Mind the Gap

A qualitative study on preschool teachers’ perception on digital game-based learning

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Abstract

The research reported here is a qualitative case study aimed to identify the position of digital game-based learning (DGBL) in the public and private preschools of Stockholm. The research is placed within the broader framework of digital game-based learning and the practical implementation of digital games in education. Teachers are seen as key-responsible for adopting and integrating a new tool, like digital games, in the teaching procedures. In this study, the emphasis is given to the role of the teachers in the practical implementation of digital games into the classroom.

The research examines the attitude of teachers towards digital games and investigates the role of these attitudes in the implementation of DGBL. The empirical findings of the study are analyzed and discussed through the prism of the existing literature on the field.

The study shows that the perception of teachers on digital games and on the use of technology in early childhood education is the main factor that influences the implementation of digital games in preschools. The teachers’ attitudes can be distinguished in two categories: positive teachers and sceptical teachers. Furthermore, there are several other barriers that prevent the spreading of DGBL in education institutions. Regardless of the teachers’ stance and the existing barriers, teachers are aware of the existence of digital games applicable to early childhood education and many of them do make use of them. In this study, the ways of implementation of digital games are also presented. However, teachers do not discuss digital games with the parents, while the discussion among colleagues is limited. The lack of information and appropriate training reveal a gap between the research community and the educational practice of DGBL.
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<tr>
<td>DATEC</td>
<td>Developmentally Appropriate Technology in Early Education</td>
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<td>DGBL</td>
<td>Digital Game-Based Learning</td>
</tr>
<tr>
<td>ECEC</td>
<td>Early Childhood Education and Care</td>
</tr>
<tr>
<td>ICT</td>
<td>Information and Communication Technologies</td>
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<tr>
<td>OECD</td>
<td>Organization for Economic Cooperation and Development</td>
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<tr>
<td>ZPD</td>
<td>Zone of Proximal Development</td>
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<td>UNESCO</td>
<td>United Nations Educational, Scientific and Cultural Organization</td>
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Anastasia - Thomai (Anthemis) Raptopoulou
To my parents,

who made everything possible
"[Digital is] just another tool in our arsenal or an arrow in our quiver, if you like. Digital enables us to do more with less in a shorter time. I think all of us grew up using digital. There's a new generation coming through of people who have never used tape and don't really harken back to the days of that; but digital is here, and it's great. We love it."

Ben Wilkins
Chapter 1

1.1. Introduction

Growing bodies of research link digital games to learning theories, arguing that digital games create a stimulating learning environment, improve student motivation, stimulate creative thinking, and provide challenging and meaningful contexts for learning (Prensky, 2001; Gee, 2003; Squire, 2004; Shaffer, 2007; Egenfeldt-Nielsen, 2007). Digital games incorporate features, such as challenging of the gamer, engagement of the gamer and multimodality, that support and promote learning while attract the attention of the user. Therefore, there is a strong belief that digital games can be a powerful educational tool with proper application in the classroom settings. An increasing number of people are using digital games to learn in informal environments, but at the same time their acceptance in the classroom as an instructional activity has been mixed (Kenny and McDaniel, 2011). Indeed, regardless of the existing theoretical research concerning digital game-based learning (DGBL), little has been done on the empirical research concerning the use of DGBL in the classroom. Plenty of digital games and application software in forms of digital games are produced - many of them are introduced in the market as educational - however, it is not known in what degree they are being used, how they are being used and by whom. Additionally, when digital games are used in the classroom, there is limited empirical evidence of the practical implementation of them, especially in the early childhood education.

A key factor in the use of digital games in the classroom is that of the teacher. The existing academic research in the field, as well as the developing of digital games for educational purposes is not enough to bring games into schools. Teachers are those who will decide to carry a new tool into the classroom and implement it in their teaching; regarding digital games, their use in the classroom is rather limited. Despite the importance of the role of the teacher, not much is known about the acceptance of digital games by teachers, especially early childhood education teachers. Technology implementation plans are focused too much on the technology aspect and this can be considered a flaw, because teachers are in many areas the true change agents of
schools in terms of modes of education (Bourgonjon, De Grove, De Smet, Van Looy, Soetaert, Valcke, 2013).

Taking the aforementioned research into consideration, the interest of the researcher on the practical application of digital games and the related literature review, led the researcher to notice that there was lack of literature on the teachers’ acceptance of digital games and the implementation of digital games in the classroom, especially within the frames of the early childhood education and preschools. The absence of evidence on this matter calls for a deeper understanding of what preschool teachers’ perception of digital games is and whether this perception relates to their use in the classroom. This study attempts to fill the gap between the academic community and the common practice in the classroom, by searching for empirical data in the preschools with teachers as the participants of this study. The main focus of the research is the perception of preschool teachers on DGBL and the implementation of digital games in the preschool classrooms, since it is not fully known whether preschool teachers are using digital games or which factors influence the use of digital games as educational tools in preschool classrooms.

The initial focus of the study was the comparison between teachers that are employed in the public or the private sector. The thought behind this comparison was that the sector, to which the schools belongs to, would make a difference regarding the approach of teachers towards education, the educational tools provided by the school and their use by the teachers, and the goals of the schools on the modernization and digitalization of the schools. However, the conducted study led the focus of the research on the teachers themselves, indicating that private or public sector does not affect the DGBL outcomes as much as the attitude of teachers towards digital games and the technology in general.

The above speculation on the topic of DGBL and its practical implementation in early childhood education resulted into the emergence of the research questions of this study.
1.2 Aims and objectives

This study aims to gain a deeper understanding of what preschool teachers’ perception of digital games is and whether this perception relates to their use in the classroom. The objectives of this study are:

- To identify teachers’ opinions on digital game-based learning and whether they use digital games in the classroom or not
- To identify the differences between the teachers working at the public and the private sector regarding the use of digital games and DGBL
- To identify the ways digital games are used in practice
- To find out if the teachers are discussing about digital games with other colleagues or parents and to what extend the discussion is an important factor in forming their opinion on the subject of DGBL

1.3 Limitations and delimitations of the research

As with any other research study, this study contains certain limitations, which affect its complete evolution and accuracy.

The first limitation is the size of this study. The research is qualitative and comparative case study limited to two types of preschools, public and private, all based in Stockholm. This is intended to be a small study from which the data is to be collected through interviews with teachers. Therefore, the results will not make generalization possible. For a better understanding of teachers’ perception of digital games both on a national and international level, a larger scale study should be conducted.

Other limitations worth mentioning are the willingness of the subjects to participate in the interviews and the language used for the interviewing. Since the outcomes of the research are based on the answers of the interviewees, it is essential to make sure that the interviewees are willing to participate and that the answers they give are truthful ones and not ones they believe are proper to say. Despite the fact that English is widely spoken in Sweden, there might be the possibility that the
interviewers do not feel comfortable to speak in a language other than their native tongue and this might affect the answers given.

It is also important to underline that ICT and digital games are not equally approachable by all children in all continents, neither in institutional early childhood education centres or at home. Nevertheless, it is our obligation to study the phenomenon to better understand how to project it today in order to harness its huge potential tomorrow.

1.4 Significance of the Research

When the implementation of new tools in education, such as the digital games, is being discussed and examined, the investigation of stakeholders’ beliefs is considered essential. The undertaken study allows us to make a further step from the theory of applying digital games in education, to the actual implementation of them in the classroom. This study is an attempt to provide some insight into the opinions of the teachers—who are the main actors responsible for the implementation of the educational tools in the teaching procedure—about the DGBL. This study will help us to identify the factors responsible for the felicitation or the impedance of digital games in the classroom and will allow for DGBL to be an applicable and effective educational tool. Policy makers, educational institutions, and teachers are seeking for didactic techniques and tools that serve the demands of society and promote learning in the century of information technology. Digital games may be one of these tools.

This study will provide a deeper understanding on how teachers perceive digital games, what their thoughts are about them, and whether they would use them in an educational setting or not. Furthermore, if this study was to be used and developed by others in a larger scale, this understanding can be useful to education stakeholders and digital game developers.
1.5 Structure of the thesis

The first chapter of the thesis presents the main topic of the research, introduces the problem in focus and identifies the aims and objectives of the research, as well as the research questions. The second chapter introduces the research area; it gives a detailed presentation of the existing theories in the field and presents the theoretical framework of the study. In the third chapter the research methodology employed by the researcher is presented, while the fourth chapter provides the reader with the context settings and gives details of the procedures followed for data collection, data analysis and the completion of the research. The fifth chapter presents the report of the research findings that deal with the perception of the teachers on DGBL and on digital games in general and discusses the position of the digital games in the Swedish preschool. The sixth chapter discusses the study’s findings. The seventh, final chapter of this study summarizes the research and presents recommendations and ideas for further research.
Chapter 2
Conceptual and theoretical framework

This chapter deals with the historical background, the theoretical background and the conceptual framework within which this research is placed. The chapter begins with the historical background, an introduction on how digital games ended up gradually into the classrooms and are claiming their position as promising educational tools. The topic of DGBL is a fairly new concept and it incorporates several contexts. This chapter is also a brief introduction of the key concepts that are related to the DGBL and it attempts a connection between the DGBL and the learning in early childhood education. It proceeds with introducing the constructivist perspectives that relate the DGBL to the learning and teaching procedures. Finally, a literature review of the field is presented.

2.1 Historical Background

During the last two decades, digital media has gained a ubiquitous presence, not only in the lives of adults but also among children. The use of technology is gaining popularity between school aged children to a degree that have led to the characterization of the new generation of students as the ‘media generation’. “This media generation has been raised with the remote control of the TV, a computer mouse or a game stick in one hand, and the mobile phone in the other” (Divjak, Dowling, Fisser, Grabwska, Heemans, Kendall, Mihnec, Ritzen, Syso, Vicari, van Weert, 2004, p.8). The development of the technology and the increased access to media has led to changes in the way young children learn. This change is creating new needs and demands, but it is also opening new channels for learning with the use of digital tools. Information and communication technologies (ICT) are gradually integrating in the classrooms and are taking a more central role in the education system.

The idea of using ICT technologies in childhood education is not a new concept. Already in 1930s, the French educator Celestin Freinet integrated
pedagogical ideas and ICT existing to formulate a model of a school that would use the application of ICT within the classroom (UNESCO, 2010). The use of computers in education is traced back to the late 1950s (Gredler, as cited in Gibson, Aldrich and Prensky, 2007, p.6), and “in the 1960s, there were few educational applications of computers in universities, with most performing routine computational tasks.” (Fernández-Manjón, Bravo-Rodríguez, Gómez-Pulido, Sánchez-Pérez, Vega-Rodríguez, 2007, p.3). Initially, the use of computers was rather small and was limited in higher levels of education, but before too long it was considered a tool with high potential for all educational levels; In the mid-1960s Papert and Feurzeig “were pondering on the idea that computers should be at children’s disposal so that they could learn in a different way” (UNESCO, 2010, p.22).

Digital games are an ICT tool which recently is gaining ground in education. For the use of digital games in education, a starting point appears to be “the strong transitions within the business sector and the military for using games for educating people, which dates all the way back to the eighteenth century” (Egenfeldt-Nielsen, 2007, p.21). However, the instructional use of digital games did not appear in the educational scene until the early 1970s. In the mid-1890s the concept of educational entertainment (edutainment) made its appearance. Edutainment is content designed to educate and to entertain, and in the case of digital games it includes game titles that provide game experience and simple gameplay based on rather conventional learning theories. By the mid-1990s, edutainment was successfully evolving in the educational scene, focusing mostly on the early childhood education with activities such as reading, spelling, typing and arithmetic (Egenfeldt-Nielsen, 2007).

