td>3 +</td>
<td>Exciting</td>
<td>Exciting, a good quality.</td>
</tr>
<tr>
<td></td>
<td>4 -</td>
<td>Unpredictable</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>5 +</td>
<td>Entertaining</td>
<td>-</td>
</tr>
<tr>
<td>Participant 7</td>
<td>1 -</td>
<td>Limiting</td>
<td>Like not too many options on what to do, it's not that kind of game that you get lots of options.</td>
</tr>
<tr>
<td>(Karjasilti)</td>
<td>2 +</td>
<td>Simple</td>
<td>Kind of simple, but I don't know, kind of challenging but simple, it depends. In a good way simple, not messed up.</td>
</tr>
<tr>
<td></td>
<td>3 +</td>
<td>Easy to use</td>
<td>When you're used to touch screens it's easy to use.</td>
</tr>
<tr>
<td></td>
<td>4 +</td>
<td>Engaging</td>
<td>When you find something you don't know what to do next and the game continues.</td>
</tr>
<tr>
<td></td>
<td>5 +</td>
<td>Useful</td>
<td>Just like you have to understand what you read, you learn from the text and you know what to do. You have to read carefully. Reading was helpful.</td>
</tr>
<tr>
<td>Participant 8</td>
<td>1 +</td>
<td>Simple</td>
<td>Like, you had only to click on things, in a good way, definitely not a bad thing</td>
</tr>
<tr>
<td>(Karjasilti)</td>
<td>2 +</td>
<td>Fun</td>
<td>A couple of good jokes</td>
</tr>
<tr>
<td></td>
<td>3 +</td>
<td>Understandable</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>4 -</td>
<td>Limiting</td>
<td>You couldn't do all the things you wanted to, couldn't go through every door and such.</td>
</tr>
<tr>
<td></td>
<td>5 +</td>
<td>Fast</td>
<td>It wasn't too long, not too bad for a small game, could've been longer though.</td>
</tr>
</tbody>
</table>
Out of 39 adjective cards chosen (one participant left one out), 31 were interpreted as positive and 8 negative, noted by plus and minus signs. In line with the video recording transcripts, the most used adjective is "fun" (five participants). One of the participants mentions the narrative in his explanation: "It was a fun game, with the narrative and all, and the game jersey with the information splash, otherwise fun as well" while two others mention the jokes and reading was funny. One of the participants thought the music in the game was funny.

Other popular positive adjectives were "engaging" (four participants), "entertaining" (three participants), "unpredictable" (three participants), "easy to use" (three participants) and "interesting" (three participants). "Difficult to use" was picked by two participants who had trouble with the game interface or difficulties getting out of the first room in the game. One participant also with difficulties getting out of the first room chose the word "unpredictable": "Didn't really know what to do in the beginning".

Three of the participants also mentioned in their comments that they could've played longer, which is confirmed also by others by going through the interview transcripts, which are presented in the next subchapter.

5.3 Interviews

The interviews were conducted in a semi structured way with a total of eight interviewees, four at each school. Seven of the interviewees were part of the target group of 15-16 year old ice hockey players while the remaining one was a football player of the same age. The focus of the interviews was designated to two adjacent categories: to explore user experience (Roto et al. 2011) and to try to find out whether the game (and the experience of it) generated any thoughts about reading or reading motivation in the participants. These results — along with the results from the adjective cards and game test sessions — are discussed again in the next chapter, regarding reading motivation. The interview transcripts can be found in Appendix 5.

The duration of the interviews was limited. Originally a total time of 20-25 minutes for each interview was reduced to 10-15 minutes as the interviews were conducted in a school environment. It is to be noted that the interviews were conducted in the Finnish language and afterwards translated to English, by trying to preserve the colloquial nature and the information of the interviews. Also, due to a technological fault and a corrupted file, one of the interviews was lost, reducing the total number of interviews analyzed in this thesis to seven.

The interviews were started with questions related to reading and what kind of games do they play, if any. The interviews show that all seven of them play NHL games and/or Fifa. None of them mention any games that have a lot of reading and none of them actively play adventure style games. However, one of the participants mentions playing them occasionally: "Yeah, maybe online something with reading and maybe adventure, but other than that, not so much".

The reading habits of the participants include online sports news, which all of the participants mentioned and online tabloids. Four of the participants mention magazines and two of them draw the line to sports magazines. Three mention that they don't read books at all, while two of the participants mention reading books for Finnish class in school.

Regarding the game test session there are 25 positive comments about reading in the game. One of the participants mentions the benefits of reading in the game: "Umm, I
dunno... other than that, like I thought that it pays off to read this and this carefully, like it helps to get forward in the game". Later he mentions with enthusiasm that he read all of the long texts in the game and continues: "Yeah... of course, if the texts are long and they have stuff you have to read carefully to really understand something. And just like the game was, you don't get forward if you don't read. That's important".

All of the participants say they read all of the longer texts in the game and that the amount of reading was not too much. One interviewee described the amount of reading as being "just the right amount" and when asked about whether he read all of it: "Yeah. And it wasn't too long to read". There is one comment about reading that can be interpreted as neutral, but not necessarily negative: when asked about the amount of reading in the game the interviewee describes it as "adequate", in a disinterested tone of voice.

When asked about the language and the wording in the game, two of the participants mentioned it was fun: "Umm. Like kind of funny. Jokes and stuff. Not too appropriate". Two also mentioned it was clear, one mentioned the language being easy to read and one said it was informative. When asked about familiarity, two of the participants mentioned the language in the game made the game feel more familiar to them. Others perceived familiarity in other areas of the game, such as the main character being an ice hockey player or the game world itself.

The game had a total of three hidden books, some of them visible to be found only by poking around and some hidden by leaving clues in the text. Four of the participants found these books by reading the clues in the text and three found the books by both poking the screen and reading the text, which was confirmed by both from the interviews and game transcripts.

As for reading motivation, the interviews have a total of seven positive comments about reading motivation and five negative ones. One of the interviewees felt motivated towards reading and answered readily: "Yeah, it did kind of motivate to read". However, on the contrary, one was adamant that games cannot motivate to read: "Well, not really" and continues when asked about whether anything could be done to make a game more motivating towards reading: "No, not really". Another interviewee had almost identical thoughts about motivation: "Umm, not really".

Some of the interviewees had interesting thoughts about reading motivation. One mentioned reading in the game as being useful for younger players: "Yeah, well if there's a lot of text then you get to practice reading at the same time, if you're somewhat younger". He mentions also that Finnish ice hockey books would be useful in the game for reading motivation:

"Well, of course... like you could use some Finnish ice hockey books in the game, then you could read them and try to find the book elsewhere".

Another interviewee mentions reading in the game could affect reading other texts, in a positive way:

"I guess it's a matter of getting used to something, like when you play a lot of games and you do a lot of reading in them and then it gets easier to read, and you have enough strength to read, also other texts".

Four out of seven interviewees thought that the game or some other game could increase motivation towards reading and could come up with good explanations and ideas. The other three didn't feel a game could motivate towards reading but could not explain their
thoughts further. On level with thoughts about reading motivation two out of seven interviewees expressed their interest towards text-rich adventure games, while the others were not so much interested.

However, six out of seven participants stated that they would like to play a similar game with a lot of reading and only one expressed disinterest towards playing this kind of games. One of the interviewees was so enthusiastic about the game that he wanted to play again using a different jersey number right after the interview, to see what kind of information splash about which NHL player would turn up:

"Yeah, I would like to try. ... I guess, if I put in my own number... so if it's from NHL, then I guess... what was it, Max Pachiotretty. (Seems eager to try out, takes the Ipad from the table)"

Three other participants also expressed their willingness to try the game out with a different number, as one of them puts it: "Yeah, it occurred to me that what if I had put in a different number, what would the info splash be like then".

The game character and the game world were thought to be good. When asked, all of the participants picked familiarity and believability over unfamiliarity and unbelievability, regarding the main character or the game world. Ice hockey theme was thought to be a positive thing by five of the participants. One participant was a football player, but he liked the ice hockey theme regardless of that. He mentioned that his friends that were not into ice hockey or sports at all wouldn't be interested in an ice hockey themed game: "Well, then it wouldn't be interesting (to them), not so much".

The data from the seven interviews analyzed in this thesis, consisting of reading motivation, game genre being interesting, willingness to play a similar game and the hidden books found in the game is described in the table below (Table 11).
### Table 11: Interview data from reading and game genre.

