

Sanna Juutinen

Emotional Obstacles of E-learning



JYVÄSKYLÄ STUDIES IN COMPUTING 145

Sanna Juutinen

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ABSTRACT

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E-learning is becoming more and more important learning media in both educational institutions and in corporate world. As this learning and teaching style keeps expanding to new areas of learning, teaching and training, it sets the requirements of the students and teachers to whole new level what the traditional way of teaching has done. The teachers and learners are obligated to learn new skills to manage their way through e-learning courses. The old habits and skills are no longer adequate in this new world of learning. This causes several students to frustrate and give up or make the new way of learning as a negative in their own thinking. The development of new e-learning courses and systems should be done with the care of users and their experiences.

This dissertation's focus is in the emotions of the e-learning users. The overall goal is to find out the emotional obstacles that e-learning brings to the users in their e-learning experience. Previous research has often paid attention to the systems that e-learners are using in order to improve the efficiency and functionality of those systems. The human-computer interaction and emotions that arise to users from these systems are not been researched earlier and therefore the emotional aspect of e-learning requires more attention. To understand the emotional effect in e-learning, two separate data sets were analyzed in order to discover the emotional obstacles in e-learning process. The dissertation proposes a tentative model that shows the emotional aspects that e-learning has to the students.

Finally this dissertation recommends some future research aspects on the area and mechanisms to improve the user experience of the e-learners in order to make their e-learning more fluent and enjoyable.

Keywords: E-learning, user experience, emotional usability, emotions

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- II Juutinen, S. & Saariluoma, P. (2007). Usability and emotional obstacles in adopting e-learning - A case study. In M. Khosrow-Pour, (Ed.) Managing world wide operations and communications. (pp. 1126-1127). New York: IGI Publishing
- III Juutinen, S., & Saariluoma, P. (2010). Emotional obstacles for e-learning - a user psychological analysis, European Journal of Open, Distance and E-learning, 2010(I), Retrieved from [http:// www.eurodl.org/?article=402](http://www.eurodl.org/?article=402).
- IV Juutinen, S., Saariluoma, P., & Jokivuori, P. (Submitted). Age as the emotional obstacle in e-learning experience. (Submitted)
- V Juutinen, S. (Submitted). Emotional reasons for drop-out in e-learning courses. (Submitted)
- VI Juutinen, S., Huovinen, T., & Yalaho, A. (2011). Technophobia as an emotional obstacle in e-learning. In Proceedings of Ireland International Conference on Education (IICE-2011), Dublin, Ireland.

1 INTRODUCTION

1.1 Significance of the research

In human-computer interaction (HCI) research, emotions have been researched in relation to different IT products (Weller, Pegler & Mason, 2005; Brusilovsky, 2004; Annapoomima & Soh, 2004; Brusilovsky, 2004) but the emotional meaning in interactions in e-learning has been left with less attention. This research brings in front the need to pay attention to users' experiences and the effect of the emotions in the e-learning process (Juutinen & Saariluoma, 2006; 2007; 2010). Purpose of this research is to find out some of the emotional factors that make the learning results lower in e-learning than in traditional learning, and especially, see how the emotions have an influence on the high dropout rates in e-learning (Juutinen & Saariluoma, 2006; 2007; Juutinen, submitted) when comparing to the traditional teaching. These issues are in the scope of this research.

This research is using some psychological mechanisms to research emotional human-computer interaction process using user psychology. User psychology is fairly new area of research and therefore it doesn't have long research tradition to support the new results (Saariluoma & Oulasvirta, 2010). The user psychology's attempt is to get the psychologists already working with technology related issues help the system developers to change the old testing based ways of developing software and computer systems and start using psychological terms and methods (Saariluoma & Oulasvirta, 2010). The new models are needed in order to develop more user friendly computer systems in the future, therefore research as presented here are needed. Explorative research in user experience is needed in order to develop new models, practices and information in the discipline of user psychology. Exploratory research in emotional effects on e-learning is needed due to the lack of prior knowledge of this phenomenon (Järvinen, 1999).

The whole overall e-learning experience is depending on how the students handle the errors and troubles in their studying process. E-learning requires

more effort, technical skills and maturity from the students than traditional teaching does (Hiltz & Wellman, 1997; Kumar, Kumar & Basu, 2001). As e-learning studies require more maturity and taking more responsibility of one's own studies without having the teacher as a support constantly, therefore the students are more vulnerable to have problems with their studies and also to the effects that the troubles may cause. Also the change from classroom learning to e-learning can cause troubles to some students with the lack of immediate support and feedback from the teachers in a case of problems (Juutinen & Saariluoma, 2006; 2007).

E-learning nowadays is ever increasing teaching method both in educational institutions and in business world, therefore also these emotional factors of e-learning have to be checked and researched with care to avoid the drop out students to be left behind in their academic studies or in their work trainings. This research studies more closely the emotional aspects of in e-learning trying to understand students' behavior when dropping out from courses or having troubles coping with new studying systems better. Understanding the behavior of the students in troublesome situations may be helpful to the teachers and e-learning developers in e-learning courses to be able to offer more efficient support and better e-learning solutions for all the students despite their skills or background knowledge.

One important question concerning e-learning is why it is not always liked by people. Why are individuals reluctant to participate in e-learning sessions and courses and why do they not like them? These questions, although not applicable to all the students, apply to many (Juutinen & Saariluoma, 2006). One can look at the obstacles in participating in e-learning as a technical problem and look for improvements in advancing technology. Undoubtedly, the advancement of technology is important, but before that advancement can take place, one must have a clear idea about how and why current technical practices should be improved. One can also see it as a usability problem (Oatley, 2004; Boehner, DePaula, Dourish & Sengers, 2007; Rosson & Carroll, 2002; De Villiers, 2004; Yu, Chang, Liu, & Chan, 2002). However, the analysis of the existing interaction technology is not necessarily sufficient, as the obstacles are often in the minds and emotions of people rather than in the immediate interaction modes (Juutinen & Saariluoma, 2006; 2007). This is why we should know the mental reasons behind problems stemming from disliking, instead of just looking at how people interact with interfaces – even though this is also vital.

Consequently, in this research the obstacles are seen as emotional processes and they are applied user psychology to analyze the roots of the difficulties. The research has shown that e-learning systems can make the users frustrated, confused and reduce their interest in learning (Juutinen & Saariluoma, 2006; 2007; Shneiderman, 1976; Alavi, Yoo & Vogel, 1997; Hara & Kling, 2000; Zhang, Zhao, Zhou, & Nunamaker, 2004; Drennan, Kennedy & Pisarski, 2005).

There are many motivations from an educational point of view, for paying attention to emotions in e-learning. Firstly, the importance of emotions in education has been convincingly demonstrated in traditional classroom teaching

(Meyer & Turner, 2002; Hannula, 2006; Meyer & Turner, 2006; Weare, 2004; Patrick, Skinner & Connell, 1993; Weller et al., 2005). Secondly, failures and frustration in using computers is commonplace for almost anyone who has operated a computer (Branco, Firth, Encarnacao & Bonato, 2005). This is reflected in technophobia where the existence of emotional problems has been empirically proven (Brosnan, 1998).

We also know that e-learning requires the students to have more maturity and self-discipline, which indirectly implies that overcoming emotional obstacles is important in e-learning (Hiltz & Wellman 1997; Kumar, Kumar & Basu, 2001). A concrete example of this is demonstrated in a study by Shneiderman, Alavi, Norman & Borkowski (1995). They found that students tend to become more actively involved in teaching in the electronic classroom, where new techniques of teaching are being used, than they are in traditional teaching. For the reasons presented, it is important to analyze emotional obstacles in e-learning. As a starting point and as a means of systematizing our endeavor, a model of how emotions are involved in e-learning should be created.

Nevertheless, it is a real problem for the future development of this mode of teaching. If a large segment of people do not like e-learning, it easily slows down the development of the field and causes divisions between people who will and can benefit from e-learning courses, and people who cannot. Thinking about the future, the mental obstacles for participating in e-learning easily result in losing important opportunities in advancing one's personal development. Even though e-learning is a growing area of teaching all over the educational field, not all the educators have taken it as part of their educational curriculum without resistance. E-learning is promising cost saving education to schools and companies, but the results are still not at the same level with traditional classroom teaching with bigger dropout rates.

The research presented here shows the need for effective tutoring and some amount classroom teaching for the students who are not able to complete the courses with independent work. Taking a part of traditional teaching into e-learning courses would help the weaker students' performance and probably this way also cut down the dropout rates in e-learning courses. The availability of these support systems in e-learning courses and having the information about them would make a group of students more confident about their abilities with e-learning even though they would never need these support services. E-learning concept itself is the cause of negativity for some students and therefore for them to know the possibility of the same studying modes as they have been used to would make them more comfortable to learn new learning habits.

1.2 Research approach and goals

Research goals of this research were to describe and explore the phenomenon of emotional e-learning using qualitative research methods and explain it using

quantitative methods. The two different data sets used in this research are designed to address the overall research aims. The overall aim of the thesis is to explore, describe and explain:

- The emotional effect in e-learning environment for the learning results and experiences of the students.

In pursuing the overall aim, the research objectives of the thesis are to:

- Increase the body of knowledge of emotions in e-learning by gathering users' emotional experiences in e-learning and in technology, especially the computer.
- Find out the effects of technophobia to high dropout rates in e-learning.
- Gather more information about the effects of the design of the e-learning system to the motivation of the students.
- Find out the user experiences of the students and how it affects to their learning and studying motivation.
- Gather more background information of the e-learning students and the effects of the previous skills to the e-learning experience.

1.3 Expected results

This thesis' aim is to discover some new dimensions in e-learning research using user psychology. It involves emotions into the e-learning studying and shows the importance of them in designing the interfaces and contents of the e-learning planning. The findings of this study will provide a clearer understanding of emotional effects in e-learning and suggests improvements to the phenomenon. In addition to the publications and suggested future work, this research includes:

- More detailed information about the emotions students feel during their e-learning studies.
- How the negative and positive emotions affect to the outcomes of the learning results in e-learning.

1.4 Structure of the thesis

This thesis has five different chapters. In the first part, the introduction for the area of the research is made. In second part the background concepts are defined and explained with previous literature done on the field. Third part is composed by the approach for the research problems and the methods used in this research. Fourth part is a summary of the published articles and their main findings. The fifth part is explaining the results and contribution of this research with future research suggestions.

2 BACKGROUND OF THE RESEARCH

2.1 E-learning

E-Learning is another way of teaching and learning. While traditional teaching is usually done in classroom with teacher leading the class through, in e-learning the leading of the teaching is usually done by a technical device. E-learning can be in its widest definition the following: e-Learning includes instruction delivered via all electronic media including the Internet, intranets, extranets, satellite broadcasts, audio/video tape, interactive TV, and CD-ROM. E-learning can also be defined as instruction delivered via a computer that is intended to promote learning (Clark & Mayer, 2003). The second definition can be broken down into the what, how, and why of e-learning:

What. Instruction refers to content (e.g., words and pictures describing how lightning storms develop) and instructional methods (e.g., presenting words in spoken form rather than printed form). E-learning depends on instructional material being presented using effective instructional methods.

How. Delivered via a computer refers to presenting material via a computer by way of internet, intranet, CDROM, or related means. Instructional output includes images and printed words that appear on a screen, and sounds and spoken words from a speaker or headphones; learner input includes spoken words through a microphone, characters entered on a keyboard, and screen items clicked with a mouse. Thus, e-learning uses the output and input channels of computers and their peripheral devices.

Why. Intended to promote learning refers to the goal of helping to foster changes in learners' knowledge, which is reflected in changes in their performance. Thus, e-learning is intended to help people achieve learning objectives." (Meyer, 2003, p. 298)

In the research introduced here, the term e-learning is referred to a kind of teaching that uses any technical devices to support teaching, usually that technical device being a computer.

E-learning is well researched area in multidisciplinary fields. In information technology field considering the human-computer interaction, the re-

search has mostly been concentrated on the investigation of the software and hardware systems that enable the e-learning to be in effect (Weller et al., 2005; Brusilovsky, 2004; Annapoomima & Soh, 2004; Brusilovsky et al., 2005). In later studies, the usability and human cognition have been the growing interest of the researchers (De Villiers 2004; Yu et al., 2002).

Much less attention has been called to emotional usability, especially in e-learning, though this theme is becoming increasingly more important as a part of usability research (Picard & Klein 2002; Norman 2004). In emotional usability the designers pay attention to how the users like the user interface. This is an important new paradigm, because emotions have a central role in human mentality. People evaluate the value of things for themselves on the ground of their emotions and this is why emotions have such an important position in explaining which products people use and which they put aside.

Previous studies of e-learning have pointed out how inadequately equipped and poorly designed e-learning systems can make the users frustrated, confused and reduce their interest for learning (Shneiderman et al. 1995; Hara & Kling 2000; Zhang et al. 2004; Drennan et al., 2005). Hara and Kling (2000) investigated how the students respond to the problems and asked their opinions about the e-learning system in one small web-based distance education course. Students' opinions about the problems in technical area of the course and distress are obvious in the results. The research is done in a small web-based course and the main point has been to examine the students' distressing experiences due to communication and technical errors. This research shall extend this line by analyzing all emotional motives that the students give for their dislike to use an e-learning environment. The ultimate concern is thus how an e-learning course could be made more appealing and enjoyable for the participants to stay in the course until the end of it.

Paying attention to emotions in e-learning is well founded. The importance of emotions in education has been illustrated and researched in many ways; through the traditional classroom teaching. Weller et al. (2005) discusses the traditional classroom teaching and schools from the aspect of emotional literacy and these same results can be applied to e-learning courses at some extent. Frustration using computers is a common phenomenon nowadays around the world with almost everyone who has operated a computer at some point (Branco et al., 2005). Finally, we know also that e-learning requires more from the students, it requires the students to have more maturity and self-discipline, which indirectly implies that overcoming emotional obstacles is important in e-learning (Hiltz & Wellman, 1997; Kumar et al., 2001).

We may also look at the research done by Shneiderman et al. (1995). They found that students tend to become more actively involved to teaching in the electronic classroom where new techniques of teaching are being used than they do in traditional teaching. One reason for that might be the anonymity that also was noticed in Yu et al. (2002). Being unknown to others makes it easier for students give their opinions and contributions to the conversations. This enables students to be more involved and also more in control over their learning

process. Emotions are also playing a role in this issue. Since the students enjoy the learning process and get to be involved and choose their own learning environment outlook, they have much more fun and enjoy the learning (Drennan et al., 2005). They identified two key elements of student satisfaction: Ease of access and use of online flexible learning materials and autonomous and innovative learning styles. For the presented reason is logical to assume that analyzing what kind of emotional obstacles students encounter in their e-learning studies has its role in the vast field of e-learning research.

2.2 Emotions

In literature, there is debate whether there is a set of basic emotions and how to measure them (see Ekman & Davidson, 1994; Picard, 1997). Often the list of named feelings is referred as basic or primary emotions that can be reliably tested (Ekman, 1994; Evans, 2001). Also there is a debate about how many of these basic emotions exist and the precise names for them. One example list is shown in Table 1. The list is proposed by Ekman (2003). While the basic emotions may not be an exact list of emotions experienced people all over the world, they serve at least the purpose of expressing our emotions understandably (Cameron-Bandler & Lebeau, 1986).

TABLE 1 List of basic emotions and alternatives (Ekman, 2003, p.2)

<u>Ekman's term</u>	<u>Alternatives</u>
Happiness	Joy
Sadness	Distress
Anger	
Anxiety	
Disgust	
Fear	
Surprise	

Emotions are essential in forming priorities (Oatley & Johnson-Laird, 1987; Parrott, 2004). Emotions also have a crucial function in defining our personal relations to the external world. They explain why we adopt some course of action and reject another. Definitions of emotions usually describe proximate aspects such as physiology, subject experience or facial experience, and are often emphasizing one or another component (Izard, 2007). An evolutionary approach to emotions defines them in terms of how they came to exist (Nesse & Ellsworth, 2009). According to this approach emotions are modes of functioning, shaped by natural selection, that coordinate physiological, cognitive, motivational, behavioral, and subjective responses in patterns that increase the ability to meet the changing situations (Nesse, 1990). Emotions adjust multiple component

processes to create an organized response to the changing challenges in different situations (Nesse & Ellsworth, 2009).

Through their action-controlling functions, emotions explain much of human-technology interaction. Research suggests that it makes sense to call attention to emotions in e-learning. Emotions are important in learning and in classroom behavior (Meyer & Turner, 2002; Hannula, 2006; Meyer & Turner, 2006; Weare, 2004; Weller et al., 2005). Unsuccessful use of computers gives rise to frustrations and even technophobia (Brosnan, 1998). Emotions are thus a central topic in user psychology (Saariluoma, 2004), and we have to analyze the way emotions are involved in human-technology interaction mechanisms.

