# Learning environments for the Net-generation learners

Master Thesis

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**Abstract**
Based on a written questionnaire among 224 students of preliminary vocational education in The Netherlands, the present paper explores the use of digital media and web technology and the characteristics of Net-generation learners as being the next generation of workers. Two developments in digital media and web technology have been taken into account: 1) virtual social networks and 2) multi-user virtual environments. These incorporate the general use of the internet, instant messaging, weblogs and gaming. Empirical findings from this study have shown that responding students from preliminary vocational education are intensive users of digital media and web technology. A social nature is exposed through the use of technologies that enable them to create and maintain relations or social networks. Further data analysis provides insights into possible differences caused by e.g. Social Economic Status, gender, and educational track. Furthermore, this paper explores the design of learning environments based on concepts of networks and communities of practice that make the most profound use of the digital media and web technology most used by Net-generation learners.

Key-words: Net-generation, learning environments, digital media, web technology, internet, communities of practice

**Samenvatting (Dutch)**
Op basis van een schriftelijke vragenlijst afgenomen onder 224 VMBO studenten in Nederland, verkent dit paper het gebruik van digitale media en web technologie en de kenmerken van de lerenden van de Net-generatie als zijnde de volgende generatie werkenden. Twee ontwikkelingen in digitale media en web technologie zijn in acht genomen: 1) virtuele sociale netwerken en 2) multi-user virtuele netwerken. Deze omvatten het algemene gebruik van het internet, instant messaging, webloggen en (video)gamen. De empirische bevindingen van deze studie hebben uitgewezen dat de VMBO studenten uit de steekproef intensieve gebruikers zijn van digitale media en web technologie. Een sociale natuur wordt getoond door het gebruik van technologieën die hen in staat stelt om relaties en sociale netwerken te maken en te onderhouden. Verdere data analyse biedt inzicht in mogelijke verschillen veroorzaakt door bv. sociaal economische status, geslacht en gekozen leerweg. Verder verkent dit paper het ontwerp van leer omgevingen gebaseerd op concepten van netwerken en communities of practice welke aansluiten bij het gebruik van digitale media en web technologie door jongeren van de Net-generatie.

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**Learning environments for the Net-generation learners**
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**Introduction**

Due to emerging developments in digital media and web technology, people are changing the way they communicate and access information. Unlike older generations, the currently youngsters are now growing up with these new media technology. This generation of youngsters, often referred to as "the Net-generation" (Tapscott, 1998), is therefore expected to be more profoundly changing than older generations. In addition, there is a fast growing disconnect with the use of digital media and web technology by the Net-generation in education and in informal learning and communication processes at home (Levin & Arafeh, 2002; Selwyn, 2006). Expected changes in communication and information seeking processes are therefore primarily caused by out-of school use of digital media and web technology (Levin & Arafeh, 2002).

The impact of these changes and the aforementioned disconnect is currently heavily debated in the field of education, but the research on this topic is still in its infant state. Publications on research of the use digital media and web technology by young people (Levin & Arafeh, 2002; Selwyn, 2006) describe students who perceive technology as having changed their ways of communicating and accessing information, but do not describe these changes in detail or go into the possible impact on learning environments. Another group of authors (e.g. Jones, 2002; Tapscott, 1998; Prensky, 2001) describe changes in communicating, accessing information and learning processes caused by the use of digital media and web technology. Although they argue for major changes in educational as well as corporate learning, peer reviewed publications of these arguments are hardly available.

It is questionable what digital media and web technology are actually being used, how frequently and to what extent this usage results in certain characteristics. As the members of the Net-generation are the future generation of workers it is important to explore the impact of these developments on the field of HRD and in particular the design of learning environments within organizations.

This study is derived from a specific HRD related problem at The Netherlands Tax and customs Administration (NTA). This organization is currently experiencing an aging workforce and a relatively large number of employees are expected to retire within the next 10 years. At the same time, there is an expected shortage on the labour market on qualified workers for the upcoming years (CWI, 2005). Combined with an aging workforce this could lead to a strong competition on the labour market for the next generation of workers, the Net-generation (Burke and Ng, 2006). Organizations, such as the NTA, are now facing the challenge to create a work and learning environment that is attractive to this new generation of workers. As a reaction to these developments, the NTA is intended to design and develop a special work and learning program for final grade students of preliminary vocational education, with the intend to create a pool of possible new, young and qualified workers.

This paper reports an empirical study on the use of digital media and web technology by this specific target group of students. Furthermore, it will be investigated to what extend these students show certain characteristics that might have been developed through the use of digital media and web technology. Based on these findings, recommendations will be explored for the design of learning environments for Net-generation learners in organizations such as the NTA as well as other organizations.

**Net-Generation**

Due to emerging developments in digital media and web technology, people are changing the way they communicate and access information. In contrary to older generations, the currently youngsters are actually using these new media technology during their formative years and are therefore expected to be more profoundly changing their ways of communicating and accessing information (eg. Tapscott, 1998; Jones, 2002; McMillan & Morrison, 2006; De Haan, Van 't Hof & Van Est, 2006). Several authors have yet described this argument and provide us with a mix of terms for this "new" generation: Millenials (Howe & Strauss, 2000), Homo Zappiens (Veen, 2000), Digital Natives en Digital immigrants (Prensky, 2001) and the Net-generation (Tapscott, 1998; Oblinger & Oblinger, 2005). In the current debate on this topic in Dutch education, there seems to be a preference for using the term Net-generation (SURF conference 2005; ALT-C conference 2006; CVI conference 2006) as a description for this phenomenon. Therefore, the term Net-generation will be used in this paper.

By means of similar formative experiences and characteristics, a distinction can be made between generations (Becker, 1993; De Haan et al., 2006; Van den Broek, 1999). This implies that if we can perceive a Net-generation, the emerging developments in digital media and web technology is a life-forming development for its members (De Haan, et al., 2006) as well as they share similar characteristics that differ from those of previous generations. Using these two concepts that distinguish a generation from another, the Net-generation can be defined as a generation which holds the following two aspects:
- shared formative experiences: the emerging digital media & web technology
- shared set of characteristics: new ways of communication and accessing information

An often heard critique to the argument of the Net-generation is that changing communication and accessing information processes caused by emerging developments in digital media and web technology could not necessarily be ascribed to one generation because also other generations get in touch with these new technologies. According to Oblinger and Oblinger (2005), the key difference, is that the youngsters of the Net-generation are actually surrounded by digital media and web technology and they are already using it at a very young age. Developments and experiences during the formative period in the life cycle, make these experiences having a greater impact than in other stages of life (De Haan et al., 2006). According to De Haan et al. (2006), the difference in use of digital media and web technology lies in what Net-geners are doing online and how long they are doing it.

Another aspect of the critique is that differences within the population of the Net-generation might exist. A study by Levin & Arafeh (2002) shows, that not all children have the right skills and knowledge to navigate the web effectively. This is partly because some do not have access to new media and web technology at home. 'Younger' members of the Net-generation also seem to have developed different skills than 'older' members of this generation (Livingstone & Bober, 2005).

In order to get an understanding of the concepts that distinguish between the Net-generation and other generations, an overview of the emerging digital media and web technology as a major formative experience is presented in the next paragraph. Later on, an overview of the literature on the characteristics of the Net-generation is given.

**Emerging digital media and web technology**

Various explorative studies for educational policy report on emerging digital media and web technology that are likely to have an impact on how people communicate and access information and will be of value for learning processes (Dede, 2005; Horizon, 2006; Owen, Grant, Sayers & Facer, 2006). These publications are more developed as explorative studies for educational policy. Emerging technologies and their value for the facilitation of learning processes are also discussed on various conferences (Educause, 2005; Alt-C, 2006; CVI, 2006; SURF, 2005). In conclusion to these explorations, a growing body of knowledge provides empirical findings on the application of the emerging digital media and web technologies in learning environments (e.g. Oravec, 2003; Steinkuehler, 2006). For the study presented in this paper, two developments have been taken into account that characterize the changing nature and use of digital media and web technology: 1) virtual social networks and 2) multi-user virtual environments.

*Virtual social networks*

The use of the World Wide Web is currently evolving from being a medium in which information was transmitted and consumed (Downes, 2005) towards a platform in which services are offered to the user (O'Reily, 2005). A desire to visualize, design and search through global social networks underlies these services (Boyd, 2005). Web services such as 'Hyves' (www.hyves.nl) and 'My Space' (http://myspace.com) are social network sites that provide people with access to experts in online or virtual communities of practice. These web services also often facilitate personal broadcasting, for example through tools for weblogging by means of which people can create weblogs. People are using weblogs to express their thoughts and ideas on particular subjects. These personal reflections are seen as a vital part of weblogs (Oravec, 2003).

Virtual networks are also build and maintained through the use of services for online communication. Instant messaging (IM) is the most used form of online communication, even more used than e-mail (De Haan & Van 't Hof, 2006). Chatting through the use of instant messaging

services can be characterized as synchronous communication, unlike weblogging which is a form of asynchronous communication. Instant messaging is a form of real time communication through which you can also see if contacts from your network, or friends list, are online. Windows Live Messenger (MSN) is an example of a widely used IM service in The Netherlands. The use of the web as a platform for services is often referred to as Internet 2.0 or Web 2.0. There currently is a lot of debate on the use of the term "Web 2.0" (e.g. Boyd, 2005). Some even argue that it is just another buzzword or marketing trick (e.g. Siemens, 2006). The media regularly report on the extreme popularity of Web 2.0 services, especially among the youngsters of the Net-generation. Numbers and figures are, however, often collected for commercial uses. It is therefore of concern to question the real use of these services by the Net-generation and its impact on students' learning processes.