<table>
<thead>
<tr>
<th>Interviewee</th>
<th>Reads</th>
<th>Game motivates to read</th>
<th>Game genre is interesting</th>
<th>Would like to play a similar game</th>
<th>Hidden books found in the game</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (Pateniemi)</td>
<td>Online, sports news, no books</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>2, by reading the clues</td>
</tr>
<tr>
<td>2 (Pateniemi)</td>
<td>Online tabloids, magazines, no books</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>2, by reading the clues</td>
</tr>
<tr>
<td>3 (Pateniemi)</td>
<td>Online tabloids, magazines, no books</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>2, by reading the clues</td>
</tr>
<tr>
<td>4 (Karjasila)</td>
<td>Online tabloids, sports news, morning paper, sports magazines, books for school class</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>2, by reading the clues</td>
</tr>
<tr>
<td>5 (Karjasila)</td>
<td>Comics, online tabloids, books for school class</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>2: 1 by reading the clues and 1 poking around</td>
</tr>
<tr>
<td>6 (Karjasila)</td>
<td>Online news, sports magazines, no books</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>2: 1 by reading the clues and 1 poking around</td>
</tr>
<tr>
<td>7 (Karjasila)</td>
<td>Online news, sports magazines, no books</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>2: 1 by reading the clues and 1 poking around</td>
</tr>
</tbody>
</table>

The amount of hidden books found in the game was almost identical between all of the interviewees. The participants who claimed to have found the hidden books by reading the clues did indeed do so, based on the game session transcripts. Also, the interview data between the two groups of children, one of which already familiar to the game concepts, was not noticeably different. During the interviews the participants were also asked to rate the game based on smiley face cards, which is described in the affect grid in the next subchapter.

### 5.4 The affect grid

The affect grid (Colomo-Palacios, Casado-Lumbreras, Soto-Acosta, and García-Crespo, 2011) was used to measure the game user experience of the game. A scale of smiley cards was used to measure the emotions regarding game experience and reading in the game. The smiley faces from a sad smiley to a disinterested one to a happy one represent a scale from one to five, which are placed on two axes, shown in figure 22 (Figure 22).
The game experience, as it was explained to the participants, represents the game for its entertainment, enjoyment and other typical game characteristics. Reading in the game represents how enjoyable reading was in the game and also whether it could affect reading motivation in general.

The results, with a positive score on the affect grid taking place in the top-right corner of the grid, show that reading in the game was not an issue to the test group. The average scores for game experience and reading in the game are 3.57 and 3.78 (combined 3.68). Some of the participants mentioned that the game experience would have been better if the game had been longer, as one describes it: "Umm... like when I was... when you escape the locker room I had a feeling that there could have been a final area where you could like fight the zombies. So it could have had an ending like that or something". One interviewee was disinterested in reading, but still picking a three from the middle of the scale: "It was adequate". On the other hand, two of the participants rated the reading in the game as five: "That would be five, there was some good reading and such".

There was no difference in the affect grid score between the test participants who had been along right from the start (Karjasilta) and the group that the game concept was totally new to. The game test sessions produced mixed results and data for the game and its reading and reading motivation and some of the participants had trouble expressing their thoughts on some subjects. However, depending on interpretation, there is a slight inclination towards that reading motivation could be improved through games. These results and the persuasive features of the game regarding reading motivation are discussed in the next chapter.
6. Discussion

In this chapter, the game Hockey Zombies - Escape from the Arena is discussed regarding the research questions of this study and the theoretical background. The research question of this thesis was "what kind of features should a game for improving reading motivation include?" with an assumption that reading motivation can be improved through games. A persuasive game was designed from scratch in order to find out whether reading motivation could be improved through games and what kind of features are useful in this endeavor. The game Hockey Zombies - Escape from the Arena was then evaluated and tested with the target group of ice hockey playing boys aged 15-16 years. This chapter discusses the results of this thesis regarding reading motivation, what kind of features should a game designed for improving reading motivation include, the persuasion strategy behind Hockey Zombies - Escape from the Arena and whether reading motivation can be improved through games.

The interview results from the target group reflect the PISA 2009 findings on reading habits. The test users read mostly sports news, tabloids and the obligatory books for Finnish class. None of the test users read books for fun, on their own. They play games, but not games that include a lot of reading. However, playing a text-rich game designed for improving reading motivation is not entirely out of the question as members of the target group chose this genre over others at the first interview and questionnaire session.

Improving reading motivation, when placed in the O/C matrix (Oinas-Kukkonen 2012), is one of the hardest target behaviors to achieve. It includes forming and reinforcing an attitude, which can be hard to do if the user dislikes reading in general or has a negative attitude towards reading. Regarding the improvement of reading motivation by playing Hockey Zombies - Escape from the Arena, it is worth looking into what kind of impressions the game aroused or that did it evoke enthusiasm, as Lucero et al. (2006) did in their study.

Lucero et al. (2006) found out in their study that their target group of young children was enthusiastic and motivated toward using their software. Their overall results were positive and that their software was indeed able to motivate the children to read, write and perform other activities in the software. Following their lead, Hockey Zombies - Escape from the Arena was designed with features from BCSS, persuasive technology, and serious games, which forms the first category in the persuasion strategy behind the game. The second part includes two behavior related theories behind BCSS, mimicking Lucero et al. (2006) in their use of Gardner's (1999) MI theory. Lastly, the game genre chosen was an ice hockey themed point and click adventure game.

Lucero et al. (2006) use Fogg's (2002) persuasive technology as their persuasive game development basis. Persuasive technology lists coercion and deception as the antitheses of persuasion, which is also the case with BCSS (Oinas-Kukkonen, 2008). The interviews from Hockey Zombies - Escape from the Arena show that the game features that were designed with persuasion in mind were received positively. None of the participants complained about the game as being irritating because of the reading and persuasive attempts in it, ruling out coercion and deception. On the contrary, the interviewees seemed to like the game, the persuasive attempts in it, both the direct and indirect (Oinas-Kukkonen, 2008). All of this indicates that some persuasion towards reading motivation might have occurred.
On a critical note, the interviews had only seven directly positive comments about reading motivation and five negative ones. Four out of seven interviewees thought that the game (or games in general) could affect reading motivation positively while the others did not believe the game (or games in general) could motivate to read. When the assumption that reading motivation can be improved through games is put to question, the answer is ambiguous. According to the interviews, roughly half of the participants thought so, but all of them liked reading in the game. If you include reading in a game as a form of reading and build engaging, likable games that have a lot of reading in them, then the answer is an obvious yes.

The affect grid test scored an average of 3.78 out of 5 for the reading in the game and 3.57 for the game experience. Although the positive score might be partly due to the novelty factor of the game as the test users had not played many similar games before, the score is still a sign on the positive side. Also, there was no difference between the different target groups at different schools, one of which already familiar to the game concept. By comparison to the results from Lucero et al. (2006), Hockey Zombies - Escape from the arena evoked similar enthusiasm towards the game. Overall, the results are positive and the score for reading in the game reflects the interview data that reading long text excerpts was perceived as fun and interesting.

The interview results regarding reading in the game were interesting when compared to the behavior change related theories behind BCSS (Oinas-Kukkonen, 2008). The main character likes to read and reminds of it in encouraging ways, acting as a role model according to the social cognitive theory (Bandura, 1986). This might affect reading motivation on an unconscious level when persuasive features such as similarity and tailoring are added to gameplay. The results show that the main character in the game was considered as the average ice hockey playing junior (who likes to read), but whether this actually affected reading motivation remains open to interpretation. All of the interviewed stated that the main character was believable, likable and seemed familiar, which are all key aspects of persuasion (Oinas-Kukkonen, 2008).

According to the self-efficacy theory (Bandura, 1977) the individuals who perceive themselves as capable of taking action also do take action. Finding the hidden books in the game might result into looking up the actual book from a library or a book store and reading it, as one of the test users suggested. The self-efficacy theory also points out that taking action can happen also through vicarious experiences, social models and altering the negative emotional tendencies and self-beliefs. The interviews show that many of the participants had negative self-beliefs about reading. However, the reading in the game was perceived leisurely as a fun activity. Hence, the game might have a positive mark on reading motivation, as it turns over the negative self-belief on reading. This can happen also through vicarious experiences. If other members of the peer group regard reading in the game as fun and unobtrusive, it might affect the self-beliefs of others. This is also the premise of the social cognitive theory.

