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Socialization, Mediation and Learning by Doing: The Role of School, Family and (Virtual) Peers in Playing Video Games

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Socialization, Mediation and Learning by Doing: The Role of School, Family and (Virtual) Peers in Playing Video Games

Mia J. W. Stokmans[*] *and Huib Nieuwenhuijsen*[**]

Abstract: Despite a turbulent ever-changing digital environment, it appears as if everyone who has access, is capable of using digital information. But, research on the digital divide indicates differences in internet skills. This article focusses on the acquisition of digital competences needed to play video games, the oldest digital application. In our study, we described gaming competences by means of nine categories. We distinguished knowledge, skills and attitudes for instrumental, structural, and strategic competences. We described modes of learning from different perspectives: individual learning approach (practicing), mediation (co-gaming, instructive mediation, and restrictive mediation), and socio-cultural background (age, gender, educational level, and educational level father). On the basis of this framework we stated five hypotheses that were tested by data of an online international questionnaire (N=273) that was conducted among frequent gamers. Results indicate that socio-economic background and practicing influence instrumental competences. Mediation is most important for strategic and structural competences. However, restrictive mediation only affects instrumental competences negatively. These results suggest that different learning processes are at work for acquiring instrumental, structural, and strategic competences. Further research is needed to generalize these findings to less frequent gamers or other digital domains.

Keywords: digital divide, digital competences, practicing, mediation

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Introduction

The widespread use of digital information as well as the numerous instrumental and hedonic functionalities users assign to it is realized in just a few decades. Video games for example were only available to the general public as late as 1974 when Atari introduced 'pong' (Demaria & Wilson, 2002). The first initiatives for the creation of the World Wide Web were set in 1990 (Pew Research internet project, 2014). The first social network was introduced in 1997 (Boyd & Ellison, 2008). In a period of about twenty five years digital information has conquered the world. In this short period of time, most people have adopted the use of digital information as part of their lives. Furthermore, devices like a mini-computer, personal computer, tablet, and mobile phone, needed to gain access to digital information, have seen a rapid development within the same period of time (Meekers, 2013), as well as user interfaces for presenting digital information and software needed to retrieve and produce digital information (such are search engines (see for example: Wall, 2006; 2013) and word processors (see for example: Clark, 2014).

Access to information technology and the ability to use digital information is regarded as a necessity to participate in today's knowledge and information-based society (Servon & Nelson, 2001; Selwyn, 2004; Hargittai & Hsieh, 2013). Research on the digital divide, concerning issues of inequality between social groups of both access and use of digital information, focus on first order effects regarding who has access to the technology, and second order effects about the inequality in the ability to use the technology among those who have access (DiMaggio, et al., 2001; Graafland-Essers, et al., 2003; Dewan & Riggins, 2005). Research indicates that people who did not grew up with the widespread use of digital information have trouble in mastering this art and adapting it to the technological innovations of the internet (Buckingham & Willet, 2006*;* Eurobarometer*,* 2008*;* Tapscott, 2008). Furthermore, studies that focus on youth found considerable differences in digital competences (Livingstone & Helsper, 2007; Hargittai & Hinnant, 2008) and differences in competences tend to grow (van Dijk, 2005). These finding indicate that growing up and having access in itself does not lead to mastering digital competences and accentuates the importance of social processes and learning that affect the acquisition of digital competences. This leaves us with the question: how do people acquire competences needed to make use

of digital information? By this question we go one step further than the second order effects of the digital divide (inequalities in digital competences) and focus on the acquisition process itself.

Since different acquisition processes and core competences can be identified for using different types of digital information (according to function, hardware and software technology) for different purposes, we will narrow down this global question to a specific type of digital information, namely video gaming. Video gaming became the focus of our research for several reasons. Firstly, it is one of the oldest digital applications, which would make the potential effect of socializing agents such as parents and education, more visible. Secondly, the feedback given by particular games makes gaming an appropriate environment for learning by doing, as will be explained later (see Kahneman, 2012). Thirdly, a large amount of background information about gaming is available, as well as an abundance of (digital) social platforms on this subject. This gives the opportunity to explore the impact of information sharing, which is one of the advantages of the WWW when learning competences (Bolton, 2010). By focusing on video gaming, the main question of our research becomes: how do people acquire competences needed to play video games? In the next section we will give a summary of relevant literature to get a preliminary answer on this question that will be explored by an empirical study about gaming.

Acquiring video gaming competences

In the main question three keywords provide a guideline for exploring the literature:

1. Video games. In the first part a description of this product category is given.
2. Video gaming competences. In the second part gaming competences will be defined and conceptualized.
3. The acquisition (of competences). In the final part of the introduction we will go into social processes and learning to get a grip on the acquisition of video gaming competences

What do we mean by video games?

Although everyone has an idea of what a video game is, it is very hard to give a clear cut definition of the concept. In this paper we prefer the term video game over electronic or digital game, since the term video emphasizes the fact that moving images or (animation) movies are an important part of the game. The terms electronic or digital refer to technology that is not necessarily linked to moving images. In defining video games, we will firstly describe the broader category of games and then narrow it down to video games.

Definitions of the concept game, are very old and divers (Huizinga, 1955; Caillios, 1957). Although a game is a product, an object, it is not only defined by characteristics of the product, but also in terms of what people do with it (Caillios, 1957; Crawford, 2003; Juul, 2005). In general, people play games mainly for hedonic benefits (amusement, enjoyment) (un-productive, according to Caillios, 1957). However, we believe that instrumental benefits, as in educational goals, can be of secondary interest. Restricting the definition of games purely to hedonic benefits implies that players will not accomplish competences that are useful in a real-life setting. In the case of video games this is almost impossible, since they make use of digital information that needs to be retrieved and processed. This competence is an aspect of digital competences as defined by the European Commission (2007). Furthermore, role-playing games have a lot in common with simulations. One can, for example, explore how to behave in a particular role, although in role-playing the emphasis lies on hedonic and not on educational benefits.

Furthermore, all games can be characterized by rules that indicate what is allowed while playing the game. These rules are applied in an interactive sequence of actions and reactions that determines the course or progress of the game. In our opinion, interactivity does not necessarily mean that the action and reaction of different agents should be directed to the same object in the game as Crawford (2003) states. In the case of a racing game, for example, every player has his own car. The reactions are provided by the game: it 'computes' the course the car should move given the input of a player. From this perspective single player video games are interactive too. A single player game is a struggle against elements in a fictitious setting (as in racing), against one's own competences (as in chess, or solitaire) or against chance (as in Yahtzee).

Moreover, the outcome of a game is uncertain. Often the outcome is linked to winning or losing, but we prefer to broaden it to reaching goals specified in the rules of a game or set by players themselves. In traditional games, such as card games or sports, this is winning the game. However, in role-playing games, winning or losing is not a main goal. In such games players design and explore a fictitious setting to experience an adventure or to socially interact as another personality. Since players intent to get a personal positive outcome of a game, playing a game involves mental and/or physical effort. By leaning (by doing) a player acquires competences to reach the positive outcomes with less effort.