Juutinen and Saariluoma (2006; 2007; 2010) investigated emotional interaction in e-learning and found a connection between success and failure, on one hand, and pride and frustration, on the other. If you are able to use the technology and the e-learning systems, you generate pride that motivates you to continue your studies and work, and if you're not handling it, your whole attitude towards e-learning can easily become negative and make you feel lot less motivated to continue to study in e-learning courses.

2.2.1 Appraisal

Appraisal theories of emotion propose that the emotions people experience correspond to their appraisals of their situation. In other words, individual differences in emotional experiences reflect differing interpretations and explanations of the situation and events. (Ellsworth & Scherer, 2003; Lazarus, 1995) Therefore, if individuals interpret the situations differently, they should be experiencing different emotions. Motivation also can affect the appraisals of individuals (Baumeister, 1998). Often people see what they are looking for to see and want to see themselves in good positive light (Imada & Ellsworth, 2011).

E-learning experience is strongly affected by the way the students see the e-learning itself and how they think they will succeed in it. It is not necessarily the system used in e-learning or the outlook of it in the beginning, but the appraisal that the students have of the e-learning itself. They may have not taken any courses in e-learning but have an opinion about it already beforehand. Appraisal plays important in what kind of emotional experiences students will have out of their e-learning studies. In Juutinen, Huovinen and Yalaho (2011) the appraisal of e-learning and technology is shown to be affecting to the experience that the students have during their studies. The negative appraisal leads to negative outcomes and positive appraisal to positive learning outcomes (Juutinen & Saariluoma, 2010). The Pride-Frustration model developed in this presented research shows the positive and negative appraisal effects in e-learning process. The negative appraisal leads the students into the negative cycle where learning process becomes harder to handle and makes the students to be less interested towards learning while positive appraisal helps the students to become more interested on new things and learn more even about the learning system itself. This helps the students to stay more positive in their e-learning courses and control their emotions in case of problems and hard times.

Students have different appraisals about the world around them, with technology and computer especially the previous experiences are in crucial role. While working with computers, slow and unclear or unusual responses from an interface generally mean problems in usage. The most common interface design problem is to leave the user in a state of uncertainty in this situation (Brave & Nass, 2003). This leads the user to fear the worst and lead them to the state of anxiety. This could be avoided by providing the user a well-placed, informative message or state indicator to calm the user down (Brave & Nass, 2003). For users to get immediate feedback on their actions reduces the uncertainty and makes them to get to more positive state of mind. In e-learning area, the same phenomena come out in studying process. Students are uncertain whether their work has been received by the teacher or are they doing the work in right way. The slowness of feedback either from the interface or the teacher causes them to be uncertain what is coming next and causes them to experience anxiety and frustration. (Juutinen & Saariluoma, 2006; 2007; 2010)

2.2.2 Emotions and actions

Human emotions are seen to be reactions to events that seem to be relevant to the individuals' needs, goals, or concerns (Brave & Nass, 2003). Fear for example is a reaction to a situation that is threatening the individual's physical well-being while joy on the other hand is a reaction to a situation when individual fulfills their goals. Emotions that control human actions are related to the relation between needs and motives (Saariluoma, 2004). Emotions have an essential role in the valuation of various issues. For example, we may feel hunger and thirst. We become aware of our needs through emotions; we don't usually detect the thirst, more likely we feel it. It is thus understandable that emotions have an important role to play in human conceptualization of the world. (Saariluoma, 2004)

Positive emotions are associated with pleasures and negative emotions with discomfort (Stanley & Burrows, 2001). People rarely complain of having too much joy or happiness or other positive emotions, but they tend to complain about even tiny negative feelings. Applying this to user experience, we should consider how users might feel when using the system in hand and how they might deal with some difficult situation they could come across while using the system. Problems generate negative emotions and later on associate them to a particular system from where they seem to originate.

Anxiety is a normal emotion experienced at some point by every human (Stanley & Burrows, 2001). The purpose of anxiety is to motivate an individual to seek solution for a perceived danger or problem. Anxiety can make people react several ways; usually it lowers people's concentration, makes them worry or behave over actively and have uncontrollable thought processes (Stanley & Burrows, 2001). These symptoms make the learning process a lot harder than it would be with positive emotions. Frustration diminishes the abilities of the user with respect to attention (Kitayama & Niedenthal, 1994), memory retention (Kahneman, 1973), learning (Lewis & Williams, 1989) and thinking creatively

(Isen, Daubman & Nowicki, 1987). It may lead the user to get frustrated with the same system in the future also.

2.2.3 Motivation

Meaning of the emotions in controlling the human actions is depended on the common dependency between needs and motives. (Saariluoma, 2004) Therefore it is important to also understand the nature of motives. All needs have included emotions that are noticed through emotions. Hunger causes the feeling of hunger and pain and making ones dreams come true includes joy and happiness. Since the emotions are described to serve or reflect the motives (needs, desires, values, interests) (Blasi, 1999) also the needs get they value through the emotions. Satisfying the needs influences the emotional states. Negative states are usually punishing and positive rewarding for individual. Rewards help one to pursue their goals and punishments cause withdrawal behavior (Saariluoma, 2004). In users point of view the essential reward is a positive user experience with technology. It urges the individual to pursue their goals in the certain user context, while the difficult to use service is not appealing and only necessity will make people to use it (Saariluoma, 2004).

When students begin their e-learning, they have different emotions about starting the studying with e-learning. Emotions vary according to the motives that the students have enrolled the courses for. In this research, the effect of motivation of the students has become clear in the e-learning experience (Juutinen, submitted; Juutinen, Huovinen & Yalaho, 2011). The reason and motivation why the students have started the e-learning, creates either a positive or negative starting situation for the students' e-learning career. The students who are obliged or forced to take the e-learning courses against their own interest or will are most likely the ones that either drop out or get very negative experiences from e-learning even with finished courses (Juutinen, submitted). The students who are in e-learning courses to develop themselves for their work or their spare time are the ones that are motivated to learn new ways of learning and studying. They goal is to make the most of the e-learning and learn as much as they can. For this, positive attitude towards the e-learning system helps and assures the good experiences with e-learning and lead them to their goals that they had set for e-learning.

In a case of e-learning, the motivational point is important, since in e-learning the teacher is not supporting or motivating the students constantly for better achievements as in traditional classroom teaching. The students are supposed to motivate themselves in their learning and keep up their studies in their own schedules. E-learning demands a lot more responsibility from the students than the traditional teaching does and therefore the students would need to have more motivation to keep up with the learning in e-learning courses. The motivation could be imposed by the course instructors or other responsible for marketing the courses to the students. All the good sides of e-learning should be brought up in the introduction of the course and especially the freedom that e-learning brings to the student instead of the harder requirements

that e-learning has for students. The freedom of studying is one key thing that the students wish to have even more in e-learning (Juutinen & Saariluoma, 2006; 2007; Juutinen, submitted) and this should be marketed more to the students who are not necessarily that interested in e-learning in the beginning.

2.3 Emotions in learning and in e-learning

Emotions have a big impact to learning in traditional teaching (Weare, 2004) and in e-learning (Branco et al., 2005; Juutinen & Saariluoma, 2007; 2010). The emotional connection between emotions and learning results in e-learning courses has been under research strong implications to this have been found (Juutinen & Saariluoma, 2006; 2007; 2010). Attitudes towards e-learning have been both negative and positive, always depending who you are asking from. Frustration using computers is a common phenomenon nowadays around the world with almost everyone who has operated a computer at some point (Branco et al., 2005). For some users frustration level grow to the extent of developing technophobia. Technophobia can be apparent even with people who are using the computer (Brosnan, 1998), not just with the ones that don't use the computer at all. The computer self-efficacy and attitudes play big role in frustration levels (Lazar, Jones, Hackley & Shneiderman, 2006). Frustration has been researched to take up to 1/3-1/2 of time spent on the computer (Lazar, Jones & Shneiderman, 2006) and this should be considered while planning courses and timetables.

Frustration is one emotion that comes to almost all e-learning students at some point of their studies. Frustration may be due for example to a technical aspect, design, usability, lack of instructions or their messiness or even to the whole overall experience of e-learning. For some students, this frustration is a normal emotion when working with computers and, for some, it becomes an overwhelming experience making them hesitant to continue (O'Regan, 2003).

Peoples' responses to frustration can be either adaptive or maladaptive (Shorkey & Crocker, 1981). Adaptive responses are constructive and are applied to solve possible problems that are blocking the goal. Maladaptive responses usually make the problems worse by creating additional problems and by lacking constructive problem-solving. These maladaptive responses can be categorized into objective (aggression, regression, withdrawal, fixation, resignation) and subjective (extra-punitive, intropunitive, resignation) responses (Britt & Janus, 1940).

Research has indicated that one of the psychological mechanisms that people use the most when attempting to master frustrating situations is regression. Regression may be defined, in a broad sense, as reverting to behavior of a lower level of maturity when faced with a problem. (Thomas, 1951) Due to the frustrating experiences with computers, the frustrated e-learner may become unable to process any new information, whether the information is about the system or the topic of the course.

People react in different ways to different situations. Partly these reactions are learned and based on previous experiences. Some people associate positive emotions to new technology and others think of technology as a negative issue. (Juutinen, Huovinen & Yalaho, 2011) The difference among these two groups is that they associate the same technology in a completely different emotional context (Saariluoma, 2004). People's emotional reactions don't stay unchanged; they are in a constant change during their whole life (Power & Dalgleish, 1997). Someone who has been reacting very negatively towards technology can later even like using technology. People's emotional contexts can thus change. This kind of process may be referred to as emotional learning (Saariluoma, 2004).

Learning is not purely a cognitive phenomenon (Apps, 1991). It is a process that is closely linked to students' social and emotional needs, as well as to the context of their learning environment (Saariluoma, 2004). Especially in e-learning, a positive experience of using the system is the most important reward. It motivates the users to execute their needs in that certain user context. A hard-to-use service is not encouraging, and people will only use it if they are forced to (Juutinen & Saariluoma, 2010).

2.4 User experience

User experience is talked and written a lot nowadays but unfortunately user experience is a vague term and making a good user experience means different things to different people. A good definition for user experience would be needed and also the methods for evaluating and designing user experience. Research has tried to come up with a good definition for user experience and it would be crucial to state what a good user experience is in order to design one. Also, the fact whether a product provides a good user experience or not should be elaborated. There are some similar terms used with user experience such as usability and user satisfaction.

Usability is defined in ISO 9241-11 (ISO, 1998, p.6) standard as

“the extent to which product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specific context of use.”

Usability and user satisfaction with the product are important parts of user experience. User's satisfaction in user experience can be caused by some other factors than the usability of the system. *User satisfaction*, effectiveness and efficiency are seen as three key components of usability. User experience is also about user satisfaction, but the source of satisfaction is different. Usability leads to satisfaction by eliminating the usability problems, but user experience is about designing for pleasure in the first place (Hassenzahl & Tractinsky, 2006).

Due to the fact that user experience is lacking a good, well-known definition has made it a buzzword that has several interpretations (Forlizzi & Battarbee, 2004). Below here are some definitions for user experience:

"All the aspects of how people use an interactive product: the way it feels in their hands, how well they understand how it works, how they feel about it while they're using it, how well it serves their purposes, and how well it fits into the entire context in which they are using it" (Alben, 1996, p.4).

"Every aspect of the user's interaction with a product, service, or company that make up the user's perceptions of the whole." (UPA, 2006)

"The overall experience, in general or specifics, a user, customer, or audience member has with a product, service, or event" (Shedroff, 2011) Shedroff defines experience separately as "the sensation of interaction with a product, service, or event, through all of our senses, over time, and on both physical and cognitive levels."

"A result of motivated action in certain context." (Mäkelä & Fulton Suri, 2001, p.388)

"A consequence of a user's internal state (predispositions, expectations, needs, motivation, mood, etc.), the characteristics of the designed system (e.g. complexity, purpose, usability, functionality, etc.) and the context (or the environment) within which the interaction occurs (e.g. organizational/ social setting, meaningfulness of the activity, voluntariness of use, etc.)." (Hassenzahl & Tractinsky, 2006, p.6)

"A momentary, primarily evaluative feeling (good-bad) while interacting with a product or service." (Hassenzahl, 2008, p.2)

To user experience, there are many perspectives to it. List of goals of a successful products are listed by Norman (2004) and Jordan (2003). To provide users functionality: usability, pleasure and pride (Jordan, 2003) or to engage users on behavioral, visceral and reflective level (Norman, 2004). Both of the definitions agree that in addition to behavioral level there are also visceral and reflective levels with behavioral level including right functionality and usability, the visceral level including pleasure and wow and reflective level including self esteem of owning the product (Roto, 2006). According to Norman (2004), the reflective level also includes other properties specific to human thinking or emotions such as moral and empathy.

User experience (UX) research takes the human perspective; it is interested in understanding the role of affect as a consequence and a mediator of technology use (Hassenzahl & Tractinsky, 2006). Lately in user experience research, emotions are seen as forming the core of human experience and different aspects of emotional experiences are being studied (Isomäki, 2009; McCarthy, Wright, Wallace & Dearden, 2006; Ståhl, Sundström & Höök, 2005; Mahlke & Thüring, 2007). User experience is rather focused on positive emotions and to prevent frustration and dissatisfaction has always been one of the main objectives of UX research (Hassenzahl & Tractinsky, 2006). In user experience, generally there are two basic ways in dealing with emotions (Hassenzahl, 2006): One line of user experience research emphasizes the importance of emotions as consequences of using the product (Kim & Moon, 1998; Desmet & Hekkert, 2002; Hassenzahl, 2003; Tractinsky & Zmiri, 2006). The other line concentrates on their importance as antecedents of product use and evaluative judgments (Singh & Dalal, 1999; Norman, 2004).

User experience can't directly be explained as a reaction to the design of a product, even though it is obviously part of it. The user experience is affected by several background factors, out of which, the most important ones are goals – what is the consumer going to do with the product, experience – what is known about the product beforehand, expectations and self regulation. User experience is not simply just the “goodness” or “badness” of the experience, but the central part of it is the significance to the user; how important they feel the product is in their everyday lives. Users can see the product for example a device to improve their own competence or a social status symbol (Saariluoma, Kujala, Kuuva, Kymäläinen, Leikas, Liikkanen & Oulasvirta, 2010).

User experience is strongly involved in the everyday technology and computer system usage. Mostly the user experience is considered to be the experience the user gets from using the device or a product. In this dissertation research, the user experiences are considered to be part of the emotional usability due to the weight on the concern of the emotional experience in e-learning.

2.5 Emotional usability

In emotional usability the designers pay attention to how much the users like to use the user interface. (Norman, 2004) The attention of designing is on the effect that the using has for the user, instead of the traditional focus on the usage. The traditional way in designing is to think whether the user finds quickly what they want and need as in emotional usability designing the focus point is in issues like do the user like finding what they want or need, and do they like it what they find it. (Saariluoma et al., 2010)

Lately, the emotional usability has been given more importance in software and hardware designing. Designers have discovered how important people's emotions in using things are, especially when it comes to computers and to computer software. Norman (2004) has shown how people relate to the design by its appearance even at the cost of usability. He tells fascinating examples how people purchase things that are very attractive but the user will never be able to actually use them. The same emotional design applies also to e-learning environments, if the users find them appealing; they are much more likely to use them. Designing is also an issue with Shneiderman & Plaisant (2005) and Nielsen (1993): they are talking about how to apply the emotional designing to the user interface designing and to computer software. Shneiderman & Plaisant (2005) and Nielsen (1993) want to show that good design is hard to create but very easy to do a bad one. Their books are giving some guidance for designing designs that are enjoyable for users to use instead just thinking the functions. In e-learning design these guidelines should be affecting to the outlook designing of the course, if the outlook of the course is very disoriented or intimidating, many participants will not take the course, unless the topic of the course is very interesting or the course is compulsory for the person.

Previous studies of e-learning have pointed out how inadequately equipped and poorly designed e-learning systems can make the users frustrated, confused and reduce their interest for learning (Hara & Kling, 2000; Zhang et al. 2004; Drennan et al. 2005; Shneiderman et al.1995). Hara and Kling (2000) investigated how the students respond to the problems and asked their opinions about the e-learning system in one small web-based distance education course. Students' opinions about the problems in technical area of the course and distress are obvious in the results. The research is done in a small web-based course and the main point has been to examine the students' distressing experiences due to communication and technical errors. This current research is going to add the emotional and the interface design side for this aspect. The Hara and Kling (2000) research doesn't give the overall answer to the question why students get frustrated with the course and drop out; it only gives the opinions about technical side problems in e-learning environment.

Emotions are lately considered as a major contributor and effectors in interface design and human-computer interaction. In increasing amount research, emotions are the major factor when it comes to design. (Saariluoma et al., 2010) In e-learning literature this aspect of research haven't occurred yet and this research attempts to fill that gap. Research is going to focus on the affect of emotional interaction in e-learning courses. How an e-learning course could be made more appealing and enjoyable to participants to stay in the course until the end of it.