*Multi-user virtual environments*

According to Kirriemuir and McFarlane (2004, p. 1) "Computer and video games are today an important part of most children's leisure lives and increasingly an important part of our culture as a whole". There has, however, been very little disciplined study on the use of gaming as a learning tool (Squire, 2002; Steinkuehler, 2006). Computer and video games are increasingly recommended for use in learning environments. Simulation games in particular are good for learning, as was argued by Gee (2005). These games are "digital simulations of worlds that are 'played' in the sense that a player has a surrogate or surrogates through which the player can act within and on and that have 'win states'" (Gee, 2005).

A more interactive form of simulation games are the Massively Multiplayer Online Games (MMOG's). In these games, players connect through the internet and start playing, communicating and learning with each other. Squire and Steinkuehler (2006) describe a MMOG as follows: MMOGs are highly graphical 3-D videogames played online, allowing individuals, through their self-created digital characters or 'avatars', to interact not only with the gaming software (the designed environment of the game and the computer-controlled characters within it) but with other players' avatars as well. The virtual worlds of a MMOG are persistent social and material worlds, loosely structured by open-ended (fantasy) narratives, where players are largely free to do as they please (Steinkuehler, 2005).

Many commercial games also have large fan sites. These are virtual communities in which game players organize themselves around their shared goal to develop expertise in the game (Shaffer, Halverson, Squire & Gee, 2005). These fan sites form meaningful learning experiences (Shaffer et al., 2005) and are interesting objects for research as they emerge in out-of school contexts without a formalized curriculum or assignment from a central authority. Studying the learning processes that develop in this spontaneous way - coming from the intrinsic motivation of the learners, will provide us with arguments on how to design learning processes in educational or more formalized settings.

Gamers also interact with each other outside the game using web 2.0 services to communicate and learn about a particular game like eg. instant messenger services by which text messages can be exchanged to communicate and learn from other players. Not extraordinary, they even extend their online relationships to the real life and meet with each other face to face (Galarneau, 2005). Another technology through which players can exchange information are wiki pages. Primarily known from Wikipedia, an online encyclopaedia, wiki pages are multi-user environments that allow users to create or edit these wiki-pages and add information to it, hereby creating a large platform of users to exchange information. As apposed to the information exchange that resides trough the use of instant messaging, a Wiki is an asynchronous tool. Content is created by the users of the environment and could be retained at later stages as well.

In Table 1, the two emerging digital media and web technology that are subject to the study presented in this paper are summarized, with their tools and applications.

**Table 1.** *Emerging digital media & web technology and their tools and applications*

| Digital Media / web technology | Tools/ application |
| --- | --- |
| Virtual social networks | - Online networking services (hyves; myspace) |
| | - Online communication: MSN |
| | - Weblogging |
| Multi-user virtual environments | - Interaction through (online) games |
| | - Gaming communities/ fan sites |
| | - Exchange of information: MSN - Wiki pages |

The above described two developments in digital media and web technologies are considered to either already have changed or will change the way the Net-geners communicate and access information in the next two years (Dede, 2005; Horizon, 2006). For the years ahead also other technology developments will have an impact. By time mobile phone connections can compete with the speed of wireless networks, they become an interesting device for access to information at any place and any time. Also virtual worlds like eg. Second Life are likely to be able to offer flexible spaces for learning environments within a few years (Horizon, 2007).

**Net-generation characteristics**

In the previous section, the emerging developments in digital media and web technology were described as they are seen as a major life forming experience that is of strong influence on the characteristics of the members of the Net-generation. However, the body of research on the characteristics of the Net-generation is still in its infant state. Many scholars (e.g. Brown, 2000; Oblinger & Oblinger, 2005; Tapscott, 1998) provide us with arguments about changing characteristics, but minimally support their arguments with empirical evidence and through published articles in peer reviewed journals. Most empirical evidence that does exist, provides information about the use of digital media and web technology in terms of when, where and how (e.g. Levin & Arafeh, 2002; Selwyn, 2006). A few publications provide insight into empirical evidence and their methods of research (De Haan et al., 2006; Eshet, 2004). In this section the dominant arguments from various scholars about the characteristics of the Net-geners are described. Also a reflection on these arguments through the use of the empirical studies is given.

Brown (2000) describes a set of four dimensions or shifts that describe the Net-generation characteristics developed through the use of digital media and web technology:

The first dimension is in *literacy*. According to Brown (2000), the Net-generation's exposure and familiarity with digital media has resulted in a new and digital kind of literacy. These youngsters are not only textual literate, but are also image and screen literate. The Net-generation is able to intuitively use a variety of digital media (Oblinger & Oblinger, 2005). Also, they are proliferated multitaskers because they often use diverse media at the same time and are able to quickly switch their attention from one to another. Also when Net-geners are surfing the web, they are working with multiple screens, communicating with different people at the same time using MSN and navigate the internet searching information. According to Brown (2000), navigation may well be the main form of literacy, which is a form of literacy beyond text and image.

The second dimension concerns *learning*. A preference for discovery or experiential based learning is emerging through the incredible amounts of information available through the web, (Brown, 2000; Tapscot, 1998). Most Net-generation learners prefer learning by doing rather than by being told (Oblinger & Oblinger, 2005). Tapscot argues that the new media helped to create a learning culture where learners enjoy an enhanced interactivity and connection with others. He calls this the shift from broadcast to interactive or experiential learning which shows up when e.g. gamers learn how to play a new video game. They learn by playing the game and communicate with others through fan sites and use of instant messaging services.

With the two shifts mentioned above, literacy and learning, a third dimension comes into sight, one that concerns *reasoning*. This is a shift toward a more constructive form of learning. Brown calls this 'bricolage'; the ability to find something and use it to build something you deem important. Being able to judge whatever you find on the web becomes critically important (Brown, 2000). Recent publications in Dutch media indicates that this ability or skill might not have been well developed by all youngsters as it is argued that youngsters rarely check whether the information they find on the web is actually accurate (Duimel & De Haan, 2007).

The final dimension as described by Brown (2000) has to do with a bias toward *action*. The Net-geners first try to do things themselves. If they experience any problems they contact a peer from their (virtual) social network and finally they consult a tutorial. Net-geners are used to do things at high speed (Prensky, 1998). When they receive an e-mail, they will reply almost instantly. According to Oblinger & Oblinger (2005) immediate reply is often more important than accuracy of the content of the message. Being action oriented and living at high speed brings an implication for the learning process of the Net-gener. It has affected the time taken for critical reflection (Prensky, 1998). This seems to be in high contrast with the Net-gener's preference for experiential learning, in which the process of reflection is so important.

Next to the mentioned four dimensions, Brown also describes a shift in the use of the technology which is "a shift from the use of technology to support an individual, towards the use of technology to support the relationships between individuals" (p. 20). Along with this shift, Brown argues, new social protocols will be discovered. Also Oblinger & Oblinger (2005) refer to the social aspects of the Net-generation. They argue that their *social nature* results in a preference to work in teams and use ICT to communicate peer to peer, for example via MSN or weblogs. The communities and social networks of Net-geners are physical, virtual and hybrid, which means that they find virtual interactions as valuable as physical interactions. Net-geners are emotionally open and use the web as a "social technology to reveal their feelings, to express their views, to meet new people, and to experience different cultures (Oblinger & Oblinger, 2005; p. 2.12)". Through the use of the web as a social technology, the term 'social' gets into a different perspective. Within some web services like 'Friendster' or 'Hyves', a person in your contact list is called a 'friend'. The meaning of being friend in the real and virtual world gets mixed. Being a friend of a friend has also become acceptable (Oblinger & Oblinger, 2005). In Table 2 the digital age shifts that refer to the changing nature of the Net-generation, and describe Net-generation characteristics are summarized.

**Table 2.** *Net-generation characteristics (Based on Brown, 2000, and Oblinger & Oblinger, 2005)*

| | |
|---|---|
| 1. Literacy | Ability to 'read' rich media |
| | Navigation as new form of literacy |
| 2. Learning | Discovery, experiential learning |
| 3. Reasoning | Lateral stuctured reasoning. |
| | Bricolage and judgement. |
| 4. Action | Immediacy is seen as important; action oriented |
| 5. Social nature | Web is being used to maintain relationships between people |

Eshet (2004) described five major skills which are required in order to become what is called 'digitally literate', to be able to function effectively in digital environments. These skills show a high similarity with the five Net-generation characteristics as described in Table 2. It is however important not to assume that all youngsters have developed the above described characteristics. Some youngsters might not have developed these characteristics because of a lack of access to digital media and web technology, others because of a lack of interest or because they are just not able to. A study by Eshet and Hamburger (2004) on the presence of digital literacy skills amongst three different age groups revealed that digital literacy skills are not equally present amongst all age groups. More importantly, the researchers warn that the notion of Net-geners all being more digitally literate than older age groups should be treated with care.