From the above, one can deduce characteristics of the product video game. A video game applies moving pictures to create successive fictitious settings. These settings are created (and re-created) by a device (with a microprocessor) based on the rules of the game and the actions of one or more players. Furthermore, input and output devices are needed to take care of the interactivity of a game. With input devices one can think of a keyboard, mouse or controller, a typical output device is a (computer) screen. One can play video games on devices like a computer, a game console, a smartphone, etcetera. A game can be online or offline.

Video Games competences

While describing competences needed for playing video games, we should realize that video games are played online or offline, using a device that transfers digital information. In consequence, it involves specific gaming competences next to digital competences. Both will be described successively.

From our description of video games, competences can be defined as: playing video games by the rules set to reach positive outcomes with a minimum of effort. The rules of a game distinct one game from another. The way games create opportunities for a player can be characterized by means of progression and emergence (Juul, 2005). Progression means that opportunities are presented successively and the progression of a game is programmed in detail. In other words, a game presents a situation, a reaction of a player is regarded as wrong (game over) or right (next situation). This means that progression games are generally very linear in nature. In an emergence game, opportunities are presented simultaneously as well as successively, a player chooses which path to take, which determines the next set of opportunities presented by the game. This

intermediate feedback is not in terms of wrong or right, but affects the way the game progresses. In order to learn the rules, one should assess the effectiveness of choices and actions made in reaching set goals. Compared to emergence games, in progressive games the feedback is more indicative (has more diagnostic value) for the effectiveness of the actions and choices made.

In conceptualizing digital competences we start from the description of the European Commission (2007, p. 7) "the confident and critical use of Information Society Technology (IST) for work, leisure and communication" In this document it is indicated that it requires knowing and understanding the nature, role and opportunities of Information Society Technology in an everyday context. They include knowledge of computer applications, information storage devices and management, and an awareness of opportunities and threats that go with communication on the World Wide Web. This knowledge is supported by basic skills in ICT and electronic media. One is able to collect (retrieve, assess, and exchange), produce (produce, present and store), and process (integrate and reflect) information in a systematic and strategic way to accomplish set goals. It goes with a critical and reflective attitude towards available information and a responsible use of interactive media (European Commission, 2007).

If this description in compared with the conceptualization by Steyaert (2000, 2002) and van Dijk (2005, 2006; van Deursen & van Dijk, 2011) one can distinguish three types of competences:

1. Basis competences to handle the device and the medium (instrumental or medium related internet skills).
2. Locating and processing of information (structural or information internet skills).
3. Ascertain the usability of the information for set goals (strategic competences).

According to the European Commission (2007) competences are multifaceted and can be described as a combination of knowledge, skills and attitudes to fulfill tasks set in a domain. Herewith, we come to nine aspects of gaming competences as summarized in table 1.

Instrumental competences are about how to handle devices to play different games. Since devices and games change very quickly, one needs knowledge about different types of devices and what to do with them, as well as fine instrumental skills that are learned by prolong training (endurance attitude).

Table 1. Competence domains for playing video games

	Instrumental	Structural	Strategic
Understanding and knowledge	• computer applications • devices	• information retrieval, storages and management • narratives of game stories	• opportunities and treats of communication on the World Wide Web • rules of games
Skills	• basic ICT skills • instrumental skills	• produce, collect and process information • recognizing situations • reach in a familiar way	• use information to reach set goals • decision making • evaluate actions
Attitude	• endurance	• hedonic benefits	• instrumental benefits

Structural competences are needed to recognize different structures in which information can be stored, presented, and managed. It concerns the question: what to do in this gaming situation? This competence can be applied in playing games in that, for example, a player recognizes a situation in a game that triggers a reaction that worked in other similar situations. The attitude that goes with structural competences is more hedonic in our opinion. A player enjoys the game for its own sake.

Strategic competences are needed to come up with a plan of action to reach set goals. In concerns the question: What to do to reach set goals, or how effective is this action in reaching set goals? To come up with a strategic plan, one needs knowledge of rules of games, and use presented information to reach set goals (what are alternative actions, how effective are they in reaching my goal, and decide what to do). The attitude that goes with strategic competences is more instrumental in our opinion. A player realizes that playing a game can be instrumental in reaching ones goals, also outside a gaming situation.

Structural and especially strategic competences require that a gamer thinks about gaming experiences in other gaming situation. This thinking about provides insights that can be transferred to new gaming situations to develop and improves structural and strategic competences (Kolb, 1984). This transfer of competences is less straight forward for strategic competences as it is for structural competences due to less similarity at the practical level. In consequence, reflective abilities are more in demand in developing strategic competences (Groen, 2011).

Social processes and learning

In order to arrive at a global framework to model the acquisition of digital competences by social processes and learning we adapt the structurationist view of Bourdieu (1984, 1997), since it allows us to integrate social context factors, mediation (instruction), and practice into an overall framework. In this framework, the development of gaming competences is based on social processes in which the culture or habitus (schemas of perception, evaluation and modes of conduct; see Bourdieu, 1984) of playing video games is transferred from an agent to a learner (see for example Grusec & Hastings, 2007) as well as playing on frequent basis, in order to become familiar with the competence domain (instrumental/structural/strategic). The socialization process is not restricted to a specific age of a learner (for example, 25 years; Kraaykamp, 2002) since we believe that getting acquainted with and learning about the culture of a leisure activity is a lifelong learning process, especially in the case of gaming. In consequence, the group of socializing agents is not restricted to teachers, or parents, agents can also be peers or friends.

To summarize (see also table 2), learning to play (new) video games is influenced by social processes in a specific social context and learning by doing. Learning by doing is useful to practice competences transferred from a social agent to a learner and to explore consequences of actions by means of trial and error.

Table 2. Types of learning in video gaming

Type of learning	Action by an agent	Learning theory
Practice	none	Operant conditioning • trial and error
Mediation	• co-gaming - observation - playing together • instructive mediation • restrictive mediation	Social interactionist • mediation
Implicit socialization by socio-cultural background	• Implicitly rewarding or restricting	Structurationist view

Looking more closely to the learning processes, we see three important paradigms:

1. The structurationist perspective that provides a global framework to introduce the different form of capital that mediate conditions set by society, social class, and sub-culture.
2. Mediation, in which social capital and social interaction play an important role.
3. Learning by doing or trial and error learning.

We will discuss them shortly to gain insight in how competences needed to play video games are acquire and updated.

Structurationist perspective, the notion of capital

We adapt the structurationist approach of Bourdieu (1984, 1997) as a global framework to model the acquisition of digital competences for gaming. A structurationist approach pays attention to memories of (routinized) practices that allow people to repeat actions in similar ways over time (Selwyn, 2004). From this viewpoint, the different forms of capital distinguished by Bourdieu (1997) provide a notion that underlie differential access to, and use of video games. .