Boehner, DePaula, Dourish & Sengers (2005) are introducing an alternative model of emotion as interaction: dynamic, culturally mediated, and socially constructed and experienced. Due to this model, they are stating new requirements for the design of affective systems. For new design, instead of sensing and transmitting emotions, as was done before, systems should support humans in understanding, interpreting and experiencing emotion. They investigate the emotional interaction through two case studies. In the case studies it is investigated emotions through inputting emotions into the machine and then noting the interaction of emotions inputted between machine and human. The affective connection has also researched by Axelrod (2004). Both of these researches try to find out the ways which users communicate their emotions. Boehner et al. (2005) collected the data through two different case studies they have arranged for the research and in Axelrod (2004) there are four groups who two of them are using the same systems but are told the different background information how the system will respond to their emotions. By doing this, Axelrod (2004) wants to see whether users' expectations about the systems affect how they use it or communicate with it. When it comes to design and emotions, this kind of research is needed due to users' unexpected behavior. With these results it may become easier to develop better interfaces that are appealing for the users and reduce the frustration, what is commonly felt when using computers. It may not be possible to actually predict the user behavior, but with some research there might be some kind of thought what might happen in certain situations and with certain type of interface.

In interaction design, the role of emotion is a key element. Zimmerman (2003) has researched how emotion, industrial design and interaction design affect on others. Product development should also take into account the balance this relationship between emotion and usability. Zimmerman (2003) pointed out his notions through student projects, where the students were to design a product for a specific target group and user context. This doesn't produce real life results as the students are not the professionals of design, but it gives some guidelines how the balance could be found in product design and target them for certain group of users. For future e-learning course design, this kind of information is very useful. Having an idea of the affects of different kind of designs, it will be easier to predict what the users will do and will want from the interface they are using. So the e-learning course designers can use this information as guidelines when designing new interfaces.

The problem with emotional usability is that, despite all the research that has been done of the topic, the industry doesn't want to follow the results gotten out of the researches. (Saariluoma et al., 2010) The old time traditions are still affecting the thinking in industry, effectiveness, linearity, money still drives our society and this causes the fact that industry is slow on adopting the human dimension for the designing process. As the way people interact with the world is colored by their mood or emotional state (Wensveen, Overbeeke, Djajadiningrat & Kyffin, 2004). Industry still carries on with the thinking that human don't communicate with the machine and this is totally out of date thinking since at least the negative emotions are communicated to the machine and other products, like hitting the computer screen, slamming the door, throwing the mouse or shove a chair (Wensveen et al., 2004). Of course, none of these functions matter to the object, but they make the user feel certain emotions. Getting the human dimension for a part of a designing process, the people have to demand different kind of products. If there is no demand for change, industry won't change the way things are due to the costs of the new way of thinking.

2.6 Technophobia and Techno confidence

2.6.1 Technophobia

As technology develops, it demands people to develop their working habits. For some this is a normal way to work. When there is new technology, they take it in to their everyday life functions and their work. But for others, this kind of development and demand for new technology is terrifying. They are very reluctant to adopt any kind of technology to their actions; even it sometimes would help their life enormously. (Saariluoma et al., 2010) This kind of people are said to have technophobia. This kind of fear towards technology has been seen in everywhere and obviously with increasing amount of technology surrounding us, the technophobia is showing up with more people and more widely than ever.

Defining technophobia is essential at this point. There are many definitions of technophobia, but the most commonly cited definition is the one proposed by Jay (1981, p.47) who defines it as:

1. a resistance to talking about computers or even thinking about computers
2. fear or anxiety towards computers
3. hostile or aggressive thoughts about computers

With his definition, the technophobia research area is fairly broad. More recent update for the definition is from Rosen and Weil (1990, p. 276):

1. anxiety about current or future interactions with computers or computer-related technology;
2. negative global attitudes about computers, their operation or their societal impact; and / or
3. specific negative cognitions or self-critical internal dialogues during actual computer interaction or when contemplating future interaction.

The label computerphobic (or technophobic) describes individuals who range from severe reactions on all dimensions to mild discomfort on a single dimension. (Brosnan, 1998) This definition shows how technophobia can be apparent, even with the people who are using computers (Brosnan, 1998), not just with the ones that don't use the computer at all.

Technophobia has implications to design and development. The use of new services is always in small quantities in the beginning. As the service becomes popular among the big user groups then it has the possibility to become the "next hot thing". New services have been thought to be somehow informal ways to transform data and information, especially in the corporate world. This is what happened to email in the 1980s. It was considered to be an element of reducing productivity (Grudin, Tallarico & Counts, 2005) and was predicted as companies carefully measure the effect, they would terminate email use (Pickering & King, 1992). This obviously did not happen and nowadays email is a "big player" in information distribution business, especially in companies and educational institutes. This shows how email was intimidating even for researchers, who thought the new messaging system will take the time from efficient work time and somehow disturb the workers. Now we know better, but without the people who weren't reluctant towards the new technology, email would be unused today.

For new technology usage in education, the teachers are the link between the students and the technology. For example computers have a lot to offer nowadays to teaching but it still is being underused by teachers. This is due to the attitudes and the lack of knowledge how to take the advantage of the computers in teaching also they are experiencing lack of confidence in their own computer skills, they think they don't to have enough pedagogical skills to

teach students with computers and some teachers think that there is nothing technology could bring more into their teaching (Lam, 2000; Brosnan, 1998). But the problem is not just the teachers at school, to be able to use the assistance of technology and computers in their teaching, the teachers need the support and assistance of the other personnel in school. They need to get the funding from the principle of the school and support from the computer administrators. Also some other personnel may be needed, based on the school the teacher is in. It is seen that the administrator is sometimes the falling point for the lack of technology usage (Lam 2000). They are not supportive in their actions or are questioning the need of computers in some subjects. Usage of the technology also brings troubles among sex differences, there are signs showing that computers are used more by boys and male teachers than girls and female teachers (Starker, 1989). This may give the boys advantage over the girls when moving to higher levels of school. From the atmosphere that comprises of an anxious model and gender-biased classroom practices the children will get unintentional signals that the computing is a genderized activity (Saunders, 1993). This role model impact is described by Rosen and Weil (1995, p.27):

“With these fears, negative cognitions, and negative attitudes, teachers will not be able to provide confident role model to the students as they attempt to teach the students how to use the machines. As earlier work has shown, these students will likely become the next generation’s technophobic adults.”

The future will show how the equality will work among the school staff and students as the technology continues developing to more hidden and hopefully easier to use.

So it is not just the fear of technology that makes technology underused or e-learning courses have high dropout rates. It is also all the things going around them. But having technophobia will not make it easier to handle all this technology around the learning process, since it arouses lots of emotions that are discouraging to learning. From these emotions, fear and anxiety are the most common ones (Brosnan, 1998). These emotions can drive the user away from the technology for a long time or make the using unpleasant.

Students in e-learning courses tend to react on usability problems with fairly strong emotions (Juutinen & Saariluoma, 2006; 2007; 2010). Students’ learning results in e-learning are affected by the way they react on the problems in learning and technique. The positively reacting students are more equipped to overcome bigger and more problems than the negatively reacting and thinking ones (Juutinen & Saariluoma, 2010). The frustration-pride model (Juutinen & Saariluoma, 2010) indicates the positive and negative cycles in e-learning experience. The students who manage to keep their attitude and thinking positive despite the setback in studying are more likely to be able to finish their courses with positive experiences.

Fear of technology plays a big role in e-learning studying (Juutinen, Huovinen & Yalaho, 2011). In most e-learning courses the main learning device is the computer, with which every student have to work with and if they have

fear or anxiety towards computers or any new technology, it makes their e-learning career fairly difficult.

2.6.2 Techno confidence

While researching the impact of technology to humans, usually the emphasis is on the negative impact to the users. But the positive impact should have some attention also. In this present research, the positivity towards the technology and using is called techno confidence. It is important to see also the users who are willing to use technology and are eager to learn new devices and systems that can either help them to do things faster and easier or just entertain themselves with the new gadgets. The attitude towards the technology in overall is important to the experience the user will get from using a new device. The one that fears the technology in advance, despite the usability of the device, their user experience will be negative. The same device to a person who is confident about their abilities to learn the new technology can be very easy to use and they will probably enjoy using it. Also with positive attitude towards the new device, the user will be more willing to learn to use it and spend time and effort in learning.

In this research emotional experiences have found to be very important in learning outcomes (Juutinen & Saariluoma, 2007; 2010; Juutinen, Saariluoma & Jokivuori, submitted; Juutinen, Huovinen & Yalaho, 2011). Students may have success and failures in their e-learning studies. With successful events, the students became more and more enthusiastic to learn more about the topic in the course but also to learn more about the e-learning environment and the technology used in it. Positive user experiences encourage people to use products and services (Norman, 2004). The positive experiences create a feeling of capability and give more self esteem to the users. Feeling that they are capable to do something means that the user knows that they know how to do something and are able to control the usage of a product. When the user have the self confidence to use the product more and courage to try new and more things, they will have more positive emotional experiences with technology and more willingness to use more and new technology in the future (Juutinen & Saariluoma, 2010).

Positive emotional experiences are noticed to be making people more open to new things and more broad-minded about different issues (Fredrickson, 1998; 2001). This enables individuals to learn more about wider range of issues. Someone who hasn't used technology too much earlier may become curious of using technical devices after receiving a positive experience with them. For example, someone who succeeds with their goal of cooking food with their new oven will be more interested to use also other even more technical devices in the future. These positive user experiences can help the users to develop stronger emotion on their own abilities with technology. They become more interested on the devices and services that they could take advantage in their everyday lives. Therefore they will be more interested to use and experiment more new products and services than what they would have done before. These

techno confident people see the advantages of technical devices over their disadvantages and are more open to explore new things in order to make their own and other people's lives better and maybe easier.

2.7 Human technology interaction (HTI)

The area which researches the interaction between human and technology is called human technology interaction research. (Saariluoma et al., 2010) Sometimes also the term usability is used, which is lot more narrow term and focuses mainly on how the users would be able to use the technology the easiest. Usability research doesn't set the relationship between technology and products to broader social and society context, even though that's where the real meaning of technology opens from (Saariluoma et. al, 2010). The functionality of human technology interaction is in many ways essential cost dilemma. Creating a functioning interaction can be expensive and hard for the company developing it but on the other hand poorly designed interaction can be very costly to the client. Therefore the technical functionality is not the only and valuable enough goal for interaction designing (Saariluoma et al. 2010).

It has become important to understand the human-technology interaction. The information and communication technology (ICT) is continuously developing and it is opening new possibilities for human living but at the same time makes the interaction problems more complex. Also the service producers and researchers have noticed that it is important to make the interactions between humans and devices and products easier if they are wished to be used and fully adopted by the users. Finally all the new emerging technologies will be very challenging for people to use because the traditional interaction types are replaced with new ways. (Saariluoma, Parkkola, Honkaranta, Leppänen & Lamminen, 2009b)

Users are very enthusiastic to tell what they want out of the products and services that they are using. They also genuinely want to influence to what kind of products are produced and developed. Users' participation to the markets could help to produce better services but this would require efficient user-based and participatory design methods. Also the multidisciplinary research done in the area of human-technology interaction should be used as a tool to develop better interfaces and devices, but many times in interaction design still today the designer is doing the design decisions based on folk psychology and thinks how his own mind would work and how they would operate in certain situation (Saariluoma et al. 2009b).

2.7.1 Human Computer Interaction (HCI)

Human Computer Interaction research's fundamental objective is to make computer systems more usable, more useful, and to provide users experiences fitting their specific background knowledge and objectives (Fischer, 2001). HCI

researches the interactions and the relationships between humans and computers (Olson & Olson, 2003). HCI is not researching just user interfaces but it is a multidisciplinary field that is covering many areas (Helander, Landauer & Prabhu, 1997; Olson & Olson, 2003). In the beginning of HCI research, the focus was on the interfaces and their possibilities for more usable systems (Fischer, 2001). Later the main focus has been shifted beyond the just the interfaces towards the tasks and actions that the interfaces and systems process.

Figure 1 gives a one idea of conceptualizing the human factors that have to be taken into account while designing a human-computer interface. The human factors of behavior, cognition, physiology and emotions are shown in the figure.

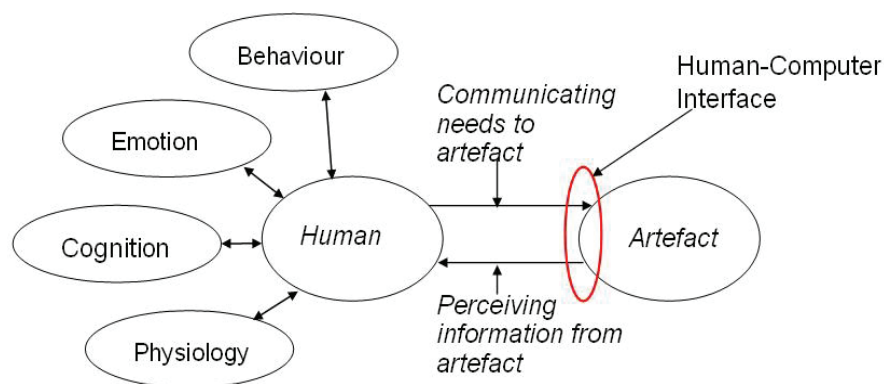


FIGURE 1 A model of Human-Computer Interaction (Harrison, 2009, p. 4)

Researching the interaction between humans and artifacts, and the application of HCI knowledge have become more complex as the artifacts we interact with have become more complex (Shneiderman, 2002). Nowadays HCI applies to more than just the traditional desktop computer-based products. It is included in many simple, everyday, domestic and industrial appliances, vehicles and information services incorporating computer components (Cooper, 1999). HCI knowledge is becoming widely applied in industry (Dix, Finlay, Adowd & Beale, 2004).

HCI has to solve the problems of designing interfaces for the whole communities. It is not enough to design something for one user, but nowadays people demand easy use with possibility to personalize their interfaces to their own preferences. The same dilemma is present nowadays with all technology design. People want to use technology that is easy to use and makes their everyday lives easier. This requires that the technology that they need to use is not too hard to learn or otherwise they left unused at least from the group of users that are not willing to spend big amounts of time in learning new using methods and this may put people in different places and value due to the lack of using some important services needed to succeed (Saariluoma et al., 2010). As the

technology and computers comes in our everyday lives in increasing amount; in homes, schools, workplaces, cars, airplanes, literally in every aspect in our lives, the technology that is useful and usable is extremely important and therefore the research in interaction between humans and technological devices becomes even more important than ever.

2.7.2 Emotional HTI

As emotions are reactions to situations deemed relevant to the needs and goals of the individual, means that a user comes to a computer or other technical device hoping to achieve certain goals - making coffee, reading email, watching TV, washing clothes, etc. The degree that the goal or need is fulfilled by the technical device has a direct impact on the emotional state of the user. A device that would be able to detect the users emotional states could use that information as feedback whether the needs or goal of the user were met and change the approach or the displayed information according to the users emotions if needed. For example if an interface detects frustration, desperation or anger in a user, a new approach may be tried or offer assistance (Klein, Moon, & Picard, 1999). In general, the user preferences could be automatically determined based on the user's emotional reactions to interface elements (Picard, 1997).

Nowadays users are becoming more and more aware and demanding on products that they use and purchase, they want products with good usability and functionality. People want to use and purchase things that are easy to use and nice to watch (Norman, 2004). If one product fails to fulfill their needs, it won't be used unless it is necessary and products with good usability are in more favor. Products that ignore the user's emotional states or fail to fulfill the needs and wants of the users can cause the performance of the users to drop and fail them to reach their goals with the device. When technological device functions as the user has expected it to work and the need or goal is fulfilled, the positive emotions arise and makes the user more confident and willing to use the device again in the future. Human technology interaction design and research has come a long way and it's getting more and more interest in the design are, more work is clearly needed in the area. More technological development is needed in the emotional recognition done by the devices and the advantages that it would bring to the usability. Users need both efficient and effective as well as enjoyable and satisfying interfaces and devices to use. This way they keep using them instead of leaving the technology unused despite the help it would bring to their lives.

3 RESEARCH APPROACH

3.1 Research questions

To investigate the emotional factors in e-learning, research questions were developed. The main research question of this research is:

- *“What are the emotional obstacles in e-learning?”*

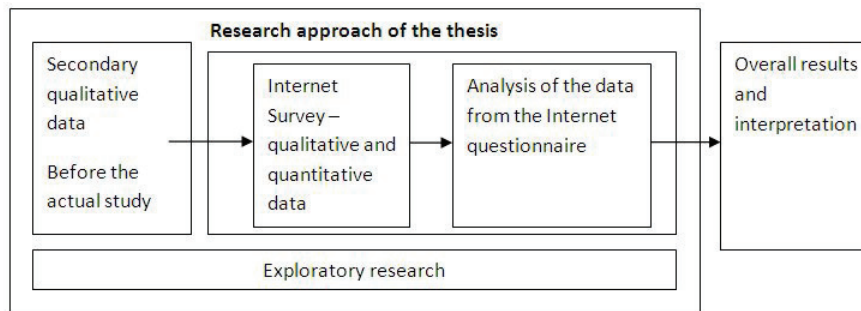
To be able to research into this question, four sub-questions were developed. The sub-questions were:

- “Does the students’ background have an effect on obstacles in e-learning?”
- “How the design of the e-learning course affect to the e-learning experience?”
- “Why do people who register for e-learning classes do not complete the course?”
- “Does technophobia affect on the e-learning experience?”