As the Eshet and Hamburger (2004) study shows, youngsters (with an average age of 17) seem to excel in photo visual skills and branching literacy skills. These skills can be compared with what Brown (2000) described as the new digital kind of literacy i.e. being able to intuitively use a variety of

digital media and being able to navigate through the non-linear, lateral structures of the web. On the contrary, the Eshet and Hamburger (2004) study showed that the older aged participants performed better in reproduction and information literacy tasks. Reproduction skills comprise the ability to construct new meaningful knowledge from pre-existing data. Information literacy entails the skills to judge the quality and validity of information. This shows similarity with what Brown has described with the third digital age shift holding the concepts bricolage and judgment.

In his 2004 publication, Eshet added a new kind of literacy to his conceptual framework for digital literacy. This is a *social-emotional* literacy which is a compound of the other four literacy skills. In short, it entails the ability to 'survive' in – online - virtual social networks and multi-user environments such as described before in the section on emerging digital media and web technology. Next to this, it entails aspects as a willingness to share data and knowledge with others, the capability to judge information, abstract thinking and to collaboratively construct knowledge in virtual environments. The Eshet & Hamburger (2004) study did not reveal significant differences between the various age groups regarding the degree of social-emotional literacy, but the authors relate this to their lack of understanding in this concept. Eshet (2004) argues that in order to be social-emotional literate, one needs to have a high degree of information literacy and branching literacy. As youngsters perform to a lower degree on literacy skills, educators should emphasize on the development of these skills in order to help young learner to be socio-emotional literate. This argument corresponds to the conclusions of Ten Brummelhuis (2006) and Janssen and Hermes (2006) who argue for a major role for education to develop these skills with their students. However, studies among middle- and high school students in the USA (Levin & Arafeh, 2002) and secondary school students in the UK (Selwyn, 2006) have revealed a fast growing disconnect between the use web technology in formal learning (education) as compared to the informal learning and communication occurring during home use of these tools. In particular the UK study found that the primary reason for this disconnect does not lie in a lack of physical access on educational institutions, but in restrictions through regulations and content filters. The shared set of characteristics by the Net-generation, as argued before, is therefore primarily developed by out-of school use of digital media and web technology (Levin & Arafeh, 2002). This implies that research in this area should focus on out-of school use of digital media and web-technology.

**Research questions**

As was mentioned before, the emerging digital media and web technology can be perceived as a major formative event that is likely to shape the characteristics of the members of the Net-generation. In the study presented in this paper, two major developments in digital media and web technology were emphasized: (1) the emerging virtual social networks and (2) multi-user virtual environments. Within both developments, special attention is paid to the rise of 'web 2.0' services that are likely to have a great impact on ways of accessing and communication of information. This study does not focus on the design of content within multi-user virtual environments, and more explicitly the multi player online games. Instead, this study focuses on the use of these environments that facilitate learning *about* games. In studying to the actual use of digital media and web technology, focus is on the home use of technology. The underlying assumption is the perceived disconnect between the use of digital media and web technology at home, as compared to the use of these tools within formal learning arrangements at school. Secondly, this study seeks to investigate characteristics that are ascribed to the Net-generation through their use of digital media and web technology. Based on the assumption that technologies are increasingly used as a social medium to support relationships between individuals, this study focuses on social aspects of learning from which recommendations can be proposed for the design of (work-place) learning environments that make the most profound use of digital media and web technology in order to fit with the characteristics of the Net-generation. In order to provide these recommendations, and based on the aforementioned information, two research questions are important.

The *first research question* is of a descriptive nature and runs as follows: *What is the use of digital media and web technology by students of preliminary vocational education that are subject to the dual work and learning program?* The aim is to describe what kind of digital media and web technology is actually used and where these media are used. A distinction is made between home and school use of

digital media and web technology. Furthermore, this question focuses on how these digital media and web technology are used for the access and communication of information.

The *second research question* evolves on the findings of the first research question and goes into characteristics of the Net-generation. This question runs as follows: *To what extent do students show Net-generation characteristics as a result of their use of digital media and web technology?* The aim is to find a relationship between the use of digital media and web technology and the development of certain characteristics that have been ascribed to the Net-generation.

Based on the findings of the two research questions and supported by a theoretical exploration on the relevant epistemology, recommendations can be proposed that could be of value for the designers of learning environments for Net-generation learners in organizations such as the NTA as well as other organizations.

**Method**

*Instrument*

Data was collected through the use of a written questionnaire (see the Appendix for a complete questionnaire). Based on the digital media and web technology described in Table 1, the questionnaire covered the main categories of the study and questions were presented in this categorized order. The first two categories, demographics and general access and use of digital media and web technology, were presented to all participants within the sample. Demographics covered questions regarding eg. 'gender', 'educational track' and 'socio economic status'. The second category covered participants' access to ICT as well as their general use of digital media and web technology. Participants were, for instance, asked for their three most favourite websites in order to reveal what types are favourite. With the other categories 'instant messaging', 'weblogs' and 'gaming', only the first questions were presented to all participants. These questioned the frequency of which the category is used, e.g. "How many times do you read weblogs or internet diaries from other people? A five point scale was used running from "never" to "multiple times a day". When participants responded "never", they were directed to the next category. Others, who responded to use the tool or activity of the specific category, were presented more in depth questions. These include e.g. "How many names do you have in your MSN contact list?" or "Do you read weblogs from people you know personally?" and "Do you ever visit fan sites or communities about games?" The last category of the questionnaire was again presented to all participants and covered questions about their life next to the use of digital media and web technology and participant's position on different propositions, such as "Through playing online games, you make new friends".

The design of the questionnaire was tested in a pilot session with 100 respondents at an educational institute other than the current participating four institutes. Comments or feedback derived from the pilot session were processed in the final design of the questionnaire.

*Sample*

The preliminary vocational education system in the Netherlands (VMBO) consists of four advanced vocational tracks. These tracks differ from being more practice oriented to more theoretical based. Students select a specialization stream in the last two years of their four year educational program. VMBO students from the specialization stream in economics were subject to the current study as they are the target group with the work-learning program which the Netherlands Tax and Customs Agency (NTA) was intended to start. Because the NTA is a national operating organization and their target group is thus spread over the entire country, four demographically dispersed VMBO-institutes were selected to participate in the study, based on their willingness to co-operate. The selected institutes, which are anonymously numbered 1-4, and educational tracks are described in Table 3.

Two different delivery methods were used to distribute the written questionnaire to the students at the four selected institutes. To three institutions, an e-mail invitation was send to complete an online version of the questionnaire. At one institution, the questionnaire was presented on paper. The institutes were left freely to distribute the questionnaire among their students, given that they were in compliance to the requirements of the current study. All students in class of the three different tracks

at each institute were asked to participate in the study as part of their regular schedule. The tracks at each institute differ from each other as track A being most practice oriented, track B is more advanced practical based, and track C is most theoretical based. From each track various all third grade students with an emphasis on economic subjects were selected. Students within the sample (N=224) were all born between 1990 and 1992. Within the sample, 55% were boys (n=122) and 45% were girls (n=102), 32% (n=70) attends educational track A, 40% (n=88) track B and 29% (n=63) attends track C.

As a student's intellectual capacity or background could possibly have an impact on the use of digital media and web technology, information was needed on socio economic status (SES). It is difficult to measure a student's SES using a written questionnaire with students as information about parent's background is mostly not available with them. In order to gather an indication on a students' SES, the indicator "number of books at home' was used in the questionnaire. This indicator was also used in international trend studies on students in preliminary education, TIMSS (Meelissen and Doornekamp, 2004). Most students were classified to 'Enough for one shelf' (28%) and 'Enough for a whole bookcase' (32%).

Because institutes were free to distribute the questionnaire among their students, it appeared there was not sufficient data available afterwards on the total target population. Response percentages are not available and therefore, no response analysis is described in this paper. As such, it should be emphasized that data from the current sample cannot be generalized to the population. Generalizing conclusions to be drawn from this study should be done carefully.

**Table 3** *Characteristics of responding students in percentages of total sample (N=224)*

|  | **%** | **n** |
|---|---|---|
| Gender |  |  |
|   Boys | 55 | 122 |
|   Girls | 45 | 102 |
| Preliminary vocational Education Institute (VMBO institute) |  |  |
|   # 1 | 24 | 54 |
|   # 2 | 13 | 30 |
|   # 3 | 26 | 58 |
|   # 4 | 37 | 82 |
| Educational track[1] |  |  |
|   A | 32 | 70 |
|   B | 40 | 88 |
|   C | 29 | 63 |
| Number of books at home[2] |  |  |
|   None to very little | 18 | 41 |
|   Enough for one shelf | 28 | 62 |
|   Enough for 1 whole bookcase | 32 | 70 |
|   Enough for 2 bookcases | 15 | 34 |
|   Enough for 3 or more bookcases | 7 | 16 |

[1] A = most practice oriented; B = more advanced practical based; C = most theoretical based
[2] Average score on proxy for Social Economic Status (SES) "Number of books at home"

*Data analysis*

For the part of the actual use of media and web technology, descriptive methods were used to find answers to these questions. In order to categorize students most favourite websites, a categorization was developed based on the results. The main purpose of a website was identified through a short exploration. To this main purpose, the website was identified. In order to categorize students most favourite (video)games, a categorization was used that was presented in Kirriemuir and McFarlane (2004). As also noted by Kirriemuir and McFarlane, categorizing games can be a difficult task as some games might held aspects of more categories. Again, a game's primary focus was used to categorize it.