Reading motivation can spark from even less than finding a hidden book in a game. After the pre-development-phase game concept presentations (session 1) two of the target group members had a shift in reading motivation, as their teacher later reported. The development team had to only mention the importance of reading and the concept of reading motivation, which was enough to inspire the two of the target group. They had a sudden surge in reading motivation, first picking up a book by Juhani Aho for Finnish class and later starting to read biographies of Finnish ice hockey players on their own. The two did not take part in the game test sessions, so it remains unknown whether playing the game would have had more effect on their reading motivation.
The persuasive features of the game had a lot of positive qualities in them, regarding the interview results. The persuasive features of the game are discussed below, with a critical note on what could have been done better, what works and what doesn't work.

**Tailoring** was targeted by making the game about ice hockey. According to Oinas-Kukkonen (2008), the system should provide tailored information for its user groups. This was achieved by including ice hockey related information splashes throughout the game. There were three directly positive comments about the information splashes in the results, and the ice hockey theme was thought to be an overall positive thing.

**Personalization** and personalized content increases the system's persuasive capabilities (Oinas-Kukkonen 2008). The game offered the player to select a personalized game jersey number which had effect on an information splash in the gameplay, so personalization and tailoring were intertwined in the gameplay. This is also evident in the results, since most of the comments about tailoring also regard the personalized content. Personalization might have been useful to implement in other areas of the game as well, but the time scope of the project did not allow it. However, the game was a small game with relatively short gameplay which did not allow personalizing it further. Adding more personalized features could be profitable in terms of persuasion.

**Praise** was targeted by having the game character compliment himself (or the user) after solving a puzzle or finding a hidden book. According to Oinas-Kukkonen (2008), praise can make the user more open to persuasion. This was received well in the results and is related to similarity, as the game narrative was abundant with ice hockey related terminology. The praising narrative was also perceived as fun and not too formal and the implementation of praise can be thought to have been very successful.

**Similarity** makes the system more persuasive by reminding the user of themselves in some meaningful way (Oinas-Kukkonen 2008). The ice hockey related slang, concepts and lingo were commented on positively by all of the test users. Whether this made the game more persuasive is open to question. Similarity has its mark in the feedback as the most picked adjective cards were "fun", "engaging" and "interesting". Similarity was easy to implement due to the game genre and the target group. Achieving similarity with a wider target audience might prove to be a more difficult task.

**Rewards** were only partially implemented as hidden books in the game. According to Oinas-Kukkonen (2008), a system that rewards the target behavior may have greater persuasive powers. One of the test users made a comment about the hidden books, which were Finnish books about ice hockey, that it would be nice to try to find the book after playing the game. Rewards might have an effect on reading motivation, but adding a complete points or reward system (Yusoff et al. 2009) was discarded due to short development time. Such a system might improve the persuasive capabilities of the game, if the players would be more likely to return to the game afterwards to achieve a higher score.

**Suggestion** is targeted by encouraging the user to read an important text excerpt prior to solving a puzzle and having the main character making encouraging comments about reading in general. Oinas-Kukkonen & Harjumaa (2009) list direct and indirect routes as key persuasion strategies. Both of these were implemented by adding direct and indirect suggestion in the game narrative. The results show that both implementations of these strategies were thought to be positive and neither caused irritation or frustration, as long as they were implemented together with likability, humor and similarity. Having a too direct route for persuasion without compensating features might not be such a good idea.
Liking in the game is related to similarity as the game was visually ice hockey themed and stylized with cartoon graphics. According to Oinas-Kukkonen (2008) a system that is visually attractive for its users is likely to be more persuasive. The visual look was thought to be "good" or "ok" in the results, but it is hard to say whether it had affect on reading motivation, other than that the visual look turned the test users toward the game and not away from it. As an afterthought, having a stupendously great visual look might have made the game even more persuasive.

By offering public Recognition, according to Oinas-Kukkonen (2008), a system can increase the likelihood that the user will adopt the target behavior. Recognition was turned upside down in the development phase and implemented by adding reference to known ice hockey players who are motivated towards reading. The results have no comments about these references, so it is hard to say whether it had effect on reading motivation. Recognition in its original form, by offering social recognition might produce better persuasive qualities, but social features were not included in the game.

Credibility is divided into trustworthiness and expertise by Fogg (2002) and Oinas-Kukkonen (2008). Fogg (2002) describes credibility as believability. The results show that the game world, narrative and the game character were received as believable. This might have had effect on persuasion, but it would be interesting to see the results if the game was made intentionally unbelievable, or false. However, especially the information splashes were received openly, mainly due to their truthfulness and the subject was interesting to the test users.

Choosing the best guidelines depends a lot from the game genre. According to Yusoff et al. (2009), serious game developers have adapted their game development according to game genres. For example, playing a single-player adventure game like Hockey Zombies - Escape from the Arena would not probably benefit from adding a social support feature other than sharing a link to the game with others. What's more, the PGD guidelines used in Hockey Zombies - Escape from the Arena might not be the best choice for a multi-player role playing game, but they serve as a good reference as they are. The theme of ice hockey was implemented in all aspects of the game and the according to the interviews, the target group was taken by it. The two background theories — the social cognitive theory (Bandura, 1986) and the self-efficacy theory (Bandura, 1977) — played an important role in the game development process throughout the line and worked seamlessly with the PGD guidelines, though more in the background and not as visibly as the MI theory in the work of Lucero et al. (2006).

In summary, in the development of Hockey Zombies - Escape from the Arena, the PGD guidelines were implemented successfully in the game, along with the help that the process guidelines provided. The PDG guidelines proved to work fluently with the two background theories, the self-efficacy theory and the social cognitive theory, which is backed by the interview data. This is significant since it shows that it is possible to integrate high-level behavior change-related theories into the end product, as it is already the premise of BCSS (Appendix 1). What's more, the persuasion strategy was overall successful. All of the implemented features are positive candidates for any game designed for improving reading motivation as they are derived from the state of the art research in persuasion. The next chapter concludes this thesis, along with limitations that apply to this thesis and implications of the work for future research.
7. Conclusion

In conclusion, this thesis provided answers to the research question "what kind of features should a game for improving reading motivation include?" by developing a persuasive game Hockey Zombies - Escape from the Arena. The game was then evaluated using a target group of ice hockey playing school children, aged 15-16, using game test sessions, semi-structured interviews, adjective cards and an affect grid test. The results include a set of ten PGD guidelines designed to improve reading motivation and a persuasive strategy for game development process.

These guidelines and the persuasion strategy were discussed by comparing the game to the work of Lucero et al. (2006) and the rest of the background literature, including BCSS, persuasive technology, serious games and the two background theories behind BCSS, the self-efficacy theory and the social cognitive theory. The assumption was that motivation, or reading motivation, can be improved through games. While the game only might have improved the reading motivation of the test users, it was evident that the test group was enthusiastic and motivated towards playing the game.

There are limitations that apply to this study. The number of target group test users (N=8) was low compared to the similar study by Lucero et al. (2006), who had 50 participants playing their game, Papelucho. Also, the time schedule for creating the game was tight, so many potential features were scrapped and in the end of the game was cut too short. The interviews were planned carefully, but due to the school environment some interruptions occurred, which resulted in a lost interview recording due to one of the recording devices not starting and the other ending up with a corrupted file. As an afterthought, the interviews could have been longer with some extra open ended questions and the total interviewing time should've been calculated to include the occasional interruptions. However, the gathered data was adequate for the purposes of this study and the evaluation can be viewed as successful.

The results from this study leave some open questions that would profit from future research into the subject. The concept of improving reading motivation through games is not extensively researched and as the reading habits of the young are in the decline, researching the improvement of reading motivation through games is crucial. The topic is currently very actual and future work on this topic can yield beneficial results. For instance, a longer study with more gameplay sessions and more participants would provide more accurate results. Most importantly, future research would benefit from measuring the amount of reading motivation thoroughly in the beginning and end of a longer study with a larger number of participants.