In the past decade, wide acceptance of ICT and their expansion in the classrooms set off a growth of interest in digital games, with a growing body of evidence suggesting that digital games have educational value. In 2003, a movement started in United States which used video games in teaching and training (Annetta, 2008), which was in a great degree empowered by James Paul Gee book (2003), *What Video Games Have to Teach Us About Learning and Literacy*, which focused on the learning principles in video-games and their potential application within classrooms. Since then, more and more advocates are highlighting the benefits of digital games and their potentials of becoming educational tools, which can engage students and follow the demands of a technologically advanced society (Gee, 2003;
Squire and Jenkins, 2011; Egenfeldt-Nielsen, 2007; Steinkuehler, 2008; Shaffer, 2007).

Despite broad coverage of the theoretical part on how digital games can become a useful tool in education, little has been done in its actual implementation in educational institutions, especially in Europe. A reason might be the fact that little has been done in raising awareness among teachers regarding digital-game based learning within classrooms, or in training teachers on how to effectively implement digital games as teaching tools in the classroom. “Successes in informal learning have caused supporters to falsely believe that implementing them into the classroom would be a relatively easy transition and have the potential to revolutionize the entire educational system. In spite of all the hype, many are puzzled as to why more teachers have not yet incorporated them into their teaching.” (Kenny, McDaniel, 2011, p.197).

2.2 Key Concepts

2.2.1 Digital games

A digital game is an interactive game for one or more players, played on an electronic device. It is a set of rules and goals and it is used for entertainment purposes. As Salen and Zimmerman (2003) agree, games are systems in which players engage in an artificial conflict, defined by rules, which results in a quantifiable outcome. They are played via screens on various devices like computers, televisions, tablets or mobile phones. Digital games are often referred to as electronic games, or computer games or video games. However, the continuously changing nature of technology and the parallel existence of several definitions for electronic games, computer games or video game are therefore difficult to frame and to satisfactorily define. The term “digital games” represents the totality of the formats and, therefore, will be used to denote all of the above.
2.2.2. Educational digital games

Digital gaming has become a significant leisure activity for a wide range of people, with digital gaming activities targeting to a much younger audience and paving the path for educational digital games. In general, educational games are games designed for educational purposes. Different types of games can be used in an educational environment and can take on educational values, depending on the way they are used and what their goals and purposes are. Digital games, like all kinds of games, have as a main goal to entertain and, within the range of games used for education, digital games can also be included. Educational digital games can be on several subjects, such as language and reading, math, science; they can support the development of several skills, such as thinking and reasoning, creativity and emotional development. Thus, there is a wide selection of educational games that apply to different needs.

It is not trivial to explain what makes a digital game educational. The characterization of a digital game as educational is closely related to several key concepts such as games and play, education and learning (Egenfeldt-Nielsen, 2007). Educational digital games can be of different kinds, with the main categories being: (a) commercial educational digital games -often referred to as edutainment, (b) commercial game titles used for education and, (c) research-based educational digital games that follow existing formula and patterns of the successful commercial educational computer games.

Two examples of games, with focus on the early childhood education, that illustrate the idea of what is an educational digital game are; the Peppy Pals and the DreamBox Learning Math. Peppy Pals focuses on the development of the emotional intelligence of children and teaches them empathy, emotion and collaboration through role-playing. It is a story telling application, with animals as main characters and with several scenarios that inspire discussions about feelings. The game contains neither words nor written language, yet it provides the children with the possibility to learn to give empathy. DreamBox Learning Math is an educational math game, which adjusts to the children’s math competency while they play. Children are given several tasks to solve in different settings and are provided with rewards and positive messages. The
feedback of the game is immediate and help is offered every time that the child faces a problem they cannot solve.

### 2.2.3 Digital game based learning

In the teaching procedure, the use of digital games with structured goals and defined learning outcomes is often referred as digital game based learning (DGBL). In DGBL, learning and motivational potentials of digital games are used to promote learning and transmit knowledge. A main characteristic of game based learning is the balance between two elements: the element of learning and the element of play (Egenfeldt-Nielsen, 2007). While game-based learning existed as a concept, the term DGBL was coined by an influential authority on the research field of DGBL, Marc Prensky, in his book *Digital Game Based Learning* (2001). Marc Prensky (2005) argues that DGBL is based on two key premises: that the learners have changed radically and they need to be motivated in new ways. On DGBL, digital games are perceived as non conventional educational tools that can create opportunities and reach new goals in the way of teaching.

In this study, to effectively understand what game based learning is, the researchers will not only focus on the definition of digital games, but also on the understanding of the concepts of learning and play.

### 2.2.4 Learning

The concept of learning is an element in understanding what makes a digital game educational and why it should be used as a teaching tool.

Learning is a complex concept, formal and informal in nature, impossible to limit in the narrow borders of educational institutions, whilst continuously expanding beyond the academic contexts. For Jarvis (2006), learning is the acquisition of knowledge through study, or experiences or being taught; it is a combination of processes which begins with the transformation of experience. Piaget (1977), on the
other hand, “defined learning as having only a limited role within a larger process of the functioning and growth of structures” (p.xxxvii), while he believed that “learning of specific behaviors or contents can only take place within existing structures” (Piaget, 1977, p.xxxvii). Learning is of a dynamic nature and can take place in many different situations empowered by many ways. According to Jarvis (2006), the complexity of the human learning renders almost impossible a total understanding of it almost impossible, no matter how many research papers has been published over the years.

Learning and education are two terms closely related to the educational system and to each other. The meaning of education is closely related to schools and institutions, however is also “the education which everyone gets from living with others […] and the deliberate educating of the young” (Dewey, 1916, p.6).

2.2.5 Learning in early childhood

In this thesis the main focus is set on learning in early childhood. Humans learn to learn at a very early age initially by transforming their experiences into knowledge and usually through play. Early childhood is commonly defined as the ages between birth and eight years. Between these ages, learning is of great importance as it contributes to the development of the child. “Education in the preschool aims at a children acquiring and developing knowledge and values (Skolverket, 2011a, p.3). Since learning in early childhood has a great effect on the overall development of the child, it cannot be attributed solely to one discipline. “For early childhood education, learning is closely related to the development of the whole child. Thus, learning is framed more broadly as being related to cognitive, social, emotional, physical, and cultural development” (Rosen, Wang and Yelland, 2008, p.103). Therefore, the learning in early childhood has a broad character and is of a multidisciplinary nature. In an attempt to define the aims and goals of the early childhood education, OECD and UNESCO created the Early Childhood Education and Care (ECEC) curriculum, which has become a major priority in many countries around the globe (OECD, n.d.a). Some of the aims included in this curriculum are: health and physical
development, emotional well-being and social competence, positive approaches to learning, communication skills, cognitions and general knowledge (UNESCO, 2004).

Even though there are several basic premises on what children should learn during their first years of development, the relatively recent evolution and spreading of information and communication technologies (ICT) has changed not only the way young people learn, but also what is demanded from them to be learnt. Along with that, the way education and learning are taking place has changed too. It is apparent that the multidisciplinary nature of the ECE, as well as its multimodality, allows a wide selection of topics and activities regarding what children should be taught at what age. This gives enough space for a variety of approaches and new tools such as digital tools and digital games to be used as educational tools, supporting practices outside of the traditional and ordinary.

2.2.6 Play

When we are talking about learning and the development of a child, play is considered a leading activity and driving force, which motivates the child, challenges him to take action and helps him interact with others. The concept of the importance of the role of play in a child’s development is closely related with the name of Jean Piaget. Piaget placed great importance on the education of children, focusing on the knowledge that children are constructing on their own, often by playing. Play has such a central role in children’s reality that there is a difficulty in “distinguishing a child’s play from his beliefs” (Piaget, 1951). As Egenfeldt-Nielsen (2007) argues, “learning is prerequisite for playing” (p.7) and children search for knowledge through play. Play constitutes an important part of children’s cognitive and social development, while it is a privileged learning experience (Rosas, Nussbaum, Cumsille, Marianov, Correa, Flores, Grau, Lagos, Lopez, Lopez, Rodriguez and Salina, 2002). Through play, children construct their own world, stimulate their imagination, and develop the ability for communication, as well as the ability to cooperate and solve problems. Moreover, through play, children can express themselves and comfort their feelings. Learning in childhood education promotes that:
“Conscious use of play to promote the development and learning of each individual child should always be present in preschool activities” (Skolverket, 2011a, p.6).

“The basic assimilative function of play means that it is a type of activity in which established schemas are exercised rather than changed, things fit into schemas rather than schemas adjusting to things. That is why play is fun” (Piaget, 1977, p.693-694)

Even though playing is an activity that can be described in several ways, it is almost impossible to be defined accurately. “Researchers have failed to reach consensus on a definition of children’s play” (Saracho and Spodek, 2006, p.712). Piaget (1977) identified three sorts of play: rule games, exercise games and the symbolic play. Sutton-Smith (as cited in Van Eck, 2007) distinguished seven kinds of play: (i) play that has as a purpose to learn something useful, (ii) play that challenges fate, (iii) play that renders power with winners and losers, (iv) play that serves to confirm the identity of those who play, (v) play of imagination and improvisation, (vi) play as self, (vii) play as frivolous.

The presentation of several kinds of play reinforces the idea that play is a complex concept -just like learning. Different kinds of play support different kinds of learning and address to different kinds of learners. Play, as a concept, is closely related to games in a rather complicated way. According to Salen and Zimmerman (in van Staalduinen and de Freitas, 2011, p.34) there are two ways to frame the relationship of play and games: games are a subset of play and play is a subset of games, since games are contained within play and play is contained within games. This definition of the relationship between game and of play is unsatisfactory. While one cannot deny the close relation between the two of them, one cannot define the differences between them either. In this study, I will refer to games as subset of play, as games are seen as a framework within play can be seen.

2.2.7 Connecting the concepts of learning and play with the study

The promotion of DGBL challenges the boarders between learning and play and often finds resistance in its implementation. While in other levels of education learning and play might be separated, in preschool education these two concepts are highly interconnected to such a degree that there is no distinguish between them. As is it
already stated above, in early childhood education learning is of a multidisciplinary and multimodal nature and is often connected to play, which constitutes an important part of children’s development. However, these two concepts are not that easy to describe or define. In further understanding the complexity of play and learning, stressing the multimodality of the latter, it is easier to understand why digital games could be successful educational tools.

Even though the concepts of learning and play are not connected to the results of the study, they are critical for building the digital game-based learning framework. If digital games are perceived merely as games with entertainment as their main purpose, this research attempts to examine digital games from a different perspective and connect them to the teaching procedures. Therefore, while discussing digital games, we must refer to these key-concepts in order to explain how digital games are perceived in relation to education and learning. By referring to them, the researcher can explain further why digital games are perceived as promising educational tools for early childhood education and how they can be related to learning in preschools.

Digital games are promoting learning through multimodality in several different areas, which comes in accordance with the belief that early childhood education should be of a multidisciplinary nature. Moreover, digital games incorporate the element of play which is considered critical in early childhood learning and development. Based on all we know about learning and play in young ages, digital games are a new tool and a different approach introduced to the children that might empower learning from a different perspective

2.3 Constructivist perspectives
A solid framework for understanding the concept of DGBL is a framework supported by the theory of constructivism. The concept of “learning by doing” involves many constructivist principles that support game-based learning. Constructivist theories have made important contributions to building the framework of the educational potentials of digital games and the interactions between digital games and learning.

Constructivism is a perspective about how people learn, and it is generally attributed to Jean Piaget. The fundamental principle of constructivism is that the
learners are constructing their own understanding and knowledge of the world through experiencing things and reflecting on those experiences. The constructivist theoretical approach “focuses on the learners’ control of learning processes and attempts to mitigate the gap between the knowledge as a concept real life experience” (Huang, Rauch and Liaw, 2010, p.1173). In the classroom, the constructivist view of learning usually encourages students to take on a more active role in their learning, while the teacher has the role of a guide who understands the students’ pre-existing conceptions and attempts to build on them through given activities (UNESCO, 2010, p.118).

The constructivist theories that will be used in this study to support the concept of learning through digital games are: the Vygotskian constructivist theory and the experiential approach to learning as formulated by David Kolb.