In the beginning of the research, the hypothesis was made of the effects of the emotions in e-learning process. The hypothesis estimated that negative emotions have some negative effects on the attitudes, motivation and learning results in e-learning. And positive emotions would help the e-learning process. To find an answer to the hypothesis, articles were written and a model was developed based on the data and articles.

3.2 Research methods

In this research, foundational analysis, secondary analysis and mixed methods were used. The research is done using quantitative and qualitative analysis. Two different data sets were collected using two different surveys. Surveys were sent to the e-learning students by e-mail and answered through e-mail and internet. Figure 2 shows the research approach in this thesis.



Procedures :	Procedures :	Procedures :	Procedures :
Data analysis using qualitative analysis methods	Data collection using a internet questionnaire Questionnaire included open and closed questions	Data analysis for quantitative data using different quantitative methods Qualitative analysis for the open answers for further analysis	Collect the results from previous steps Discussion with previous literature
Results :	Results :	Results :	Results :
First draft of a tentative emotional model Articles I and II	Second set of data including quantitative and qualitative data	Connection between emotions and learning results Articles III- VI	Tentative emotional model

FIGURE 2 Research methodology of the thesis

3.2.1 Foundational analysis

Foundational analysis refers to a metascientific method to improve the validity of scientific argumentation and to search and locate faults in argumentation (Saariluoma, 1997). Foundational analysis is developed to find the presuppositions inside certain branch of science. According to the analysis, scientific argumentation always includes theoretical and intuitive presuppositions about the functions of the phenomenon in research. For example tests that have been

done and the concepts and theories used to study them include presuppositions about the fact how the phenomenon should be approached or even what is considered to be fundamental in that phenomenon. (Saariluoma, 1997)

For the presented research this methodology is used to develop the research questions. The e-learning problems are usually taken as a cognitive issues and problems and with this the assumptions are drawn from that point of view. In this research, we look at the problems of e-learning from the emotional side. In this the foundational analysis was used to help to see the presuppositions of e-learning research that assumed the e-learning problems coming from based on cognition. The e-learning problems and the implications of these problems haven't been researched from the emotional point of view.

3.2.2 Secondary analysis

Secondary analysis is very well established methodology for doing research by reusing pre-existed statistical data (Robitaille & Beaton 2002; Heaton, 2004). In doing quantitative research, secondary analysis is common practice and generally accepted mode of inquiry (Hinds, Vogel & Clarke-Steffen, 1997). According to Heaton (1998, p.1)

“[s]econdary involves the use of existing data, collected for the purposes of a prior study, in order to pursue a research interest which is distinct from that of the original work”.

In the same vein, Gurbaxani and Mendelson (1991, p.374) defines secondary analysis as

“... analysis of a collection of data that is not subject to the control and responsibility of the analyst.”

and also the analysis of data collected by another researcher or organization (Hyman, 1972; Stewart, 1984).

Secondary analysis, however, in qualitative research is more recent (Hinds et al., 1997; Heaton, 1998). As oppose to quantitative data, secondary analysis in qualitative method includes the use of pre-existing data derived from research and other contexts (Heaton, 2004). According to Heaton (1998, p.7), in qualitative method,

“secondary analysis can involve the use of single or multiple qualitative data sets, as well as mixed qualitative and quantitative data sets”.

She further added that this approach may either be utilized by the primary researchers to re-use their own data or by second researchers using previously established qualitative data sets.

With secondary data the researcher selects pre-existing datasets of interest and then proceed for analysis by focusing on his own research interest which

obviously different from the original work. When carrying out our secondary analysis, we followed the recommendations of Heaton (1998).

In the research presented here, the first set of data was collected to the purpose of e-learning course development and to find out the students' views of the e-learning process. The data was collected by addressing the questions to e-learning network students in two academic years, in 2002 and 2004 (appendixes 1 & 2). Students answered the questionnaires through the e-mail and they were asked to comment their views and experiences of their e-learning studying and development ideas for the courses. The questionnaires were formed of open questions. The data collection was done by other researchers and to this presented research the data was used in its original form that it was collected in. Answers from these questionnaires were analyzed using the mixed methods. Analysis was done by the researchers of the presented research. Data was used in articles I and II.

3.2.3 Mixed methods

The research method used for this research was mixed methods (Greene, Caracelli & Graham, 1989; Johnson & Onwuegbuzie, 2004). Mixed method research is defined by Johnson and Onwuegbuzie (2004, p.17) as

"the class of research where the research mixes or combines quantitative and qualitative research techniques, methods, approaches, concepts or language into a single study".

Mixed method is an unrestrained and creative form of research as oppose to more constraining monomethod. A good understanding of the strengths and weaknesses of both qualitative and quantitative methods leads one to mix or combine strategies. This approach is called fundamental principle of mixed methods research (Johnson & Turner, 2003). According to that principle, researchers should use a mixed method in a way that has complementary strengths.

This involves the recognition that all methods have their limitations as well as their strengths. According to Johnson and Turner (2003, p. 299), the fundamental principle is followed for at least three reasons: (a) to obtain convergence or corroboration of findings, (b) to eliminate or minimize key plausible alternative explanations for conclusions drawn from the research data, and (c) to elucidate the divergent aspects of a phenomenon. The fundamental principle can be applied to all stages or components of the research process." For the purpose of this research, quantitative and qualitative methods are combined and utilized as a complementary design. The purpose for combining qualitative and quantitative methods is to use the results from one method to elaborate, enhance, or illustrate the results from the other.

This presented research uses a mixed methods sequential explanatory approach, as illustrated in Figure 3. The first study and data set was qualitative data, which was collected using an e-mail questionnaire consisting open ques-

tions. With this study and data set, a tentative model was created and gained a support for the original hypothesis of the research. The purpose of this first stage of the research was to gain information whether the phenomenon under research exists or not. This first stage also gave some information what questions should be included in the questionnaire at the next stage. Second set of data was collected using an internet survey that included open and closed questions. Closed questions were four stage scale questions and open questions that the respondents had free space to answer the questions to. With analysis of both of the stages a tentative model was created as a result of this research using both quantitative and qualitative analyzing methods.

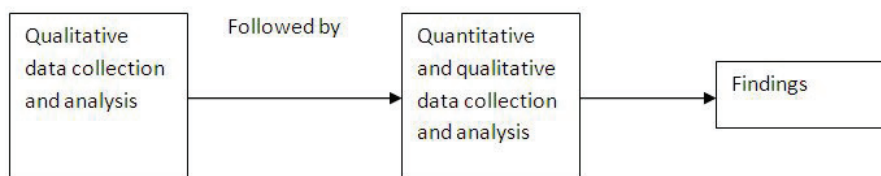


FIGURE 3 Mixed methods sequential explanatory design.

3.2.4 Survey

Survey is a data set that is collected through for example questionnaire without having direct contact to the respondents (Alkula, Pöntinen & Ylöstalo, 1999; Pinsonneault & Kraemer, 1993). Survey is an easy to realize regarding the practical issues and it enables the researcher to ask big amount of questions at the same time. The survey saves the costs of the data collection (Schmidt, 1997), especially if it is published on the internet to the group of respondents. With a questionnaire, the researcher themselves don't affect on the answers of the respondents with their own presence and the questions are at the same form for all the respondents.

The survey has its strengths and weaknesses (Gable, 1994). With survey the researcher is able to get answers with bigger amount of respondents with one questionnaire but at the same time, the questions that the researcher asks have to be thought carefully to be able to get the answers to the problems under research. Weakness of the questionnaire can be low answering percentage (Valli, 2001) or the wrong formation of the questions (Gable, 1994). Especially in making of the questions the researcher should be careful, since this is the stage forming the base for the research. While creating a form, length of it should be taken into account also, if the questionnaire is too long or there are too many questions, the respondents will leave the questions unanswered or answer recklessly (Valli, 2001). These problems can be avoided most of the time with pre-testing and careful planning.

In user research, questionnaire is one of the methods used a lot (Saariluoma, 2004). When using a questionnaire, the questions addressed to the users can be in several categories and issues. The questionnaires can relate to the attitudes the respondents have for new devices or systems or about the problem areas of the old systems. With survey, the respondents are able to tell about their wishes and their future needs but also about their disappointments in the old system. Usually questionnaire in user research is used to find out the users' opinions, attitudes, intentions, expectations, goals and also their knowledge and skills (Saariluoma, 2004).

Questionnaires are usually divided into open and close-ended questionnaires. In open questionnaires the meaning and general topic of the questionnaire are defined and then the respondents are free to write their answers in their own words. In close ended questionnaires, the researchers define all the questions and give the answering alternatives for the questions (Eskola, 1973; Metsämuuronen, 2002). Adding to these two main types of questionnaires, it is usual to combine these two in a way that some of the questions are open and some of them are closed. A benefit using the open questions is that the respondents have more freedom to use their own opinions to interpret the question and answer based on that. Closed questions again give more specified and detailed information exactly on the issue that the researcher is interested of. It is naturally depended on the research problem, which kind of questionnaire is used.

In this presented research, survey method was used to collect the second set of data. The data was collected during February and March 2008 from big Finnish government office e-learning system using an Internet based questionnaire, which included rating scale questions and open questions (appendix 3). The request to answer the questionnaire was sent out by email to the employees. The questionnaires were to be completed on the Internet. The questionnaire was divided into 5 different categories. The categories were: 1. Basic information, 2. E-learning system usability, functionality and user experiences, 3. Emotions, 4. Relationship towards new technology and computers, 5. Using a computer and network for studying. These categories measured different areas of the e-learning experience. This data set was analyzed using qualitative and quantitative methods. Data was used in articles III-VI.

3.2.5 Empirical methods

The analysis out of the data was done in two phases due to the two different sets of data (appendixes 1, 2 & 3). The first data was collected earlier by other researchers for other purposes. Therefore this research method qualifies as secondary analysis. As the data was already collected earlier and by other researcher, it had to be taken as given and therefore it had some limitations concerning the research and research questions in hand. Due to the limitations the research hypotheses subject were formulated to the resulting data limitations. The data captured adequately the emotions of the students and their reasons for dropping out from the courses and the data was relevant for this research and

answered the research questions. The data was collected using an email sent questionnaires that the students responded to. Questionnaires (appendixes 1 & 2) were done using open questions that concerned about the students' experiences in several different e-learning courses. The questionnaires (appendixes 1 & 2) were sent to all together 90 students once without reminders. 47 students answered the questionnaires in two different academic years 2002 and 2004.

With the results of this data set the hypothesis of the negative cycle was built. Results showed how people become frustrated when things do not operate as they hoped them to work. They also report their disappointments in rather straightforward style, which implies that emotional involvement is a part of explaining their drop-out behavior. A qualitative analysis of the result showed a number of emotional obstacles which might cause problems when people should use e-learning, but the decisive feeling with drop-out subjects is felt frustration. Students feel that they can't reach their goals with the given tools. From this the hypothesis that there can be found a negative cycle was made. Difficulties and failures in use make students to adopt a negative appraisal and consequently they are not willing to study details of interaction or ask help from the tutors. Therefore, their frustration increases and their appraisal will be even more negative. Consequently they do not learn by using and finally, they give up using and drop out.

The second data was collected for this research purpose and the questions were addressed to the students with separate amounts of e-learning experience. Data was collected using a questionnaire (appendix 3), which was filled through the internet by the e-learning students. The questionnaire had open and closed questions. With dividing the questionnaire like this, the respondents were able to have more freedom while answering to the open questions and the closed questions gave more detailed information of the research questions. The questionnaire was divided in five different sections in order to get more detailed information about the emotional effects to e-learning in different categories. The answers to the questionnaire were analyzed using qualitative and quantitative analyzing methods. With the analysis of this data, the Pride-Frustration model was developed based on the negative cycle found based on the first data set. Positive cycle was also found from this data and these two were combined as the final model. The questionnaire (appendix 3) was sent to around 2000 students as a link to internet questionnaire and they were reminded three times about answering and 359 students gave their answers.

4 OVERVIEW OF THE ARTICLES AND CONTRIBUTION

In this section, six original publications that were published in conferences and journals are introduced and discussed in order to further explain the implication the emotions have on e-learning experience and students' performance in e-learning courses. The goal of this research was to find the effects that emotions have in e-learning courses and studying and build a model that explains the phenomenon. Research questions were defined in order to discover the emotional implications in e-learning studies and a model was created for future development of e-learning courses and planning. The original articles are presented in the original form at the end of this thesis.

4.1 Research questions and hypothesis

One main question and four sub-questions were defined for this research in order to have a view on the emotional effect in e-learning. To answer these questions and hypothesis, six articles were written and published in conferences and journals. Questions were defined and explained earlier in this thesis in section 2. Hypothesis for this research was that the emotions students feel during their e-learning studies have negative and positive outcomes in learning results. The positive one enables the learning and negative ones prevent the learning in some extent. The research questions developed and articles written based on the questions are done in order to see whether the hypothesis holds or not. Each article has its own hypothesis and main findings to that hypothesis.

This study presented here is combined of two data sets. The data sets were collected using two different questionnaires (appendixes 1 & 2). The first data set (see appendix 1) is an explanatory research, since there was no prior knowledge of this particular phenomenon (Järvinen, 1999). The second set of data (see appendix 2) was complementary explanatory research complementing the results gotten out of the first set of research data. The goal of this research

was to create a user psychological model by researching the impact of emotions for e-learning experience.

4.2 Article I: Some emotional obstacles of e-learning

Juutinen, S. & Saariluoma, P. (2006). Some emotional Obstacles of E-learning, In *Proceedings of Digital Learning India*, New Delhi, India

Hypothesis: Emotions affect on the e-learning experience and they should be considered while designing e-learning courses.

This research paper focuses on the emotional themes in e-learning. E-learning research has previously concentrated on the research of the technical aspects of e-learning, mainly to develop the interfaces and software faster and more efficient. The human aspect of the research was lacking and especially emotional aspect. This research paper is aiming to cover that void and give some points to see how important emotions are also in e-learning. In earlier research, the emotions have already shown to be influencing to the traditional teaching, but not in e-learning field. Lately, the usability and human cognition have been the growing interest of the researchers but much less attention has been called to emotional usability, though this theme is becoming increasingly more important as a part of usability research. This paper, the analysis was done using a previously collected data by other researchers (see appendix 1). So the data was not collected for this purpose originally, but the questions were open questions answered by the students who had participated to different amounts of e-learning courses.

Main findings: The answers gave an outline for further research of this phenomenon and assurance of the emotional themes connections with e-learning. Students' answers were analyzed with the view to identifying the emotions and other reasons behind dropping out from the e-learning courses and how they were affecting to the students' motivation for studying the course.

When studying in e-learning course, students become frustrated when things do not operate as they hoped them to work. They also report their disappointments strongly, which implies that emotional involvement is a part of explaining the drop-out behavior. The qualitative analysis of the result revealed a number of emotional obstacles which might cause problems when people use e-learning. Frustration was the most common emotion. From the analysis done in this paper, a tentative model called the negative use cycle was developed. This paper shows clearly that the emotions affect on the e-learning on several ways. The negative cycle starts with a failure in using the e-learning system or having some troubles in other areas in e-learning, such as not getting enough guidance from the tutors or teachers in the courses. This negative experience doesn't have to be drastic but it gives to a student a negative appraisal from the e-learning system and out of the e-learning in overall. This may lead the student to lose their interest to study or learn anything if it is done through e-learning

courses. Unwillingness to learn will lead the students not to want to participate or try to pass the courses anymore with withdrawal behavior from the e-learning courses. This negative cycle can go on for several times and every time it makes the students' studies harder and make them more likely to drop out from the courses and from the whole e-learning. It is important to consider this emotional cycle while researching e-learning and developing new courses to avoid this kind of cycle to even occur.