In order to relate the found use of media and web technology to characteristics of the Net-generation, explorative methods are used. Based on the Net-generation characteristics provided in

Table 2, data was explored. A literature review on relevant epistemology and the questionnaire results were used to explore for recommendations for the design of learning environments for Net-generation learners in organizations such as the NTA as well as other organizations.

**Findings**

The following paragraph goes into the findings regarding the first research question on the use of digital media and web technology by students of preliminary vocational education that are subject to the dual work and learning programs. The used digital media and web technology are presented as well as a more in depth description is given on how these media and technology are used and how the web is being used to access information. Possible differences between variables such as gender, educational track and social economic status are also searched for, as well as the scores on home and school use of digital media and web technology are presented. Furthermore, perceptions of the students regarding digital media and web technology are described. The last section evolves on the findings of the previous. It encompasses the second research questions regarding the characteristics of the Net-generation.

*Access to digital media and web technology*

The responding students (N=224) appeared to have access to digital media and web technology to a high degree; 96% reported to have access to a desktop PC and 40% has access to a laptop. Other mobile devices to which students have access to are mobile phones (87%) and to a smaller degree I-pod devices (33%). A little 9% of the students has access to portable computers such a PDA's or Blackberries. This study only held questions regarding the availability of these devices, so that they not need to be necessarily owned by the students themselves.

A majority of the students reported to have access to internet at home through a wired broadband connection, 34% has cable and 30% an ADSL connection (n=234). Wireless connections are much less integrated, 10% reports to have a wireless cable or ADSL connection. Also 18% of the students are not aware of what connection they have at their home pc.

*Use of digital media and web technology*

Data showed that responding students are extensive users of the internet; they use the internet, on average, one to several times a day. Most frequent is the use of MSN to send instant messages (IM) as apposed to the frequency of playing games or reading weblogs. The extent to which students are using MSN almost equals the frequency they report on using the internet. Games are played several times a week and weblogs are read only a few times a year on average. With the latter, 53% has reported to never read weblogs. Table 4 provides an overview on the extent to which digital media and web technology are used by the students.

**Table 4.** *Means (M) and standard deviation (SD) for the use of digital media and web-technology, with means divided to boys and girls (on a scale running from 0=never to 5=several times a day).*

|  | $M_{Total}$ (sd)* | $M_{Boys}$ | $M_{Girls}$ |
|---|---|---|---|
| Use of the internet | 4.38 ( .64) | 4.36 | 4.39 |
| Use of MSN to send IM | 4.23 (1.03) | 4.21 | 4.25 |
| Playing games | **2.66 (1.70)** | **3.45** | **1.71** |
| Reading weblogs | **1.21 (1.51)** | **.93** | **1.55** |

*) Bold values: difference between groups is significant ($p < 0.01$). Based on t-test for equality of means.

Significant difference between groups were found with respondents' frequency of playing games ($p<0.01$). Boys play games at least once a week, while girls play games once or twice a month. Gender differences were also found with reading weblogs. Girls appeared to read weblogs significantly more often than boys ($p<0.01$). On average, boys read weblogs a few times a year, girls do this once a month. There were no substantial differences found between groups found among students on educational track. In terms of the number of books at home (SES), the use of digital media and web technology is equally divided, with the exception of the reading of weblogs for which a small difference between groups of SES was found.

*Favourite websites*

Students were asked for their most favourite websites which were categorized into eight different categories, identifying a websites' main purpose. 'Social networking sites' appeared to be most popular (30%, n=207). Websites of which its main purpose is to provide services for social networking were categorized as such. These are regularly characterized by the ability for visitors to create their own profile on which personal information is expressed in forms of text, images or video. Through these profiles, visitors are able to connect with others. Most commonly found social networking sites are http://www.PP2G.com, http://www.hyves.nl or http://www.fiestainfo.nl. Second most popular category is 'information' websites (23%). These websites provide access to information. No subdivision between types of information was made in this category. Google was mentioned mostly as most favourite website in this category. Also several portal sites, such as http://www.msn.com, were identified that could be used as a homepage in the browser from which users have access to all different types of information. Several students also mentioned their school institution's portal as their most favourite website. Other categories were 'gaming' (14%), 'sports' (11%), 'e-mail' (10%), 'video' (7%), 'music' (4%) and 'religion' (2%). Table 5 summarizes the findings regarding students' most favourite website, presented in a categorized order.

**Table 5.** *Percentage of respondents' score for most favourite websites, categorized, in total and divided by gender*

| | | Gender | |
|---|---|---|---|
| **Website category** | Total (%) *(N=207)* | Boys (%) *(n=109)* | Girls (%) *(n=98)* |
| Social Networking | 30 | 43 | 57 |
| Information | 23 | 46 | 54 |
| Gaming | 14 | 90 | 10 |
| Sports | 11 | 96 | 4 |
| E-mail | 10 | 24 | 76 |
| Video | 7 | 29 | 71 |
| Music | 4 | 44 | 56 |
| Religion | 2 | 25 | 75 |

Substantial differences between groups were found in students' preference for certain categories between boys and girls (see Table 5). At first, girls are more likely to favour social network sites (57%). Also video sites and e-mail sites are more likely to be favoured by girls. Boys, on the other hand, also like social networking sites but there is a large difference when it comes to sport sites. 96% of the students who reported a sport site as their most favourite are boys. A large difference has also been found for gaming sites; 90% boys. It is not most remarkable that boys seem to have a preference for websites about gaming as boys also are significantly more frequent players of games (see table 4).

*Use of digital media and web technology to access information*

All students in the sample were asked how they use internet to access information. Almost all of them reported to use the internet to search for information regarding essays or other school related topics (99%, N=224), with 53% of the students using the internet on a weekly basis for this purpose. A minority of 17% reported using the internet to look for updates on the latest news on a weekly basis and an additional 15% on a daily basis; 42% reported to never use the internet for this purpose. From this questionnaire it is not clear whether other sources like newspapers or television are used to gather information on the latest news.

Almost all students (98%) perceive that they know how to use a search engine like Google to find information on the internet. A 71% of the students use the internet to find information about (continuing) education. A majority of 57% of the students reported that they never use Wikipedia to search for information. It is not sure if all respondents are aware of what Wikipedia is and if they really do not use it. When asked if students know how to write texts in a wiki, 83% reports to have

never heard of it. The large amount of missing scores is also remarkable, 3% did not fill in this question. A suspected correlation between the (non) use of Wikipedia and the editing of wiki's could not be found.

*How students are communicating using MSN*

The responding students appeared to be heavy users of MSN messenger for the purpose of sending instant messages (98%, N=224). On average they reported using MSN every day, with even 50% using MSN multiple times a day. There were no significant differences found with the extent to which MSN is used by boys and girls. Most of the students who use MSN (90%) reported that they use the instant messenger program to keep connected with friends and to plan their social activities (67%). MSN is also the most preferred way of communication for short conversations with friends (62%, n=213) as apposed to other communication methods such as e-mail (1%), SMS text messaging (9%), personal contact (14%) or (mobile) telephone (15%). When it comes to having more serious conversations respondents reported a preference to speak with a friend in person (62%). MSN would still be the second most preferred communication method (22%).

Students differ on using MSN to chat about school related topics, 42% reports to chat about homework. The use of MSN messenger also might be a good example of "multitasking". On average, the students report they are "mostly" chatting with several persons at the same time. A 44% of the students report to chat with more than 10 persons at the same time. It is not clear what the intensity or content of these conversations is. It is also unclear if students are chatting with 10 persons in one dialogue box or have 10 individual conversations. It appeared that students maintain a large network of digital contacts. On average students have around 200 contacts in their contact list. This number of digital "friends" largely exceeds the amount of "real-world" friends students have personal contact with on a regular basis, 28% reported to have contact with 5 to 9 friends and 41% reported to have contact 15 or more friends.

**Table 6.** *Means (and standard deviations) of respondents' scores on the content of activities with the use of MSN on a scale running from 0=never to 3=always.*

|  | Mean (sd) | n |
| --- | --- | --- |
| Block someone | .94 (.52) | 219 |
| Conversations with several people at the same time | 1.91 (.92) | 219 |
| Send a link to a website | 1.05 (.81) | 219 |
| Send pictures or documents | 1.59 (.74) | 218 |
| Send music or video files | 1.48 (.80) | 216 |
| Telephone or video conversation | .95 (.82) | 216 |
| Send a message to someone in the same room | .74 (.80) | 217 |

Table 6 provides an overview of students' responses on questions regarding their activities in MSN. Respondents' behaviour in using MSN appeared to be of a relatively social nature. MSN provides a functionality to block a certain contact. When doing this, the blocked contact is prevented to chat and see one's online status. On average, students reported to "sometimes" use this functionality and thus block someone from their contact list (SD=.51). There also seems to be a high degree of integrity while using MSN; 92% report to never make a fool of someone by pretending they are someone else. Also only 13% report using MSN to tell something they would not tell face to face. The latter does not indefinitely imply that students' behaviour could be characterized as 'social', but it does tell that digital environments seem not to be used as a façade in addition to communication in 'real-life' experiences. MSN is mainly used to chat with others through the use of instant messages. The more advanced communication possibilities are being used at a minimum. On average, students reported they sometimes use the telephone or video call functionalities (mean=.95; SD=.8). This could be explained by the preference to chat with more persons at the same time and the fact that video or phone calls can only be made with one connection at the time. But no significant correlations between those variables could be found. Also the exchange of digital object through the use of MSN happens at a minimum size. Links to websites are transferred sometimes (mean = 1.1; SD= .8), while music and video files (mean = 1.5; SD= .8) and pictures and document files (mean = 1.6; SD= .7) are transferred

a little more often. The students are almost never chatting with persons that are in de same physical room (mean = .7; SD= .8).