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Table 1: Constructivist perspectives
2.3.1 Vygotskian Theory

A significant contributor to constructivist theory is Lev Vygotsky, whose main research was focused on early childhood education. He believed that children construct their own understanding, without passively reproducing what is given to them (Bodrova and Leong, 2007, p.9) and that they achieve this by instruction and by using either physical or mental tools. The focus of Vygotsky on the role of the teacher and the acquisition of tools is the main reason why the Vygotskian constructivist theory was chosen for this study.

In early childhood, children lack mental tools and their learning is less effective and efficient. Therefore, external mechanical tools are provided to give support to the children’s mind. According to Vygotsky (as cited in Jarvis, 2006, p.163) “things do shape the mind”; Tools provide this interaction between child’s thought and practical activity, which is essential in order to shape knowledge in the first stages of life. In the Vygotskian approach to learning, “the purpose of learning, development, and teaching is more than acquiring and transmitting a body of knowledge; it involves the acquisition of tools” (Bodrova and Leong, 2007, p.16). “Vygotsky believed that the difference between humans and lower animals is that humans possess tools” (Bodrova and Leong, 2007, p.16). Tools –physical or mental- extend people’s mental capacity and enable them to do things they could not do otherwise. Tools play a major role in the learning process and gives ability to the learner to construct knowledge on his or her own terms. Furthermore, tools are constructions of the learner’s world and help them to develop also social relations, besides learning tactics. As Dewey argues “knowledge is not just a mental state; rather, it is an experiences relation of things, and it has no meaning outside of such relations” (as cited in Hung and Chen, 2001, p.4). Therefore, the acquisition of tools is a way for children to acquire knowledge, and it is widely encouraged in early childhood education in the form play. We can deduce from this that digital games can be regarded as mechanical tools which can support or even enhance children’s learning.

Aside from the importance of the acquisition of tools, and on contrary to Piaget who was focusing on what children learn by themselves, Vygotsky emphasizes
Piaget argued that “the child is inventing rather than discovering his ideas” and that “each child must invent them for himself” (Piaget, 1977, p.xxxvii). However, according to the Vygotskian approach a child can accomplish more with right guidance and support from elders, when he is stimulated to overcome his limitations. In the Vygotsky’s concept of the zone of proximal development (ZDP) the independent learning and learning under guidance and collaboration come together; “The discrepancy between a child’s actual mental age and the level he reaches in solving problems with assistance indicates the zone of his proximal development” (Vygotsky, 1986, p.187). Vygotsky emphasizes the role of the teacher, supporting the idea that the development of a child and its instruction are highly connected, as the instruction “is stimulating a series of inner developmental processes” (Hedegaard, 1996, p.172) that the child cannot reach by himself.

![Figure 1: Zone of Proximal Development by Lev Vygotsky](attachment:image.png)
2.3.2 Experiential approach to learning

The experiential approach to learning is also situated within the constructivist learning theory. The experiential approach was formulated by David Kolb, who was influenced by the work of John Dewey.

In the experiential approach to learning, the learning is seen as a cycle, which begins by concrete experiences and ends by the application of what has been learned. The experiential approach “stresses the connection between concrete experience, reflection, concepts and application” (Egenfeldt-Nielsen, 2007, p.17). More specifically, the learning cycle by Kolb is consisted of four phases that include:

- “concrete experience” where the learner participates in an experience such as a simulation;
- reflective observation where the learner reflects on the experience;
- abstract conceptualization where the learner considers thoughts and reflections to identify the significance of the learning experience and considers what may have been done differently to enhance the outcome;
- active experimentation which involves using what was learned to direct future practice.

The experiential learning approach lays focus on concrete experience as the starting point for students’ learning (Egenfeldt-Nielsen, 2007, p.17), but “learners must experience each phase of Kolb’s cycle to achieve optimal learning” (Poore, Cullen and Schaar, 2014, p.e244). The engagement of students in active experiences is considered to be a very important element of learning and it is highly connected to the playing of digital games.

Theories of constructivism, especially these two theories, are considered relevant in the area of digital games and learning. These two theories have elements in common which make them a suitable framework for this study. They are both theories focused
on learning, are learner-centered, are suitable for the learning in early childhood, and they can be applied in the form of play. These theories present elements that support digital-games and learning in early ages from two different perspectives: the Vygotskian theory states that the assistance of the teachers and the tools are necessary for the transition and acquisition of knowledge, while the experiential theory states that concrete experiences lead to effective learning. Consequently, learning occurring through digital games can be supported equally from these two theories. Digital games can be seen as tools which provide children with the interaction between thought and practical activity. At the same time, they can be seen as a way to provide to the children concrete experiences through the conceptualization of situations and active engagement. This interaction along with the concrete experiences are provided to children as an act of play, and as Vygotsky argued, “play affects more than the children’s cognitive development” (Saracho and Spodek, 2006, p.710).

When it comes to the early childhood education learning, teachers form a critical role and should not be neglected. Using digital games in education is not seen as substitution of teaching and learning tools, but also as supplement and powerful tool in the hands of the teachers. Teachers can achieve more by using tools for instruction, while children can achieve more with assistance. Regardless of how successfully educational the digital games or how effectual the constructivist theories are, the learning within the classroom and the application of the games or the theories cannot occur without the proper guidance and supervision of the teacher. Teachers are these who will choose the tools that will be used during teaching procedure, thus the main focus of this study. The critical part of the role of the teacher is pointed up by Vygotsky in his ZPD theory and it is highly supported in this study.
2.4 Literature review

2.4.1 Digital games and learning

Using games in education is not a new thing. Especially in early education, teachers often implement games in order to make the lesson more playful, creative and appealing to children. Recently, digital games are gaining popularity not only as games, but as promising educational tools too. Advocates support, based on features and elements that digital games incorporate, that digital games can combine learning and play and can be integrated into the teaching procedures.

In 2003, Gee pointed out that digital games are regarded as entertainment and that the educational frame that they provide seems to be alien to many. Gee (2003) focused his research on explaining why digital games can be educational. He created a framework of learning principles found in digital games, which became an initial framework upon which researchers have used to examine digital games from an educational perspective. Gee’s learning principles (2003) present aspects of digital games such as multimodality, engagement and challenge that games provide to the gamers, which attract their attention and promote learning. According to Khine (2011), the reasons for using digital games in learning are (i) the variety of learning requirements accommodated by different genres of games, (ii) the challenges that are provided to the player by the games, and (iii) the fact that games are multimedia in nature, accommodating several learning styles and providing immediate feedback and practice, characteristics that are well-suited for today’s students. Asides from the characteristics of the various learning requirements, the multimodality and the challenge presented by Green and McNeese, Oblinger (2004) argues that games are also inherently experiential and multi-sensory. According to Green, McNeese and Oblinger, digital games support a problem-based learning which encompasses opportunities for self-assessment through their mechanisms of scoring and levelling up, and favor activation of prior knowledge. Digital games “provide a forum in which learning arises as a result of tasks stimulated by the content of the games, knowledge is developed through the content of the game, and skills are developed as a result of playing the game” (McFarlane et al., as cited in Rosas et al., 2002, p.73).
The aforementioned research provided a needed framework for the emergence of the DGBL approach. DGBL comes in accordance with the existing research stating that digital games can be used as educational tools, for the reason that they can provide an experiential problem-based learning, by combining the engagement of the player in the game with the parallel of learning through gaming. The figure below shows what DGBL represents; it is a fine balance between gameplay engagement and learning. If the balance is disrupted, then the game can be more addictive than educational or more educational and less engaging/fun.

![Figure 2: Digital game-based learning - two dimensional process. Source: Prensky, 2005](image)

The assertion that digital games would be a promising educational tool and that they should be used for educational purposes in schools is gaining acceptance within the educational technology research community. Scientists and educators repeatedly return to the conclusion that games tend to generate higher levels of students positive emotional intelligence, making the learning experience more appealing and improving participation (Annetta, 2008).
2.4.2 Teachers’ beliefs about ICT/digital games integration in the classroom

The existing research on teachers’ beliefs on DGBL is rather limited. In this section the teachers’ beliefs on ICT implementations will be also presented, as a way to see the general points of view of the teachers.

As ICT is gaining ground in our everyday lives, we can hardly imagine an educational institution without any presence of ICT. Most children encounter digital media before they even go to preschool. The presence of ICT in the educational system is regarded as a necessity, as technology is put among the core subjects of learning in the school curricula. It is apparent that we are witnessing an educational change of the nature of instruction and the incorporation of strategies that would demand the implementation of ICT into the classroom. However, an educational change is not merely a matter for the government or for the policy makers. “Educational change is dependent on what teachers do and think” (Fullan, 2007, p.129). Teachers are the ones responsible for carrying a new artifact in the classroom and effectively integrating it in the teaching and learning procedure. The beliefs of teachers towards ICT and DGBL implementation within the classroom are valuable knowledge for one more reason; teachers are engaging with other teachers’ opinions about the adoption of a new policy or a new method. According to Fullan (2007), teachers are less likely to engage with policy documents, but instead engage mostly with fellow teachers, and second with administrators and specialists.

As Ertmer (1999, as cited in Donnelly, McGarr and O’Reilly, 2011) argues, there are many barriers that are commonly referred to as issues in ICT integration. One type of them is the “impact on fundamental change and are typically rooted in teachers’ core beliefs and are therefore the most significant and resistant to change” (Donnelly, McGarr and O’Reilly, 2011, p.1470). In the research of Zhao, Pugh, Sheldon and Byers (2002, as cited in Donnelly, McGarr and O’Reilly, 2011) there are three factors identified as associated with the teachers’ impact on the technology integration in classrooms: (a) technology proficiency, (b) pedagogical compatibility, and (c) social awareness. These three factors refer to the teachers’ ability to effectively use technology, their pedagogical beliefs regarding the technology’s use, and their ability to negotiate the social facets of the school culture. Regarding the use of digital games in education, Green and McNeese (2011) identified three reasons
why teachers might be reluctant to utilize them in school: (i) difficulty the digital games to fit the curriculum and the time limitations of the class period, (ii) lack of updated school infrastructure that can support the digital games, and (iii) lack of support from school administration and parents.

In their paper, Donnelly, McGarr and O’Reilly (2011) identify four types of teachers in relation to ICT integration into practice, positioned in terms of “empowerment” versus “fatalism” and a learning focus versus an assessment focus. The four types of teachers are: a “contented traditionalist”, a “selective adopter”, an “inadvertent user” and a “creative adopter”. In relation to empowerment and fatalism, the findings show that some teachers see ICT as an opportunity to do something new with their students, while other teachers believe that is beyond their control to implement the ICT resources within the classroom. In terms of learning and assessment the findings highlight the difficulties of teachers to effectively use ICT in terms of assessment and learning. Below, the findings of Donnelly, McGarr and O’Reilly are illustrated. As digital games are seen as a new tool, like ICT in general, this illustration will serve as a framework of analysis of this study’s findings regarding the teachers’ opinion.

The opinion of teachers towards ICT integration is important for our research. My main focus lies on the opinion of teachers on the incorporation of digital games in
the classroom. According to Rosas et.al (2002) the implementation of games through computer technology still creates resistance. This resistance is based on (i) teachers’ perceptions of games as merely entertaining and not as useful instructional tools, (ii) teachers’ lack of knowledge and skills with respect to computer assisted instruction, and (iii) insufficient developments of effective educational hardware and software. In the research done by Demirbilek and Tamer (2010) math teachers’ perspectives on using educational computer games in math education were examined. According to the findings, some of the teachers were arguing that computer games should not be fun-oriented, using games in math teaching is not appropriate, board and chalk are indispensable factors, and computer game utilization would not provide any benefit. However, there were also some teachers arguing that the implementation of computer games would affect education positively. In the same research, when teachers were asked what the requirements were to use computer games in the class the answers fit the “resistance factors” presented by Rosas et.al (2002) above: teachers stated that adequate hardware and software should be provided, teachers should be educated and informed on the utilization of technology, and computer game utilization should be included in line with the syllabus and included in the curriculum.