Hockey Zombies - Escape from the Arena can be played on a browser at:

http://www.student.oulu.fi/~tkakela/kiigame/kiigame.html
References


## Appendixes

### Appendix 1, Theories behind behavior change support systems (Oinas-Kukkonen, 2008).

<table>
<thead>
<tr>
<th>Theory of reasoned action</th>
<th>Individual behavior is determined by behavioral intentions, i.e., an individual’s attitude toward the behavior and subjective norms about the behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theory of planned behavior</td>
<td>Individual’s perception of the ease with which the behavior can be performed, i.e., behavioral control influences individual’s behaviors</td>
</tr>
<tr>
<td>Technology acceptance model</td>
<td>Perceived usefulness and perceived ease of use determine an individual’s intention to use a system, which leads into actual system use, perceived ease of use impacts perceived usefulness, assumes that actors are free to act without limitations when they just have an intention to act, based on theory of reasoned action</td>
</tr>
<tr>
<td>Unified theory of acceptance and use of technology</td>
<td>Performance expectancy, effort expectancy, social influence, and facilitating conditions determine the usage intention and usage behavior, whereas gender, age, experience, and voluntariness of use moderate this impact; extended from technology acceptance model</td>
</tr>
<tr>
<td>Self-efficacy theory</td>
<td>Individuals who perceive themselves as capable of taking action also do take action; strengthening the sense of efficacy happens through vicarious experiences, social models, social persuasion, and reducing people’s stress reactions and altering their negative emotional proclivities and misinterpretations of their physical states</td>
</tr>
<tr>
<td>Social cognitive theory</td>
<td>Observing others performing a behavior influences the perceptions of individual’s own ability to perform the behavior, i.e., self-efficacy, and the perceived expected outcomes</td>
</tr>
<tr>
<td>Elaboration likelihood model</td>
<td>Central and peripheral routes are key routes for persuasion; central route is used when information processing is based upon critical thinking; peripheral route is based on rules of thumb; change via central route is more enduring, resistant and predictive of behavior</td>
</tr>
<tr>
<td>Cognitive dissonance theory</td>
<td>Individuals seek consistency among their cognitions such as beliefs and opinions; inconsistency between attitudes an behaviors creates dissonance that needs to be eliminated</td>
</tr>
<tr>
<td>Goal setting theory</td>
<td>Goals affect performance through directing attention and effort, energizing, persistence, and by leading to arousal and/or use of task-relevant knowledge and strategies; the highest goals produce the highest levels of effort and performance; specific, difficult goals consistently lead to higher performance than urging people to do their best; when goals are self-set, people with high self-efficacy set higher goals than people with lower self-efficacy; people with high self-efficacy are more committed to the assigned goals and to responding more positively to negative feedback</td>
</tr>
<tr>
<td>Computer self-efficacy</td>
<td>Computer self-efficacy means individual’s judgment of one’s capabilities to use computers for both task performance and computer performance; anxiety, innovativeness, task characteristics, prior performance, and perceived effort play a role, based on self-efficacy theory.</td>
</tr>
</tbody>
</table>
Appendix 2

This appendix contains all of the persuasive principles in the third phase of the PSD model.

**Table 1:** Primary task support principles (Oinas-Kukkonen & Harjumaa 2008).

<table>
<thead>
<tr>
<th>Principle</th>
<th>Example Requirement</th>
<th>Example Implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Reduction</strong>&lt;br&gt;A system that reduces complex behavior into simple tasks helps users perform the target behavior and it may increase the benefit/cost ratio of a behavior.</td>
<td>System should reduce effort that users have in regard to performing their target behavior.</td>
<td>Mobile application for healthier eating habits lists proper food choices at fast food restaurants. Smoking cessation web site provides an interactive test which measures how much money a user will save with quitting.</td>
</tr>
<tr>
<td><strong>2. Tunneling</strong>&lt;br&gt;Using the system to guide users through a process or experience provides opportunities to persuade along the way.</td>
<td>System should guide users in the attitude change process by providing means for action that brings closer to the target behavior.</td>
<td>Smoking cessation web site offers information about treatment opportunities after a user has answered an interactive test about how addicted (s)he is on tobacco.</td>
</tr>
<tr>
<td><strong>3. Tailoring</strong>&lt;br&gt;Information provided by the system will be more persuasive if it is tailored to the potential needs, interests, personality, usage context, or other factors relevant to a user group.</td>
<td>System should provide tailored information for its user groups.</td>
<td>Personal trailer web site provides different information content for different user groups, e.g. beginners and professionals. Web site for recovering alcoholics presents a user such stories which are close to one's own story.</td>
</tr>
<tr>
<td><strong>4. Personalization</strong>&lt;br&gt;A system that offers personalized content or services has a greater capability for persuasion.</td>
<td>System should offer personalized content and services for its users.</td>
<td>Users are able to change the graphical layout of an application or the order of information items at a professional web site.</td>
</tr>
<tr>
<td><strong>5. Self-monitoring</strong>&lt;br&gt;A system that helps track one's own performance or status supports in achieving goals.</td>
<td>System should offer means for users to track their performance or status.</td>
<td>Heart rate monitor presents a user's heart rate and the duration of the exercise. Mobile phone application presents daily step count.</td>
</tr>
<tr>
<td><strong>6. Simulation</strong>&lt;br&gt;Systems that provide simulations can persuade by enabling them to observe immediately the link between the cause and its effect.</td>
<td>System should provide means for observing the link between the cause and effect in regard to their behavior.</td>
<td>Before and after pictures of people who have lost weight are presented on a web site.</td>
</tr>
<tr>
<td><strong>7. Rehearsal</strong>&lt;br&gt;A system providing means with which to rehearse a behavior can enable people to change their attitudes or behavior in the real world.</td>
<td>System should provide means for rehearsing a target behavior.</td>
<td>A flying simulator.</td>
</tr>
</tbody>
</table>
Table 2. Dialogue support (Oinas-Kukkonen & Harjumaa 2009).

<table>
<thead>
<tr>
<th>Principle</th>
<th>Example requirement</th>
<th>Example implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Praise</td>
<td>By offering praise, a system can make users more open to persuasion.</td>
<td>Mobile application that aims at motivating teenagers to exercise praises user by sending automated text messages for reaching individual goals.</td>
</tr>
<tr>
<td></td>
<td>System should use praise via words, images, symbols, or sounds as a way to provide user feedback information based on his/her behaviors.</td>
<td></td>
</tr>
<tr>
<td>Rewards</td>
<td>Systems that reward target behaviors may have great persuasive powers.</td>
<td>Heart rate monitor gives users a virtual trophy if they follow their fitness program. Game rewards users by altering media items, such as sounds, background skin, or a user’s avatar according to user’s performance.</td>
</tr>
<tr>
<td></td>
<td>System should provide virtual rewards for users in order to give credit for performing the target behavior.</td>
<td></td>
</tr>
<tr>
<td>Reminders</td>
<td>If a system reminds users of their target behavior, the users will more likely achieve their goals.</td>
<td>Caloric balance monitoring application sends text messages to its users as daily reminders.</td>
</tr>
<tr>
<td></td>
<td>System should remind users of their target behavior during the use of the system.</td>
<td></td>
</tr>
<tr>
<td>Suggestion</td>
<td>Systems offering fitting suggestions will have greater persuasive powers.</td>
<td>Application for healthier eating habits suggests that children eat fruits instead of candy at snack time.</td>
</tr>
<tr>
<td></td>
<td>System should suggest that users carry out behaviors during the system use process.</td>
<td></td>
</tr>
<tr>
<td>Similarity</td>
<td>People are more readily persuaded through systems that remind them of themselves in some meaningful way.</td>
<td>Slang names are used in an application which aims at motivating teenagers to exercise.</td>
</tr>
<tr>
<td></td>
<td>System should imitate its users in some specific way.</td>
<td></td>
</tr>
<tr>
<td>Liking</td>
<td>A system that is visually attractive for its users is likely to be more persuasive.</td>
<td>Web site that aims at encouraging children to take care of their pets properly has pictures of cute animals.</td>
</tr>
<tr>
<td></td>
<td>System should have a look and feel that appeals to its users.</td>
<td></td>
</tr>
<tr>
<td>Social role</td>
<td>If a system adopts a social role, users will more likely use it for persuasive purposes.</td>
<td>E-health application has a virtual specialist to support communication between users and health specialists.</td>
</tr>
<tr>
<td></td>
<td>System should adopt a social role.</td>
<td></td>
</tr>
</tbody>
</table>
Table 3. System credibility support (Oinas-Kukkonen & Harjumaa 2009).