*Playing games*

A majority of the students who completed the questionnaire appear to be regular gamers; 79% (N=224) reported that they play (video) games; 59% of this group play games least once a week. On average, students reported that they unbrokenly play games for one hour a time. Fan sites or communities about games on the internet are visited by 50% of the group of gamers. Girls are more likely to visit fan sites or communities than boys. Within the population of students who have reported to play (video) games, 41% of the boys and 67% of the girls report that they visit fans sites or communities about games.

Students were asked to report their top three of most favourite games. These games were categorized into nine categories (see table 7). It appears that 'sport' games are the most favourite for respondents (40%). Examples of these games are "FIFA 2007[1]" and "Pro evolution soccer[2]". Second are the 'action games' (22%). Examples of these games are "Counter strike[3]" and "Call of duty[4]". All these four games have online multiplayer modes.

**Table 7.** *Percentage of respondents' score for most favourite (video)game, categorized, in total.*

| (Video) game category | Total (%) |
|---|---|
| Sports | 42 |
| Action games | 22 |
| Simulations | 10 |
| Adventure | 9 |
| Puzzle | 6 |
| Role playing game | 5 |
| Fighting | 3 |
| Collection | 2 |
| Strategy | 1 |

*(N=154)*

*Reading or writing weblogs*

Weblogging appears to be an activity which is not as popular as the other activities questioned in the questionnaire, 47% of the students (N=224) reported that they read weblogs and only 15% of the students actually writes his or her own weblog. Girls are significantly more frequent readers of weblogs than boys (p < 0.01). On average, girls read once or twice a month and boys a few times a year. The 15% of the students who reported that they write their own weblog were presented a few more in depth questions to reveal how this medium is actually used. In light of the size of this group (n=34), conclusions based on these results should be addressed carefully.

The students who are writing their own weblogs appeared to be doing this on average a few times a month. Mostly they read weblogs from people they don't know in real life (91%). The content they add to their weblogs is mostly focused on topics the students like such as hobbies, music and movies. On average, the students write about this once or twice a month. Students write less often about personal experiences, they do this on average a few times a year. They hardly write about things they learn at school.

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[1] FIFA 2007 is a soccer game which can be played at several game consoles as well as the PC. Online play of soccer competition is possible. See: http://en.wikipedia.org/wiki/FIFA_2007 or http://www.fifa07.ea.com/
[2] Pro evolution soccer is a soccer game which can be played at several game consoles as well as the PC. Single player and online multiplayer is possible. See: http://en.wikipedia.org/wiki/Pro_Evolution_Soccer_6
[3] Counter strike is a first person shooter game which can be played at the PC or Xbox and is an online multi-player game. See: http://en.wikipedia.org/wiki/Counter_strike
[4] Call of duty is first person shooter game which can be played at the PC, Mac or Nokia N-Gage. This games has a single player and an online multiplayer mode. http://en.wikipedia.org/wiki/Call_of_duty

*Environment of making use of digital media and web technology*

As table 8 reveals, digital media and web technology are more frequently used at home. Almost all students (92%, N= 224) reported that they "often" use the internet at home. This is in large contrast with the use of internet at school of which 35% report to use the internet "often". Students 'sometimes' make use of the internet at someone else's home (mean = 1.1; SD= .5). Internet is almost never used at the library (mean = .2; SD= .4).

**Table 8** *Means (and standard deviation) of frequency from use of the internet in certain environments, on a scale running from 0=never to 2=often.*

|  | **Mean (SD)** | **n** |
| --- | --- | --- |
| At home | 1.93 (.29) | 219 |
| At school | 1.35 (.49) | 220 |
| At someone else's place | 1.11 (.51) | 221 |
| At the library? | .18 (.41) | 219 |

It seemed unclear for a group of students whether they are allowed to use MSN at school. In general - and measured at all four locations - 83% of the students reported they are not allowed to use MSN at school. At one typical location, 28% of the students reported they are not allowed to use MSN at school. (Video) games are mostly played at students' home (94%). Games are also played at a friends' home (65%) and a small group of 18% reported that they play (video) games at school.

*Perceptions on the use of digital media and web technology*

Students were asked for their opinions regarding various statements. Table 9 summarizes the results for each statement. It appears that students' perceptions are not always very distinct among the sample.

**Table 9** *Students' positions on use of digital media and web technology, in percentages "agree"*

| Statement | Agree |
| --- | --- |
| By playing online games you make new friends | 56% |
| Youngsters who use the Internet to keep in touch with friends are having a better social life than the ones who don't do that via the Internet. | 30% |
| Most youngsters are careless with their personal information on the Web. | 66% |
| Youngsters waste a lot of time on the web, they should better do other things. | 38% |
| Gaming is addictive; youngsters should not play more than two hours a day. | 49% |
| It's OK to copy pieces of text from the internet for your own work. | 73% |
| If you don't learn how to work with a computer at a young age, you run behind to your classmates when you enter school. | 59% |
| The internet helps youngsters to perform better in school. | 64% |

*(N=207)*

A small majority of 56% of respondents believes that through playing online games, you will be able to meet new friends. A minority of 30% agreed with the proposition "when you maintain your social network online, you are to have a better social life than people who don't do that via the internet". This image on the role that digital media and web technology could have to build and maintain a social network is a bit diffuse. It also appears that students who are more frequent players of (video) games are more likely to agree that you are able to meet new friends through playing online games.

Regarding one's own privacy on the Web, 66% agreed with the statement that most youngsters are careless with their personal information. This is seen as an indicator of awareness of the dangers that come with an "online life". On the other hand, there is not a very large distinction regarding the perception on the time spent online, 38% agreed that youngsters waste a lot of time online and half of the response group agrees that gaming is addictive and should be limited to two hours a day. With the latter, a significant correlation relation was found with the frequency of which games are played (r=.31; p<.01). Respondents, who reported to play games 'often', are more likely to disagree with the statement that games are addictive. It is also striking that a relatively large majority of 73% of the

students believe it is allowed to copy pieces of texts from others for their own work. This could be explained in two ways. Youngsters on the one hand may believe it as normal to "steal" intellectual work from others, on the other hand this could also be seen as an indicator that students are willing to share their own information with others and therefore think it normal to take information from others as well.

Students are a little more distinct regarding their perceptions on the value of the internet for learning purposes. Whereas a majority of 59% agreed that if you don't learn how to work with a computer at home, you will lag behind classmates when entering the school period; 64% agreed that the internet will help students to do better at school.

*Indications for Net-generation characteristics*

Several indications towards perceived Net-generation characteristics could be identified through the students' use of digital media and web technology. This section summarizes the findings found in this study regarding this second research question on the characteristics of the Net-generation.

Most indications could be identified towards a *social nature* of the Net-generation. Findings showed high scores on questions regarding the use of digital media and web technology to connect and maintain relationships with others. Students are intensive users of MSN and use it primarily to keep connected with a large network of (online) friends (>200 friends). Games that are most popular appeared to be games that have online multiplayer modes and websites that are most popular are sites that facilitate social networking. Also students' questioned positions on the use of digital media and web technology showed positive scores towards social characteristics. A majority of the respondents perceives that one can make new friends through playing online games.

Indications on other characteristics could be found towards *multitasking* as students reported to be instant messaging with several persons at the same time. Indications towards *navigation* characteristics could be found with a majority of students reporting to know how to use a search engine like Google.

## Conclusion and discussion

Based on an extensive exploration of literature, the emerging digital media and web technology are seen as a major formative event that has shaped or has been shaping the characteristics of the perceived "Net-generation". The aim of this study was to investigate at first the actual use of digital media and web technology by students of preliminary vocational education as they are seen as members of the "Net-generation" as well as subject to the dual work and learning program at the Netherlands Tax and customs Agency (NTA). Secondly, conclusions towards the characteristics caused by use of digital media and web technology are described. Concluding, an exploration towards recommendations on learning environments for Net-generation learners is provided.

*Use of digital media and web technology*

This study has found a wide adoption of digital media and web technology with students of preliminary vocational education. The technologies that are most frequently used facilitate or support relations with other individuals. At points, the extent to which responding students make use of digital media and web technology, primarily at the home place, can generally be seen as very high or intensive but differences between groups do exist especially between boys and girls. In this respect, it is argued that the notion of a "Net-generation" of youngsters using all technologies should be treated with care.

Nearly all students were found to be adepts of using Microsoft MSN Live Messenger (MSN) to send instant messages for the purpose of keeping connected with other individuals from their personal network. Also other technologies that facilitate or support relationships with other individuals were found to be used frequently. Social network sites were most reported as students' most favourite website. As this study does not provide insights into the use of these social network sites, it could be questioned if Net-geners are actively involved in these online communities, as core participants, or act more peripherally. A recently published large scale study by Duimel and De Haan (2007) among students from all levels of secondary education in the Netherlands also reports a high use of MSN (95%). With students of preliminary vocational education using MSN even more frequently and over a longer period of time, than students from higher levels of preliminary education. Duimel and De Haan

also found a high adoption of social network sites. They report 42% of students of preliminary vocational education to actually have a personal profile at a social network site which also is a higher percentage as compared to other educational levels.