2.4.3 The position of ICT in the Swedish curriculum

After reviewing, through the existing literature, the teachers’ beliefs on the implementation of ICT and DGBL within the classroom, the next step would be to examine the position of ICT in preschools in the country of our interest, in this case of Sweden.

Ten years ago, learning featuring ICT and digital games was an emerging and developing field of research in Sweden (Gustafsson, Fowelin and Kretz, 2005), with researchers and academics focusing on the educational potential of the digital tools and their effective implementation in the school.

For the Swedish government, IT (information technologies) seemed to be of a great importance. According to the Government Bill’s Proposition 2004/05: 175, the National Agency should be given the task of investigating the need for improved monitoring of the use of IT and IT skills in preschool, schools, and adult education.
Following, municipal and independent authorities carry the responsibility for the issues concerned with ICT in the school areas, and the schools are responsible for the pupils to be able to use modern technology as tools in communication, creation and learning (Regeringskansliet, 2011). “Between 2005 and 2010, the Government earmarked special funds for the development of ICT in teaching” (Regeringskansliet, 2011, p.34), with preschools also taken into consideration. As the Government Bill (Proposition 2004/05:175) states, the ICT use in preschools is rather limited compared to the rest of the school system and the positive opportunities that ICT bring should be offered already in preschool in accordance to the preschool curriculum.

Despite the plethora of initiatives between 2005 and 2010, little has been done for the further upgrading of the schools. ICT in the curriculum for compulsory school and preschool class is only mentioned as “modern technology” and “digital technology” as a tool in some subjects. For instance, in mathematics “pupils should be given opportunities to develop knowledge in using digital technology to explore problems” (Skolverket, 2011b, p.59). However, there have been additional publications commenting on how ICT tools can be used in school, i.e. in music (Digitala verktyg i music, n.d.) When it comes to the curriculum for the preschool (Läroplan för förskolan, Lpfö 98, revised 2010), it says nothing at all about digital games, digital tools or information technology except this phrase:

“Multimedia och informationsteknik kan i förskolan användas såväl i skapande processer som i tillämpning.” (Multimedia and information technology can be used in preschool it creates processes as well as in implementation.) (Skolverket 2011a, p. 7)

There is a paradox emerging from the initiatives for the ICT promotion in education between ten years ago and today. Ten years ago the initiatives on the implementation of modern technologies and the update of the education institutions was a priority for the government and it was valued as critical, when ICT was not such an active part of people’s everyday life. Today, when the use of digital devices and technologies has been rendered as an integral part of the everyday life of people, the initiatives for the technologically oriented update of the education has, in comparison, faded away.

Apart from the above, use of technologies in preschool demands personnel which is technologically aware and educated. Teachers should be able to use ICT in
the educational activities based on circumstances. “The National Agency for Education has to continuously monitor teachers’ use of ICT and ICT skills in preschool, school and adult education” (Regeringskansliet, 2011, p.34). However, some recent investigations “indicate that a majority of Swedish teachers actually do not use computers in their classrooms as much as they are expected to do” (Gu, 2011, p.30). This creates a gap between what is expected by the government for ICT use in education and the current practice.
Chapter 3
Methodology

This part of the thesis attempts to present the research methodology of the study. In order to investigate the perception of preschool teachers on DGBL, the researcher applies qualitative research strategies and employs semi-structured interviews. In the following, the research design, the research strategy and the sampling methods are presented.

3.1 Research design
The research design provides the framework needed for the collection and analysis of the data. This research study is intended to be a comparative one. According to Bryman (2012), the comparative design embodies the logic of comparison and it aims in the better understanding of the social phenomena when they are compared in relation to two or more meaningfully contrasting cases or situations. The aim of using the comparison design in this study is to seek for similarities and differences and to gain a greater awareness and deeper understanding of the beliefs of preschool teachers on DGBL in different contexts.

The comparative study is often related to the examination of particular phenomena in two or more countries. However, “comparative research should not be treated as solely concerned with comparison between nations. The logic of comparison can be applied to a variety of situations” (Bryman, 2012, p.74). For the setting of a comparative framework for the study, the Bray and Thomas Cube is applied.

3.1.1 The Bray and Thomas Cube
In the academic field of comparative education, the logic of comparison is closely related to the belief that we can understand social phenomena better if we draw data and insights from two or more contrasting situations. The comparative education
research might set its framework on a national level, but its nature is such that demands a multi-level analysis. Highlighting that exact need of multi-level analysis, Bray and Thomas (1995) produced a three-dimensional and multileveled cube and presented it as a model of comparative study. As it is described on Bray, Adamson and Mason (2007), the cube is comprised of three-dimensions, which contain different levels for comparison: the first dimension contains geographic/locational levels, the second dimension contains nonlocational demographic groups and the third dimension comprises aspects of education and of society. This cube was designed to allow comparative education researches “to achieve multifaceted and holistic analyses of educational phenomena” (Bray, Adamson and Mason, 2007, p.8).

![Bray & Thomas Cube: A Framework for Comparative Education Analysis](image)

Figure 4: The Bray & Thomas Cube: A Framework for Comparative Education Analysis ((Bray, Adamson and Mason, 2007, p.9)

Applying the research framework of Bray and Thomas for the comparative education analysis, this study examines and compares the beliefs of preschool teachers on DGBL and their relation to the private and the public sector. More
specifically, the research focuses on DGBL as a teaching method from the aspect of education, takes preschool teachers as the nonlocational demographics group and focuses on the geographic/locational level of the city of Stockholm.

What is intriguing to the researcher is how the preschool teachers deal with the method of DGBL, and since Sweden has both public and private school under the same curriculum, a comparison between the two of them will lead to a deeper understanding of the phenomenon. It is important to highlight that the main questions of this study is not about the difference between the public and private sector, but about the teachers’ implementation of the DGBL in different contexts.

### 3.2 Research strategy

The focus of this study is the investigation of the participants’ beliefs on DGBL. Therefore, the study seeks understanding rather than quantification in the collection and analysis of the data. For this reason, the researcher employed a qualitative research strategy, as it is considered the most suitable for this research.

The nature of any social research is formulated by the researcher and is guided by specific considerations, which are shaping and developing the outcome of the research. These considerations are the ontological and the epistemological ones: The former one deals with assumptions about the nature of reality and is related to the way in which research questions are formulated and research is carried out, while the latter one is dealing with the way we perceive knowledge and is related to research practice (Bryman, 2012). This study is a qualitative case study, which is within the frames of the social constructionist approach and with an interpretive nature. By giving the participants the opportunity to express their opinions, this study indicates that it comforts social actors as internal realities that have a role in shaping the society. Additionally, the researcher using interpretivism will analyze the qualitative data based on the different opinions of the teachers and the way these opinions are shaping the application of DGBL. In order to reach knowledge and understanding of the cases, an inductive approach, in which the theory will be generated out of the research, will be applied along with the qualitative research strategies.
3.3 Research methods

The most suitable and supportive research method for investigating the present topic is this of the semi-structured interviews.

In order to approach the individual perception of DGBL within the classroom, preschool teachers from schools located in the area of Stockholm are interviewed. The data is collected these semi-structure interviews, in which the interviewees could openly express their beliefs, uncertainties and insights on the concept. The questionnaire of the semi-structured interviews has questions and sub-questions and it is built on three key areas: opinion, practice and discussion. This division is made in order to collect information for every key area separately, which allows having a clear image of the teachers’ perception depending on the different group.

3.4 Sampling

The type of sampling that is used in this research is a purposive sampling, commonly used in qualitative research. According to Bryman (2012), purposive sampling has to do with the selection of units, with direct reference to the research questions being asked. Based on the guidelines of the research questions and the objectives, the interview participants are preschool teachers working in the area of Stockholm. There are certain factors which limit the sampling process, such as the limited amount of time and the difficulty to find subjects willing to be interviewed. Under these limitations, the researcher has to take specific decisions concerning the data collection process and analysis.

The city of Stockholm is selected for several reasons. First of all, it is the researcher’s place of residence. Moreover, in comparison to other countries, Sweden has a highly ranked education system that applies innovating teaching methods and follows the demands of the technology oriented information society, it promotes the use of various digital tools in education, and it also has the means to succeed something like that. However, the fact that the Government of Sweden supports this kind of initiatives does not mean that the schools follow them. In the compulsory schooling of Sweden, schools are required to use modern technology for every student. However, there is lack of evidence on how preschools are dealing with the
use of ICT, despite the fact that the use of digital tools is supported by their curriculum. Furthermore, in Sweden the private and the public schools are under the same national curriculum, which provides a comparability framework between the schools.

The data for this research are collected from seven participants from several public and private preschools within the city of Stockholm. It would be an omission here not to highlight that the researcher cannot generalize the findings of this research to a population, even though the participants are chosen on a random basis. This research is providing us with an insight of what the general belief of the participants on the DGB is and the possible practice of it, but the generalization would demand a bigger scale study.

3.5 Data analysis

The research method employed in this study for the collection of the data is this of the semi-structure interviews. The collected data are transcribed and analyzed using the approach of thematic analysis. This is not an approach that “has been outlined in terms of a distinctive cluster of techniques” (Bryman, 2012, p.578). However, a strategy that assists the thematic analysis is the structure of a framework, which helps to construct an index of central themes and subthemes. The framework is the product of the reading of the transcripts and assists the researcher in the analysis.

The framework in the existing study is based on the retrieved themes that arise from the thorough reading of the transcript interview data and is structured under consideration of the research questions.

3.6 Reliability and validity

The concepts of reliability and validity were initially introduced and developed in the quantitative research, and their purpose is to provide quality to the research. In the qualitative research, the concepts of reliability and validity are approached from different positions, as qualitative studies should be evaluated according to different criteria from those used by quantitative researchers (Bryman, 2012). Lincoln and
Cuba (as cited in Bryman, 2012) proposed two primary criteria for assessing a qualitative study: trustworthiness and authenticity.

Trustworthiness is the sum of four criteria that are equivalent to quantitative research. These criteria are: the credibility, which is parallel to internal validity, the transferability, which is parallel to external validity, the dependability, which is parallel to reliability, and the confirmability, which is parallel to objectivity. According to Bryman (2010), the reason why Cuban and Lincoln could not apply the quantitative research criteria of reliability and validity was because they indicated that there are absolute truths about the social world that the social scientists have to uncover, while in the qualitative research there can be more than one accounts.

In addition to the trustworthiness’ criteria, Lincoln and Cuba also suggested criteria of authenticity that concern the wider political impact of the qualitative research. These criteria are: the fairness, the ontological authenticity, the educative authenticity, the catalytic authenticity and the tactical authenticity.

### 3.7 Ethical consideration

Bryman (2012) states four principles that a social researcher should have in mind, using the very same principles Diener and Crandall formed in 1978. These four ethical principles are covering four main areas: (i) whether there is harm to participants, (ii) whether there is a lack of informed consent, (iii) whether there is an invasion of privacy, and (iv) whether deception is involved.

In this research ethical malpractice is not expected. The participation in the study is voluntarily. The participants are informed of the content of the study and asked for permission of recording before their interview was being taken. Moreover, the prospects of deception and invasion of the privacy of the participants are not foreseen. In any case, an expressed confirmation of privacy is upheld and the ensuring of anonymity and confidentiality in relation to the recorded information.
Chapter 4
The Data Collection

In this chapter, the data collection process will be presented through the background information of the country setting and the interviewees. The methods applied for the data collection are guided by the research purpose and the research questions of the study. The chapter serves as a preparatory chapter to the following, “Analysis and presentation of the research findings”.

4.1 Presentation of the country setting

The selection of Sweden for the collection of the data of this study is not arbitrary. Sweden is a technologically advanced country, which promotes the ICT learning in all the levels of education, including the preschools. With low unemployment rate and a strong economy, Sweden is a country that has the means to provide the schools with the digital tools needed to meet the needs of the students and the demands of the society. According to OECD (n.d.b), the level of Swedish expenditure for core services is among the highest across OECD countries, while Sweden prioritized education as a key public sector.