Bourdieu (1993, 1997) distinguishes three types of capital. Firstly, economic capital: the level of monetary resources. Income is important in that it provides the means to get access to up to date IST supplies (Murdock et al., 1996). Secondly, social capital: the resources available in social networks. Social networks provide a base to exchange practices and digital competences about gaming, and to find appropriate others to play video games (Murdock et al., 1996; DiMaggio & Hargittai, 2001). And thirdly, cultural capital: the extent a person has absorbed the various practices in the domain over time. The absorption of various practices can be conceptualized as embodied (as in knowledge, proficiency, and attitudes), as objectified (as in the possession of games and the exposure to games via magazines, books, and other media), and as institutionalizes (as in formal credentialized training) (Selwyn, 2004). The conceptualization of embodied cultural capital in the domain of video gaming overlaps the conceptualization of digital competences regarding video gaming as described above.

The notion of capital suggests that (implicit) restrictions set by society, social class or social-cultural background on introducing and socializing a learner into video gaming can have an effect on what and how video games are played and therefore it affects the competences acquired. In

consequence, variations in competences can be linked to socio-demographic variables (see for example Hargittai & Hinnant, 2008).

Mediation of a learner

The influence of social capital on digital competences can be viewed form a social interactionist perspective (Mead, 1967; Hewitt & Shulman, 2011), that states that a person gives meaning to a (virtual and social) setting in the light of personal goals set (Mead, 1967; Hewitt & Shulman, 2011). This meaning is not objective, it is a social construction in which social networks (social capital) play an important role. The meaning (for example the effectiveness of an action in a video game) is learned and confirmed by social interaction, or mediation.

In studies about the occurrence of mediation (Austin, 1993; Huston & Wright, 1996; Valkenburg, et al., 1999; Livingstone & Helsper, 2008; Notten, et al., 2011) different types are recognized. Firstly, co-gaming (playing video games together), in which the experience itself is shared, without it being discussed verbally. For video gaming, two sub-categories of co-gaming can be distinguished: the learner is watching another individual play the game (observational learning), and the learner and another individual play the game together. Co-gaming facilitates practicing. Now one sees how (new) actions are performed at the behavioral level and one sees what actions sequences can be applied in what gaming situations. But the effectiveness of action sequences is still an idiosyncratic, subjective interpretation (there is no discussion). Therefore, we believe that co-gaming facilitates the acquisition of instrumental competences (more practice) and structural competences (verification what others do in this gaming situation), but is less effective in acquiring strategic competences.

A second type of mediation is instructive mediation (sometimes called evaluative or active mediation), in which feedback is given during or after playing a game. This kind of mediation does not directly affect practicing (talking about is not playing), but it probably influences structural competences and strategic competences. Now players can discuss similarities and differences between gaming situations and games that can facilitate the acquisition of structural competences. Furthermore, players can talk about different goals that can be set, accompanying strategic choices, and how effective a strategy is in reaching a set goal. This facilitates the acquisition of strategic competences.

The last type of mediation, restrictive mediation, regards setting explicit restrictive rules by social agents for video gaming or playing certain video games. The rules can regard when and where video games can (not) be played, as well as what genres of games are (not) allowed to play. This type of mediation limits practicing in term of frequency, duration, or variations in video games played. Therefore we believe that restrictive mediation inhibits the acquisition of instrumental and structural competences but not strategic competences (strategic competences are not affected by practicing as explained above).

Practicing, learning by doing, trial and error

We stated all reading that learning by doing is useful to practice competences transferred from a social agent to a learner or to explore consequences of actions by means of trial and error or. The link between doing and the probability that the action will be repeated can be modeled by means of operant conditioning. In operant conditioning one assumes that a person chooses for behavioral operations or modes of conduct that result in the most positive and the least negative experiences. If a certain course of action worked last time, it will probably work this time, is the line of reasoning. Probably, these experiences affect gaming competences at a practical level.

In general, skills can be acquired by (a lot of) practicing if two conditions are met (Kahneman, 2012):

- An environment is sufficiently regular to be predictable. In the case of video gaming this means that specific actions result in particular reactions and the actions taken are predictive for the progression of the game in the short and long run. The predictability of the progression of the game depends on the rules of the game (progressive – emergence) and the extent to which interference of other players is allowed.
- An opportunity to learn these regularities through prolonged practice exists. For video gaming this opportunity can be restricted when other human players are needed for playing the game or by restrictive mediation of social agents.

In other words, in order to learn competences to handle the regularities in video games by means of practicing, feedback and repetition are important. Due to interactivity, feedback is provided immediately at the behavioral level. This quick feedback facilitated the learning process at this level. But, this feedback is often not immediately nor diagnostic (did it work as

expected) for the structural and strategic level. Regarding the structural level, a player probably makes inferences about the game, based on the similarity with other gaming situations and game structures. This categorization can suggest an action sequence to handle the gaming situation at a practical or behavioral level. Regarding the strategic level, a player probably reflects on the action sequence taken (as suggested by the categorization) to get an idea of how effective it is in reaching the set goals. In consequence, we believe that it will cost a lot of practice to acquire structural competences (recognize different types of games and develop action sequences for it) and even more practice to acquire strategic competences (setting goals and evaluating the effectiveness in reaching set goals).

Hypotheses

In the above four hypotheses where formulated:

1. Gaming competences differ by socio demographic variables (age, gender, social class).
2. Instrumental and structural competences are inhibited by restrictive mediation (not strategic competences).
3. Instrumental competences can be acquired by practicing (gaming frequency, duration).
4. Structural competences can be acquired by practicing (getting familiar with the structures in ICT and gaming), co-gaming (looking how other do it), and instructive mediation.
5. Strategic competences are facilitated by instructive mediation.

Due to differences is access and use of internet as differences in culture (Hofstede, 1998), the research will be conducted for western cultures.

Research method

In order to explore the relation between modes of learning and gaming competences, we conducted a cross-sectional survey among adult active gamers in western cultures.

Study design

This study should be regarded as a descriptive research: we are primarily interested in describing the relations between modes of learning

and gaming competences. This focus is bases on the meagre body of knowledge regarding the relationship between the core constructs as was elucidated in the introduction. The relation we are looking for is a common condition for gamers: they acquired gaming competences by one or more modes of learning. Since we believe that gamers are aware of modes of learning as well as gaming competences, we can explore the relationship by asking gamers about these constructs. Given these considerations, we designed a cross sectional survey to gather the data.

Data collection and sample

For a cross sectional survey, the sampling of respondents is crucial to ensure the validity of the relation detected. However, there is no sampling frame available to select respondents at random and it is even hard to specify a sampling frame that is not dependent on frequency of gaming. In consequences we made use of online gaming platforms[1] and invited visitors to fill in the questionnaire. This sampling procedure can be characterized as a convenience sample.