<table>
<thead>
<tr>
<th>Principle</th>
<th>Example requirement</th>
<th>Example implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Trustworthiness</strong></td>
<td>A system that is viewed as trustworthy will have increased</td>
<td></td>
</tr>
<tr>
<td></td>
<td>powers of persuasion.</td>
<td>Company Web site provides information related to its products rather than simply providing biased advertising or marketing information.</td>
</tr>
<tr>
<td></td>
<td>System should provide information that is truthful, fair and</td>
<td></td>
</tr>
<tr>
<td></td>
<td>unbiased.</td>
<td></td>
</tr>
<tr>
<td><strong>Expertise</strong></td>
<td>A system that is viewed as incorporating expertise will have</td>
<td></td>
</tr>
<tr>
<td></td>
<td>increased powers of persuasion.</td>
<td>Company Web site provides information about their core knowledge base. Mobile application is updated regularly and there are no dangling links or out-of-date information.</td>
</tr>
<tr>
<td></td>
<td>System should provide information showing knowledge,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>experience, and competence.</td>
<td></td>
</tr>
<tr>
<td><strong>Surface credibility</strong></td>
<td>People make initial assessments of the system credibility</td>
<td></td>
</tr>
<tr>
<td></td>
<td>based on a firsthand inspection.</td>
<td>There are only a limited number of, and a logical reason for, ads on a Web site or mobile application.</td>
</tr>
<tr>
<td></td>
<td>System should have competent look and feel.</td>
<td></td>
</tr>
<tr>
<td><strong>Real-world feel</strong></td>
<td>A system that highlights people or organization behind its</td>
<td>Company Web site provides possibilities to contact specific people through sending feedback or asking questions.</td>
</tr>
<tr>
<td></td>
<td>content or services will have more credibility.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>System should provide information of the organization and/or</td>
<td></td>
</tr>
<tr>
<td></td>
<td>actual people behind its content and services.</td>
<td></td>
</tr>
<tr>
<td><strong>Authority</strong></td>
<td>A system that leverages roles of authority will have enhanced</td>
<td>Web site quotes an authority, such as a statement by government health office.</td>
</tr>
<tr>
<td></td>
<td>powers of persuasion.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>System should refer to people in the role of authority.</td>
<td></td>
</tr>
<tr>
<td><strong>Third-party endorsements</strong></td>
<td>Third-party endorsements, especially from well-known and</td>
<td>E-shop shows a logo of a certificate that assures that they use secure connections. Web site refers to its reward for high usability.</td>
</tr>
<tr>
<td></td>
<td>respected sources, boost perceptions on system credibility.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>System should provide endorsements from respected sources.</td>
<td></td>
</tr>
<tr>
<td><strong>Verifiability</strong></td>
<td>Credibility perceptions will be enhanced if a system makes it</td>
<td>Claims on a Web site are supported by offering links to other web sites.</td>
</tr>
<tr>
<td></td>
<td>easy to verify the accuracy of site content via outside</td>
<td></td>
</tr>
<tr>
<td></td>
<td>sources.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>System should provide means to verify the accuracy of site</td>
<td></td>
</tr>
<tr>
<td></td>
<td>content via outside sources.</td>
<td></td>
</tr>
<tr>
<td>Principle</td>
<td>Example requirement</td>
<td>Example implementation</td>
</tr>
<tr>
<td>---------------------------</td>
<td>--------------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Social learning</strong></td>
<td>A person will be more motivated to perform a target behavior if (s)he can use a system to observe others performing the behavior.</td>
<td>System should provide means to observe other users who are performing their target behaviors and to see the outcomes of their behavior.</td>
</tr>
<tr>
<td><strong>Social comparison</strong></td>
<td>System users will have a greater motivation to perform the target behavior if they can compare their performance with the performance of others.</td>
<td>System should provide means for comparing performance with the performance of other users.</td>
</tr>
<tr>
<td><strong>Normative influence</strong></td>
<td>A system can leverage normative influence or peer pressure to increase the likelihood that a person will adopt a target behavior.</td>
<td>System should provide means for gathering together people who have the same goal and make them feel norms.</td>
</tr>
<tr>
<td><strong>Social facilitation</strong></td>
<td>System users are more likely to perform target behavior if they discern via the system that others are performing the behavior along with them.</td>
<td>System should provide means for discerning other users who are performing the behavior.</td>
</tr>
<tr>
<td><strong>Cooperation</strong></td>
<td>A system can motivate users to adopt a target attitude or behavior by leveraging human beings’ natural drive to co-operate.</td>
<td>System should provide means for co-operation.</td>
</tr>
<tr>
<td><strong>Competition</strong></td>
<td>A system can motivate users to adopt a target attitude or behavior by leveraging human beings’ natural drive to compete.</td>
<td>System should provide means for competing with other users.</td>
</tr>
<tr>
<td><strong>Recognition</strong></td>
<td>By offering public recognition for an individual or group, a system can increase the likelihood that a person/group will adopt a target behavior.</td>
<td>System should provide public recognition for users who perform their target behavior.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Names of awarded people, such as “stopper of the month,” are published on a Web site.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Personal stories of the people who have succeeded in their goal behavior are published on a smoking cessation Web site.</td>
</tr>
</tbody>
</table>
Appendix 3

Questionnaire form for session one.

[Table]

<table>
<thead>
<tr>
<th>Do you read?</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Online news</td>
<td>School books</td>
</tr>
<tr>
<td>Blogs</td>
<td>Comics</td>
</tr>
<tr>
<td>Facebook / Twitter</td>
<td>Narrative Fiction (such as Harry Potter, Game of Thrones)</td>
</tr>
<tr>
<td>Newspapers</td>
<td>Non-fiction</td>
</tr>
<tr>
<td>E-books</td>
<td>Magazines</td>
</tr>
<tr>
<td>Other, what?</td>
<td>I don’t read</td>
</tr>
</tbody>
</table>

**What have you been reading lately (2-3 examples)**


**Do you play games?**

<table>
<thead>
<tr>
<th>Computer</th>
<th>Console</th>
<th>Mobile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ipad, other tablet</td>
<td>Online</td>
<td>I don’t play</td>
</tr>
</tbody>
</table>

**What have you been playing lately (include platform, 2-3 examples)**


**Rate the game concepts by ratings 1-5 (1 = not interesting at all, 5 = interests a lot!)

1. Social Reader
2. Quiz game
3. Adventure game

**What was good about the concepts?**


**Was there anything to improve on?**


**I would be interested to try the following game concepts:**

- Social reader
- Quiz game
- Adventure game

**Mitä seuraavasta omia etsiäksesi hyytin pelin sisältää?**

- Competition against others
- Collaboration with others
- Searching for information outside the game

<table>
<thead>
<tr>
<th>Reading</th>
<th>Problem solving</th>
<th>Writing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

Thank you!
Appendix 4

Question list for interview sessions two and three.

Name?

Ice hockey? (follow-up questions)

Have you played other games lately, what? What games do you like?

Have you read any texts lately, books, magazines, other? (follow-up questions, reasons)

Adjective cards, how did that feel like? Why? Any other adjectives? Reasoning behind adjective card choices?

The game: (ask follow-up questions to all of these)

- Feelings, thoughts, etc.?
- Did you like the game? Why?
- Game character, thoughts? (Believable/credible?)
- Game world, thoughts? (Believable/credible?)

Similarity, likeness, familiarity, fun, other, what?

Jersey number, what number did you choose? Why?

Did you read the text related to the jersey? Thoughts on that? Would you like to try again with a different number?

Long texts in the game, did you read them all? Thoughts? Too much/too little, thoughts?

Would you like to play other games like this? (adventure, reading)? What do you think of games like this?

Any other games with lots of reading in them?

*Affect grid*, rating, why, how, feelings?

Game language, text, slang, thoughts? How did the reading/language/text feel like? Anything that was out of the place, why? Why not? Did the terminology strike as being correct, false, adequate, other, why?

What thoughts or feelings did you have about the reading in the game?

Hidden books, did you find any? Thoughts? By trying out or by reading the clues?

Could the game motivate to read more? (books not necessarily)

Could the game motivate more, how?

Could the game motivate to play other games like this?
Appendix 5

Interview transcripts from sessions two and three.

**Interviewee 1**

(Material that did not get recorded, beginning of the interview: Turkka is playing ice hockey as a C junior in Oulun Kärpät hockey team. He reads all of Kärpät-related news from the daily paper or online.)

**Interviewer:** Alright, next we have a few questions, to which there are no right or wrong answers, so you can relax and just answer how you feel like. First, what was your name?

T: (omitted)

**H:** Have you played other games lately, if so, what games do you like?

T: Umm... I've been playing like with Playstation, NHL and stuff.

**H:** Any adventure games?

T: Not so much, maybe sometimes when I was younger I played more adventure style games.

**H:** Have you read any books or anything else text related lately?

T: Books, not so much,

**H:** What about magazines and other text, online perhaps?

T: Whatever comes up... something like, Jääkiekko-lehti (ice hockey magazine) and stuff like this.