Sweden has a decentralized school system; the government has the overall responsibility for education and sets the general framework at all levels, with curricula, goals and syllabi. The ministry of Education and Research has the overall responsibility for central administration of the educational system, and it sets the frames, while the agencies implement the law and ordinances. The municipalities are responsible for providing and operating the schools.

In Sweden all the preschools follow goals established by the Swedish Parliament, the Riksdag. Preschool in Sweden has had its own curriculum since 1998, which was set by the Riksdag and the Government. The Responsibility for carrying out this national curriculum falls upon the National Agency for Education, which is
also responsible for educational research and development for the continuous updating of education. However, how the curriculum and the goals are going to be conducted is upon the preschools to decide within certain frameworks. The fact that preschools located in Sweden follow the same national curriculum makes the comparison between the preschools applicable.

Preschool is an important part of the daily lives of families in Sweden with children. In 2012, over 90% of children aged three to four were enrolled in the preschool system (OECD, n.d.b). The preschools in Sweden are both municipal and independent preschools (i.e. public and private preschools). The private preschools can be run by staff co-operatives, by a foundation or a company (Skolverket, n.d.). The municipalities are responsible for both private and public preschools. They also have the responsibility to ensure that there are enough preschools for the children, and to check whether the preschools fulfil the requirements of schooling (Skolverket, n.d.).

The preschool in Sweden is student-oriented and the needs of the children are highly prioritized. It emphasizes the importance of play in a child’s development and learning, as well as the holistic development of the child through various pedagogical activities and the supportive co-operation with parents (Skolverket, 2011a). In the curriculum for the preschool (Skolverket, 2011a), the use of technology it is also considered a basis among the areas of learning, as a topic of learning or as a way of learning and expression for the promotion of the development of the child. Furthermore, the schools are responsible for ensuring that every student is able to use modern technology only within the frames of the compulsory education, even if the use of technology is considered important in every level of education.

### 4.2 Presentation of the interviewees

The interview participants are teachers working either in private or public preschools located in the city of Stockholm. None of the teachers is working in the same preschool. The working experience of the teachers ranges from 3 to 10 years and the ages of the teachers are from 26 to 50 years old. The students’ ages of the teachers vary between 1 and 5 years old. The selection of the sample has as a main purpose to
serve variation, despite its limited size, through different teacher ages, student ages, years of experiences and schools. Four of the teachers interviewed are employed by the private sector and three of them by the public sector.

The researcher had initially planned to conduct interviews with 8 participants. However, due to personal issues, two of the participants cancelled the interview meetings and the researcher managed to come in contact only with one more preschool teacher willing to take part in the study. The lack of time did not make possible the further searching of another participant, therefore the researcher decided to abdicate the last interview and focus on the analysis of the already collected data. A total of 7 interviews are conducted and transcribed for the analysis of the data.

4.3 Data collection

The study is designed to be of a qualitative nature and, therefore, for the collection of the data, semi-structured interviews are conducted, in order to reveal the individual perceptions on DGBL in the preschool classrooms. The interviews are scheduled to be conducted in the period between January and February 2015 in Stockholm. The interview participants are found and contacted by the researcher and the interview meetings are organized between the interviewer and the interviewee either in a public place or via internet with voice calls. The participants are informed by the researcher about the following meeting, the general topic of conversation, the length of the interviews and the protection of anonymity and ethical considerations. The participation of the interviewees is voluntarily. The interviews are recorded using a voice recorder mobile phone application and the interviewees are asked for permissions to audio record the interview. That is necessary in order to capture the exact words of teachers for the later transcriptions and the detailed data analysis. Since the interviewer is employed as a substitute in one of the preschools, the finding of the participants started through the common networking that later on got expanded. This information need to be taken into consideration since the interviewees felt comfortable having common acquaintances with the interviewer, fact that made them express naturally their opinions.
The interviews are conducted in the English language, except for one that is conducted in Greek and then translated into English. Despite the fact that English is not an official language in Sweden and it is not the native language of none of the teachers, there were no significant language barriers existing between the researcher and the interviewees during the interviews. The level of English varied among the participants, but in most cases it was better than average, therefore no translator was needed.

The interview guide includes 16 questions and sub-questions divided into four main areas: the introductory questions, the opinion of the teachers, the practice of DGBL and the discussion of the topic with parents and/or colleagues. The intention of the interviewer is to ask the same questions, or at least to go through the four main areas, with all the interviewees. The purpose of this is to enable comparability among the results. The interview guide is available at the appendix section. For testing of appropriateness of the interview guide, a pilot study was conducted before the final version was used. The method of semi-structured interviews gives the flexibility to the researcher to change or even skip questions, depending on the interviewee.

4.4 Data analysis process

The basic framework of this research is structured on the research objectives and questions, along with relevant theoretical information that emerge from the literature review. The empirical data that is analyzed is data collected from the semi-structured interviews with the teachers.

The approach that is used for the analysis of the qualitative data is the thematic analysis. Based on this approach, the researcher reads and rereads thoroughly the transcripts of the interviews and identifies several motifs in the text, which shape the themes and subthemes of the analysis. As Bryman (2012) argues, the thematic analysis is not an approach to analysis that has been outlines in terms of a distinctive cluster of techniques, but it is meant to provide a way of thinking about how to manage themes and data.
Chapter 5
Data Analysis and Research Findings

In this chapter the analysis of the data and the findings of the research will be presented. The data are collected with semi-structured interviews and then analyzed using the approach of inductive thematic analysis. The main themes emerge from the analysis of the data are the teachers’ different attitudes towards DGBL, the barriers to the use of DGBL, the implementation of DGBL in the classroom and the discussion of DGBL among parents and colleagues. The analysis of the data and the findings are structured following the research questions.

5.1 Differences between the public and the private sector

This study was intended to have a comparative character between the teachers employed in the private sector and the teachers employed in the public sector. However, the collected data did not support any substantial differences between the two sectors and the comparison is not applicable to the study.

The interview analysis revealed that the differences regarding the application of DGBL between the public and the private schools are not dependent on whether the school belongs to the public or the private sector. From the overall review of the data, it seems that the use of ICT and, more specifically, the use of digital games within the classroom are dependent on the teachers’ perspective on digital games and on the staff’s perspective on digital games, meaning the employer, the colleagues and the parents of the students.

Nevertheless, the fact that there are no differences identified between the two sectors from the analysis of this limited sample does not exclude the possibility of patterns emerging in a larger scale study.
5.2 The teachers’ perception on DGBL

While the application of DGBL within the classroom is not influenced by the sector that the school belongs to, it does revolve around the individual teacher. From the interviews, it becomes clear that personal individual perspectives and attitudes are influencing the use of DGBL more than the personnel collaboration, the availability of teachers, the ICT training or even the age of the students. Respectable differences are identified between the opinions of the teachers on DGBL, which affect the use of digital games in the classroom. From the findings on the perception of teachers on the DGBL, two different categories of teachers emerge: the positive teachers and the sceptical teachers. The positive teachers tend to be the ones who are keen on using digital games for teaching and learning purposes within the classroom, while the sceptical ones tend to not make use or to make reserved and limited use of digital games.

**Positive teachers**

The positive teachers perceive digital games as one more method or one more tool which will help them to teach children with a different approach. All of them recognize the fact that our society becomes more and more technologically oriented and consider very important that the children grow up while are learning how to use digital tools. For them it would be an omission to exclude this part from their education and the school.

*It becomes increasingly important for the children to have certain contact with the digital world* – Teacher 1

That does not mean that the teachers are not applying traditional teaching methods to their classrooms, but at the same time they do implement digital tools and games when they think that is suitable. Most of the teachers who are identified as positive do make extended use of digital games on their teaching procedures, but not without having the full control of them. From the answers of most of them, it is apparent that they are planning from before when to use them, in what context and how.

The positive teachers seem to be well aware of the dangers of digital games. In their interviews, the teachers mention that children should spend limited time with the tablets playing digital games, as they should develop their social skills by also interacting with their friends. Also, according to them, children should play with
physical and not only with digital toys and they should use their bodies. They admit that there is always the danger of the children getting too absorbed in the screens. However, the aforementioned do not prevent them from using the digital games with their students.

Almost everything can be appropriate if you use it the right way – Teacher 6

Positive teachers recognize, more than the sceptical ones, the negative effects of the digital games in the practice, but they have found ways to overcome the problem. From their answers, these teachers seem to have a clear idea of what to avoid while using DGBL, and most of them mention the controlled use of digital games and the rendering of limits, such as time limits and rules for use.

The thing is not to leave the children play with these devices for much time, because in this way you are depriving them the communication with the other people – Teacher 3

In order to make the most efficient use of the digital games with their students, it seems that the positive teachers are dealing more with the consequences of the DGBL. They know how to apply digital games into the classroom and how to avoid the misuse of them. For instance, one of the teachers said that a student is getting too absorbed in the screen and it is very difficult to co-operate with him. For that reason, the teacher always pays extra attention to when he is going to give the tablet to the student and what he is going to say to him. Teacher’s intention was to keep the situation under control and, at the same time, not to deprive the student from the ability to play with the digital game.

The positive teachers are also the ones supporting that the digital games are appropriate for early childhood education. However, one must be aware of how to use them and for how long, especially with children of young ages. For the teachers, the issue of time and use under guidance are also considered to be very important.

A common characteristic of the positive teachers is their attitude towards the children; they share a curiosity for the children’s world. The teachers are willing to approach children and their reality by finding more about things that attract their interest. One way they have found to succeed in that is through digital games.

I learn from the children and their everyday life many things and I try to get into their world through the apps –Teacher 3
For these teachers, digital games are not merely a fun tool to teach with, but also a way to come closer to the students and teach them by using something they are interested to.

Despite their interest on digital games and DGBL, the positive teachers have never come across to anything theoretical related to the research field of DGBL. Whatever they have learned was from personal interest and, only in one case, from a training course on the use of tablets in the preschool.

_Sceptical teachers_

Most of the teachers who were identified as sceptical make either none or limited use of the digital games. Regardless of the use they make they are hesitant towards digital games.

The sceptical teachers are found to be anti-digital when it comes to the education of young children, mostly because they think that digital games are anti-social tools. They prefer to use more traditional methods of teaching, like books, physical tools and oral communication. For these teachers, digital tools might be used already from the children, but these digital tools are against what teachers believe is suitable for the early childhood education.

_I would feel negative about it. If I had to be objective it would be yes, but personally I wouldn’t use it maybe. I would use real life tools – Teacher 4_

Most of the sceptical teachers are pointing out the negative effects of digital games and their inappropriate characteristics for their use in schools, yet they have not used them or read anything related to DGBL. This scepticism might be a result of the way the teachers grew up or their idea of how a child should play, learn and grow up.

_Personally, I would rather use conventional and real life tools. It is maybe the way I grew up – Teacher 4_

During the analysis of the data it was observed that the sceptical teachers are the ones who, along with the fact that they are feeling negative about using digital games and/or tools, admitted that they are not making use of extra resources or digital games they might be offered by the preschool’s administration.
We have one specialist who is always available if you want to ask something, if you want to learn something, but I haven’t used the resource — Teacher 7

They have a few games that they promote, yes, they use minecraft, they have a portal where I read it, editing photos programs, they also have a painting program, but that’s how far I got — Teacher 5

Sceptical teachers feel more comfortable using traditional teaching methods and tools they already know how to use, rather than adapting to a new way of teaching or implementing new tools into their classrooms.

From the sceptical teachers’ answers is apparent that they think that DGBL is an alternative to social interaction. Sceptical teachers tend to put these two in opposition to each other which brings them in contrast with the positive teachers. In other words, instead of seeing digital games as a contribution and a promising tool to their work, sceptical teachers see it as an obstacle to children’s development. However, the use of digital games by positive teachers show that social interaction can be combined with the DGBL and can be supported through that.