The platforms were selected on the basis of popularity and their willingness to publish a link to the questionnaire. Inspection of the list of platforms suggest a genre bias that coincides with a gender bias (Cashman, 2014) (genres preferred by males). Visitors of the platforms voluntary participated in the research. The willingness to participate probably coincide with their engagement with gaming. In consequence, one can expect that more motivated games filled in the questionnaire. The questionnaire itself may contribute also to bias in response. We tried to structure the questionnaire in such a way that it motivated and encouraged the respondent to become involved in the topic, to cooperate, and to complete the questionnaire.

The survey was online from 29 March to 14 May 2013. The questionnaire was in Dutch as well as English to appeal to an international public on the platforms. 471 respondent visited the questionnaire and 273 completed it. The answers of 4 cases were given within a short period of time using the same IP address, which raised suspicion that this was in fact the same person. In consequence these cases were deleted from the data file. Important respondent characteristics are displayed in table 3.

[1] For a list of platforms: see list of sources.

Table 3. Respondent characteristics of the sample (N= 269)

Characteristic	
Sex	88,1% male; 11,9% female
Age	Minimum: 13; maximum: 68 Mean: 2.,44 (s.d.= 8.64)
Gaming frequency	Mean: 6.00 (s.d.= 0.74) several times a week
How long do you usually play	Mean: 3.31 (s.d.= 0.85) 1-3 hours (3) – 3-7 hours (4)
Age of introduction to gaming	Minimum: 2; maximum: 16 Mean: 6.99 (s.d.= 2.82)

Table 3 indicates that men are over-represented in the sample (88,1 %) and that the respondents are frequent players, who play almost every day for about 4 hours. They are rather young (mid-twenties), and on average 7 years of age when they first played a video game. Most respondents have an American nationality (31%), followed by British (15%), Dutch (13%), and German (5%). Other nationalities constituted less than 5% of the sample. Furthermore, the majority of the sample has higher vocational training as highest educational level (24% lower vocational training). About 42% of the sample consists of students, and 41% has a job.

This sample is probably not a representative sample of gamers in the western world. As research of the industry indicates (ESA, 2014) about half of the gamers in the US is female (48%) and has an average age of 31 years. Our sample started relatively young with playing games. On average men start gaming at an age of 13 (ESA, 2014). To summarize, our sample is probably not representative. It can be characterized as dominated by frequent male gamers who started relatively young with gaming. However, due to the relative young age at which the sample started gaming, the effects of restrictive mediation at home and mediation during education can be made visible (Livingstone, et al, 2011).

Measures

The questionnaire consisted of four blocks, which focused on different sets of constructs: 1. socio-demographic background, 2. mediation, 3. gaming competences, 4. gaming behaviour. We will discuss the questionnaire in accordance to the constructs mentioned in the introduction.

Table 4. Univariate statistics regarding socialisation

		N	Number of items in scale	Cronbach 's alpha	Mean (s.d. in brackets)
Socio-cultural background					
Age		269	1	-	26.44 (8.44)
Education father		248	1	-	4.75 (1.76)
Education respondent		263	1	-	4.78 (1.62)
Socialisation during primary and secondary education					
Parents	Co-gaming	269	2	0.68	2.22 (1.56)
	Instructive	269	3	0.76	0.96 (1.49)
	Restrictive	261	2	0.70	3.22 (2.10)
School	Instructive	251	2	0.53	1.63 (1.07)
Peers	Co-gaming	262	2	0.64	4.75 (1.71)
	Instructive	216	3	0.71	3.78 (1.45)
Current social interaction					
Real peers	Co-gaming	269	2	sum	7.10 (3.08)
	Instructive	269	4	0.90	4.66 (1.50)
Virtual peers	Co-gaming		1	-	4.75 (2.06)
	Instructive		4	0.86	4.04 (1.98)
Practice					
Past (child and adolescent)		269	4	0.74	4.43 (0.89)
Now		269	2	0.62	6.00 (0.74)

Social-cultural background, mediation, and practice

In the introduction it was argued that modes of conduct in the social-cultural background of a respondent molds and restricts socialisation and gaming practice of a person. In this study we used four indicators to model these effects: age, gender, educational level of the father, and educational level of the respondent. We decided not to construct one index of social position on the basis of educational level (respondent and father) due to low correlations between these variables (r = 0.18). Educational level of father and respondents is between 4 and 5, what indicates that the average level of education was between middle vocational training (4) and higher vocational training (5) (see also table 4).

Regarding 'mediation', different types of mediation (co-gaming, instructive, and restrictive) by different agents (parents, education, and peers) were distinguished. Table 4 shows important univariate statistics of the variables constructed. The data indicate that parents play video games less than once a year (mean = 2.02, s.d. = 1.54) with their children and if

they played they did it without communicating about the game (mean = 1.94; s.d. = 1.39). The attention paid to gaming during primary and secondary education (hedonic games as well as educative games) was also rather small. Gaming as an education tool was used about once a year during primary education (mean = 2.31, s.d. = 1.66) as well as secondary education (mean = 1.92; s.d.= 1.47). Respondents indicated that they had friends in their physic social network that enjoy gaming (mean = 3.45; s.d.= 1.07; 1= none, 5 = a lot). These results suggest that the amount of mediation with parents or education is rather meagre compared to the amount of mediation with peers in the past (during primary and secondary education). The amount of mediation with physical and virtual peers in the current social situation is comparable to that of peers in the past.

Practice should give an index for learning by doing. In consequence we surveyed gaming behaviour in the past and nowadays. The correlations between gaming behaviour now and that in the past is rather low (r= 0.21). In consequence two indicators of learning by doing are distinguished.

Game competences

For gaming competences, the items were categorized in instrumental, structural, and strategic, the competence domains of gaming. Important univariate statistics for gaming competences are displayed in table 5. For instrumental competences, we concentrated on skills and attitude. We did not focus on knowledge for two reasons. Firstly, in order to play games, this knowledge should be supported by basic skills (see definition IST competences). Secondly, it is very difficult to select a small number of representative and discriminating questions that tap this kind of knowledge for the sample selected (adult frequent gamers).

Regarding structural competences, we surveyed knowledge (familiarity with game narrative), skills, (searching information how to play a game) and attitudes (hedonic). For strategic competences, we surveyed skills (succeeding in finding needed information) and attitudes (instrumental). Again, we did not focus on knowledge, due to the difficulty of selecting a small number of representative and discriminating questions that tap knowledge about gaming for the sample selected (adult frequent gamers).

We decided not to sum the indices within a competence domain due to low correlations between indices of the corresponding competence domain (instrumental: correlations was 0.17; structural: correlations were 0.098

[knowledge and attitude], 0.40 [knowledge and skills], and 0.073 [attitude and skills]; for strategic the correlation was 0.024).