**H:** Ok. How did you feel about the adjective cards you just selected? You picked four...

T: Yeah, what did I pick... It was fun, 'cause the game was about those texts and they were pretty funny. And then... pleasing, it was kind of fun to play and... umm, the game was ice hockey related, which is my sport, and...

**H:** Did you like that?

T: Yeah, it was pretty nice, and then... what was it. Maybe understandable, the game was easy to understand and the purpose was understandable.

**H:** Can you come up with any other adjective to describe the game?

T: Not really, that was it...

**H:** Ok... what kind of feelings did you have while playing the game?

T: I dunno... it was like, I don't really know.
H: If you had to come up with a rating from one to five, (shows the smiley cards), of which one represents this sad face and five is this happy smiley face, which one would you pick? First, only for the game itself, what would be your choice?

T: I think this, number four.

H: And then, if we're only rating the game for its reading, which one would you choose then?

T: Umm...

H: I mean, was the reading stuff in the game boring, fun, or something in between, from one to five?

T: Yeah, reading would be somewhere between two and three... (picks smiley card number three)

H: And what about the game character, what did you think about him? Did you think it was believable or not?

T: The character was kinda good... so, well, it was like...

H: What about the game world?

T: Yeah, the game world was believable.

H: What did you think about the beginning, where you got to choose the jersey number, what was that like?

T: It was kind of, like... umm, it was a good thing.

H: Did you read the text related to the game jersey number in the game?

T: Yeah I did.

H: Would you like to try the game with a different player number?

T: Umm... yeah, it made me wonder that I would like to try with a different number.

H: How did you feel about reading stuff in the game? Did it have too much long texts, or too little, or just right?

T: Umm... I think it had just the right amount of reading.

H: Would you like to play some other game dealing with text and reading in the future?

T: Yes, I would.

H: Would the genre affect your decision?

T: Yeah, I think it would...

H: What about, if it was an ice hockey related game?

T: Yeah, I would rather play that.
H: Ok, and then... about the language in the game, how did the language in the game feel like? Like word choices and stuff.

T: Umm... I guess they were... umm.

H: Anything that caught your attention? In a good or bad way?

T: No, I don't think there was anything like that...

H: What about the hidden books in the game, did you find any?

T: I found two of them...

H: Good, there were three books in total. How did you find the books?

T: Umm... by reading the text clues.

H: How about the motivational factor in the game, did you feel that the game could motivate to read more? Not just books, but to read in general.

T: Yeah, it did kind of motivate to read.

H: Any thoughts on the hidden books in the game?

(Has forgotten the hidden book titles)

T: Umm... can't really remember.

H: Ok, what do you think, can a game like this motivate to read more, and how do you think it could be made to motivate even more?

(Gets seemingly frustrated, can't think of an answer)

T: Can't really think about anything.

H: Ok, final question... how did the visual look of the game feel like?

T: It was pretty... it was good. Nothing to complain.

H: Ok, thanks!

T: Thank you.
(Not recorded, talking about the game between moving from test room to interviewing room: hidden books were nice, he found two of them, by reading the text clues. The game was different than other games he's used to playing, but in a positive way.)

H: Good to meet you, what is your name?
M: (omitted)

H: Do you play ice hockey, in what team?
M: Yeah, in Oulun Kärpät.

H: What team, juniors?
M: Umm... like, C juniors.

H: Ok. Have you been playing other games lately, besides the game we just tested?
M: Yeah I've been playing NHL and Fifa, but not so much other games... yeah, Playstation.

H: Alright. Do you read books...
M: Heh, no, not so much books...

H: ...Or online, magazines, or anything else?
M: Yeah I read online, something like sports related news and stuff, magazines sometimes.

H: How much do you think you read, daily?
M: Well, during the day maybe a quick look with the phone, like sports news and maybe tabloids online.

H: Ok, and then... we did the adjective cards, what did you think about them?
M: Yeah, it was kinda... umm.

H: Can you come up with any other word describing the game?
M: Not really, not anything else.

H: You picked the word entertaining, any thoughts on that?
M: Yeah, it was pretty... entertaining. Can't really come up with anything else.

H: What about, would you like to play a game like this in the future, with similar qualities?
M: Don't know really, maybe not so often.

H: Ok, what kind of games do get your attention? You mentioned NHL....
M: Yeah, that kind of games...
H: What kind of thoughts or feelings did you get while playing this game?

M: It was ok, in the beginning it took some time to like get it...

H: Was it challenging?

M: Yeah, it was kind of.

H: So... If you had to come up with a rating from one to five, (shows the smiley cards), of which one represents this sad face and five is this happy smiley face, which one would you pick? First, only for the game itself, what would be your choice?

M: Umm... maybe three or two from here (picks both cards)

H: And what about reading, same rating but only for the reading in the game?

M: Oh yeah, that would be a three.

(Disturbing noise from the room next door)

H: So, let's continue. How did you like the game character?

M: ...

H: Was it believable or false?

M: Yeah, it was believable.

H: Was it a good thing that the game was ice hockey related?

M: Yeah I think so, it was.

H: Can you describe the ice hockey theme, how did you feel about that?

M: Umm... I don't know how to answer that.

H: What about the game world, with the locker room, ice hockey arena and so on, how did you feel about that? Was there anything that caught your attention, anything missing or just in general stuff?

M: Well... that was pretty ok and such... good thing, there was no errors or anything.

H: Did you feel any familiarity?

M: Well... (thinks) Somewhat, yeah, maybe. (Body language shows otherwise)

H: What about the game jersey number in the beginning?

M: ...

H: What number did you choose?

M: Was it 88...

H: Is that your own jersey number?
M: No, my number is eight...

H: Did you feel like you would like to try with a different number, with the jersey number related text in the game and such?

M: Yeah, maybe.

H: Did you read the info splash related to the game jersey number?

M: Yeah I did... Something, Eric Lindros, but I can't really remember anymore what it said.

H: It's ok, you don't have to remember it here. Did you read the whole text though?

M: Yeah I did.

H: How about the other longer texts in the game?

M: Yeah I read about the hidden books and such.

H: Did you skip any texts?

M: No...

H: How did you feel about the amount of reading in the game?

M: It was pretty ok.

H: Not too much or too little?

M: No, not too little.

H: Have you played other adventure genre games besides this?

M: Yeah, some...

H: What games?

M: Can't remember...

H: How did you feel about the language in the game? Words and such.

M: Yeah, it was ok.

H: Anything that caught your attention?

M: No...

H: Did the language make the game feel any more familiar, or...

M: Yeah it did, a bit.

H: What kind of feelings or thoughts did the game bring up, related to reading?

M: ...
H: Like, there was these hidden books...

(School bell rings)

M: Don't really know how to answer that one...

H: Did you feel any more motivated towards reading?

M: Umm... not really.

H: Why?

M: Umm... (long silence)

H: Ok. Would you like to try this kind of game, with a lot of reading, and perhaps with a similar ice hockey theme?

M: Umm, I guess... not so much.

(Time for the interview runs out)
16.12.2013 Interviewee three

(Background noise, recording had to be started from beginning)

H: So, let's go again from the beginning. Your name, (omitted)?
A: Yeah.

H: And you play Ice hockey, in Oulun Kärpät, C juniors.
A: Yeah.

H: What position?
A: Defenseman.

H: Have you been playing any other games, with Playstation, or other platform?
A: Yeah, I play kind of a lot, with Playstation... been playing like NHL and Fifa. All the older versions and now these just released, like NHL 14. And some war games, but not so much these days...

H: Ok. Do any of the games you play include reading? Fifa and NHL not so much obviously, but how about the others? Have you played any adventure games?
A: Yeah, not so much reading in NHL. Well yeah, maybe online something with reading and maybe adventure, but other than that, not so much.

(Interview interrupted, time schedule problem)

H: Ok, let's go on... About the adjective cards, you had good reasoning on your choices. Can you come up with anything else, a word or a thing besides the ones you chose?
A: Well it had pretty good words there, can't really come up with anything else...

H: What kind of thoughts or feelings did you have while playing the game?
A: Umm, I dunno... other than that, like, I thought that it pays off to read this and this carefully, like it helps to get forward in the game.

H: Did you read all the texts in the game, even the longer ones?
A: Yes!

H: How did you feel about the game character?
A: Yeah, it was like... like... I dunno, like... what can I say?

H: For example, with the game character being a hockey player, how did that feel like, did it make it feel closer to you?
A: Yeah it did, it's like familiar! Totally different than if the game was about a different sport, so it was actually pretty much like that.
H: How did the character feel like, was it well done or did it feel artificial?
A: Yeah it was like... just spot on!