A common characteristic of the sceptical teachers emerging from their interviews is their tendency to protect children from the technology. They believe that the use of digital tools by children limits their social and emotional development, makes them absorbed in the devices and results in receiving information rather than interaction. In contrast with the positive teachers who are inventing ways to make use of digital games by limiting the negative effects, the sceptical teachers prefer to limit the use of digital games or not make any use of them at all.

When I started and I got more responsibilities I decided to remove most of the games and focus on other types of learning […] I prefer showing them, letting them touch, more to experience stuff than getting the information — Teacher 7

Interesting is the fact that sceptical teachers state that they would prefer to use “real life tools”, or they would prefer children to interact with the “real world”, insinuating that digital games abstain from reality.
5.3 The implementation of DGBL in the classroom

Digital tools usually used by the teachers are tablets which are widely used, mobile phones, laptops, cameras and projectors. Most of the digital tools are used by teachers for documentation of the progress and activities of children and for administrative tasks. Additionally, teachers use the available digital tools to show videos to the children, search on Google and work, in some cases, with PowerPoint presentations. Therefore, based on the teachers’ answers, the preschools in Stockholm are making use of digital devices during their teaching procedures. Two out of seven teachers mention that their schools lack of efficiently operational technological devices, something that prevents them from using any digital tools during the day.

Most of the participants of this research are using or have used digital games during their teaching procedures. Only two out of seven teachers interviewed have never used any kind of digital games in the classroom. In general, one would say that the teachers are familiar with the general concept of digital games; have heard of digital games and are aware of the existence of educational digital games, regardless of their willingness to use them or not with their students.

When teachers were asked how they usually implement the digital games, the teachers mentioned at least four different ways that DGBL can be applied in the classroom. These ways will be referred as: (i) the taking turns approach, (ii) the teacher-led approach, (iii) the projection approach, (iv) the small team game approach.

The most common approach among the teachers is taking turns. In the taking turns approach, the teacher is gathering the children in a circle, one child has the tablet on his/her hand and the rest of the children are waiting for their turn, while their friends are playing. According to teachers, this teaches children how to be patient, but at the same time it can be time consuming.

Usually we sit in a small room and we have the tablets and we are in small groups. One of the kids is playing and the others are waiting their turn –Teacher 6

This is usually applied when the teachers have smaller group of children, so that the students don’t wait for long time and become anxious. Another way, a slight variation of the latter, is the teacher-led approach. In this approach, the children again get to
sit in a circle, but instead of them taking turns, the teacher is holding the tablet and the children play by giving answers and co-operating altogether. A common implementation way is, also, the projection of the tablet’s screen, either with the use of projectors on the wall or with the use of auxiliary screens. In the projection approach, the projector device or the screen is connected to the tablet and they project its screen. In this way, the teachers have the opportunity to work with bigger groups of children. Another approach mentioned by the teachers is this of the small team game approach, where two or three children share the tablet by playing together, under the supervision of the teacher.

The first two approaches are mentioned by most of the teachers, whereas the two last approaches are mentioned only by the positive teachers, who are searching of more ways to use the digital games and occupy as many children as possible at the same time. Apart from the first approach of taking turns, the rest of the approaches applying by the teachers allow the social communication and interaction among the students. As with playing any other game, in this use of digital games students have to co-operate and team up in order to be part of the gameplay.

The teachers claim that they have specific goals when they are implementing digital games in the classroom. Based on the participants’ use of them, the digital games are seen as teaching tools that help teachers to promote learning in a different way.

I do always like to have a specific goal in mind; I don’t like giving the computer just for fun – Teacher 2

It’s always educational. We never use them unless it’s for educational purpose – Teacher 7

Teachers apply DGBL in specific contexts, such as language learning or math teaching, in order to teach their students in a playful way or simply to introduce another way of learning.

According to the teachers, children are always encouraged to play together.

A student might say to me that he wants to do that, and I agree if only finds the team to do it with – Teacher 3
That may be happening for two reasons: first because they want to give to the DGBL activities a more social character with elements of interaction between the students; second for reasons of practicality, as teachers need to team up with as many children possible from their group. In any of these reasons the result is the same, as the children learn how to co-operate and work with the digital devices by interacting with their friends. In this case, the playing of digital games is not a lone activity but a group activity, which allows the social development of the child.

All of the teachers share the same opinion on the fact that children should not play without supervision. Teachers agree that their presence is obligatory and the children should be supervised while using the digital tools and games. Children might need help and guidance, but also there is the possibility that at any moment unguarded, children can get exposed to inappropriate content, which they want to prevent.

There are times that they cannot fulfil what the game asks, so they need a bit of help, they need to understand something –Teacher 1

Teachers do not feel the fear of substitution by the digital devices. They are aware of the fact that children need an instructor who guides them through the games and supports them in making the best use out of these. Teachers seem to take seriously the role of instructor, especially in early childhood education.

An area of great importance to the teachers is the early childhood education. When the teachers were asked their opinion on whether the digital games are appropriate for the early childhood education, most of them replied that, as any tool, they can be appropriate with the right use. Of course, the themes of controlled used and limited time often are mentioned, as teachers are aware that children should be exposed to different ways of learning and playing and should have the possibilities of trying different things. Nevertheless, as teachers argue, with the right use the digital games can be suitable for young ages. When the teachers were asked about the appropriateness of the games for young children, some of them pointed out the importance of the content of the game.

A reason for avoid digital games is if the digital games are rubbish, that is the only reason –Teacher 1
The games, according to the teachers, should pass the right messages to the children and be of a good quality. It is critical to test the game before giving it to the children and be aware of the content of the game. Digital games might be a promising educational tool; however, as with any other tool, the quality of each one of them must be tested before use.

There are not any gender-differences pointed out by the teachers. None of the teachers has observed anything gender related when the use of digital games by the children is taking place. That may be due to the fact that Sweden is a gender-egalitarian country and promotes the gender equality from the preschools already. Therefore, the possibilities of finding gender-related differences within the Swedish preschool are considered low.

5.4 Barriers to the use of DGBL in the classroom

The resistance of the teachers towards DGBL within the classroom settings is a result of several barriers. The nature of these barriers can differ depending on the individual or the working environment. In this study three factors were identified that influence the application of digital games within the classroom: the practical limitations, the ideological limitations and the lack of training and/or information.

Practical limitations

A reason why the teachers avoid the use of digital games in the classroom is the difficulty to implement them efficiently. Some of the teachers are claiming that when they use digital games are able to work with no more than three children at time and that makes their application challenging for bigger groups of students.

I would rather use some other forms where you can involve more kids. My idea of it (digital game based learning) is that you can only involve not so many kids –Teacher 5

This is a common limitation mentioned among teachers who are thinking the approach of taking turns as the only approach to apply the DGBL in the classroom. Additionally, the application of DGBL can be time-consuming if not applied in an efficient way, and teachers do not usually have extra time to spare on that, thus they prefer to use another tool with their students.
Many times we don’t have time to do something new, something that is not related to the things that we are doing – Teacher 4

Another practical limitation is the **shortages on technological equipments.** Some of the teachers report that the preschools where they work do not have the technological devices or the digital tools needed to apply the DGBL approach with their students. The shortages vary from shortages on tablets, very slow laptops, or even lack of wireless internet connection.

**Ideological limitations**

Besides the practical limitations that might constrain teachers from applying the DGBL, there are also ideological limitations. Ideological limitations are connected to the individual teachers or to the individuals surrounding them in their working environment, such as the employer, the colleagues and the parents.

Some of the interviewed teachers, mostly the sceptical ones, seem to be biased towards digital games, which prevents for using them. These biases are a result of their opinion of video games based on stereotypes, or their personal beliefs based on the way they grew up. Some of the teachers believe that digital games are games used mostly for the leisure time, or that are simply a way to keep the kids occupied without having any specific goal:

I think that they are used mostly for leisure, especially at home. I think it’s like instead of the TV kids just play a game, by pressing the same button million times and slicing a carrot – Teacher 5

Also, teachers think of digital games as a lone activity which isolates children and prevents them from being socially and emotionally developed.

Of course they are learning, but they are learning in another way, they are not learning by interacting with others and interacting with the out world. They are concentrating on a very particular screen and they don’t see all the rest – Teacher 4

The main thing is that what we should be working with in the preschool is the social interaction between individuals and working with the tablets or computers sort of isn’t too social – Teacher 5
The demands and biases of parents are another important barrier that the teachers cannot overlook. Besides the employer, parents are a highly involved stakeholder, especially in the private preschools. Teachers and employer follow the demands of the parents and make sure not to create any unwanted conflicts.

I don’t agree with that (not using digital tools), but I have to listen to my boss. I don’t want any conflict in the school. I don’t agree, but I respect what they think – Teacher 6

When one of the teachers was asked for some reasons why she does not use digital games in the classroom she said that:

I’m not sure what the reactions of parents would be, “I send them to school to do some activities and not to play some game” – Teacher 4

It seems that parents are very involved in the education of their children in a way that they get to decide what is going to be taught to their children by the teachers and in what way.

In the beginning I was using them (digital games) a lot, but then the parents started complaining and I stopped. Parents don’t like us to be playing with the computers and all these things, because we only lose our time – Teacher 6

Some parents, similarly to some teachers, perceive digital games as a merely leisure time activity. They believe that by playing you keep the child occupied and that is a waste of time, plus there is no purpose in playing digital games while someone can accomplish the same goals with traditional activities. Just like the sceptical teachers, these parents put the traditional methods in opposition to DGBL, without considering possible the parallel use of them in the classroom.

Another barrier, which can be perceived as an ideological one, it the collaborative support that teachers get in their working environment. It seems that supporting colleagues can facilitate the use of digital games in the classroom, while colleagues that are not in favour of DGBL can prevent the teacher from using digital games.
Lack of training and/or information

Teachers seem to be unaware of DGBL. An interesting pattern emerging from the interviews is that none of the teachers, positive or sceptical, have ever come across or read anything on digital games or DGBL.

Besides the fact that any of the teachers have read anything on DGBL and the use of digital games for educational purposes, there also very few teachers who have been offered relevant trainings from their employer for the use of the tables or even for some digital games. As one of the teachers argued:

But it is not that is negatively evaluated; we just don’t see it as an option –Teacher 4

However, the amount of information received on the topic also depends on the individual teacher. One of the teacher mentioned that even though they have a specialist in the school for that task, yet she has never asked for help on that matter.

For me, we need more information. Sometimes, when people think that something is wrong, it is because they don't know enough about it –Teacher 6

In this study’s sample, the ICT training does not seem to be a barrier for the teachers in order to use the digital tools available in the preschools. Most of them feel adequate with their existing training, even though many of them would like to know even more. It is interesting the fact that most of the teachers’ training on ICT comes mainly from their personal interest, rather than from offered courses and seminars.

5.5 The selection of the games

The most common games that are used by the teachers belong to the categories of language and mathematics. Teachers’ goal is to teach children the basics with games, such as how to spell, how to read, how to count, etc. Other popular choices of games among the teachers are natural sciences games, experiments, and construction games. From the teachers’ answers it is clear that they search games related to the frames set by the national curriculum, the preschool’s program and their educational goals; most of the times, teachers search games having something specific criteria in mind.
The criteria based on which the teachers select their games can be summarized into three main categories: educational criteria, game design criteria, and age criteria.

Criteria are the age and what I will teach, so it is connected to our projects. I see also if there is a developing rate, games that give positive feedback and also give ability to children to play with somebody else – Teacher 2

When the teachers are searching for digital games with educational criteria, they follow the guidelines from the national curriculum, the preschool’s schedule and the projects they are having each time. Besides these, some of the teachers mention that the digital games they pick have to fit their perception of education and have to pass nice messages through their gameplay. When teachers are searching with game design criteria they are focusing on the graphic design of the games and the game features, such as games attractive to the children, games with many levels that are progressing slowly and give the opportunity to children to repeat their actions and learn, and games that give the possibility for multiplayer activities. Furthermore, teachers are also focusing on the age factor depending on the ages of their students.