Computer and (video) games are also popular among the responding students, especially for boys. Boys appeared to be more extensive players of games than girls. This gender difference is also found by Duimel and De Haan (2007). These authors also report a difference in gaming for students of preliminary vocational education as being more extensive players than students from other levels of vocational education. Students' most favourite games are games that could be categorized as 'sport games', and can be played online. This could indicate that students prefer games that enable them to connect with others. This corresponds with respondents' preference of using social tools like MSN messenger and visit social network sites. In contrast, role playing games appeared to not be very popular. This is remarkable as these games are strongly built around elements of social game play. Game fan sites or communities are visited by half of the group of gamers. From this research we do not know how many times these communities are visited and for what purpose. It would be interesting to gather more information on how students of preliminary vocational education are using these sites as it could tell us more on how they learn to play a particular game.

Remarkably low is the use and reading of weblogs as this tool is also frequently presented in social network sites like "pp2g" or "hyves". This low use could be explained by the fact that communication with others through weblogs is asynchronous as apposed to the synchronous communication in tools like MSN and online gaming.  Low use of weblogs is consistent with findings from other studies and is related to the high degree of text to be used in this medium (Duimel & de Haan, 2007). As opposed to Duimel & De Haan, differences between boys and girls in their use of weblogs were found in the study presented in this paper. Girls appeared to be more frequent users of weblogs. Maybe, this could be ascribed to the similarity weblogs have with 'paper-based' diary's girls often use, although support 'for this is lacking from the data. Another technology which is non-frequently used is wiki's. A large majority of the sample has never heard of this online, text based authoring tool. At the same time the online encyclopaedia Wikipedia, which uses this technology, is being used by 43% of the sample. This could indicate that they use the technology without interest in the technology itself.

Overall, the results from this study are supportive to arguments of e.g. Oblinger & Oblinger (2005) concerning a high use of digital media and web technology by youngsters from the Net-generation. But, ascribing this high use rate to all youngsters, i.e. the 'Net-generation', should be done carefully. Differences between groups do exist, for instance between boys and girls. This study also specifically addressed students of preliminary vocational education with a specialization to economy. No students of other specialization tracks or levels of education were involved in the study. Nor were other aged, already working youngsters or generations as for example parents involved in the study to address certain generational aspects. Other publications of e.g. Duimel & De Haan (2007) point towards differences in the use of digital media and web technology between youngsters of various levels of secondary education. In this respect, more research is needed into the use of digital media and web technology by students of preliminary vocational education in relation to other levels of education and other generations of learners. Also, the instrument used in this study was designed to preliminary discover usage of digital media and web technology, using a rather broad perspective. As new forms of digital media and web technology currently emerge at a fast pace and youngsters are likely to adopt these new forms quickly as well, the current instrument preferably needs to be adjusted and used on an annual basis in order to keep a clear sight on the technologies used by youngsters. With new forms of websites and games emerging, new methods have to be developed to characterize the technologies that are being used. At the same time, more in depth information is needed specifically into how digital media and web technologies are integrated in youngsters' daily lives. In order to address this last question, new instruments (eg. in depth questionnaires and interview schemes) need to be developed for further research.

*Characteristics of Net-generation*

As a high use of digital media and web technology was confirmed by the data, the second aim of this study was to investigate the impact of this on characteristics ascribed to members of the Net-generation. An indication of certain characteristics can be derived from the data.

The results from this study show a highly social related use of digital media and web technology. In this respect it is therefore argued that respondents expose a social nature through their use of digital media and web technology. Using these technologies to keep connected with others is widely accepted throughout the sample. At the same time, the value of online as apposed to offline relations is kept in perspective.

It seems likely that through the use of technology, new social protocols are being developed as argued by Brown (2000). Some of the data from this study are reflective to social protocols in the context of the use of digital media and web technology. At first, data shows that technology enables respondents to have more than two hundred friends on average. On the on the other hand, respondents have relatively small group of 15 friends they meet in real life. Also a majority of the sample perceives that you are able to make new friends through online gameplay. These findings reflect social protocols regarding *friendship* in the context of digital media and web technology. They suggest that in virtual environments, friendship has a different value and being a friend with someone that you meet online is accepted. Other findings are reflective to social protocols towards *self exposure* in virtual environments. Data shows a majority of respondents to visit social network sites, noted that from this study it is unknown if personal profiles are actually created. Also, a majority of the sample perceives that youngsters are careless with their personal information on the web. These findings suggest that although youngsters are aware of possible dangers, self exposure on the web is found to be important. A last set of data regards social protocols reflect the sense of *ownership* towards information on the web. Findings show almost all respondents to be using the web to access information and with a large majority to be comfortable with copying texts for use in their own work. Perhaps this shows that youngsters have no sense of ownership regarding online materials. Once it is on the web, materials are perceived to be 'owned' by the public. Summarizing, various findings from this study are reflective to social protocols in the context of digital media and web technology. These social protocols can be divided into three aspects: a) friendship, b) self exposure and c) ownership. Valid conclusions regarding the direction and effects of these aspects can hardly be drawn from the results of this study as there is little comparison made between perceived offline and online social protocols. But it seems likely that if new social protocols are being developed, new skills are required to be able to handle those protocols, referring to 'socio-emotional skills' as described by Eshet & Hamburger (2004).

It can be argued that social protocols in the context of digital media and web technology are likely to have come into different perspectives. When referring to a social nature of respondents awareness is advised on these different perspectives. Much more research is needed on how these social concepts are perceived by youngsters and how they relate to what is accepted in our current (offline) society. Continuing, it should be studied what 'socio-emotional skills' are involved and if or how these are being developed through the use of technologies in order to explore how the field of HRD should anticipate on these developments.

Valid conclusions or arguments regarding other perceived Net-generation characteristics as described in the literature part of this paper should be proposed with much care. Much more information than could be collected with the current used questionnaire is needed to draw valid conclusions. Data shows some evidence that respondents are 'multitaskers' as they report to chat with several persons at the same time, but again, much more information is needed here. Almost all respondents reported that they know how to use a search engine like Google for searching information. Herewith, it could be argued that navigation, as a main form of literacy is well mastered. We need to take in consideration that the current questionnaire data does not give us in depth information on the use of digital media and web technology to discover any shared characteristics among the members of the Net-generation. Data can confirm a variety of digital media and web technology is used, but does not show if this is used intuitively. Students' perception on the use of search tools like Google is available, but there is no information on the extent to which students are really effective in their search efforts. In order to provide a valid conclusion on the shift in literacy and an answer to the question if all Net-geners are really digitally literate, more in depth research, using different instruments is required. The use of oral, more explorative questionnaires is recommended.

In summary, the empirical findings from this study show that responding students from preliminary vocational education are intensive users of digital media and web technology. A social nature is exposed through the use of digital media and web technologies that enable users to create and maintain relations or social networks. Results do not imply that there is a 'generation' that is more social then others or that a social nature is developed by the use of digital media. It shows that there is a group of youngsters using technology intensively and thereby creating new possibilities to build and maintain relationships. It is emphasized that findings show that differences between groups exist. It could be discussed if the term 'Net-generation' can still be applied to the group under study as the influence of the use of technology on the development of characteristics of a certain generation can still be questioned. Research on cultural change (Hofstede & Hofstede, 2005) has for example shown that technology has no effect on a generation's core values, it merely could affect shared practices of culture. Just like this study has shown practices evolved for building and maintaining relationships through the use of digital media and web technology. Either less, introducing yet another new term would not help to improve the design of learning environments and make them fit to their target groups. As such, the term 'Net-generation' will be continued to be used throughout this paper.

*Learning environments for Net-generation learners*

The findings from this study support the need to explore new possibilities and their implications for the field of HRD or more specifically for the design of (virtual) learning environments for Net-generation learners. In the following section some of these new possibilities and implications will be explored through an elaboration on relevant epistemology regarding the described use of digital media and web technology and characteristics of the Net-generation.

A view on learning that could support the findings from this study regarding the Net-generation is the socio-cultural perspective. Within this perspective it is argued that the construction of knowledge originates from the social interaction between learners such as might be found within forms of collective learning such as networks or communities of practice (Akkerman, 2006; de Laat, 2006). The current study has found most frequent use with technologies that facilitate relations between individuals and that could be able to support digital networks and communities of practice. It should be further investigated if the social interaction that occurs when students of preliminary vocational education interact through the use of the digital media and web technology studied in this paper is equal to the social interaction within the socio-cultural perspective. But in the perspective of the current exploration it is presumed it is.

A distinguishing feature of networks of practice is its loosely coupled character (de Laat, 2006). Participants in such networks decide when and how they share their knowledge. Whereas networks of practice are large and loosely coupled networks of people, communities of practice are smaller units within those networks of practice. Communities of practice can be situated in that (part of the) organization where the learner is active or employed, and networks of practice to extend beyond the borders of that (part of the) organization. Further research on this aspect should show how communities and networks of practice would fit within the context of the dual work and learn program at the NTA.