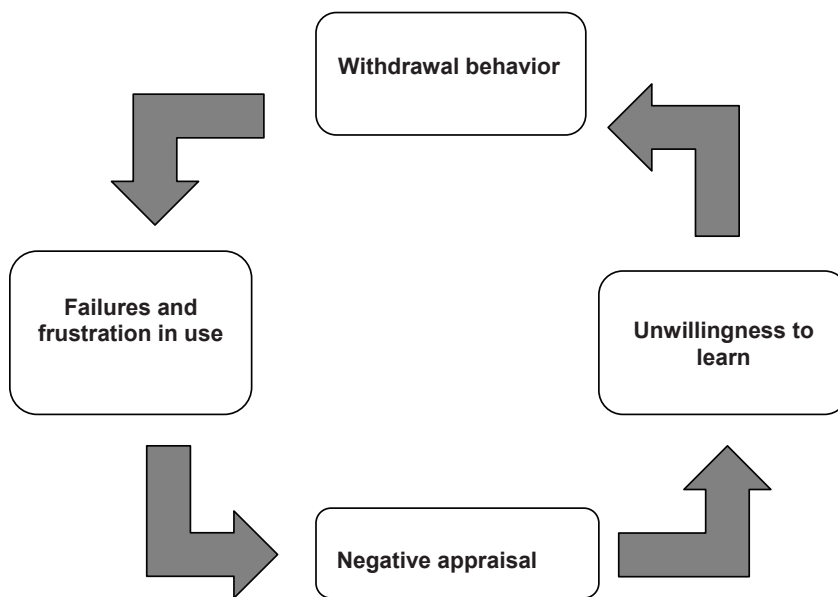


FIGURE 4 Negative use cycle

4.3 Article II: Usability and emotional obstacles in adopting e-learning - A case study

Juutinen, S., & Saariluoma, P. (2007). Usability and emotional obstacles in adopting e-learning - A case study. In M. Khosrow-Pour, (Ed.) *Managing world wide operations and communications*. (pp. 1126-1127), New York: IGI Publishing.

Hypothesis: Emotions cause some part of the e-learning's high dropout rates.

Focus of this paper is on the emotions that arise from an e-learning experience and on how these might affect to the students who drop out from the course. The analysis was done with the students' answers about their experi-

ences about e-learning courses they had participated and they may have dropped out of. The most commonly reasons were analyzed here and the negative cycle developed in the first paper was used in order to explain the connection between the stopping out behavior and negative emotions in e-learning. When students come across with the usability problems, their reactions are emotional, when the emotional reactions are negative; it leads them to make negative participation decisions.

Main findings: The results of this paper show that emotional aspects of computing are important to analyze when introducing an e-learning course to the students. The outcome from the e-learning experience may be shame and frustration with dropout on the one hand, and pride and self-confidence with success on the other. The results support the tentative model built in the first article. The negative cycle exists and the results also give marks of an existence of a positive cycle.

4.4 Article III: Emotional obstacles for e-learning - a user psychological analysis

Juutinen, S. & Saariluoma, P. (2010). Emotional obstacles for e-learning - a user psychological analysis, *European Journal of Open, Distance and E-learning*, 2010(I), Retrieved from [http:// www.eurodl.org/?article=402](http://www.eurodl.org/?article=402)

Hypothesis: E-learning has some emotional obstacles that affect to the learning experience and future studies.

Third article concentrates to the emotional obstacles of e-learning on the user psychological point of view. Article looks at human action from an emotional point of view and thinks how the involved systems of emotions could explain the key behavioral issues. Article tries to model the difference between students who move towards positive learning experience and students who, although not drop-outs, nevertheless leave their opportunities unused.

Main findings: The empirical research illustrates that success generates pride and failure frustration. The negative emotions are very probably not motivating and the positive ones are motivating. Research shows the negative effects and positive effects of emotions in e-learning and based on the previous articles and the new results a Pride-Frustration model was developed (Figure 5). The model has two sides; negative cycle and positive cycle. The negative cycle starts with negative experience leading the student to have negative appraisal which causes the student to have unwillingness to learn and finally have withdrawal behavior from the e-learning. Positive cycle on the other hand start with a positive experience, making the student to develop a positive appraisal that helps them to be more enthusiastic to learn new things and finally act very socially that helps the studies move forward easily. The side that the student goes into is depending on their e-learning experience. The students having negative

emotional experiences go to the negative cycle and the ones with positive emotional experience go to the positive cycle. The emotional experiences are not necessarily related to the amount of troubles or errors the students have while studying in e-learning courses, but the emotional experience that they get to themselves from the learning process. Some students are able to handle the difficult situations better than other ones and are able to keep their appraisal more positive than the other ones. This helps them to stay on the positive side of the model and keep on having more positive experiences. The ability to handle negative events is dependent on the individuals and their past experiences.

4.5 Article IV: Age as the emotional obstacle in e-learning experience

Juutinen, S., Saariluoma, P. & Jokivuori, P. (submitted). Age as the emotional obstacle in e-learning experience. Submitted to *International Journal on E-Learning (IJEL)*.

Hypothesis: Aging affects to the e-learning success and emotional experience in e-learning.

Main findings: This research paper is researching the effect of age of the students and other variables and how they affect to the e-learning experience. The effect of age was showing in the attitude the students had towards the e-learning and studying using computers. The older students' emotions towards e-learning were more negative than the younger ones'. The cause to this was the amount of computer usage the different aged people had. The younger ones had been using the computers through all their lives while the older ones were introduced to them in their adult lives, probably even forced to start using them through their work tasks. For older students the idea to study using the computer that they were reluctant to use in other times also was not too appealing and this caused them to have negative appraisal towards the whole e-learning idea. The motives to enroll the e-learning courses were also a factor to the older students. While younger students have enrolled to the courses in order to develop themselves and add their knowledge, many of the older students answered that only reason for them to participate to e-learning was the employer's request to take the course for work task purposes. This causes them not to be too enthusiastic learning all the new learning methods and computer-based learning systems. Also involved in the e-learning experience creation with the age of the students, four different emotional factors were discovered to be involved in e-learning studying process: pride, satisfaction, frustration and anxiety. These factors caused the students to be either more enthusiastic about the e-learning or more reluctant. The positive factors were encouraging the students to learn more and better while the negative factors were making the students lose their interest towards any learning. Factors were found through the factors

analysis done out of questions concerning the usability of the e-learning environment.

The emotional experience was also affected by the reasons why the students were on the e-learning course; the ones that were looking for new information and developing themselves were more positive in e-learning and the ones that were obligated to take the courses were more reluctant towards the whole e-learning concept. Their emotions and appraisal towards the e-learning were negative even before participating e-learning courses.

Younger students had more user experience with computers in their free time and in work life even though the older students had plenty more of the actual working experience. This enabled the younger students to stay more positive while learning with the computers while the older students were not so enthusiastic about using the computer as a component of their studies. The emotional experience being negative about the computers, the e-learning started to feel negative also and caused more problems.

4.6 Article V: Emotional reasons for drop-out in e-learning courses

Juutinen, S. (submitted). Emotional reasons for dropping out from e-learning courses. Submitted to *The Electronic Journal of e-Learning*.

Hypothesis: Emotions affect to the drop-out behavior in e-learning.

This paper focuses on the effects that emotions have on the students' habit of not finishing the e-learning courses. E-learning has been researched to have higher drop-out rates than traditional teaching and this paper researches the emotional reasons for this phenomenon.

Main findings: Students, whose attitude towards e-learning was negative, were much more likely to leave the courses without finishing them than the ones that had positive attitude. If in the beginning of the course the students were faced with negative experiences with their learning environment or with the studying process itself, they were likely to start thinking negatively about the whole e-learning process, develop negative appraisal and want to quit the learning and studying. On the other hand, students who enjoy the learning environment and have had positive user experiences with the e-learning system, had positive appraisal towards e-learning and were happy to finish their courses and start new ones later. The attitudes of the students were also affecting to the ability of looking for help or solve problems in e-learning courses. The positive thinkers were able to handle bigger and more problems without developing negative thinking since they were able to find and accept help for their possible problems while the negatively thinking students blamed everything for the system or the course without any will to look for solutions for their prob-

lems and were not able to see the good sides of the new learning system or courses.

The outlook and usability of the systems were highly affective to the experience and emotional outcome that the student had from their e-learning experience. Support and guidance offered, especially in the beginning of the studies were in great value to the enjoyable e-learning for the students. The answers about the usability and the problems clearly varied depending on the appraisal the students had towards the e-learning. Depending on the individual answering, the usability problems were either crucial in system using or just minor interface outlook problems. The same problem could be severe in other student's answer while other one described the problem as minor obstacle. The computer using experience was also the factor in this one; it determined how well the students were able to adjust themselves to the new learning system and how much they were able to handle for example technical problems before considering dropping out from the course.

4.7 Article VI: Technophobia as an emotional obstacle in e-learning

Juutinen, S., Huovinen, T., & Yalaho, A. (2011). Technophobia as an emotional obstacle in e-learning. In *Proceedings of Ireland International Conference on Education (IICE-2011)*, Dublin, Ireland.

Hypothesis: Technophobia is causing obstacles in e-learning studies.

This paper is focusing how technophobia and emotions towards computers are affecting the emotional experience in e-learning courses.

Main findings: Technophobia cause troubles in e-learning. The students who are reluctant using computers are usually reluctant towards other technology also and therefore these students usually are lacking computer skills due to the reluctance. The poor computer skills cause these students to have more problems in e-learning and in e-learning the students react strongly to problematic situations.

When a student is technophobic, they have very hard time getting rid of the negative emotions towards computers and other technology used in e-learning in order to be able to continue their studies with e-learning successfully. To develop fear towards the computers is often caused by previous bad experiences with computers or other technology, lack of skills with technology and lack of guidance or support with technology usage. Out of these problems, the skill level of technology usage is strongly related to troubles in e-learning and negative emotions coming out of the learning experience. Also the emotions that the students had towards computers in general, not just for studying purposes is very affective to how they feel about using computers in their studies. The negative emotions affect great amount on the emotions that e-learning

causes to students. The negative cycle developed in earlier articles applies also with students having technophobia. They have negative experiences already before coming to the e-learning courses and therefore their appraisal is negative towards the e-learning. Most likely this type of students will not be able to pass the courses without adequate support and help from the teaching staff of the e-learning courses. Effective technical support would help with the technophobia problems and would help these students to get to the positive cycle and be able to continue their studies.

4.8 Discussion of the empirical evidence

In general, the empirical research gave support for the research hypotheses. The data collected and analysis is done based on that indication that e-learning experience changes according to the emotions that arise from e-learning. In addition, the research provided additional information of the reasons behind the emotions in e-learning and how the emotional cycles can cause either failure or success in e-learning studies. The articles clearly show the effect of the emotions to e-learning students and their e-learning experience and success in e-learning studies.

4.8.1 Articles I-II

Experiments presented in Articles I and II indicated that emotions have an impact on the e-learning success and dropping out rates. The qualitative analysis done out of the first questionnaires (appendixes 1 & 2) in these articles gave a picture of the negative cycle that is produced by the emotional experience in e-learning courses. Negative emotions caused the students to drop out from the courses easier. E-learning requires students work more independently and this doesn't suit for all students. The support and help that they were used to get in traditional teaching was causing students to get frustrated and go in to the negative state of mind. New learning media wasn't the best solutions for these students.

4.8.2 Article III

Article III presents the results from the second questionnaire (appendix 3) that show that success generates pride and failure frustration in e-learning. The negative emotions are not motivating while the positive emotions are. Analysis based on this article's result and the results from the articles I and II the Pride-Frustration model was presented. The model shows the results of the negative and positive emotions and their effects on the learning results.

4.8.3 Articles IV-VI

In articles IV, V and VI, different emotional obstacles were discovered. Second set of data from the questionnaire (appendix 3) was used. In article IV, factor analysis was used to find out emotional factors that cause emotional obstacles. Four factors were found and they were investigated more closely. After the factors were transformed to variables, the Cronbach's alpha was calculated to ensure the internal consistency of the response data. Different comparisons with several variables were made using these newly formed emotional variables. Results show the clear effect of the age to the emotional experience in e-learning. Older students were more likely to end up to the negative side of the Pride-Frustration model developed in article III.

Article V analyses more closely the common problem in e-learning; dropping out. Analysis was done using the emotional factors formed from the factor analysis done in article IV. The open questions were analyzed and categorized for analysis. From the analysis can be seen the frustration towards the lack of support, learning schedules and learning material. The results from this article show that the Pride-Frustration model works also while evaluating the dropping out students. The negative experiences with e-learning causes some students to leave the courses and never to come back to study through e-learning.

In article IV students' attitudes towards computers, new technology and using the computers in their studies were researched. Comparisons with these variables were made by the computer skills that the student had. The analysis showed that the more skills the student had, less reluctant they were using the new technology and they were more open to technology usage in any case. Negative experiences and emotions cause the students to even develop technophobia to them and therefore become even more reluctant to interact with the computers and other technology.

4.9 Contribution to collaborative research

Articles I-III were prepared in close collaboration with Pertti Saariluoma. The early planning of the articles was done in collaboration and after writing a first full manuscript of each article on my own; rewriting was completed in close collaboration changing opinions and formulations of the papers. Naturally the adoption of emotional perspective and user psychology were inspired by Saariluoma's earlier work in this area (Saariluoma, 1997; 2003; 2004; 2005; Oulasvirta & Saariluoma, 2004; Suvinen & Saariluoma, 2008; Saariluoma, Kuuva, Laitinen, Parkkisenniemi & Rimppi, 2009a; Saariluoma et al., 2009b).

For Article IV, the statistical analysis was done in close collaboration with Pertti Jokivuori, who was guiding the author with the tools and analyses. The full manuscript was written in collaboration with Pertti Saariluoma and the author.

Article VI was co-authored with Tanja Huovinen and Anicet Yalaho. The author assisted Huovinen in the statistical part as analyzing the results. The author wrote the first full manuscript and then the co-authors collaborated in writing of this article in rewriting process.

5 RESULTS AND CONCLUSION

In this research presented, emotions showed to play important role in e-learning success and experience. The importance of emotional usability is obvious and should be taken into account while planning new courses or improving old ones. Pride-Frustration model has been developed for understanding the emotional phenomenon in e-learning (Juutinen & Saariluoma, 2010). It shows the negative and positive cycles that the students have the possibility to go into while studying in e-learning courses. Future research intends to investigate other possible area to use the model, since the emotions are strongly related to all human technology interaction areas. Also the mechanisms causing the frustrating and anxiety should be put under closer research in the future to avoid the students not to drop out from their courses due to frustration. More future research plans are explained in chapter 5.3.

5.1 Pride-Frustration model

Our goal in this research has been to build a general user psychological model of the users of e-learning systems. As is well known, work has been based on simulation in this area for a long time (Card, Moran & Newell, 1983). Nevertheless, until recently, relatively little attention has been paid towards the way emotions work in interaction (Norman, 2004). This is unfortunate, as emotions have a very central role in explaining human motivation and action; therefore, scientific research in emotional behavior is important (Abele-Brehm & Glendolla, 2000; Franken 2002).

In this presented research, researchers began with a relatively straightforward conceptual model. This means that human action were looked at from an emotional point of view and considered how the systems of emotions involved could explain the key behavioral issues. It was needed to figure out how the contents of activated emotional states could explain the nature of associated human actions. During the course of this study, researchers have specifically

been interested in valence, i.e., positive and negative stances towards e-learning. This means that it was needed to model the difference between students who move towards positive learning experience and students who, although not drop-outs, nevertheless leave their opportunities unused.

The empirical research illustrates that success generates pride and failure frustration. The following is a sample of answers that were given by the respondents describing their emotions while using the e-learning system:

"I didn't quit any courses, but I did some of them sloppily because I was so frustrated."

"I was pleased with the fact that I managed to pass the course, and happy and proud about the new things that I had learned."

This is not surprising per se, because success, in fact, normally generates pride and failure leads to frustration. However, it is important to see that it is precisely this combination that is important in analyzing global level emotional processes. This study utilized substantially diverse materials, but again, this same pattern of global emotions was found. This model is called the Pride-Frustration model. This model is important as it provides us with an overall global schema, where emotions figure prominently in this investigation of interaction.

The Pride-Frustration model has two sides; negative cycle and positive cycle. The side that the student goes into is depending on their emotional e-learning experience. The emotional experience can start earlier than the actual studying in e-learning begins. The appraisal of an individual can be either positive or negative towards studying through e-learning. Attitude towards e-learning either makes the positive experience harder or easier to get. If a student's attitude towards the e-learning studies is negative, the emotional experiences will more likely to be negative, while with positive attitude the student is more probably experiencing positive emotions in the beginning of their e-learning studies. The motivation that the students have for e-learning also is one key issue what kind of emotional experience will the students have. When the student have enrolled to the course from their own will in order to develop their skills or get more knowledge, they are more motivated and want to see what e-learning has to offer for them. When the students are obligated to join the courses against their own interests or will their motivation is not necessarily too high and their expectations from e-learning are not very high and therefore they are not ready to make efforts to succeed in their studies when problems arrive.

The students having negative emotional experiences go to the negative cycle and the ones with positive emotional experience go to the positive cycle. Emotional experiences can differ from one student to another. The emotional experiences are not necessarily related to the amount of troubles or error the students have while studying in e-learning courses, but the emotional experience that they get to themselves from the learning process. Some students are able to handle the difficult situations better than other ones. This helps them to stay on the positive side of the model and keep on having more positive experi-

ences. Positive experiences helps to get more positive experiences and be more curious to do and learn more while the negative experiences make the individual to have withdrawal behavior and make them not to want to explore the studying process or system any further.