Most of the teachers claim that either they do not search for games at all, or they do search but not actively. Only one of the teachers admitted that he searches for games actively and methodically by himself. In general, digital games are found by the teachers, are suggested during trainings and seminars, are given by the administration of the school, or are discovered thanks to the children. When the teachers search by themselves, they visit application stores or visit educational websites. In application stores they search by putting filters, they download and they test them, while in the websites they follow suggestions that other preschool teachers have made.

5.6 What children learn with DGBL according to their teachers

What children are learning, according to their teachers, can be separated into two main categories: the social skills and the cognitive skills.
**Social skills**
Teachers believe that their students learn (a) how to co-operate by sharing the tablet and by playing with their friends and (b) how to be patient by waiting for their turn in order to play.

**Cognitive skills**
According to the teachers, when the children are playing with digital games, they are learning how to interact with the technology and how to handle digital tools, which will prove useful to them later on. Moreover, depending on what kind of games they play, the children are learning basics of language and mathematics and sciences.

When the interviewer asked the teachers what children learn using digital games, the sceptical teachers seemed to hesitate or to be more unprepared than the positive teachers to give answers on that topic. In addition, those who mentioned the social skills’ aspect are mainly positive teachers rather than sceptical ones. However, in this study the focus is not on what children are learning from DGBL. The categories of social and cognitive skills are a result of what teachers think that their students are learning by using the games.

### 5.7 Reasons to avoid DGBL

When the teachers were asked if they see any problems using the DGBL or if there are any reasons to avoid using digital games in the classroom, they highlighted many different aspects of the digital games and their application in the preschool.

What emerges as a pattern from the findings is the reply of the most of the teachers, who are identified as positive. According to their answers, there are no reasons for avoiding the use of digital games in the classroom, if one is aware of the way they should being used.

It depends on how you use it. By itself it’s neither good nor bad, and so I trust the way we use these tools in our process of teaching –Teacher 1
The positive teachers tend to agree that there should be rules and limits in the use of them by children, teachers must have the control of the situation and be the guide and supervisor. Once they have a clear image on how digital games should be used and why, there are no reasons for avoiding them.

5.8 Discussion of DGBL with parents and/or colleagues

When the teachers were asked if they discuss about digital games and digital tools with colleagues and/or parents in order to raise awareness and improve the way digital games are being used, there was a general consensus in their answers that there is lack of discussion on that topic.

All of the teachers agree that there is no such discussion taking place with the parents, except for some specific cases where it was observed that the child was reacting negatively to the games and there was need for further support. Most of the times the teachers would be the ones to initiate such a discussion with the parents, but from the parental side there is not specific interest on discussing about the use of digital games by the children in the preschool or at home.

I believe that the digital games should be one of the topics discussed in the meetings with the parents, and so far it is not. In the meetings they mention many things but that, and the digital games are closer to the life of the children that describing what we do in the preschool every day –Teacher 3

When the teachers were asked if they discuss the digital games with their colleagues, only two of them said that they do discuss about it; they usually discuss about what they use, how they use it and what updates they have from related trainings and seminars. For the rest of the teachers the discussions are happening rarely and they are taking place only when there is need to discuss a problem related to the digital games. From the answers of the teachers it seemed that the positive teachers would be the ones interested to initiate a discussion and reflect on the use of digital games with their colleagues, while the sceptical teachers do not share the same
interest in discussing the topic, unless there is something crucial to talk about, for example if a child is reacting negatively to the use of digital games.¹

However, some of the teachers mentioned that, when they are searching for digital games to use in the classroom, they do discuss games with their students.

Children have of course their own propositions, for example they say that at home I have this kind of game where I do this and that and the main character is a bear, and so I try to find the application they play –Teacher 1

Teachers that mentioned their discussion with the children most likely belonged to the category of the positive teachers.

The initial aim of the thesis was to examine the position of digital games in the Swedish preschools and the perception of the preschool teachers on DGBL. The conducted study managed to give answers to all of the research questions. The research identified the opinion of preschool teacher towards DGBL and distinguished teachers into two categories: the positive and the sceptical teachers. Moreover, the study managed to find what the barriers that restrain the use of digital games are, what the ways digital games are being used in the classroom are and to what degree digital games are being discussed by teachers and parents.

The research findings showed that there are significant differences on the attitudes of teachers towards DGBL, which affect the use of digital games into the classroom. The study revealed that the barriers influencing the use of DGBL can be of ideological and of practical nature. While the practical limitations can be easily

¹ Many of the teachers who were interviewed mentioned the inability of their colleagues to use the digital devices. Their colleagues’ insufficient ICT training and fear towards technology was referred as a reason why digital games are not used in preschools or in education in general. These teachers either wanted to justify themselves for not using digital games by making claims about their colleagues, or they felt that they were lacking support when they were trying to implement digital games and tools in their preschools. The fact that the teachers were not limited on expressing their perspectives, but were also referring to their colleagues is rather interesting. Even thought it was noticed this tendency of teachers making claims about their colleagues, I am not sure how to interpret it. I would like to investigate this further, but certainly more data would be needed. However, it illustrates that teachers need to have colleagues to relate to.
overcome, the ideological have usually deeper roots and might be perceived as statements from teachers’ behalf.

Moreover, the study showed that teachers implement several different ways to apply digital games to the teaching procedures, while they select games based on specific criteria. When the discussion about DGBL is concerned, the findings indicated that DGBL is not considered to be an important topic of conversation between teachers and colleagues and/or parents, since it seems that there is lack of discussion.

The research findings will be summarized and discussed further in the next chapter. The discussion of the findings will be conducted in relation to the research conversation and the literature review.
Chapter 6
Discussion of the findings

6.1 Discussion of the findings based on the research questions

Research Question 2: Identify the differences between the public and the private sector regarding the use of digital games and DGBL

The analysis of the empirical data indicated that there are no actual differences between the public and the private sector regarding the use of digital games and the DGBL. Both public and private preschools are using or not using digital games for the same reasons, e.g. shortages on technological devices, demands of the parents. What make the difference in the application of the DGBL in the classroom are the opinions of teachers and their attitudes towards digital games, rather than other factors related to the preschool itself.

Research Question 1: Identify teachers’ opinions on digital game-based learning and whether they use digital games in the classroom or not.

While, initially, the focus of the research was set on the differences between the public and the private preschools, the results led the researcher to a different direction. The research shows that the actual focus lies on the differences between the teachers’ attitudes.

Four out of seven of the teachers of this research do use or are willing to use digital games in the classroom. In particular, three out of the four positive teachers use digital games in the classroom, while the one out of these four is willing to use them but is not allowed by the administration of the school and the parents. The data demonstrated that teachers are familiar with the idea of using the digital games for educational purposes, while they are aware that children play with digital games at home. The data also showed that teachers are familiar with the digital devices and with how to make use of them. However, the fact that a teacher is using digital games or not is not a confirmation of whether he/she agrees with the use of them.
According to the findings, it is the attitude of the teachers that affects the use of digital games for educational purposes. As it is apparent, teachers are the ones who are in the critical position to choose whether they are going to make use of a tool or not, condemning it or embracing it in the classroom. However, in some cases, schools are providing teachers with some digital games, but is on the teachers to decide if they want to apply them on the classroom or not.

From the analysis of the data, two are the categories of the teachers based on their attitudes towards digital games: the positive teachers and the sceptical teachers. The positive teachers are keen on using digital games, having in mind that it is one more tool that provides them with further educational opportunities, and corresponds to the needs of the society and the interests of the children. These teachers seem to have a curiosity about children’s reality, they discuss with them about what kind of games they like and a way to approach them is through the digital games. The sceptical teachers, on the other hand, are hesitant about using digital games and, even if they use them, they would prefer not to for several reasons. They perceive digital games as a tool that is blocking the social and emotional development of the children and traps children into a digital reality. They admit that children are learning through the digital games, but they would prefer to use other tools and accomplish the same educational tools with something closer to the traditional ways of teaching. A common characteristic among these teachers is their tendency to protect children from the technology and focus more on traditional ways of teaching and learning, which they think are more appropriate for the early childhood education. The positive teachers, who are in favour of the DGBL, are the ones who are looking constantly for ways to improve the use of digital games in the classroom and make the learning through them efficient, while sceptical teachers either they will not use them at all, or they will use them but without putting much effort on it.

Besides the identification of the opinions of the teachers towards DGBL, this study focused also on the identification of the barriers as the reasons why teachers are not using or are not willing to use digital games in the classroom. There are three factors that influence the application of digital games in the preschool and these are the practical limitations, the ideological limitations and the lack of training and/or
information. The practical limitations include the difficulty to implement digital games, the lack of time, and the shortages on technological equipment. The ideological limitations are connected with the perceptions of the individual teachers, the perception of the parents on the use of digital games for educational purposes and the opinions of the teachers’ colleagues. Finally, some of the teachers admit that if they had better knowledge on how to use digital games with their students they would feel more comfortable with using them.

The practical barriers lead to some interesting insights on what is happening in the preschools and what teachers have to deal with when they want to introduce a new tool. First of all, teachers might not have the devices or the extra time needed to implement the digital games in the classroom. In case they do have these two elements, they might not know how to make efficient use of them. And even if they do have all of the above, they might not have supportive stakeholders to facilitate the use of digital games in the classroom. As it is apparent, the use of digital games might be dependent on the teachers’ beliefs, but at the same time it needs a fertile ground for its efficient implementation in the preschool.

The ideological limitations are of a great importance in this study, as they are also related to the attitudes of the teachers towards digital games. These limitations show that teachers are biased towards digital games. The idea that teachers have on digital games might often be a result of biases and stereotypes. These teachers believe that digital games can result to isolation of children, to limited development of their social skills and to an unhealthy way of upbringing. These limitations might come from lack of knowledge, from their idea of how a child should grow up or by their hesitation towards the use of technology by young ages. Besides the teachers’ opinions on DGBL, there also other individuals involved to the application of new methods on the preschool. The findings indicate that the role of the parents is very critical, since they do involve in the education of their children and they react whenever they disagree with the practices of the preschool. Therefore, even if the teachers are positive towards the use of digital games, the parents might be the ones who prevent them from implementing digital games in their teaching procedures. Besides the teachers’ attitudes and the parents’ demands, the collaborative support
forms a great role in the application of digital games. Teachers argue that the ideological limitations of their colleagues can often influence the use of DGBL.

The lack of information of the teachers brings on the surface a very critical topic for discussion. It is not coincidental the fact that none of the teachers has ever read anything related to the digital games and DGBL. This information comes to confirm the gap existing between the academic community and the practice. While there are countless of articles and research written on the subject of DGBL, teachers are not aware of any concepts or theories existing on the field of DGBL, even if they make use of it.

*Research Question 3: Identify the ways digital games are used in practice*

From the answers of the teachers on how they use the digital games in the classroom, four ways of implementation were identified: i) the taking turns approach, (ii) the teacher-led approach, (iii) the projection approach, (iv) the small team game approach.

If we take into consideration that teachers have not read anything on how to apply digital games in the classroom and only two of them stated that they have been offered training, we can support that these approaches are thought by the teachers themselves. The sceptical teachers, who believe that digital games are not social activities and they demand children to be merely focus on a screen, apply the taking turns and the teacher-led approaches. The positive teachers might also apply these approaches, but they are searching for more ways to use the digital games and transform them into group activities. Therefore, they implement also approaches like the projection approach and the small team game approach.

For once more, the way teachers choose to implement the digital games in the classroom is connected to their perception of digital games and their attitudes towards them.
Research Question 4 Find out if the teachers are discussing about digital games with other colleagues or parents and to what extend the discussion is an important factor in forming their opinion on the subject of DGBL

It is observed that there is very limited discussion on the topic of DGBL between the teachers, their colleagues and the parents within the preschool. While colleagues are more likely to discuss some aspects of DGBL with each other, the discussion between parents and teachers rarely takes place and almost never the parents are the ones to ask for such a discussion. This opposes to the fact that digital games are an important part of the children’s everyday life and children come in contact with them almost every day, especially at home. Taking into consideration the fact that mostly the positive teachers are willing to discuss or initiate a discussion on digital games and DGBL, the discussion about digital games is highly connected to the opinion of the teachers. If teachers are in favour of digital games and they are willing to improve their application in the classroom, they are more likely to be open for discussion, while teachers that are sceptical or even against digital games will not consider digital games as a topic worth of mentioning in staff or parent meetings. Additionally, positive teachers are not only willing to discuss digital games with parents and colleagues, but also with their students. This shows that positive teachers want to involve more digital games in their teaching environment, as well as in their teaching procedures, while the sceptical teachers do not consider DGBL as a topic of a great importance.