Table 5. Univariate statistics of gaming competences

		N	Number of items in scale	Cronbach's alpha	Mean (s.d. in brackets)
Instrumental	Skills	264	1	-	4.16 (0.72)
	Attitude	268	1	-	3.31 (0.85)
Structural	Knowledge	264	1	-	4.09 (0.73)
	Skill	269	1	-	4.37 (1.53)
	Attitudes	269	3	0.86	4.36 (0.82
Strategic	Skills	251	1	-	4.41 (0.64)
	Attitudes	269	3	0.64	3.59 (0.79)

Results

In order to explore the hypotheses regarding the relation between the competence domains of gaming and the different types of learning, we conducted a number of regression analyses. The results of these analyses are presented per competence domain.

Relation between instrumental competences and types of learning

The regression analysis with instrumental skills (left part of table 6) as the dependent variable explains about 14% of the variance ($F(17,175) = 1.68$, $p = 0.05$; adjusted R-square = 0.06). In the introduction it was hypothesized that socio-demographic variables reflect differences in gaming competences (hypotheses 1). Table 6 indicates that only educational level of the respondent has a (marginal) positive effect on instrumental skills (beta = 0.14, $p = 0.09$). As hypothesized for instrumental skills, restrictive mediation has a negative effect (beta = -0.15, $p < 0.05$) and practice in the past has a (marginal) positive effect (beta = 0.18, $p = 0.059$).

Regarding instrumental attitude, the regression explains about 29% of the variance ($F(17,175) = 4.23$, $p < 0.01$; adjusted R-square = 0.22). Here the socio demographic variables have an effect: gender (beta = 0.13, $p = 0.06$), age (beta = -0.20, $p < 0.05$), and the educational level of the respondent (beta = 0.15, $p < 0.05$) affect the instrumental attitude. The results about instrumental attitude partly confirm the hypotheses.

Restrictive mediation has no (significant) effect (beta = -0.10, p > 0.10), although an effect was expected. As hypothesized, practicing in the past has a marginal (positive) significant effect (beta = 0.15, p = 0.07). Unexpectedly, co-gaming with virtual peers (beta = 0.26, p < 0.05) as well as instructive mediation with real peers (beta = 0.16, p = 0.08) have a positive effect on instrumental attitudes. It seems that younger males with a higher education game longer, which is even more evident when they co-game with virtual peers and discuss gaming with real peers.

Table 6. Impact (standardized coefficients) of types of learning on instrumental competences

	skills		attitude	
	beta	t-value	beta	t-value
Socio-cultural background				
Gender (male = base)	0.11	1.51	0.11	1.68*
Age	-0.11	-1.19	-0.23	-2.58**
Education father	-0.00	-0.05	-0.09	-1.38
Education respondent	0.14	1.70*	0.16	2.14**
Restrictive mediation				
Parents	-0.15	-1.99**	-0.10	-1.48
Practice				
Age of introduction	0.01	0.15	0.01	0.11
Practice in the past	0.18	1.90*	0.15	1.80*
Practice now	0.02	0.28	0.00	0.00
Co-gaming				
In the past with parents	0.02	0.12	0.05	0.43
In the past with peers	0.08	0.80	-0.14	-1.59
Now with real peers	-0.05	-0.59	-0.03	-0.39
Now with virtual peers	0.02	0.20	0.26	3.25**
Instructive mediation				
In the past with parents	0.05	0.41	-0.02	-0.20
In the past with peers	-0.10	-1.00	0.09	0.98
In the past at school	0.02	0.03	-0.11	-1.50
Now with real peers	0.07	0.72	0.16	1.75*
Now with virtual peers	0.09	0.98	0.11	1.36

** p< 0.05; * p< 0.10

Relation between structural competences and types of learning

The regression analysis with structural knowledge as the dependent variable explains about 10% of the variance (F (17,175) = 1.17, p > 0.10; adjusted R-square = 0.014). Although the regression did not reach significance, two variables in the regression reach a marginal significant value. As the left part of table 7 indicates, male respondents (beta = 0.3, p = 0.09) have more structural knowledge than female respondents and

instructive mediation with virtual peers (beta = 0.17, p = 0.07) goes together with more structural knowledge. Unexpectedly, restrictive mediation has no (significant) effect (beta = -0.03, p > 0.10).

Table 7. Impact (standardized coefficients) of types of learning on structural competences

	Knowledge		Skills		attitude	
	beta	t-value	beta	t-value	beta	t-value
Socio-cultural background						
Gender (male = base)	0.13	1.71*	0.05	0.66	0.05	0.61
Age	-0.06	-0.61	0.04	0.49	-0.13	-1.39
Education father	-0.00	-0.03	-0.06	-0.83	0.01	0.18
Education respondent	0.01	0.14	0.04	0.05	0.03	0.33
Restrictive mediation						
Parents	-0.03	-0.41	0.11	1.55	0.01	0.15
Practice						
Age of introduction	0.06	0.65	0.08	1.55	-0.09	-0.97
Practice in the past	0.13	1.39	-0.02	-0.17	-0.08	-0.88
Practice now	-0.08	-0.98	0.07	0.93	0.10	1.21
Co-gaming						
In the past with parents	0.10	0.71	0.04	0.31	0.12	0.93
In the past with peers	0.03	0.32	0.14	1.53	-0.17	-1.73*
Now with real peers	0.04	0.44	-0.29	-3.20**	0.08	0.86
Now with virtual peers	-0.03	-0.28	0.14	1.72*	0.09	0.99
Instructive mediation						
In the past with parents	0.01	0.07	0.01	0.05	-0.17	-1.30
In the past with peers	0.05	0.49	-0.09	-0.97	0.03	0.26
In the past at school	-0.11	-1.34	0.14	1.95**	-0.04	-0.55
Now with real peers	-0.00	-0.01	0.37	3.82**	0.14	1.39
Now with virtual peers	0.17	1.82*	0.14	1.67*	-0.04	-0.41

** p< 0.05; * p< 0.10

The regression analysis with structural skills as the dependent variable explains about 24% of the variance (F (17,175) = 3.25, p < 0.01; adjusted R-square = 0.17). The effects are somewhat surprising. As table 7 indicates, none of the socio-demographic variables have an effect. Unexpectedly, structural skills are not affected by restrictive mediation by parents (beta = 0.11, p > 0.10). Furthermore, we expected that practice would have a larger impact than instructive mediation on structural competences. However, this is not supported by the successive R-Square change value in a nested regression. Adding the practice variables to the model changes the R-Square by 0.04 (p < 0.05), adding the co-gaming variable to the model changes R-square by 0.06 (p < 0.05), and adding the instructive mediation variables to the model changes R-Square by 0.10 (p < 0.01). These results suggest that instructive mediation is more important

than practice. This suggestion is supported by the beta-coefficients. Regarding practice no significant effects are found (see middle part of table 7), while for instructive mediation, mediation at school (beta = 0.14, p = 0.05), mediation with real peers (beta = 0.37, p < 0.05), or with virtual peers (beta = 0.14, p = 0.097) affect structural skills positively. The effect of co-gaming is surprising: Co-gaming with real peers (now) has a negative effect on structural skills (beta = -0.29, p < 0.05).