H: And how about the game world? Locker room, and so on...
A: Yeah, that was like... umm, realistic anyway.

H: Sounds like that is a positive attribute.
A: It is.

H: What about the game jersey number in the beginning...
A: I have played with that number in the past and I just put it there...

H: Is that the number you would still like to play with?
A: Yeah!

H: Would you have liked to try the game with a different number, with the info splash later in the game and such?
A: Yeah, it occurred to me that what if I had put in a different number, what would the info splash be like then.

H: So would you like to try with a different number?
A: Yeah, I really would.

H: Ok, and then... about the longer reads in the game, did you read all of the texts?
A: Yeah.

H: How was the amount of reading in the game?
A: It was just fine, just fine.

H: Would you like to play a game like this in the future, if it was a "real" game?
A: Yeah, I would. If it was like a game that takes longer, that would be good.

H: How did you like the language in the game, word choices and such?
A: Umm. Like kind of funny. Jokes and stuff. Not too appropriate.

H: Did it have correct ice hockey terminology and slang in it?
A: Yeah, it did, it did.

H: What kind of thoughts or feelings did you have towards reading while playing the game?
A: ....

H: Ok, let's try a different approach. If you had to come up with a rating from one to five, (shows the smiley cards), of which one represents this sad face and five is
this happy smiley face, which one would you pick? First, only for the game itself, what would be your choice?

A: I guess this (picks up four)

H: And how about rating the game only for its reading, same question?

A: Umm...

H: I mean, how did the game make you feel towards reading in general?

A: Yeah, it was like, with the game jersey thing in there, with the informative approach... you get information. I would rate it a four.

H: Ok, both a four... did you find the hidden books?

A: Yeah, two of them!

H: Did you find them by clues in the text or just poking around?

A: One of them by clues and one by just finding it. (Gameplay transcript indicates that he found both of them by reading the clues)

H: Any other thoughts on the hidden books or just reading in general, or do you think the game could motivate to read?

A: Well well, yeah... of course, if the texts are long and they have stuff you have to read carefully to really understand something. And just like the game was, you don't get forward if you don't read. That's important.

H: Why do you think the game could make you more motivated towards reading?

A: I guess it's a matter of getting used to something, like when you play a lot of games and you do a lot of reading in them and then it gets easier to read, and you have enough strength to read, also other texts.

H: Ok, thank you, good answers.

A: Thanks!
17.12.2013 Interviewee four

(The beginning of interview has a lot of background noise, introducing each other and some conversation)

**H:** Your name was...?

A: (omitted)

**H:** So you play hockey?

A: Yeah, in Laser HT.

**H:** Do you have any other hobbies?

A: Well, not really... during winters I go skating outside.

**H:** Yep, hockey seems to take a lot of time. Do you have free time to play other games?

A: Yeah I play, with Xbox NHL and Grand Theft Auto.

**H:** GTA 5?

A: Yeah.

**H:** Ok, and how much do you read? Books, magazines, everything in general...

A: Umm... well we have to read a book for school every month. And then of course newspapers, tabloids and stuff.

**H:** Online tabloids and newspapers?

A: Yeah online.

**H:** Ok, how about... do you read any traditional newspapers or something else?

A: Well, in the morning, when I have time, I read Kaleva (local newspaper). And then I subscribe to Urheilulehti from Ilta-Sanomat (sports magazine).

**H:** Ok. Sports news seems to be the thing...

A: Yeah

**H:** Yeah... and next, about the adjective cards, you chose five words.

A: ...

**H:** Do you have anything else, maybe some other word to describe the game?

A: Well not really, not so much...

**H:** That's alright, the five are enough. However, you seemed to enjoy the game. What kind of feelings or thoughts did you have while playing it?
A: Umm... like when I was... when you escape the locker room I had a feeling that there could have been a final area where you could like fight the zombies. So it could have had an ending like that or something.

H: Yeah, the ending could use something. We ran out of time while developing the game and had some plans for the ending, but did not make it in time as we had only this autumn to make it. So it is what it is.

A: Yeah, okay.

H: How did the main character feel like?

A: Well it was just fine. The beginning of the game could have used some more clues, like when you had to open the locker. At first I didn't really figure out how to get out of the first room. (Gameplay transcript indicates he had trouble dragging inventory items on top of each other).

H: The game didn't really indicate you could drag items on top of each other?

A: Yeah, that could have been indicated somehow...

H: Would a tutorial of some sort make it better?

A: Mmh.

H: How did you feel like, as a hockey player, that the game character was also an ice hockey player?

A: Yeah, that was a positive thing!

H: How about the game world?

A: That was good as well, and it wasn't like ordinary, like you had the zombies coming against you and all.

H: Did the game world feel, perhaps, familiar or distant and unfamiliar?

A: Well yeah, it was a little of both, like you had the familiar environment and then the zombies in it.

H: Yeah, zombies are not that usual.

A: Heh, no they're not

H: How about the game jersey number, did you choose your own number in the beginning of the game?

A: Yeah, number 18.

H: Do you remember the player that was in the info splash with that same number, when you tapped the jersey hanging on the wall?

A: James Neal.

H: Expected?
A: Yeah, yeah.

**H:** Did you think about trying the game with a different number?

A: Yeah I could try.

**H:** All of the numbers from zero to 99 are covered, and the info splash changes accordingly.

A: Umm, yeah.

**H:** What about the rest of the long texts in the game, did you manage to read them all?

A: Yeah, I did.

**H:** How did that feel like, did it help you get forward in the game?

A: Yeah, the game gave good clues... with the character telling you stuff and like that.

**H:** How was the language in the game and the reading overall?

A: Yeah, it was like... clear. And informative.

**H:** Joo. Haluaisitko pelata tämmöstä peliä jos olis pitempi peli, tai siis "oikea" peli?

A: Yeah, why not. And especially if you could play mobile, like with a smart phone.

**H:** Ok. How did you feel about the language in the game? Hockey slang and so on...

A: It was alright...

**H:** Was it made well or...

A: It was just fine. The language was pretty funny, in total.

**H:** Did you notice any errors or anything that caught your eye?

A: No, did not notice.

**H:** Ok, then... If you had to come up with a rating from one to five, (shows the smiley cards), of which one represents this sad face and five is this happy smiley face, which one would you pick? First, only for the game itself, what would be your choice?

A: That would be four.

**H:** Ok, then, same question, but only for the reading part, in general?

A: That would be five, there was some good reading and such.

**H:** Ok, did you thing the reading was a positive thing?

A: Yeah, it wasn't like... like it would be boring and too simple if there was no reading. And when you read you got to get forward in the game.
H: Ok, well said. Then about the hidden books, did you find any?

A: I found one.

H: Did you find it by just looking around or by clues in the text?

A: I noticed it somewhere and then clicked it.

H: Did you notice any clues in the text related to the hidden books?

A: Not really...

H: About reading motivation... Did you have any feelings about reading motivation, or could a game increase your reading motivation, what do you think?

A: Well, of course... like you could use some Finnish ice hockey books in the game, then you could read them and try to find the book somewhere.

H: By the way, one of the books you didn't find was a Finnish book about ice hockey...

A: Oh, bummer...

H: No matter. Do you think games like this could motivate to read even further?

A: Umm...

H: Not necessarily books exclusively, but reading in general. And the game had a lot of reading by itself.

A: Yeah, well if there's a lot of text then you get to practise reading at the same time, if you're somewhat younger. Unless the game has an age limit...

H: Hmm, well there was a little of violence in the opening titles...

A: Yeah...

H: Anything else that you would like to comment?

A: ...

H: Let's take Wikipedia for example. The game had some references to Wikipedia, do you think that could affect your reading motivation?

A: Yeah, like if you leave the rest of the text out and then you would have to find it by yourself and you probably would do so.

H: Ok, good thinking. Time's running out, so thank you!

A: Thanks.
17.12.2013 Interviewee five

H: Ok, and what was your name?
J: (omitted)

H: Ok. And your hobby is also ice hockey?
J: Yeah...

H: What team?
J: Kiekko-Oulu.

H: Kiekko-Oulu... what position do you play?
J: Left wing.

H: Ok. Do you have spare time from your ice hockey hobby, do you do something else? Sports, so on...
J: No...

H: How about games, do you play, like with Playstation?
J: Yeah I have a Playstation.

H: What games do you like to play?
J: Well, NHL... and then, Grand Theft Auto... and also others.

H: And how about... do you read, books, magazines, reading in general.
J: I do read Donald Duck often and... then, we have to do these book presentations at school, so those books.