Apart from these findings, which were guided by the research questions, the data analysis gives us some more findings that relates with the way teachers are searching for digital games, if they are searching for them, with what teachers think that their students are learning by using the digital games and what the reasons for avoiding the DGBL might be.

The findings present that teachers are not searching actively for digital games; however they do have specific criteria in mind whenever they are searching. These criteria are: the educational criteria, the game design criteria and the age criteria. Educational criteria play a major role for the teachers, as they select the games mainly based on what they are going to teach. The national curriculum and the preschool’s
schedule are the main guidelines for the teachers’ selections. The most popular categories of games are the language games and the mathematics games. Aside from the educational criteria, teachers focus on the game design criteria, as they expect from the games to be appealing to the children and to have an accessible to the children gameplay. Since teachers in the preschool have to work with children of different ages, the age factor is also critical in the selection of games, as not all the games are appropriate for all the ages.

From the selection criteria it seems that teachers know what they are looking for when they are searching for educational games. Moreover, teachers are testing the games before they show them to their students, which is essential when digital games are used by young children and for educational purposes.

When the teachers were asked about what students learn with DGBL and about reasons to avoid the use of DGBL, they mentioned many different things, but their answers were short. That might be due to the fact that teachers either they have never thought of it or they did not know what to reply. Nevertheless, on what children learn from digital games, teachers’ answers could be distinguished into social and cognitive skills. The former ones include learning of co-operation, of patience and of sharing with friends. The latter ones include learning of using digital devices and basic knowledge on language, mathematics and sciences. On the reasons to avoid DGBL, it is interesting the fact that sceptical teachers had not many arguments against digital games, other than their ideological limitations. The positive teachers, on the other hand, were supporting that there is no reason for avoiding digital games as long as one is aware of how to use them.

6.2 Discussion of the findings based on the literature review

On the second chapter of this paper the teachers’ beliefs about ICT and the digital games integration in the classroom are developed based on the review of the existing literature. In general, this study comes in line with the existing research. According to the literature review, educational change is dependent on what teachers do and think; a statement that this study comes to confirm. Indeed the beliefs of the teachers affect, in this case, the implementation of digital games, which are perceived as an
educational change opponent to the traditional ways of teaching. Donnelly, McGarr and O’Reilly (2011) identified four types of teachers in relation to ICT integration into practice: the contented traditionalist, the selective adopter, the inadvertent user and the creative adopter. Even though the sample of this study is quite limited to lead us to such a detailed identification, these findings are very close to the attitudes of this research’s participants in relation to digital games integration. The digital games integration, as a concept, is very close to the ICT integration, as both belong to the same category of new tools. Even if the integration of ICT in general is gaining a wider acceptance and it is already part of the teaching methods of many teachers, the position of ICT today are taking the digital games, which are perceived as the recent new tool that teachers should be adapted to. Combining the findings of Donnelly, McGarr and O’Reilly (2011) and the findings of this study we can support that the categories of inadvertent user and creative adopter are equivalent to the category of the positive teachers, while the categories of contented traditionalist and the selective adopter are equivalent to the sceptical teachers.

Donnelly, McGarr and O’Reilly (2011), however, proceeded to a further categorization that this study did not have enough data to support it. They distinguished further the categories of the teachers into teacher-centered and student-centered, where the contented traditionalists and the selective adopters belong to the former one, and the inadvertent users and creative adopters belong to latter one. This categorization leads to an interesting reflection. It offers the opportunity to think of the sceptical teachers as teacher-centered, as they approach their students and the integration of digital games based on their scepticism toward the information society and its technological orientation and not based their students’ needs, who will have to face the changes of this information society later on.

In another study of Rosas et. al (2002), the resistance on the implementation of games through computer technology was examined. According to the study, the resistance based on (i) the teachers’ perceptions of games as merely entertaining and not as useful instructional tools, (ii) the teachers’ lack of knowledge and skills with respect to computer assisted instruction, and (iii) the insufficient developments of effective educational hardware and software. Additionally, in the study of Green and McNeese (2011) three reasons where identified as why teachers might be reluctant to
utilize digital games in school: (i) the difficulty the digital games to fit the curriculum and the time limitations of the class period, (ii) the lack of updated school infrastructure that can support the digital games, and (iii) the lack of support from school administration and parents.

The barriers identified in this study as responsible for influencing the application and integration of digital games in the classroom comes in accordance with the barriers presented by Rosas et. al. and by Green and McNeese. The teachers’ perceptions of games as merely entertaining and the lack of support from school administration and parents are included in this study’s ideological limitations, the teachers’ lack of knowledge and skills are mentioned in the lack of knowledge and training barrier, while the insufficient developments of effective educational hardware and software, the difficulty to fit the digital games in the curriculum, the time limitations of the class period, and the lack of updated school infrastructure, are mentioned in the practical limitations. It is interesting to see that, regarding the Rosas et. al. research, there were not relevant changes from 2002 to today, since the barriers that were presented there still exist in our educational reality, when the implementation of digital games is concerned.
Chapter 7
Concluding remarks and further research

Even though the digital games are a considerably new tool, it seems that they have created some space for their use on an educational level. Teachers know the existence of educational digital games and they know where to find them, regardless whether they are using them or not. Furthermore, teachers agree with the fact that children do know how to use digital devices and they do play games themselves at home using their parents’ devices. However, articles and books on the use of digital games among young children or on the application of DGBL in the early childhood education are rather limited. Since the use of digital devices and digital games by children is increasing, there is need for more empirical evidence and research on how they should be used.

It is still debatable whether the built frameworks based on which digital games are used are the expected ones. It became obvious during the study that teachers never heard of the concept of DGBL and were unaware of theories, books or articles written on that field, which comes as a surprise given the fact that for the past ten years there is a continuously developing research field on this subject. Even though teachers were using digital games as educational tools, it does not mean that they were making the best educational use possible. The absence of sufficient knowledge on DGBL by the teachers, as well as the distance between the academic community, the educational game developers and the school administrators creates a gap that prevents the DGBL to evolve, regarding its use in educational institutions. From the researcher’s point of view, there is a need for more communication. The academics should reach out to the teachers, the game developers should follow the academic research and at the same time listen to the needs of the teachers, while teachers should receive information from both sides, as well as reach out for assistance regarding the proper implementation of digital games as educational tools. There is a need to fill the gap of communication between these three groups, which they might seem separate to each other, yet they approach DGBL from different perspectives and they somehow interrelate. A way to achieve this filling of the gap would be with informative seminars organized by game developers for teachers and school administrators,
collaboration of game developers with academics and teachers during the procedure of developing educational games, or training and updating seminars for the teachers on recent DGBL research.

The need for communication between the involved with DGBL communities, such as the research community, the game developers and the teachers, is also related to the need for teacher training specifically oriented to the use of tablets and educational digital games. When teachers were asked if they feel that their ICT training is sufficient, most of them replied positively. However, from their interviews it becomes apparent that, in many cases, their training is not sufficient enough to support the DGBL implementation. Apart from the fact that teachers’ training would facilitate the use of digital games into the classroom, it would also prove useful to the overcoming of some of the barriers. Some of the ideological limitations that were standing as obstacles to the use of DGBL can be seen as a result of lack of information and special training. Some of the sceptical teachers were arguing that digital games limit the children’s social development and that digital games can only occupy few students at a time. Teachers also stated that parents are reacting negatively to the idea of teachers using digital games in preschool. Moreover, some of the teachers admitted that they simply do not know enough about this field of DGBL, or they do not how to work with digital games in the class. Taking these statements into consideration, the training of the teachers should not be limited only to the use of digital games as educational tools, but it should also inform teachers about DGBL in young ages and prepare them for dialogue with colleagues and parents.

Nevertheless, the ideological limitations are not only result of lack of information. During the interviews with the sceptical teachers, some resistance towards educational digital games was detected. This resistance can be easily overcome if it is due to lack of information or due to fear of adaptation to a new approach. However, if this resistance is deeper, like an ideological statement, then it should be further discussed. Sceptical teachers seemed to be resistant towards the use of technology in early childhood education. They would prefer to use traditional methods and tools to educate the children, instead of make use of the digital devices. To some extent, this position of the teachers can be perceived as a need to protect children from technology and its negative effects. Indeed, when early childhood education is concerned, the use of technology should be specifically structured and
limited. Should, however, the preschool be a place of resistance against technology or should it be a part of the technology society?

Digital games are just one more method, or more teaching tool, which comes as a result of our society’s technological evolution. The resistance and the difficulty digital games confront to be implemented into the schools can be an indicator of the fear of teachers and of education to adapt to a new reality that demands upgraded approaches. The differences in the attitudes of teachers present that there will be always individuals who will be able to adapt to new situations, and there will always be individuals who will hesitate or afraid to adapt. The question is whether we will approach and help these individuals by bringing the research closer to the practice, or whether we will distantly observe while the gap stays the same.
References

Annetta, L., (2008). “Video Games in Education: Why they should be used and how they are being used”. Theory into practice. 47, 229-239. doi: 10.1080/00405840802153940


## Appendix 1

### Interview guide with preschool teachers

<table>
<thead>
<tr>
<th>Area</th>
<th>Question</th>
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<tbody>
<tr>
<td><strong>Introductory Questions</strong></td>
<td>1. How old are you and how many years have you been a preschool teacher for?</td>
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<td>2. Are you employed by the public or the private sector?</td>
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<td></td>
<td>3. What are your students’ ages?</td>
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<td><strong>The opinion of the teachers</strong></td>
<td>4. Do you implement digital tools? Give examples.</td>
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<tr>
<td></td>
<td>a. How much or in what way do you use them?</td>
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<td></td>
<td>b. How do you feel about applying digital tools in the teaching procedures?</td>
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<td>5. Do you feel that your ICT training is sufficient? If not, what more would you want to know?</td>
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<td></td>
<td>a. Have you been offered any seminars, courses or further training?</td>
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<td></td>
<td>b. Where have you got the training from?</td>
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<td>6. Are you familiar with digital games and digital game based learning?</td>
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<td></td>
<td>7. Are you aware of any conceptions or theories existing on the field of digital games?</td>
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<td>8. In your opinion, are digital games only for leisure time or they can also have educational value?</td>
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<td>9. Do you think that they are appropriate for the early childhood and early childhood learning? Yes, no, and why</td>
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<td></td>
<td>10. As a teacher would you/do you use digital games in the classroom?</td>
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<td><strong>Practice of DGBL</strong></td>
<td>11. How do you use/implement the digital games in the classroom?</td>
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<td></td>
<td>a. Do you use them as tools to meet some specific teaching goals or as games for children to spend some time with? Give some examples</td>
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<td></td>
<td>b. How do you get involved as a teacher when children are playing digital games?</td>
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<td></td>
<td>c. Do you encourage children to play together or individually?</td>
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</table>
d. Do you think that the gender factor makes a difference?

12. What kind of digital games do you usually use? Give me some examples
   a. How did you find out about these games?
   b. Do you get informed by any specific sources on popular games, or educational games, or games appropriate for the early childhood?

13. With what criteria do you pick the digital games? Do you have some specific educational goals in mind when you pick the games?

14. Does your employer promote the ICT or the digital game based learning?
   a. Is the employer of the school involved in the selection of learning tools and material?

15. Is there any reason for avoiding using digital games?

16. Do you discuss about digital games and digital tools with colleagues and/or parents in order to raise awareness and improve the way digital games are being used?

**Discussion of DGBL with parents and/or colleagues**