The regression analysis with structural attitude as the dependent variable explains about 13% of the variance (F (17,175) = 1.49, p = 0.10; adjusted R-square = 0.04). The marginal effects are surprising and contradict the hypotheses. As table 7 (right part) indicates, none of de socio-demographic variables have an effect, nor restrictive mediation by parents (beta = -0.01, p > 0.10). Practice has no effect. But the structural attitude is (marginal) negatively affected by co-gaming with peers in the past (beta = -0.17, p = 0.085).

Relation between strategic competences and types of learning

The regression analysis with strategic skills as the dependent variable explains about 7% of the variance (F (17,175) = 0.92, p > 0.10; adjusted R-square = -0.02). Although the regression model did not reach significance, one variable reached a marginal significant value (see left part of table 8).

We will summarize the results following the hypotheses stated. Firstly, unexpectedly none of the socio-demographic variables affects strategic skills. Secondly, as expected restrictive mediation has no effect (beta = -0.04, p > 0.10). Thirdly, as expected, practicing has no significant effect, but it is unexpected that co-gaming with virtual peers had an marginal significant effect and it is even more surprising that this effect is negative (beta = -0.16, p = 0.09). Fourth, unexpectedly, mediation has no significant effect.

The regression analysis with strategic attitude as the dependent variable explains about 15% of the variance (F (17,175) = 1.79, p < 0.05; adjusted R-square = 0.15). The results are reported in table 8 (right part). Firstly, of the socio-demographic variable, only age has a significant effect (beta = -0.17, p < 0.10). Secondly, as expected, restrictive mediation has no effect (beta = -0.04, p > 0.10). Thirdly, we hypothesized that practicing and co-gaming would have no effect. However, the results indicate that the frequency of gaming now (practice now) has a marginal positive effect on the strategic attitude (beta = 0.13, p < 0.075) and, as expected, co-gaming

has no effect. Fourthly, unexpectedly, instructive mediation has no significant effect on strategic attitudes.

Table 8. Impact (standardized coefficients) of types of learning on strategic competences

	Skills (infocomp3)		Attitude	
	beta	t-value	beta	t-value
Socio-cultural background				
Gender (male = base)	0.02	0.24	-0.03	-0.46
Age	-0.07	-0.71	-0.17	-1.83*
Education father	0.02	0.23	-0.00	-0.01
Education respondent	0.07	0.76	0.03	0.32
Restrictive mediation				
Parents	-0.04	-0.55	-0.04	-0.58
Practice				
Age of introduction	0.02	0.21	-0.08	-0.91
Practice in the past	-0.03	-0.30	-0.11	-1.12
Practice now	-0.05	-0.59	0.15	1.79*
Co-gaming				
In the past with parents	0.08	0.58	0.08	0.60
In the past with peers	0.04	0.44	-0.06	-0.65
Now with real peers	-0.07	-0.66	0.13	1.36
Now with virtual peers	-0.16	-1.72*	0.08	0.94
Instructive mediation				
In the past by parents	-0.17	-1.24	-0.14	-1.09
In the past by peers	0.05	0.50	0.07	0.72
In the past at school	-0.09	-1.05	0.08	1.03
Now with real peers	0.15	1.41	0.06	0.60
Now with virtual peers	0.06	0.61	-0.00	-0.01

** p< 0.05; * p< 0.10

Discussion

Studies of the digital divide have predominantly explored differences in access, and use. More recent studies focus on internet skills (for example Van Dijk, 2005; Hargittai & Hinnant, 2008; van Deursen & van Dijk, 2011) and indicate marked differences between those who have access and use the internet. But almost no studies focus on the acquisition of these skills. In this paper we stated the following research question to be answered: How do people acquire competences needed to play video games? For this main question, different sub-questions were distinguished. We will discuss our research in accordance to these sub-questions.

The first sub-question was about the description of video games. In our description, we stated that video games are played for hedonic benefits, as well as instrumental benefits although the latter are of less importance. Our

results support this suggestion. Frequent players (our sample) find huge hedonic gratification in playing games (4.36 on a 5-point scale). As expected instrumental benefits are also recognized (3.59 on a 5-point scale). These results support our suggestion that people believe that by playing video games, competences can be acquired that are also useful in other domains than just playing games.

The second sub-question was about describing video gaming competences. Defining, conceptualizing, and operationalizing video gaming competences and IST competences in general, is still open to discussion (see for example, Hargittai, 2005; van Deursen & Van Dijk, 2011). Most studies focus of skills (as in van Deursen & van Dijk, 2011) or on knowledge (as in Hargittai & Hinnant, 2008). However, the European Commision (2007) distinguishes knowledge, skills, and attitudes. Furthermore, most studies do not differentiate in types of competences and difficulty to learn (medium-related and content-related, as in van Deursen & van Dijk (2011) or instrumental, structural, and strategic as in our study).

The results of our study, in which nine competence areas were distinguished, suggests that one should differentiate. Scale construction, as well as the regression analyses suggest that these nine areas are sufficiently distinct. Since the correlations between the areas are not substantial and the areas are affected differently by the identified modes of learning. This suggestion corresponds with the findings of van Deursen & van Dijk (2011), who also recommend to distinguish in different sorts of internet skills to get more grip on differences in skills.

The operationalization of the nine areas need some further attention. In our research, we often used one variable indicators for such complex constructs. Moreover, the differences in competences as indicated by the standard deviation, was rather small. This could be due to the operationalization (one indicator) or to the more or less homogeneous sample of frequent adult males that play video games on regular basis. This restriction of range could be the base of the sometimes low variance explained in the regression analyses. Further research could explore to what extent multiple variable indicators contribute to a better understanding of the competence area and ways they are acquired.

The third sub-question was about modes of learning to acquire gaming competences. In this study, we approached the acquisition of competences at three levels. At the macro level we used an structurationalist approach

that makes clear that all human behavior is restricted or facilitated in a more global social setting by capital (economic, social, and cultural) of a social class. The concept of social capital was conceptualized at the meso level in more detail by linking it to all sorts of mediation by different agents (parents, schooling, and peers). At the micro level, we zoomed in at individual learning by practicing. This approach is more extensive than approach used in other studies. Most studies about the digital divide concentrate at macro-level variables and practice (as in Hargittai & Hinnant (2008) or van Deursen & van Dijk, (2011), and the operationalization of these variables is often less refined. Due to our more refined approach in which differences in competences are related to macro, meso, and micro differences in learning opportunities, the results may differ from other studies. As Livingstone, et al., (2011) indicate, mediation practices differ for social classes, gender and age. By including all three levels of opportunities in an analysis may decrease the estimated effect of social class indicators and background variables as age and gender.