Environments or tools like instant messaging, social network sites, online games, wiki's and blogs seem to have great potential to facilitate interaction between learners in collective environments such networks or communities of practice. As with networks of practice it seems that learners should be free to choose their own ways to connect with others. With communities of practice, there are more opportunities to design specific elements that facilitate learning at the workplace or in formal learning arrangements. It would then be tempting to argue just to use the environments or tools found in this study, or one of the many others that are used by youngsters world wide which were not included in the current study. However, these environments are used primarily in out of school settings and just implementing these environments in designed learning environments would be a mere technology based implementation. Also, as shown before, not all technologies are being used by all youngsters in to the same extent. Care should thus be taken on just implementing technologies without consideration of how these technologies would facilitate learning processes. Therefore, a design for a powerful learning environment could be argued which encompasses a mix of carefully chosen tools or interventions which facilitate learners to participate electronically as well as face to face in collective learning environments such as communities of practice.

The low level of the use of weblogging tools and tools for the social creation of content like Wikipedia (wiki's) found in this study are a challenge for the design of these learning environments, as they seem to have great potential but were found to be used much less then other tools in this study. Characteristic to weblogs and wiki's is that these tools are both primarily text based. Duimel and De Haan (2007) argue that students of preliminary vocational education are barely using these tools because of their text based design. But as technology emerges, opportunities for all users to create rich and interactive content increases. This can be witnessed at sites like e.g. YouTube, where users create short movies on topics of their interest. With a target group like the students of preliminary vocational education, designers could combine the strength of the design of these tools. This could result in reflectional online weblogs build around video content. Next, the design could be made more powerful by adding possibilities for people to interact with each other by giving feedback to personal reflections from others. Online social networks could offer opportunities for learners to profile themselves and get connected with others from the same or another community, thereby enhancing possibilities to receive feedback from peers. It is important to realize that the power of social environments on the web lies within its reach and thus giving people a chance to connect with others from all over the world. Designing virtual social networks for learning purposes and keep its reach limited to the borders of the physical (formal) learning environment would not give it the power to reach its fullest potential.

When providing the ability for learners to connect with other learners or experts from all over the world, they are enabled to participate from their communities of practice into global networks of practice. An open access to the web requires a view on learning where learners experience a lot of freedom. This may seem "anarchic and threatening to those holding conservative notions of learning" (Harrison & Kessels, 2004) but through their use of digital media and web technology Net-geners, the future generation of workers, are likely to demand employers for open access to the web which enables them for social interaction with others in online communities or networks of practice. When designing learning environments for Net-generation learners, it is therefore argued to design learning environments that are able to facilitate social interaction between learners in networks or communities of practice through the use of digital media and web technology.

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**Appendix: written questionnaire**

The following appendix holds the questionnaire as was presented to the students of preliminary vocational education. As the official language was Dutch, the questionnaire was also presented in Dutch to the students. In order to prevent bias, the questionnaire is not translated for inclusion in this paper. Also, the original typeface is maintained. Note that within this study, also an online, web-based, version of the questionnaire was presented to students.

# *Welkom!*

Je gaat zodadelijk een enquête invullen over het **internetgebruik van jongeren**. Probeer de vragen rustig door te lezen en zo goed mogelijk antwoord te geven. De antwoorden blijven anoniem en zullen gebruikt worden voor het gebruik van internet voor leren.

De enquête bestaat uit 6 onderdelen, je zult **ongeveer 20 minuten** de tijd nodig hebben om hem in te vullen.

Op de meeste vragen kun je antwoord geven door het rondje van je keuze aan te kruisen. Als je een antwoord wilt veranderen, zet je een streep door het oude antwoord en kruis je de nieuwe keuze aan.

Bij sommige vragen staat een verwijzing naar een volgende vraag, volg deze aanwijzingen goed op.

Lever de ingevulde enquête na afloop in bij je docent/ surveillant.

Alvast bedankt voor het invullen!

# 1. Algemene Informatie

**1.** In welk jaar ben je geboren?

**2.** Wat is je geslacht?
*Kruis één rondje aan.*
○ Vrouw
○ Man

**3.** In welke klas van het VMBO zit je nu?
*Kruis één rondje aan.*
○ 1e klas
○ 2e klas
○ 3e klas
○ 4e klas

**4.** Welke leerweg volg je?
*Kruis één rondje aan.*
○ Basisberoepsgerichte leerweg
○ Kaderberoepsgerichte leerweg
○ Gemengde leerweg
○ Theoretische leerweg

**5.** Wat is de plaatsnaam waar je **SCHOOL** is gevestigd?
*Kruis één rondje aan.*
○ Amsterdam
○ Oisterwijk
○ Rotterdam
○ Hengelo
○ Tilburg
○ Groningen

**6.** Hoeveel boeken zijn er ongeveer bij je thuis? (Tel ook de boeken van je ouders, broers of zussen mee).
*Kruis één rondje aan.*
○ Geen of heel weinig. (0 tot 10 boeken)
○ Genoeg om een hele plank te vullen. (11 tot 25 boeken)
○ Genoeg om hele boekenkast te vullen. (26-100 boeken)
○ Genoeg om twee boekenkasten te vullen. (101 tot 200 boeken)
○ Genoeg voor 3 of meer boekenkasten. (meer dan 200 boeken)

**7.**  Hoe vaak maak je gebruik van het internet?

*Kruis één rondje aan.*
O Nooit ――――――――――→      *ga door met vraag 36*
O Paar keer per jaar
O 1 of 2 keer per maand
O Minstens 1 keer per week      *ga door met vraag 8*
O Elke dag
O Meerdere keren per dag

# 2. Gebruik internet algemeen

**8.**  Nu volgt er een aantal activiteiten die je online zou kunnen doen. Wil je per activiteit aangeven of je al weet hoe je dat moet doen, of je iemands hulp daarbij nodig hebt, of dat je dit nog helemaal niet weet.
*Kruis per regel één rondje aan*

|  | Ik hoe weet hoe dit moet | Ik heb de hulp van een ander nodig | Geen idee, nooit van gehoord |
|---|---|---|---|
| Een zoekmachine zoals Google gebruiken om informatie op het Web te vinden | O | O | O |
| Een bijlage uit een e-mail openen | O | O | O |
| Het uploaden van plaatjes of bestanden op het web zodat anderen deze kunnen bekijken | O | O | O |
| Teksten schrijven in een Wiki | O | O | O |

**9.**  Over welke van de onderstaande apparaten heb jij **thuis** de beschikking?
*Je kunt meerdere antwoorden aankruisen*
☐ Een gewone PC (desktop computer)
☐ Een laptop computer
☐ Een mobiele telefoon
☐ Een I-Pod
☐ Een PDA of Blackberry

**10.**  Met welke van de onderstaande apparaten maak je ook gebruik van het internet?
*Je kunt meerdere antwoorden aankruisen*
☐ Een gewone PC (desktop computer)
☐ Een laptop computer
☐ Een mobiele telefoon
☐ Een PDA of Blackberry

**11.** Wat zijn je **drie** meest favoriete websites?

*Schrijf je antwoord op onderstaande regels*

1. _____

2. _____

3. _____

**12.** Hoe vaak doe je de volgende dingen?
*Kruis **per regel** één rondje aan.*

|  | Nooit | Paar keer per jaar | 1 of 2 keer per maand | Minstens 1 keer per week | Elke dag | Meerdere keren per dag |
|---|---|---|---|---|---|---|
| Het verzenden of ontvangen van e-mail | O | O | O | O | O | O |
| Het verzenden of ontvangen van MSN berichten | O | O | O | O | O | O |
| Het verzenden of ontvangen van SMS berichten | O | O | O | O | O | O |

**13.** Hoe vaak maak je gebruik van het internet voor de volgende dingen?
*Kruis **per regel** één rondje aan.*

|  | Nooit | Paar keer per jaar | 1 of 2 keer per maand | Minstens 1 keer per week | Elke dag | Meerdere keren per dag |
|---|---|---|---|---|---|---|
| Het bekijken van nieuwsberichten (bv. nu.nl) | O | O | O | O | O | O |
| Informatie opzoeken voor school of werkstukken. | O | O | O | O | O | O |
| Het verzenden of ontvangen van SMS berichten | O | O | O | O | O | O |
| Informatie opzoeken over (vervolg) opleidingen. | O | O | O | O | O | O |
| Gebruik van de website Wikipedia voor het opzoeken van informatie. | O | O | O | O | O | O |

**14.** Hoe vaak maak je gebruik van het internet op de volgende plekken?
*Kruis **per regel** één rondje aan*

| | | | |
|---|---|---|---|
| Thuis | ○ Nooit | ○ Soms | ○ Vaak |
| Op school | ○ Nooit | ○ Soms | ○ Vaak |
| Bij iemand anders thuis (bijvoorbeeld bij vrienden) | ○ Nooit | ○ Soms | ○ Vaak |
| Vanuit de bibliotheek | ○ Nooit | ○ Soms | ○ Vaak |

**15.** Wat voor soort verbinding heb je met je **THUIS** computer?
*Het is mogelijk meerdere antwoorden aan te kruisen.*
☐ Telefoon verbinding
☐ Kabel modem
☐ ADSL
☐ Wireless (kabel/adsl)
☐ Weet ik niet
☐ Ik heb thuis geen computer

**16.** Controleren je ouders wel eens je computer om te kijken welke websites je hebt bezocht?
*Kruis één rondje aan.*
○ Nee
○ Ja
○ Heb thuis geen computer

**17.** Mag je op school gebruik maken van MSN?
*Kruis één rondje aan.*
○ Nee
○ Ja

# 3. Gebruik van MSN

De volgende vragen gaan over het gebruik van messenger programma's, we gebruiken als voorbeeld het bekende MSN waarmee je eenvoudig berichtjes kan versturen naar je vrienden.