The model's negative cycle starts from a failure or frustrating event happening in e-learning. Difficulties and failures in using the e-learning system or trying to pass the course then make the students to adopt a negative appraisal and consequently they are not willing to study details of interaction or ask help from the tutors for solving their problems. Therefore, their frustration increases and their appraisal will be even more negative towards their studies. Consequently they do not learn to use the system or finish their assignments and finally, they give up using and drop out or at least suffer in their studies the amount that they won't enroll e-learning courses again.

The positive cycle again starts from a success in using the e-learning system or feeling pride from something new learned. This helps the student to adopt a positive appraisal towards the learning process in e-learning and the e-learning system. This positive appraisal improves the willingness to learn more of the system and the topic of the courses. Also the social behavior during the learning process becomes easier; the positive appraisal helps the students to ask help faster and easier and find the help more effectively. With this positive attitude towards the learning helps the students while facing troubles to handle them better with less negative outcomes.

The negative cycle obviously should and could be broken in several ways. It is important to improve usability to minimize frustrating experiences for students. By communication and teaching it is important to change the appraisal of the students and help their learning and help them to find support they may need in their studies. This may lead to decreased drop-out rates in e-learning. Students can go into the positive or negative cycles at any stages in their studies. The most important stage is still the beginning of the e-learning and support that they get. Students who get a good start are less likely to go into the negative cycle but this is also possible. But the positive experiences experienced earlier may help them out of the negativity easier. This model doesn't specify the detailed mechanisms involved in generating pride and frustration, but the model provides a good basis for further analyses. The Pride-Frustration model is shown in Figure 5

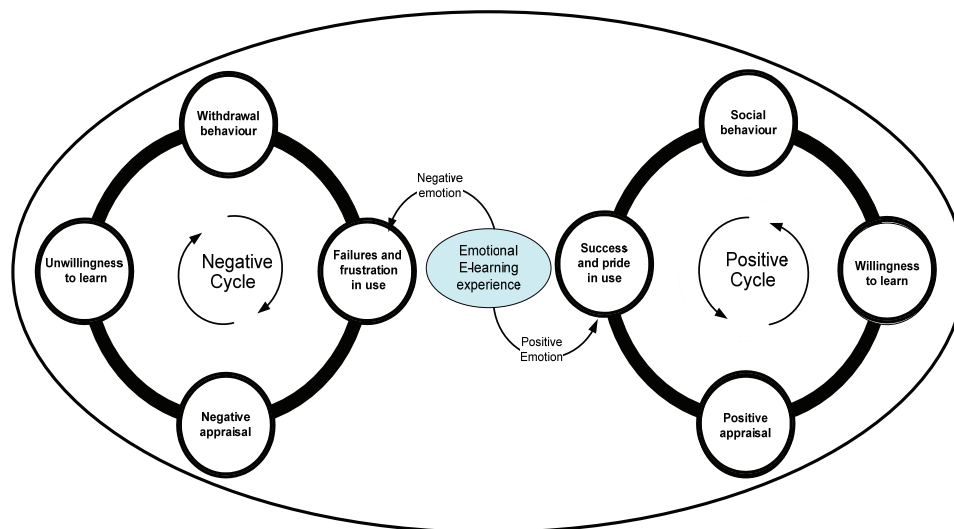


FIGURE 5 Pride-Frustration model

5.2 Discussion of the literature evidence and the model

In traditional learning and in e-learning, the connection between the learning experience and emotions and the importance of emotions have been demonstrated (Meyer, 2002; Hannula, 2006; Meyer, 2006; Weare, 2004; Patrick et al., 1993; Weller et al., 2005; Juutinen & Saariluoma, 2006; 2007; 2010; Juutinen, Huovinen & Yalaho, 2011). Also the problems of emotional interaction and emotional obstacles for e-learning have been documented (Norman, 2004; Oatley, 2004; Juutinen & Saariluoma, 2006; 2007; 2010; Hara & Kling, 2000; Zhang et al., 2004; Drennan et al., 2005). The Pride-Frustration model built in this presented research is aiming to clear the emotional process that goes on in e-learning students' experiences.

User experience is a big factor in learning experience. Positive user experiences with the computers and other technical devices or learning systems urges people to use the products and services more. While on the other hand, a negative user experience causes overall negativity towards all technical products and devices. Often the negative user experience is caused by the poor usability and weak training how to use the product and therefore the users should be taken into account more carefully when planning new products or services.

5.2.1 Positive experiences and emotions

To form a positive user experience out of the e-learning or other service, the essential concept is the feeling of capability. The feeling of capability for a user means that they can and are able to control the use of the product (Saariluoma

et al., 2010). Through this the user also defines their experiences about their everyday lives and about the product how it improves and benefits their lives.

The broaden-and-built theory (Fredrickson, 1998; 2001) assumes that positive emotions broaden the scope of attention and thought-action repertoires. On the other hand, negative emotions narrowed thought-action repertoires (Fredrickson & Branigan, 2003). The theory suggests that while positive emotions broadens individuals' momentary thought-action repertoires, making them to pursue a wider range of thoughts and actions than is typical, the negative emotions narrows the individuals' momentary thought-action repertoires by calling forth specific action tendencies (e.g. escape, attack) (Fredrickson & Branigan, 2003). The same phenomenon happens in e-learning as shown in Pride-Frustration model. The negative emotions are making the students to narrow their thinking and wanting to leave the courses while the positive emotions helps the students to learn more and overcome their possible problems.

The effects of positive affect on cognition research have been done (Isen, 2000). The research have documented that people experiencing positive affect show thought patterns that are unusual (Isen, Johnson, Mertz & Robinson, 1985), creative (Isen et al. 1987; Phillips, Bull, Adams, & Fraser, 2002), integrative (Isen, Rosenweig, & Young, 1991), open to information (Estrada, Isen, & Young, 1997), flexible and inclusive (Isen & Daubman, 1984, Bolte, Goschke, & Kuhl, 2003), and efficient (Isen & Means, 1983; Isen et al., 1991). The results of the presented research are showing the same effects of the positive and negative affects. The students who are getting positive emotional experiences from e-learning, whether the experiences are related to the system used in studying or the study process itself, are more positive to learn more and look for new ways to study and learn more of the studying environment. These students also want to find out more ways to do the same things, they are more innovative and durable when troubles come in front of them and are able to solve the problems faster and better.

5.2.2 Negative experiences and emotions

While the positive students are innovative and active, on contradictory the negative effect shows on the students receiving negative emotional experiences. They don't care too much to look for help or receive guidance. Their thinking is that they won't be able to handle the e-learning anyway, so there is no point of learning anything. To this kind of negatively thinking students, problems or obstacles are only reassuring their thinking that e-learning is hard and they can't get anything good out of it (Juutinen & Saariluoma, 2006; 2007; 2010).

Negative emotions' effects on people have also been researched. Stanley and Burrows (2001) state that negative emotions, anxiety for example lowers individuals concentration, makes them worry, behave over actively and have uncontrollable thought processes. This kind of symptoms will make the e-learning process harder than with positive emotions. The model's negative side shows this process. The negative experiences cause negative appraisal which can lead the student not wanting to learn anymore. The negative emotions' ef-

fect make the learning even harder with for example diminished skills to concentrate on the studying task at hand. Other negative emotions like frustration diminishes the student's ability to attention (Kitayama & Niedenthal, 1994), memory retention (Kahneman, 1973), learning (Lewis & Williams, 1989) and thinking creatively (Isen et al., 1987).

These negative effects cause the students to stay in their negative cycle and make it hard to come out of it in order to have a successful and enjoyable e-learning experience. When the problems have arrived for a student who has negative emotions, they are more likely to leave the studying than try harder to manage with their problems or seek for help and guidance. The negative cycle should be broken in possibly early stage in students' e-learning career if possible.

5.3 Future research

In this presented research, the connection between emotions and e-learning experience has been shown. This calls to pay attention to this phenomenon in future e-learning planning and also while improving the old systems or courses. The importance of good experience in e-learning studies is big and therefore the usability and user experiences should be taken very seriously in e-learning courses. Of course, the usability means different things to different student groups, who may vary greatly in their skill levels, but it should be taken into serious checking while planning the courses. Unsuccessful use of the computers and e-learning systems gives rise to negative emotions, frustration and anxiety and it can even cause technophobia for the student and therefore the human-computer interaction mechanisms should be analyzed carefully in e-learning system and course planning.

For future develop of this model, it is important to seek the possibility to span the use of it outside the educational field. Also the mechanisms causing the frustrating and anxiety should be put under closer research. The articles introduced in this research give a clear view that emotions are strongly related to e-learning and this should be taken into account while developing and planning new e-learning courses. The negative cycle should be cut as early in the e-learning studies as possible and turned into a positive one. The best way is to prevent the negative cycle forming at all. The ways to do this and help the student to have more positive emotional outcome is the future research. One way to prevent the negative cycle forming has come up already in the current research and it is the technical support and guidance, especially in the beginning of the e-learning courses. How to arrange this and how to find the students that need this support the most are also topics for future research. Problems is this cause the fact that many times the students needing the help and support the most are the ones who request it the least.

In the future, aging of the population can cause some obstacles, especially with e-learning solutions. Even though this generation that has grown up with the computers will have plenty of computer using experience, the problems are

the same with aging even in the future. These problems can be caused by fonts being too small or the keyboard buttons being too small or other similar issues. Having troubles of not seeing what the screen is saying will cause frustration even for the most experienced computer user and make them lose the interest to use the system anymore and therefore may not be able to use some everyday appliances or systems. These issues should be taken into account when planning new courses or developing new ones since in the future the lifelong learning possibility will be even increasingly important with even increasing technical devices in our lives.

5.3.1 Breaking the negative cycle

In the Pride-Frustration model, the student who has been sucked into the negative side, going around in cycle of negativity, should be tried to get out of there as soon as possible in order to improve their learning experiences and results. They should be gotten to the positive side and thinking positively about their learning and even the troubles that they may encounter in their e-learning studies. The cognitive therapy treats the depressed patients in a same manner; the negativity is tried to turn into positive thinking (Beck, 1976). The change in the thinking pattern is tried to do in several therapy models in cognitive therapy with different techniques and discussions that make the patient to see their own negativity and try to make them turn their thinking more positive (Beck, 1976). This means that the students must be given targeted aid in overcoming the frustration by means of offering positive success experiences. In psycho therapy, for example, this line of thought has long been a natural part of practice (Beck, 1976). It is essential to search for suitable involvement practices to be able to break the negative loop of failure, frustration and situational anxiety. It is untested, so far, in regards to what the role of guidance should be. This is, for example, because the students take the same courses while their emotional stances differ fundamentally from one another.

In cognitive therapy these techniques are used to treat depressed patients but similar techniques can be applied also in e-learning course design and planning. While planning the support systems and help guides for the courses, these techniques may come helpful. A negative student, who doesn't see any resolution for their problematic situation in their studies, may benefit from a chat or email discussion with the supervisor or tutor of the course where the student is assured that the situation can be solved and made better and therefore make the student to see their own situation better than before. The more positive thinking of the situation will help the students to see their own situation with their studies in much better light. They will become more aware of the situation and realize that the situation that felt so overwhelming for them earlier may be solved out with some effort. These students may find the support systems that the learning system has for the first time. In their negativity they are not even able to think that some support may help in their problems, many of the negatively thinking students assume in the beginning already that they

will have troubles that they won't be able to overcome and therefore they are unable and unwilling to even search for help and answers.

By making the usability better and having good user experiences out of e-learning also helps the students to progress in their studies. These experiences may have come from using other technical equipments before or they may have studied a well planned e-learning course before or used a well designed user interface. All these prior positive experiences make the students not to fall into the negative cycle in their studies even when facing troubles. The high risk of going to the negative thinking pattern is in the group of the students who are either technophobic or just having negative attitude towards the e-learning itself.

At this stage of the research, attention should be drawn towards some basic properties of emotions in explaining human action. The first issue is the psychological structure for encoding emotions. The present evidence suggests that there may either be a positive cycle, or negative cycle, which dominates students' emotional states and emotional interaction in the classroom. In the theory of motivation, emotions are often divided into those which are goal congruent and goal incongruent. Typically, positive emotions are seen as goal congruent, and negative as goal incongruent (Franken, 2002). It is known that goal congruent emotions aid in achieving one's personal goals (Lazarus, 1991). Goal incongruent emotions operate in an opposite manner. This means that the incongruent anxiety-frustration link causes students to be passive, and the positive satisfaction-pride link motivates them to be active. This connection to the general theory of motivation is important from a user psychological point of view.

In modern user psychology, the goal is to explain important interaction phenomena on the grounds of general psychological theories and understanding of the analyzed phenomena. Here, we can build an explanatory connection between our model and the psychological understanding of the relationship between emotions and motives (Lazarus, 1991). An explanatory understanding of interaction phenomena and psychological theories in user psychology is constructed via coherence between general theories and the found interaction phenomena (Saariluoma, 2005).

5.3.2 Limitations of the study

The research introduced here has its limitations. There are some limitations that need to be acknowledged and addressed regarding the present study. First limitation is the first set of data (appendixes 1 & 2) that was collected by other researchers for another purpose. As the data was already collected earlier and by other researcher, it had to be taken as given and therefore it had some limitations concerning the research and research questions in hand. Due to the limitations the research hypotheses subject were formulated to the resulting data limitations. The data captured adequately the emotions of the students and their reasons for dropping out from the courses and the data was relevant for this research and answered the research questions.

The second limitation has to do with the extent to which the findings can be generalized beyond the particular e-learning systems studied. For this particular study, only one organization was used to collect the data (appendix 3). Further empirical evaluations, however, are needed to replicate the findings in different contexts and surroundings in other e-learning systems in variety of organizations. However, because the research generated a relatively clear Pride-Frustration model, it should be relatively easy to design hypothesis-testing studies to experimentally verify and expand the model generated here. These studies would be much more likely to produce findings generalizable to larger classifications of people.

Another limitation of this study regards the model presented, in this research only e-learning is used as a ground for this model, but in future research, using of the model can be expanded to new areas, such as cell phones, tablet computers, other wireless applications and devices. Also the spectrum of emotions can be spread wider in future research; now the model considers only two emotions, pride and frustration. The model is built in cognitive science area and therefore it is not a psychological model. It is a tentative model researching the emotional human-computer interaction in e-learning.

5.4 The contribution of the research

The research presented here is an explorative research and therefore there is not previous research done in this view to e-learning. The results from this research can be applied and expended also to other fields than just e-learning. The model shows that there is a need for efficient tutoring in e-learning in order to have support for all type of students. Even though the nature of e-learning is independent studying according to each one's own schedules, the results of this research show that there is a need for some extent of traditional teaching including to the e-learning courses. With this addition, many students would be more comfortable with the new e-learning courses and models of learning with having some old ways of learning included.

Also shown from the results of this study are the students' skills with technology. The need for ability to use the technical learning devices is important due to the nature of e-learning. Without these technical skills, the students will become frustrated faster and easier than the ones that master the devices and therefore may not use the equipment at all. This applies also beyond the e-learning, since nowadays technology is spreading in all parts of our lives. Therefore skills to use technological devices are needed everywhere and this prevents some people to benefit from technological development in their lives. With e-learning, the courses should include also the possibility to learn the usage of the e-learning system if needed. Not all the student need this possibility, but the ones that are not able to use the e-learning system, would benefit with the assistance a great deal regarding their studying performance.

This research sets a ground for future research with the emotions and technology. The affect of them is not just the trouble of the educational field. The same happens while people use all the everyday used technology devices; mobile phones, music equipments and even cars nowadays. The interface and the usability of any technology device cause the user to have an emotional reaction. Weather the reaction is good or bad, depends on the usability of the device and this should be paid careful attention while designing new things. In e-learning this doesn't mean just the e-learning system itself. The content and presentations of the courses should be planned for the e-learning environment; just transferring the old slides to internet doesn't work as an e-learning course, the guidance of the courses should be developed to be functioning well through the internet or other media. The design should be overall planned, not just start to develop fancy computer system but have the human-computer interaction in mind with pedagogical thinking.

The model gives some understanding how people work when they encounter emotions while using technology. This will help the future e-learning course developers and help to analyze earlier courses what might have gone wrong in the past. The research shows the effect of age and computer skills to the overall learning experience in e-learning and with this the in the future e-learning development, these aspects should be considered more carefully to avoid these groups of users to fall out from the courses without finishing them. Most of the problems were related to the lack of support systems and guidance within both of these groups having troubles. The model helps to understand the negative cycle that student goes into when they don't get the help they need. The negative cycle feeds more negativity into the student's learning and may cause very much reluctant to learn anything anymore.