The last sub-question was about the effect of modes of learning on gaming competences. For this sub-question we formulated four hypotheses. The first one regarded the influence at the more global, macro level. We suggested that gaming competences differ by socio demographic variables (age, gender, social class). The results indicated that these differences were most pronounced for instrumental competences; young, male respondents with a higher education had a more positive attitude. These results partly correspond with the results of van Deursen & van Dijk who also distinguished different competence domains (but concentrated on skills). As in our study, their results suggest no gender difference in skills in each of the competences domains. They reported a significant effect of education level in all competence domains, while in our study it only turned up in instrumental skills. In other research, that use more global indicators of internet use or competence, often report effects of gender, age, and educational level (for an overview see for example Hargittai, et al., 2013). These differences in findings may be attributed to the inclusion of mediation indicators, or to our sample that is definitely not representative for the adult western population that use of the internet.

Surprising was that the educational level of the father (as an index of economic resources) had no effect at all. This results may be due to the sample selected. We selected frequent games, who were introduced in gaming at a very young age. In consequence, respondents in the sample

had a gaming device at a young age, which can point to a specific social class in which those resources were available.

The second hypothesis was about restrictive mediation. Since restrictive mediation inhibits practicing, we suggested that instrumental and structural competences were negatively affected, but strategic competences were not affected. The results indicated that restrictive mediation only affected instrumental competences negatively and had no effect of structural nor strategic competences. This result suggest that the acquisition of instrumental competence depends heavily on practicing, while the other competence domains can also be learned by other modes of learning.

In hypothesis three we suggested that instrumental competences are acquired by practicing. The results indicated that especially practicing in the past has an effect on instrumental skills. This finding does not correspond to the not significant effect of practicing reported by van Deursen & van Dijk, (2011). The results about the instrumental attitude indicated that this attitude was affected by practicing in the past, instructive mediation with real peers and co-gaming with virtual peers. The effect of mediation with virtual and real peers was not expected. This effect can be due to the suggesting that attitudes are a social construction and are influenced by the current social context.

In the fourth hypothesis we stated that structural competences are acquired by practicing, co-gaming, and instructive mediation. The results indicated that practicing (in the past or now) has no effect. This results is in line with van Deursen & van Dijk (2011) and the argument that restrictive mediation (that also affects practicing) has no effect on the structural competences. Furthermore, the results indicated that instructive mediation at school had a positive effect on structural skills. A positive effect was also found for instructive mediation with real peers and virtual peers. These results indicate that structural competences are probably acquired by instructive mediation and not by means of practicing. This effect can be due to the meta-cognitive processes needed to acquire and apply structural competences. As explained in the introduction, one has to abstract from the current gaming situation to a more general level to get a hunch what to do in this situation. Discussing with other gamers crafts and recreates gaming experiences to aid understanding and develop competences (Bolton, 2010).

Surprisingly a negative effect of co-gaming with peers was detected for the structural competences, although we expected a positive effect. This negative effect may be attributed to the goals set when co-gaming. Co-

gaming is often about winning the game from the opponent, a competitive goal. From this point of view it is not wise to share information of what to do in this gaming situation (structural competences). In consequence, a negative effect of co-gaming on structural competences can be expected. The differential effect of co-gaming and instructive mediation with peers can be explored in further research. We suggest that competitive goals go with co-gaming with peers and have a negative effect on structural competences. While cooperative goals go with instructive mediation with peers and have a positive effect on structural competences.

The last hypothesis was about strategic competences. We expected that strategic competences were facilitated by instructive mediation, but the results did not confirm this suggestion. The results indicated a negative effect of co-gaming with virtual peers on strategic skills and a positive effect of practicing in the past on strategic attitude. The lack of evidence regarding instructive mediation, may be due to a meagre operationalization of the complex construct. Strategic competences are about reaching goals within playing video games as well as (instrumental) goals in other domains. Goals are rather abstract. In order to be aware of goals within a game, one has to think about the gratification of playing this game (a goal within the game) and make a plan to reach set goals.

In this discussion some weaknesses of the study are already mentioned and can be summarized in two points. Firstly the sample. The sample is not representative. In consequence, the competence indicators were restricted in range. Therefore, the relations detected are only indicative; one should be careful in making extrapolations to a more general population on the basis of this research. Secondly, the validity and reliability of the measures used to get indicators of modes of learning and gaming competences. These constructs are still under construction and subject of discussion.

Conclusion

Notwithstanding the lack for a base to generalize to a general population, this study makes a contribution in defining and operationalizing modes of learning and ICT competences. How preliminary the attempt, trying to operationalize such complex constructs and explores their validity in a conceptual framework, one accumulated

knowledge and insight in these research questions. Furthermore in suggests what kind of relations may be worth exploring in further research.

Further research in this topic in needed since a better understanding of IST skills as well as the acquisition of them is important in today's information society. As research indicated, differences in physical access are fading in the western world, while differences in skills and competences get more pronounced (van Dijk, 2005; Hargittai, et al. 2013). However, IST competences are needed to use the internet for human, social, and financial capital (Hargittai et al., 2013). But, indicating that differences in skills and competences exist is a first step in thinking about and designing projects to enhance skills and competences so everyone is able to use the internet in order to enhance their human, social, and financial capital. In this perspective the opportunities to learning ICT competences, as illuminated on in this research, can give inspiration to design effective projects.

References

Austin, E. W. (1993). Exploring the effects of active parental mediation of television content. *Journal of Broadcasting & Electronic Media*, 37, 147-158.

Bourdieu, P. (1984). *Distinction: A social critique of the judgment of taste*. Cambridge, MA: Harvard University Press.

Bourdieu, P. (1993). *Sociology in question. Theory, culture and society*. London: Sage.

Bourdieu, P. (1997). The form of capital. In A. Halsey, P. Brown & A. Stuart-Wells (Eds.), *Education: Culture, economy, society* (pp. 46-59). Oxford: Oxford University Press.

Bolton, G. (2010). *Reflective Practice: Writing & professional development*. London: Sage

Boyd, D. M., & Ellison, N. B. (2008). Social Network Sites: Definition, History, and Scholarship. *Journal of Computer-Mediated Communication*, 13, 210-230.

Buckingham, D., & Willet, R. (2006). *Digital generation. Children, young people e new media*. Mahwah: Lawrence Erlbaum.

Cashman, B. (2014). *Data: mobile game genre preferences by gender*. Retrieved November 2014, from http://www.consulgamer.com/game_platforms/mobile-game-genre-preferences-by-gender/2125/

Caillois, R. (1957). *Le jeux et les Hommes* [Man and play] (M. Barash, Trans.): University of Illinois press.

Clark, J. (2014). *The History of Word Processing Software*. Retrieved May 2014, from http://internationalprogrammersday.org/the-history-of-word-processing-software/

Crawford, C. (2003). *Chris Crawford on Game Design*. Indianapolis, IN: New Riders.