**18.** Hoe vaak maak je gebruik van **MSN** (of een ander vergelijkbaar product) voor het versturen van berichten?

*Kruis één rondje aan.*
○ Nooit ─────────────→ *ga door met vraag 24*
○ Paar keer per jaar ⎫
○ 1 of 2 keer per maand ⎪
○ Minstens 1 keer per week ⎬ *ga door met vraag 19*
○ Elke dag ⎪
○ Meerdere keren per dag ⎭

**19.** Waarvoor gebruik je MSN?
*Je kunt meerdere antwoorden aankruisen*

☐ In contact blijven met vrienden die niet in de buurt wonen en die ook niet naar jouw school gaan.

☐ Het maken van (vrije tijds)plannen met vrienden

☐ Iemand voor de gek houden door je voor te doen als iemand anders

☐ iets te schrijven wat je niet in iemands gezicht durft te zeggen

☐ Praten over huiswerk, proefwerken, school

**20.** Met hoeveel mensen MSN je *GEMIDDELD* tegelijkertijd?
*Kruis één rondje aan.*
○ 1-2
○ 3 tot 5
○ 6 tot 10
○ Meer dan 10

**21.** Hoeveel namen heb je in je contactlijst van MSN?
○ Minder dan 25
○ Tussen de 25 en 50
○ Tussen de 50 en 100
○ Tussen de 100 en 200
○ 200 of meer

**22.** Geef van onderstaande dingen aan hoe vaak je dit doet als je MSN gebruikt.
*Kruis per regel één rondje aan*

| | | | | |
|---|---|---|---|---|
| Iemand blokkeren | ○ Nooit | ○ Soms | ○ Meestal | ○ Altijd |
| Gesprekken met meerdere mensen tegelijkertijd | ○ Nooit | ○ Soms | ○ Meestal | ○ Altijd |
| Een link naar een website versturen | ○ Nooit | ○ Soms | ○ Meestal | ○ Altijd |
| Foto's of documenten versturen | ○ Nooit | ○ Soms | ○ Meestal | ○ Altijd |

**23.** Geef ook van onderstaande dingen aan hoe vaak je dit doet als je MSN gebruikt.
*Kruis per regel één rondje aan.*

| | | | | |
|---|---|---|---|---|
| Muziek of videobestanden versturen. | ○ Nooit | ○ Soms | ○ Meestal | ○ Altijd |
| Een telefoon en/of videogesprek voeren | ○ Nooit | ○ Soms | ○ Meestal | ○ Altijd |
| Een bericht versturen naar iemand die in dezelfde ruimte zit | ○ Nooit | ○ Soms | ○ Meestal | ○ Altijd |

# 4. Gebruik van Weblogs

Veel websites geven je tegenwoordig de mogelijkheid om je eigen weblog bij te houden. Voorbeelden van zulke sites zijn Hyves.nl of MSN Spaces. Een weblog, dat ook wel eens *blog* wordt genoemd is eigenlijk een soort online dagboek waarin je dingen kunt beschrijven die je meemaakt. De volgende vragen gaan over weblogs.

**24.** Hoe vaak lees je **weblogs** of internetdagboeken van anderen?

*Kruis één rondje aan.*
○ Nooit
○ Paar keer per jaar
○ 1 of 2 keer per maand
○ Minstens 1 keer per week
○ Elke dag
○ Meerdere keren per dag

**25.** Houd je zelf een weblog of internetdagboek bij?
*Kruis één rondje aan.*
○ Nee ⟶ *ga door met vraag 29*
○ Ja

*ga door met vraag 26*

**26.** Hoe vaak voeg je nieuwe berichten toe aan je weblog?
*Kruis één rondje aan.*
○ Nooit ⟶ *ga door met vraag 30*
○ Paar keer per jaar
○ 1 of 2 keer per maand
○ Minstens 1 keer per week     *ga door met vraag 27*
○ Elke dag
○ Meerdere keren per dag

**27.** Lees je weblogs van mensen die je **persoonlijk** kent?
○ Nee
○ Ja

**28.** Lees je weblogs van mensen die je **NIET persoonlijk** kent?
○ Nee
○ Ja

**29.** Hoe vaak schrijf je over de volgende onderwerpen op je weblog?
*Kruis **per regel** één rondje aan.*

|  | Nooit | Paar keer per jaar | 1 of 2 keer per maand | Minstens 1 keer per week | Elke dag | Meerdere keren per dag |
|---|---|---|---|---|---|---|
| Persoonlijke dingen die je hebt meegemaakt. | O | O | O | O | O | O |
| Onderwerpen die je leuk vindt zoals hobbies, muziek, films. | O | O | O | O | O | O |
| Dingen die je op school leert. | O | O | O | O | O | O |

# 5. Gaming

De volgende vragen gaan over gaming. We hebben het dan over het spelen van video-games via de PC of via een game-console.

**30.** Hoe vaak speel je (video) games?

*Kruis één rondje aan.*
O Nooit             →     *ga door met vraag 37*
O Paar keer per jaar
O 1 of 2 keer per maand
O Minstens 1 keer per week     *ga door met vraag 31*
O Elke dag
O Meerdere keren per dag

**31.** Wat zijn je **drie** meest favoriete games?

*Type in de antwoordkaders*

1. _____

2. _____

3. _____

**32.** Bekijk je wel eens fan sites of communities op het internet over games?
*Kruis één rondje aan.*
O Nee
O Ja

**33.** Hoeveel tijd besteed je per keer **GEMIDDELD** genomen aaneengesloten aan het spelen van een game?
*Kruis één rondje aan.*
O Minder dan een half uur
O Tussen een half uur en een uur
O 1 tot 2 uur
O Meer dan twee uur

**34.** Waar speel je wel eens games?
*Je kunt meerdere antwoorden aankruisen*

☐ Thuis

☐ Op school

☐ Bij iemand anders thuis, bijvoorbeeld bij vrienden

☐ Ergens anders

**35.** Waar speel je het meest?
*Kruis één rondje aan.*
○ Thuis
○ Op school
○ Bij iemand anders thuis, bijvoorbeeld bij vrienden      *ga **ALTIJD** door met vraag 37*
○ Ergens anders

**36.** Wat is de belangrijkste reden dat je geen gebruik maakt van het internet?
*Kruis één rondje aan.*
○ Geen interesse
○ Geen tijd
○ Ik heb geen internet
○ Het is te moeilijk
○ Ik vind het niet veilig
○ Het mag niet van mijn ouders
○ Ik vind het zonde van mijn tijd
○ Het is te duur
○ Anders:

# 6. Wat doe je in de 'echte' wereld?

**37.** Ben je lid van een vereniging, zoals een muziek, toneel of sport vereniging?
*Kruis één rondje aan.*
○ Nee
○ Ja

**38.** Met hoeveel vrienden heb je regelmatig persoonlijk contact, hiermee bedoelen we dat je hem of haar ten minste 1 keer per week ziet of spreekt.
*Kruis één rondje aan.*
O 4 of minder
O 5 tot 9
O 10 tot 14
O 15 of meer

**39.** Wat gebruik je het meest wanneer je...
*Kruis per regel één rondje aan.*

| | | | | | |
|---|---|---|---|---|---|
| Een kort gesprek wilt met een vriend die je regelmatig ziet. | O (Mobiele) Telefoon | O E-mail | O MSN | O SMS | O In het 'echt' |
| Met een vriend wilt praten over iets serieus en belangrijks. | O (Mobiele) Telefoon | O E-mail | O MSN | O SMS | O In het 'echt' |
| Een privé gesprek wilt hebben met iemand dat verder niemand mag weten. | O (Mobiele) Telefoon | O E-mail | O MSN | O SMS | O In het 'echt' |

**40.** De laatste tijd komen er veel berichten in het nieuws over het gebruik van internet door jongeren. Kun je aangeven of je het met de volgende stellingen eens of oneens bent.
*Kruis per regel één rondje aan.*

| | Eens | Oneens |
|---|---|---|
| Door het spelen van online games ontmoet je nieuwe vrienden | O | O |
| Gamen is erg verslavend, jongeren zouden niet meer dan twee uur per dag moeten spelen. | O | O |
| Wanneer je als kind niet thuis op een computer het leren werken, loop je achter op je klasgenoten wanneer je op school komt. | O | O |
| De meeste jongeren zijn onvoorzichtig met het geven van persoonlijke informatie op het Web. | O | O |
| Jongeren die gebruik maken van het internet om in contact te blijven met vrienden hebben een beter sociaal leven dan jongeren die dat niet doen via het internet. | O | O |
| Jongeren verspillen een hoop tijd op het web, ze kunnen beter andere dingen gaan doen. | O | O |
| Het internet helpt jongeren om het beter te doen op school | O | O |
| Het kopiëren van stukken tekst van het internet voor je eigen werk moet kunnen. | O | O |

DIT IS HET EINDE VAN DE ENQUETE

**BEDANKT VOOR HET INVULLEN**