The research shows the emotional effect of the usability and user experiences on learning outcomes. Good usability and user experiences make students more enthusiastic and devoted to learn while the negative experiences and poor usability will cause them to get frustrated and in worst cases, drop out from their studies. The first time e-learning users are in high risk of developing negative appraisal towards the e-learning and therefore the beginning of the courses should be considered to be significant time in many students' e-learning career. A good start with support of tutors or other course personnel would prevent several students not to be discouraged at the very beginning of their e-learning studies. Even though, many times, the e-learning system is developed and introduced in a hope of cost effectiveness, the support and tutoring systems are not the place to be cheap in while planning e-learning. A well functioning support and guidance will pay it back by reducing the negativity of the students in case of troubles and therefore with high probability make the amount of the drop out students less. To be able to keep the students in the courses and make them learn what they came to learn is much more cost effective than having major part of the students to drop out due to the lack of help and support that they studies in e-learning would have required.

This model also gives signs on how to keep up the good learning experiences for students. The overall experience in e-learning is not determined with the computer skills of the students or the age of the students, even the possible technophobia don't necessarily have to mark which side of the model the student will end up. All that matters is how the student feels in the very beginning of the course, how the course schedules are determined and how their motivation for learning keeps up. All this can be supported by the sufficient guidance and support given by the course instructors or teachers. Even though the major point many times in e-learning is to cut the costs of education and training, the beginning of the learning process should be put effort and money to and planned carefully in a manner that every student have a possibility to find their way to the positive cycle and learn through e-learning.

YHTEENVETO (FINNISH SUMMARY)

Verkko-oppimisen merkitys koulutuksessa on kasvanut jatkuvasti. Sekä julkisen että yksityisen sektorin organisaatiot käyttävät sitä laajasti kouluttaessaan opiskelijoita ja työntekijöitä. Työnantajat ovat huomanneet verkko-opiskelun vaikuttavan kustannuksiin huomattavasti koulutuksen keskittyessä verkkoon. Tila- ja matkakustannukset vähenevät huomattavasti sekä työntekijöiden on mahdollista suorittaa opintojaan omaan tahtiinsa. Sama huomio on tehty akateemisessa maailmassa ja yhä useampi kurssi on suoritettavissa joko osana tai kokonaan verkko-opiskeluna. Verkko-opiskelun kannattajat vannovat uuden opiskelumuodon toimivuuteen mutta epäilyjä kuitenkin on ilmaistu sen tehokkuuden osalta.

Ongelmia verkko-opiskeluun tuo opiskelijoille annettu vapaus heidän omien opintojensa suhteen. Toisille tämä entistä vapaampi opiskelumuoto sopii todella hyvin ja he saavat opintonsa sujumaan nopeasti ja vaivattomasti omalla aikataulullaan. Tämän kaltainen opiskelija on ihannetyyppi verkko-opiskeluihin, joissa opettajan tai kurssin ohjaajan läsnäolo ei ole jatkuvaa ja kokoaikaista. Toisenlaisille opiskelijoille tämä ohjaamaton ja itsenäinen opiskelumuoto tuo mukanaan suuriakin ongelmia. Vaikka opiskelujen aikataulu on mahdollista määrittää itse oman aikataulun mukaan, opiskeluiden aikatauluja ei saada pidettyä tai edes suunniteltua. Nämä opiskelijat tarvitsisivat tarkan aikataulun opintoihin sekä jatkuvaa tukea opettajalta omille tekemisilleen. Näille opiskelijoille verkko-opiskelu voi tuottaa suuria ongelmia. Tukea ja ohjausta saadesaan tämänkin kaltaiset opiskelijat voivat harjoittaa uuden opintomuodon tarvitsemia taitojaan ja pysyä mukana myös verkko-opetuksessa.

Verkko-opetuksen yhtenä suurena ongelmana ovat olleet suuret määrät opintonsa keskeyttäneitä opiskelijoita. Opiskelijat ovat usein innokkaita aloittamaan verkko-opiskelun ja uuden kurssin mutta kohtaavat ongelmia opinnoissaan ja lopettavat opiskelun kesken. Ongelmat voivat johtua joko teknisistä ongelmista verkko-opiskelujärjestelmässä, opiskelijan omista aikatauluongelmista tai asenteesta verkko-opiskelumuotoon sekä siinä käytettäviin apuvälineisiin. Iso osa verkko-opetuksen ongelmista johtuu usein ihmisen ja järjestelmän vuorovaikutuksesta, minkä vuoksi on tarpeen tutkia vuorovaikutusta e-oppimisessa. Tässä väitöskirjassa näitä vuorovaikutusongelmia lähestytään käyttäjäpsykologisesta sekä emotionaalisesta näkökulmasta. Tässä väitöskirjassa korostetaan sitä että on olemassa monia tunneperäisiä näkökulmia ihmisen ja teknologian vuorovaikutuksen prosesseille, ja siksi tutkimuksessa on analysoitu oppimiseen liittyviä emotionaalisia prosesseja.

Vuorovaikutusongelmat voivat johtaa suuriin ongelmiin verkko-opiskelun suorittavalle opiskelijalle. Hän voi turhautua opiskeluun jo heti alkuvaiheessa ja näin ollen menettää kiinnostuksensa oppia uutta, oli se sitten uusi opiskelujärjestelmä tai kurssilla opiskeltava aihe. Tämä voi johtaa opiskelijan negatiiviseen sykliin, josta hän ei oma-aloitteisesti pääse pois ja näin ollen vaikeuttaa hänen tulevaakin opiskeluaan huomattavasti. Hän näkee kaiken verkko-opiskeluun liittyvän negatiivisessa valossa. Tällainen opiskelija on todella suuressa vaaras-

sa lopettaa verkko-opiskelunsa kesken. Näihin ongelmiin syynä ei välttämättä ole käytettävä järjestelmä, kurssin aihe, kurssin ohjaaja tai edes kurssin suunnittelu. Syy voi johtua myös opiskelijan omasta näkemyksestä ja tunteista tekniikkaa ja verkko-opiskelua kohtaa yleensä. Tässä väitöskirjassa tutkitaan näitä emotionaalaisia yhteyksiä opiskelijan ongelmien sekä tunteiden välillä.

Verkko-opiskelussa käytettävä tekniikka voi olla myös hyvin tunneperäinen ongelma opintojen kuluessa. Positiivisesti tekniikkaan suhtautuvan opiskelijan on helppo aloittaa sekä toteuttaa verkko-opiskelua, sillä hän suhtautuu yleensä myönteisesti opiskeluun ja siinä käytettävään tekniikkaan vaikka kohtaisi ongelmia näiden osa-alueiden kanssa. Negatiivisesti tekniikasta ajatteleva taas kohtaa ongelmat suurempina kuin ne itse asiassa olisivatkaan ja näin ollen hän luo itselleen lisää ongelmia omiin opiskeluihinsa. Tuen ja avun haku on monelle tekniikkaa vieroksuvalle opiskelijalla vaikeaa sillä he eivät sitä joko halua tai heitä ei kiinnosta niitä etsiä. Heidän mielessään kaikki ongelmat johtuvat pääasiassa teknologiasta ja näin ollen niitä ei voida ratkaista ja näin helpottaa heidän opiskeluaan. Suurempi määrä tukea ja opastusta heti verkko-opintojen alussa voisi auttaa näitäkin opiskelijoita saamaan enemmän irti käymistään kursseista ja tuntemaan positiivisempia tunteita tekniikasta sekä sen käytöstä niin opiskeluissa kuin muilla elämän osa-alueilla.

Väitöskirjassa on rakennettu malli, joka kuvaa opiskelijan emotionaalista prosessia verkko-opintojen aikana. Mallissa kuvataan opiskelijan tunteiden kehitymistä ja sitä, miten ne vaikuttavat opintojen edistymiseen. Malli on kaksipuoleinen, siinä on negatiivinen ja positiivinen puoli. Nämä ovat positiivinen ja negatiivinen sykli. Näihin sykleihin joutuessaan opiskelijan tunteet vaikuttavat suuresti hänen opintojen etenemiseen sekä kurssien jatkamiseen verkko-opiskelussa.

Negatiivinen sykli alkaa jonkinlaisesta negatiivisesta tunnetilan aiheuttaneesta tapahtumasta; toisille se on opintojärjestelmän toimimattomuus, toisille se on ohjaajan huono palaute. Negatiivinen tapahtuma riippuu opiskelijan näkökulmasta, mikä se on. Tällaisen tilanteen kohdatessaan opiskelija omaksuu itselleen negatiivisen näkökulman joko tähän tiettyyn tilanteeseen tai koko verkko-opiskeluun. Tämän negatiivisuuden seurauksena opiskelija menettää kiinnostuksensa opiskeluun sekä alkaa vetäytyä pois verkko-opiskelun aktiiviteettien parista. Hänellä ei ole kiinnostusta etsiä vastauksia ongelmiinsa tai tukea siihen mikä häntä vaivaa, oli ongelma sitten pieni tai suuri. Tämän negatiivisen syklin varrella opiskelija näkee pienetkin ongelmat suurena ja tämä vauhdittaa negatiivisuuden kasvua ja vaikeuttaa tästä syklistä ulospääsyä, ainakin omatoimisesti. Positiivinen sykli alkaa positiivisesta tunnekokemuksesta verkko-opiskelun aikana. Positiivinen kokemus voi liittyä opiskeluun itsessään tai opiskelijan suoriin opintoissaan. Positiivisuutta voi herättää esimerkiksi opiskelijan onnistuminen tekniikan parissa, vaikka hän ei uskonut siihen kykenevänsä. Tällaisen kokemuksen jälkeen opiskelija innostuu oppimaan lisää ja on halukas etsimään uutta tietoa lisää vaikka se olisi ajoittain hankalaakin. Opiskelija saa itselleen positiivisen asenteen ja näkökannan verkko-opintoihin sekä siinä käytettäviin menetelmiin. Tämän näkökulman ansiosta hän on halu-

kas oppimaan uutta lisää ja osallistuu innokkaasti verkko-opintojen aktiviteetteihin, joiden avulla hänen opintonsa etenevät helpommin. Tämän ansiosta myös mahdollisissa ongelmatilanteissa opiskelijalla on keinot löytää apua ja ohjausta ongelmiinsa. Negatiivista sykliä tuskin voidaan kokonaan poistaa, mutta siinä kiertävät opiskelijat tulisi tunnistaa mahdollisimman aikaisessa vaiheessa heidän opintojaan jotta tukea ongelmiin voitaisiin tarjota ja tätä kautta saada opiskelija positiiviseen sykliin mukaan.

Verkko-opiskelu vaatii opiskelijalta enemmän kuin perinteinen luokkaopetus ja tämän vuoksi sen tukitoimintoihin sekä kurssien suunnitteluun tulisi kiinnittää erityisen paljon huomiota, jotta tämä jatkuvasti yleistyvä opetusmenetelmä ei asettaisi opiskelijoita eri ryhmiin ja opetusta annettaisiin edelleen tasavertaisesti kaikille opiskelunhaluisille riippumatta heidän teknisistä taidoistaan.

REFERENCES

- Abele-Brehm, A. & Glendolla, G. (2000). Motivation und emotion. In J. Otto, H. Euler, & H. Mandl, (Eds.), *Emotionspsychologie* [The psychology of emotions] (pp. 297-305). Weinheim: Belz.
- Alben, L. (1996). Quality of Experience: Defining the Criteria for Effective Interaction Design. *Interactions*, 3(3), 11-15.
- Alavi, M., Yoo, Y., & Vogel, D. R. (1997). Using Information Technology to Add Value to Management Education. *The Academy of Management Journal*, 40, 1310-1333.
- Alkula, T., Pöntinen, S., & Ylöstalo, P. (1999). *Sosiaalitutkimuksen kvantitatiiviset menetelmät*. Juva: Werner Söderström Osakeyhtiö.
- Annapoomima, M. S., & Soh, P. H. (2004). Determinants of Technological Frames: A Study of E-learning Technology. In *Proceedings of 2004 IEEE International Engineering Management Conference*, (pp. 834 - 838). Singapore: IEEE.
- Apps, J.W. (1991). *Mastering the Teaching of Adults*. Malabar, FL: Krieger Publishing Company.
- Axelrod L. (2004). The Affective Connection: How and When Users Communicate Emotion, In *Proceedings of CHI 2004*, (pp. 1033-1034). New York, NY, USA: ACM.
- Baumeister, R. F. (1998). The self. In D. T. Gilbert, S. T. Fiske, & L. Gardner (Eds.), *The handbook of social psychology* (Vol. 1, pp. 680- 740). New York: McGraw-Hill.
- Beck, A. T. (1976). *Cognitive therapy and the emotional disorders*. New York: International Universities Press.
- Boehner, K., DePaula, R., Dourish, P. & Sengers, P. (2007). How emotion is made and measured. *International Journal of Human-Computer Studies*, 65, 275-291.
- Boehner, K., DePaula, R., Dourish, P. & Sengers, P. (2005). Affect: From Information to Interaction, In *Proceedings of AARHUS'05*, (pp. 59-68). New York, NY, USA: ACM Press.
- Bolte, A., Goschke, T., & Kuhl, J. (2003). Emotion and intuition: Effects of positive and negative mood on implicit judgements of semantic coherence. *Psychological Science*, 14, 416-421.
- Branco, P., Firth, P., Encarnacao, M., & Bonato, P. (2005). Faces of Emotion in Human-Computer Interaction. In *Proceedings of CHI 2005*, (pp. 1236-1239). Portland, OR, USA: ACM.
- Brave, S., Nass, C. (2003). Emotion in human-computer interaction. In J. Jacko, A. Sears, (Eds.), *The Human-Computer Interaction Handbook*. (pp. 81-93). Mahwah, NJ: Lawrence Erlbaum Associates.
- Blasi, A. (1999). Emotions and moral motivation. *Journal for the Theory of Social Behavior*, 29(1), 1-19.
- Britt, S. H., & Janus, S. Q. (1940). Criteria of Frustration. *The Psychological Review*, 47(6), 451-469.

- Brosnan, M.J. (1998). *Technophobia*, London : Routledge.
- Brusilovsky, P. (2004). KnowledgeTree: A Distributed Architecture for Adaptive E-Learning. In *Proceedings of WWW 2004*, (pp. 104-113). New York, NY, USA: ACM.
- Cameron-Bandler, L. and Lebeau, M. (1986). *The emotional hostage: Rescuing your emotional life*. Real People Press: Moab, UT.
- Card, S., Moran, T. & Newell, A. (1983). *The psychology of human-computer interaction*. Hillsdale: Erlbaum.
- Clark, R. C., & Mayer, R. E. (2003). *E-learning and the science of instruction*. San Francisco: Jossey-Bass.
- Cooper, A. (1999). *The inmates are running the asylum: Why high-tech products drive us crazy and how to restore the sanity*. Indianapolis, IN: SAMS.
- Desmet, P.M.A. & Hekkert, P. (2002). The basis of product emotions. In W. Green & P. Jordan, (Eds.), *Pleasure with products: beyond usability*, (pp. 60-68). London: Taylor & Francis.
- De Villiers, R. (2004). Usability Evaluation Of an E-learning Tutorial: Criteria, Questions and Case Study. In *Proceedings of SAICSIT 2004*, (pp. 284-291). South Africa: Stellenbosch.
- Dix, A., Finlay, J., Adowd, G.D. & Beale, R. (2004). *Human-computer interaction*. (Third Edition). Harlow: Pearson Education.
- Drennan, J., Kennedy, J., & Pisarski, A. (2005). Factors Affecting Student Attitudes Toward Flexible Online Learning in Management Education. *Journal of Educational Research*, 98(6), 331-338.
- Ekman, P. (1994). All emotions are basic. In P. Ekman & R.J. Davidson, (Eds.), *The nature of emotion: Fundamental questions*. (pp. 20-24). New York, NY: Oxford University Press.
- Ekman, P. (Ed.) (2003). *Emotions inside out: 130 years after Darwin's the Expression of the Emotions in Man and Animals*. New York, NY: New York Academy of Sciences.
- Ekman, P. & Davidson, R.J. (Eds.) (1994). *The nature of emotion: Fundamental questions*. Series in Affective Science. New York, NY: Oxford University Press.
- Ellsworth, P.C., & Scherer, K.R. (2003). Appraisal processes in emotion. In R.J. Davidson, K.R. Scherer, & H.H. Goldsmith, (Eds.), *Handbook of affective sciences*, (pp. 572-595). New York: Oxford University Press.
- Eskola, A. (1973). *Sosiologian tutkimusmenetelmät 1-2*. Porvoo: WSOY.
- Estrada, C.A., Isen, A.M., & Young, M.J. (1997). Positive affect facilitates intergration of information and decreases anchoring in reasoning among physicians. *Organizational behaviour and Human Decision processes*, 72, 117-135.
- Evans, D. (2001). *Emotion: a very short introduction*. Oxford University Press: Oxford.
- Fischer, G. (2001). User Modeling in Human-Computer Interaction, *Journal of User Modeling and User-Adapted Interaction (UMUAI)*, 11 (1/2), 65-86.