Demaria, R., & Wilson, J. (2002). *High Score! The illustrated history of electronic games.* Berkeley: McGraw-Hill/Osborne.
Dewan, S., & Riggins, F. J. (2005). The digital divide: Current and future research directions. *Journal of the association for information systems, 6*, 298-337.
DiMaggio, P., & Hargittai, E. (2001). *From the digital divide to digital inequality*. Working paper, Centre for Arts, Cultural and Political Studies, Princeton University.
DiMaggio, P., Hargittai, E., Neuman, W., & Robinson, J. (2001). Social implications of the internet. *Annual review of sociology*, 27, 307-336.
ESA (2014). *Essential facts about the computer and video game industry*. Retrieved November 2014, from http://www.theesa.com/facts/pdfs/ESA_EF_2014.pdf
Eurobarometer (2008). *Towards a safe use of the internet for children in the EU. A parent's Perspective.* Luxembourg: European Commission. Retrieved November 2014, from http://ec.europa.eu/information_society/activities/sip/docs/eurobarometer/analyticalreport_2008.pdf
European Commission (2007). *Key competences for lifelong learning.* European Reference Framework Luxembourg: Office for Official Publications of the European Communities.
Felton, M. (2008). Consumption Spreads Faster Today. *New York Times*, 10 February 2008.
Graafland-Essers, I. Cremonini, L., Ettedgui, E. & Botterman, M. (2003). *Matching up to the information society. An evaluation of the EU accession countries, Switzerland and the United States.* Santa Monica: Rand Cooperation, SIBIS Project.
Groen, M. (2011). *Reflecteren: de basis*. Houten: Noordhoff Uitgevers.
Grusec, J. & Hastings, P. (Eds.) (2007). *Handbook of socialization.* New York/London: Guildford Press.
Hargittai, E. (2010). Digital na(t)ives? Variations in internet skills and uses among members of the "Net Generation". *Sociological Inquiry,* 80, 92-113.
Hargittai, E. (2005). Survey measures of Web-oriented digital literacy. *Social science computer review*, 23, 371-379.
Hargittai, E., & Hinnant, A. (2008) Digital inequality: Differences in young adults' use of the internet. *Communication research*, 35, 602-621.
Hargittai E. & Hsieh, Y.P. (2013). Digital inequality. In W.H. Dutton (Ed.), *The oxford handbook of internet studies* (pp. 129-150). Oxford: Oxford University Press
Hewitt, J. P., & Shulman, D. (2011). *Self and society; a symbolic interactionist social psychology.* Boston: Allyn & Bacon.
Hofstede, G. (1998). *Allemaal andersdenkenden; omgaan met cultuurverschillen.* Amsterdam: Contact.
Huizinga, J. (1955). *Homo ludens; a study of the play-element in culture*. Boston: Beacon Press.
Huston, A. C., & Wright, J. C. (1996). Television and socialization of young children. In T.M. MacBeth (Ed.), *Tuning into young viewers: Social science perspective on television* (pp. 37-60). Thousand Oaks, Ca: Sage.
Juul, J. (2005). *Half-real. Video games between real rules and fictional worlds.* Cambridge/London: MIT Press.
Livingstone, S., & Helsper, E. (2007).Gradations in digital inclusion: Children, young people and the digital divide. *New media & Society, 9*(4), 671-696.

Livingstone, S., & Helsper, E. J. (2008). Parental mediation of children's internet use. *Journal of Broadcasting & Electronic Media, 52*(4), 581-599.

Livingstone, S., Haddon, L., Görzig, A., & Ólafsson, K. (2011). *Risks and safety on the nternet: the perspective of European children: full findings and policy implications from the EU Kids Online survey of 9-16 year olds and their parents in 25 countries*. EU Kids Online, Deliverable D4. EU Kids Online Network, London, UK.

Kahneman, D. (2012). *Thinking, fast and slow*. London: Penguin Books.

Kraaykamp, G. (2002). *Leesbevordering door ouders, bibliotheken en school.* Stichting Lezen reeks, 3. Delft: Eburon.

Kolb, D. A. (1984). *Experiential learning*. London: Prentice Hall.

Mead, G. H. (1967). *Mind, Self and Society-From the standpoint of a Behavioral social scientist*. Morris. W. (Ed.) Chicago: Chicago University Press.

Meekers, M. (2013). *Internet Trends 201*3. KPCB.

Murdock, G., Hartmann, P. & Gray, P. (1996). Conceptualising home computing: Resources and practices. In N. Heap, R. Thomas, G. Einon, R. Mason & H. Mackay (Eds). *Information technology and society* (pp. 269-283). London: Sage.

Notten, N., Kraaykamp, G. & Konig, R. (2011). Mediaoverdracht in het ouderlijk gezin. De gevolgen van ouderlijke mediasocialisatie voor huidige lees- en televisievoorkeuren. *Mensch en maatschappij,* 86, 181-202.

Pew Research internet project (2014). Retrieved May 2014, from: http://www.pewinternet.org/2014/03/11/world-wide-web-timeline/

Selwyn, N. (2004). Reconsidering political and popular understanding of the digital divide. *New Media & Society,* 6, 342-362.

Servon, L., & Nelson, M. (2001). Community technology centres: Narrowing the digital divide in low income, urban communities. *Journal of Urban Affairs, 23*(3-4) 279-290.

Steyaert, J. (2000). *Digitale vaardigheden. Geletterdheid in de informatiesamenleving.* Den Haag: Rathenau Instituut.

Steyaert, J. (2002). Inequality and the digital divide: Myths and realities. In S. Hick & J. McNutt (Eds.), *Advocacy, activism and the internet* (pp. 199-211). Chicago, Il: Lyceum Press.

Tapscott, D. (2008). *Grown Up Digital. How the net generation is changing your world.* New York: McGraw Hill.

Valkenburg, P. M. (1999). Developing a scale to asses three different styles of television mediation. Instructive mediation, restrictive mediation and social coviewing. *Journal of Broadcasting and electronic media*, *43* (1) 52-66.

van Deursen, A., & van Dijk, J. (2011). Internet skills and the digital divide. *New media society*, 13, 893-911.

van Dijk, J. A. G. M. (2005). *The deepening divide inequality in the information society.* Thousand Oaks: Sage Publications.

Van Dijk, J. A. G. M. (2006). Digital divide research, achievements and shortcomings. *Poetics*, 34, 221-235.

Wall, A. (2006-2013). *Search Engine History*. Retrieved May 2014, from http://www.searchenginehistory.com/

Online platforms

The online survey used in this research was spread through the following online channels:

Amanita Design Forum. http://amanita-design.net/forum
Automation Forum. http://automationgame.com/phpBB3/index.php
Civilization Fanatics Forum. http://forums.civfanatics.com
Eve Online Forum. https://forums.eveonline.com
Feed the Beast Forum. http://forum.feed-the-beast.com/forum/
Kerbal Space Program Forum. http://forum.kerbalspaceprogram.com
Towns Forum. http://townsgame.com/forums/
Valvetime Forum. http://www.valvetime.net/forum