H: Ok, how many books have you read this semester?
J: Well, three books so far this semester.

H: Oh, ok. Good.
J: And the presentations for the books...

H: What book are you reading at the moment?
J: I just finished it, a book called Pahojen miesten seura.

H: Ok. And do you read magazines, newspapers, or sports news?
J: Yeah, daily, I always check Ilta-Sanomat (tabloid).

H: Anything else, like blogs, stuff like that?
J: No, no blogs.
H: Ok. Then the game related questions... these don't have right or wrong answers by the way. You had a pretty positive view on the game (adjective cards). Did you feel the game was easy to use? You said it didn't have too many buttons to mix up things.

J: Yeah, that was positive.

H: Can you come up with a different word to describe the game? You took a long time searching for the last adjective, do you have any other word to replace it?

J: Umm... (thinks a long time). Not really.

H: Ok, the five is quite enough. What kind of feelings or thoughts did you have while playing?

J: Umm, well, it was pretty... umm, like exciting to play, and try out different things in the game.

H: Ok. Did you like the game in general?

J: Yeah, though it was a bit short.

H: Do you think it could've gone on longer?

J: Yeah, maybe for a room or two more.

H: Ok, then... If you had to come up with a rating from one to five, (shows the smiley cards), of which one represents this sad face and five is this happy smiley face, which one would you pick? First, only for the game itself, what would be your choice?

J: Well... maybe, if I take this... it was like, a four.

H: Ok, then the same question but only for the reading in game. The long texts, all of the narrative, reading in general...

J: Well, it was good with the information splashes and all. And the comments from the character, it was pretty good. Like when you tap thing in the game... (picks five).

H: Ok, seems you liked it. Five. As it seems, the game was a lot about reading...

J: Yeah, heh.

H: How about the game character. He's also a hockey player...

J: Yeah. He was like, the ordinary ice hockey player.

H: Ok. Did you think he felt familiar, or was it done bad or well...

J: Yeah, everything seemed familiar.

H: Anything artificial or negative things?

J: Not really, no.

H: How about the game world, ice hockey arena and such... how did that feel like?
J: Well, it was just like... an ice hockey arena.

H: How about the zombies?

J: Well, that was like... the zombies were fun in the game.

H: About the game jersey number that you got to choose in the beginning. What number did you use?

J: My number wasn't there, I put in my previous jersey number.

H: Ok, what was that?

J: I think nine.

H: What's your jersey number now?

J: 67.

H: Ok. There was the info splash later in the game, when you tapped the jersey and the text about the player appeared...

J: Mm... Yeah, I guess I pressed the number twice so it was 99.

H: Ok, what player did you get?

J: Gretzky.

H: Gretzky, of course. Did you read the info splash? Was it good, like you mentioned the game had some information splashes now and then. Did you read it or was it already known about the player?

J: Yeah I've read it already before...

H: Now that you know any player number goes with the info splash, would you like to try with a different number?

J: Yeah, I could try.

H: What player would come out, do you have a guess?

J: I guess, if I put in my own number... so if it's from NHL, then I guess... what was it, Max Pachioretty. (Seems eager to try out, takes the Ipad from the table).

H: Ok, you can try it at the end if you like.

J: Ok.

H: Then... about the other reading in the game, did you read everything, longer texts?

J: Yeah, pretty much... The hidden books.

H: How many books did you find?

J: One... No, two I guess.
H: Ok. How did you feel about the amount of reading in the game, too much, too little?

J: It was just the right amount.

H: Ok. not too much then. You read it all?

J: Yeah. And it wasn't too long to read.

H: Would you like to play a game like this in the future, like if it was also about reading, an adventure type of game like this?

J: Yeah I guess I would.

H: How did you like the language in the game?

J: It was clear and easy to read and so on.

H: Yeah, you chose the word fun in the adjective cards. Did you think the game was fun and why?

J: Yeah, it was kind of funny. The character bragged about himself and stuff...

H: Ok... Did you come across anything that seemed wrong in the language, any errors or anything that caught your eye?

J: I guess no...

H: About the hidden books, did you find them by looking around or by reading the clues in the text?

J: I just found one of them, it was on top of the shelf and there...

H: Ok. How about reading motivation, do you think a game like this could improve your motivation to read? Not just books, but reading in general.

J: Hmm... I guess, it could. A little.

H: How could we improve on that?

J: Well... for example, in the poster, it could have some more text and stuff.

H: So, more reading?

J: Yeah, more reading.

H: Ok, then you can try out the game with a different number if you like.

J: Yes!

(Jesse got to play the game through again with a different jersey number and found out the player he was expecting).
Interviewee six

(Before the interview, J mentioned he reads sports news online and the morning paper, sometimes. No books).

**H:** So how did you like the game?

**J:** It was pretty good.

**H:** Oh yeah, can you say your name again please?

**J:** (omitted)

**H:** Yeah, and... you play ice hockey as well?

**J:** No, football.

**H:** Ok, what team?

**J:** OLS.

**H:** Is that your number one hobby or do you have anything else?

**J:** Not really. During winter I go skating, sometimes.

**H:** Yeah, football can take a lot of the time...

**J:** Yeah.

**H:** Do you have time to play any games?

**J:** Yeah, every now and then... FIFA and NHL.

**H:** Grand Theft Auto seems to be also popular.

**J:** Yeah well, sometimes I play that as well.

**H:** Yeah. These questions don't have right or wrong answers by the way, so don't worry about answering. About the adjective cards, you chose mostly positive words. I take it you liked the game?

**J:** Yes.

**H:** Do you have any other word that comes to your mind that describes the game?

**J:** Not really.

**H:** What kind of thoughts or feelings did you have while playing the game?

**J:** Well, it was kind of difficult when I didn't get to... hmm...

**H:** Did you get stuck?

**J:** Yeah, at the end...

**H:** Did you need any advice?
J: No, I found the solution myself.

H: How did the main character feel like? Being a football player, it was pretty obvious that the game was targeted towards ice hockey players.

J: Yeah.

H: What did you think about the main character then?

J: Well, umm... kind of just a normal guy.

H: What if... No, what about the game world?

J: ...

H: Any believability in it?

J: Yeah there was.

H: And the zombies, not so much or what?

J: Heh, no... not so much.

H: What about, let's imagine that you were also playing ice hockey, would you like this game even more?

J: Well, not really.

H: What if you were not into sports at all?

J: Well, then it wouldn't be interesting, not so much.

H: Do you think that, let's say, some of your friends who are not into ice hockey, would they be interested in this game?

J: I guess they wouldn't.

H: H: Ok, then... If you had to come up with a rating from one to five, (shows the smiley cards), of which one represents this sad face and five is this happy smiley face, which one would you pick? First, only for the game itself, what would be your choice?

J: (Picks number four)

H: Four. And the same question, but just for the reading stuff in the game, in general?

J: (Picks number three)

H: Three. And about the amount of reading in the game, what did you think about that?

J: It was adequate.

H: What about the length of the texts?

J: They weren't too long.
H: Did you read all the way through?
J: Yeah.

H: Then... The game jersey number in the beginnin, what number did you use?
J: 55.

H: Who was the player in the info splash later in the game?
J: Somebody named David Morray.

H: Not someone you know?
J: Nope.

H: Would you like to play a game like this, if it was a little longer perhaps?
J: Hmm, yeah I would.

H: What do you think about the length of this game then?
J: Maybe a bit too short.

H: So I've heard... have you played any games like this one previously?
J: Yeah, online.

H: Adventure games?
J: Sometimes.

H: How did you like the language in the game? With the hockey slang and all...
J: It was ok...

H: Believable, or stupid, or?
J: Yeah it was pretty believable.

H: Any mistakes that caught your attention?
J: Didn't see any...

H: What kind of thoughts did you have about the reading in the game?
J: It was alright, you just go and read.

H: Not bad, then?
J: No.

H: Then there was these hidden books, did you find any?
J: Two.
H: What did you think about the books? Did you find them by looking around or by clues in the text?

J: (Thinks)... Well, I found the books there...

H: Any by reading the clues in the text?

J: Well, I found one by reading the clues.

H: Do you think a game like this could increase the motivation to read?

J: Well, not really.

H: Ok... Can you think of anything to make the game increase the motivation to read?

J: No, not really.

H: Could the game get you more motivated towards playing games like this?

J: Yes.

H: The game has a lot of reading, so that way could it get you to read more?

J: Well, yeah it could...

H: I guess we're running out of time, and that covers it pretty much. Thanks!

J: Thanks.