- Forlizzi, J. & Battarbee, K. (2004). Understanding Experience in Interactive Systems. In *Proceedings of DIS2004*, (pp. 261 – 268). New York: ACM.
- Franken, R. E. (2002). *Human motivation*. Belmont, CA: Wadsworth.
- Fredrickson, B.L., (1998). What good are positive emotions? *Review of General Psychology*, 2, 300-319.
- Fredrickson, B.L., (2001). The Role of Positive Emotions in Positive Psychology – The Broaden-and-Built Theory of Positive Emotions, *American Psychologist*, 56(3), 218-226.
- Fredrickson, B.L., & Branigan, C. (2003) Positive emotions broaden the scope of attention and thought-action repertoires, *Cognition and Emotion*, 19(3), 313-332.
- Gable, G.G. (1994). Integrating Case Study and Survey Research Methods: An Example in Information Systems, *European Journal of Information Systems*, 3(2), 112-126.
- Greene, J.C., Caracelli, V.J., Graham, W.F. (1989). Toward a Conceptual Framework for Mixed-Method Evaluation Designs. *Educational Evaluation and Policy Analysis*, 11(3), 255-274.
- Grudin, J., Tallarico, S. & Counts, S. (2005). As Technophobia Disappears: Implications for Design, In *Proceedings of GROUP'05*, (pp. 256-259.), Saibel Island, Florida, USA: Association for Computing Machinery.
- Gurbaxani, V. and H. Mendelson (1991). The Use of Secondary Analysis in MIS Research. In K.L. Kraemer (Ed.) *The Management Information Systems Research Challenge: Survey Research Methods*, (pp. 373-382). Cambridge, MA: Harvard Business School Press.
- Harrison, C. (2009). *Exploring emotional web experience: more than just usability and good design*. (PhD Thesis), University of York, UK.
- Hassenzahl, M. (2003). The thing and I: understanding the relationship between user and product In M. Blythe, C. Overbeeke, A. Monk, & P.C.(Wright, Eds), *Funology: From usability to enjoyment*, (pp. 31-42), Dordrecht: Kluwer.
- Hassenzahl, M. (2006). Hedonic, emotional, and experiential perspectives on product quality, In G. Ghaoui, (Ed.), *Encyclopedia of Human Computer Interaction*, (pp. 266-272). London: Idea Group.
- Hassenzahl, M. (2008). User experience (UX): towards an experiential perspective on product quality. In *Proceedings of the 20th French-speaking Conference on Human Computer Interaction (Conférence Francophone sur l'Interaction Homme-Machine) IHM '08*. (pp. 11-15). New York, NY: ACM Press.
- Hassenzahl, M., & Tractinsky, N. (2006). User Experience – a Research Agenda. *Behaviour and Information Technology*, 25(2), 91-97.
- Hannula, M. (2006). Motivation in mathematics: Goals reflected in emotions. *Educational Studies in Mathematics: Affect in Mathematics Education: Exploring Theoretical Frameworks, A PME Special Issue*, 63(2).
- Hara, N., & Kling, B. (2000). Students' distress with a web-based distance education course. *Information, Communication & Society*, 3(4), 557-579.

- Heaton, J. (1998). Secondary analysis of qualitative data. *Social Research Update* 22. <http://www.soc.surrey.ac.uk/sru/SRU22.html> (18.9.2011)
- Heaton, J. (2004). *Reworking Qualitative Data*, London: Sage Publications Ltd.
- Helander, M. G., Landauer, T.K., & Prabhu, P.V. (Eds.) (1997) *Handbook of Human-Computer Interaction, (Second, Completely revised ed.)*, Amsterdam: Elsevier Science Ltd.
- Hinds, P. S., Vogel R. J., & Clarke-Steffen, L. (1997). The Possibilities and Pitfalls of Doing a Secondary Analysis of a Qualitative Data Set. *Qualitative Health Research*, 7(3), 408-424.
- Hiltz, S. R. & Wellman, B. (1997). Asynchronous learning networks as a virtual classroom, *Communications of the ACM*, 40(9), 44-49.
- Hyman, H. H. (1972). *Secondary Analysis of Sample Surveys: Principles, Procedures, and Potentialities*. New York: John Wiley and Sons.
- Imada, T., & Ellsworth, P.C. (2011). Proud Americans and Lucky Japanese: Cultural Differences in Appraisal and Corresponding Emotion, *Emotion*, 11(2), 329-345.
- Isen, A.M. (2000). Positive affect and decision making. In M. Lewis, & J.M. Haviland-Jones, (Eds.), *Handbook of emotions, 2nd ed.*, (pp. 417-435). New York: Guilford Press.
- Isen, A.M., & Daubman, K.A. (1984). The influence of affect on categorization. *Journal of Personality and Social Psychology*, 47, 1206-1217.
- Isen, A.M., & Daubman, K.A., & Nowicki, G.P. (1987). Positive affect facilitates creative problem solving, *Journal of Personality and Social Psychology*, 52(6), 1122-1131.
- Isen, A.M., Johnson, M.M.S., Mertz, E., & Robinson, G.F. (1985). The influence of positive affect on the unusualness of word associations. *Journal of Personality and Social Psychology*, 48, 1413-1426.
- Isen, A.M., & Means, B. (1983). The influence of positive affect on decision-making strategy. *Social cognition*, 1(2), 18-31.
- Isen, A.M., Rosenzweig, A.S., & Young, M.J. (1991). The influence of positive affect on clinical problem solving. *Medical Decision Making*, 11, 221-227.
- ISO 9241-11:1998, *Ergonomic Requirements for Office Work with Visual Display Terminals (VDTs) – Part 11: Guidance on Usability*. Switzerland: International Standardization Organization (ISO).
- Isomäki, H. (2009). The Human modes of Being in Investigating User Experience In P. Saariluoma, H. Isomäki, (Eds.) *Future Interaction Design II*, (pp. 191-207). London: Springer-Verlag.
- Izard, C.E. (2007). Basic emotions, natural kinds, emotion schemas, and a new paradigm. *Perspectives on Psychological Science*, 2, 260-280.
- Jay, T. (1981). Computerphobia. What to do about it. *Educational Technology*, 21, 47-48.
- Johnson, R. B. & Onwuegbuzie, A. J. (2004). Mixed Methods Research: A Research Paradigm Whose Time Has Come. *Educational Researcher*, 33(7), 14-26.

- Johnson, R. B., & Turner, L. A. (2003). Data collection strategies in mixed methods research. In A. Tashakkori, & C. Teddlie, (Eds.), *Handbook of mixed methods in social and behavioral research*, (pp. 297-319). Thousand Oaks, CA: Sage.
- Jordan, P.W. (2003). Designing Great Stuff that People Love, In M. Blythe, K. Overbeeke, A. Monk and P. Wright (eds.). *Funology: From Usability to Enjoyment*. Dordrecht, Netherlands: Kluwer.
- Juutinen, S., & Saariluoma, P. (2010). Emotional obstacles for e-learning - a user psychological analysis, *European Journal of Open, Distance and E-learning*, 2010(1), Retrieved from [http:// www.eurodl.org/?article=402](http://www.eurodl.org/?article=402).
- Juutinen, S. (Submitted). Emotional reasons for drop-out in e-learning courses. (Submitted)
- Juutinen, S., Saariluoma, P., & Jokivuori, P. (Submitted). Age as the emotional obstacle in e-learning experience. (Submitted)
- Juutinen, S., & Saariluoma, P. (2006). Some emotional Obstacles of E-learning, In *Proceedings of Digital Learning India Conference*, New Delhi, India.
- Juutinen, S., Huovinen, T., & Yalaho, A. (2011). Technophobia as an emotional obstacle in e-learning. In *Proceedings of Ireland International Conference on Education (IICE-2011)*, Dublin, Ireland.
- Juutinen, S. & Saariluoma, P. (2007). Usability and emotional obstacles in adopting e-learning - A case study. In M. Khosrow-Pour, (Ed.) *Managing world wide operations and communications*. (pp. 1126-1127). New York: IGI Publishing.
- Järvinen, P. (1999). *On Research Methods*. Tampere: Opinpaja Oy.
- Kahneman, D. (1973). *Attention and effort*, Englewood Cliffs, NJ: Prentice Hall.
- Kim, J., & Moon, J.Y. (1998). Designing towards emotional usability in customer interfaces - trustworthiness of cyber-banking system interfaces. *Interacting with computers*, 10, 1-29.
- Kitayama, S. & Niedenthal, P.M. (Eds.) (1994). *Heart's Eye: Emotional Influences in Perception and Attention*, New York : Academic Press.
- Klein, J., Moon, Y. & Picard, R.W. (1999). This computer responds to user frustration. In *CHI '99 extended abstracts on Human factors in computing systems (CHI EA '99)*. (pp. 242-243). New York, NY, USA:ACM.
- Kumar, A., Kumar, P., & Basu, S. C. (2001). Students perceptions of virtual education: An exploratory study. In M. Khosrow-Pour, (Ed.) *Web based Instructional Learning*, (pp. 132-141). USA: IRM Press.
- Lam, Y. (2000). Technophilia vs. Technophobia: A Preliminary Look at Why Second-Language Teachers Do or Do Not Use Technology in Their Classrooms, *The Canadian modern Language Review/ La Revue des langues vivantes*, 56(3), 389-420.
- Lazar, J., Jones, A., Hackley, M. & Shneiderman, B. (2006). Severity and Impact of Computer User Frustration: A Comparison of Student and Workplace Users, *Interacting with Computers*, 18(2), 187-207.

- Lazar, J., Jones, A., & Shneiderman, B. (2006), Workplace User Frustration with Computers: An Exploratory Investigation of the Causes and Severity, *Behaviour and Information Technology*, 25(3), 239-251.
- Lazarus, R. (1991). Cognition and motivation in emotion. *American psychologist*, 46, 352-367.
- Lazarus, R. S. (1995). Vexing research problems inherent in cognitive-mediational theories of emotion - and some solutions. *Psychological Inquiry*, 6, 183-196.
- Lewis, V.E. & Williams, R.N. (1989). Mood-congruent vs. mood-state-dependent learning: implications for a view of emotion, In D. Kuiken, (Ed.), *Mood and Memory: Theory, Research, and Applications*, Volume 4 of Special Issue of the Journal of Social Behavior and Personality, no. 2, 157-171.
- Mahlke, S., & Thüring, M. (2007). Studying antecedents of emotional experiences in interactive contexts. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, (pp. 915-918).New York:ACM Press.
- McCarthy, J., Wright, P.C. Wallace, J., & Dearden, A. (2006). The experience of enchantment in human-computer interaction. *Personal and Ubiquitous Computing*, 10(6), 369-378.
- Metsämuuronen, J. (2002). *Tutkimuksen tekemisen perusteet ihmistieteissä*. Helsinki: Methelp.
- Meyer, D. K., & Turner, J. C. (2002). Discovering emotion in classroom motivation research. *Educational Psychologist*, 37, 107-114.
- Meyer, D.K., & Turner, J.C. (2006). Re-conceptualizing Emotion and Motivation to Learn in Classroom Contexts. *Educational Psychology Review*, 18, 377-390.
- Meyer, R. E. (2003). Elements of a science of e-learning. *Journal of Educational Computing Research*, 29(3), 297-313.
- Mäkelä, A., Fulton Suri, J. (2001). Supporting Users' Creativity: Design to Induce Pleasurable Experiences. In *Proceedings of the International Conference on Affective Human Factors Design*, (pp. 387-391). London: Asean Academic Press.
- Nesse, R.M. (1990). Evolutionary explanations of emotions. *Human nature*, 1, 261-289
- Nesse, R.M. & Ellsworth, P.C. (2009). Evolution, Emotions, and Emotional Disorders, *American Psychologist*, 64(2), 129-139.
- Nielsen, J. (1993) *Usability Engineering*, USA:Academic Press.
- Norman, D.A. 2004. *Emotional Design: Why we love (or hate) everyday things*. New York: Basic Books.
- Oatley, K. (2004). The bug in the salad: the uses of emotions in computer interfaces. *Interacting with Computers, Human Computer Interaction in Latin America*, 16(4), 693-696.
- Oatley, K. & Johnson-Laird, P. (1987). Toward a cognitive theory of emotion. *Cognition and Emotion*, 1, 29-50.

- Olson, G.M., & Olson, J.S. (2003). Human-computer interaction: Psychological aspects of the human use of computing. *Annual Review of Psychology*, 54, 491-516.
- O'Regan, K. (2003). Emotion and E-learning, *Journal of Asynchronous Learning Networks*, 7(3), 78-92.
- Oulasvirta, A. & Saariluoma, P. (2004). Interrupts in interacting with computers. *Behaviour & Information Technology*, 23, 55-64.
- Parrott, W. G. (2004). The nature of emotion. In M. Brewer, & M. Hewstone, (Eds.), *Emotions and motivation*. (pp. 5-20). Oxford: Basil-Blackwell.
- Patrick, B. C., Skinner, E.A. & Connell, J. P. (1993). What Motivates Children's Behavior and Emotion? Joint Effects of Perceived Control and Autonomy in the Academic Domain. *Journal of Personality & Social Psychology*, 65(4), 781-791.
- Phillips, L.H., Bull, R., Adams, E., & Fraser, L. (2002). Positive mood and executive function: Evidence from Stroop and fluency tasks. *Emotion*, 2, 12-22.
- Picard, R.W. (1997). *Affective Computing*. Cambridge, MA: MIT Press.
- Picard, R. & J. Klein (2002). Computers that recognize and respond to user emotion: theoretical and practical implications, *Interacting with Computers*, 14, 141-169.
- Pickering, J.M., & King, J.L. (1992). Hardwiring weak ties: Individual and institutional issues in computer mediated communication, In J. Turner, R. Kraut (Eds.) *Proceedings of CSCW 92*, (pp. 356-36). California: Association for Computing Machinery.
- Pinsonneault, A., & Kraemer, K. L. (1993). Survey Research Methodology in Management Information Systems: An Assessment, *Journal of Management Information Systems*, 10(2), 75-105.
- Power, M. & Dalgleish, T. (1997). *Cognition and emotion: From order to disorder*, Hove: Psychology Press.
- Robitaille, F. D. & Beaton, E. A., (Eds.) (2002). *Secondary Analysis of the TIMSS*, Netherlands: Kluwer Academic Publishers.
- Rosen, L.D., & Weil, M.M. (1990). Computers, classroom instructions and the computerphobic university student, *Collegiate Microcomputer*, 8(4), 257-283.
- Rosen, L. D., & Weil, M. M. (1995). Computer availability, computer experience and technophobia among public school teachers. *Computers in Human Behavior*, 11(1), 9-31.
- Rosson, M. B. & Carroll, J. (2002). *Usability engineering*. San Francisco: Morgan Kaufman.
- Roto, V. 2006. *Web Browsing on Mobile Phones - Characteristics of User Experience*. (Ph.D. Dissertation), Helsinki University of Technology, Espoo, Finland.
- Saariluoma, P. (2003). Apperception, content-based psychology and design. In U. Lindeman (Ed.). *Human behaviour in design*. (pp. 72-78), Berlin: Springer.
- Saariluoma, P. (2005). Explanatory frameworks for interaction design. In A. Pirhonen, H. Isomäki, C. Roast & P. Saariluoma, (Eds.), *Future interaction design*. (pp. 67-84). London: Springer.

- Saariluoma, P. (1997). *Foundational analysis*. London, UK: Routledge.
- Saariluoma, P. (2004). *Käyttäjäpsykologia* [User psychology]. Porvoo : WSOY.
- Saariluoma, P., Kuuva, S., Laitinen, T., Parkkisenniemi, J., & Rimppi, A., (2009a). Ontology of Emotional Interaction. In G. Graham (Ed.), *Proceedings of the Eight European Academy of Design International Conference*, (pp. 393-398).
- Saariluoma, P., Parkkola, H., Honkaranta, A., Leppänen, M. & Lamminen, J. (2009b) User Psychology in Interaction Design: The Role of Design Ontologies. In P. Saariluoma, H. Isomäki, (Eds.) *Future Interaction Design II*, (pp. 69-86). London:Springer-Verlag.
- Saariluoma, P., Kujala, T., Kuuva, S., Kymäläinen, T., Leikas, J., Liikkanen, L.A. & Oulasvirta, A. (2010). *Ihminen ja teknologia – Hyvän vuorovaikutuksen suunnittelu*, Helsinki, Finland:Teknologiainfo Teknova Oy.
- Saariluoma, P. & Oulasvirta, A. (2010). User Psychology: Re-assessing the Boundaries of a Discipline. *Psychology*, 1(5), 317-328. Aberdeen, Scotland: Gray's School of Art, The Robert Gordon University.
- Saunders, J. (1993). Closing the gender gap, *Executive Educator*, 15(9), 32-33.
- Schmidt, W.C. (1997). World-Wide Web Survey Research: Benefits, Potential Problems, and Solutions. *Behavior Research Methods, Instruments & Computers*, 29(2), 274-279.
- Shedroff, N. (2011) An Evolving Glossary of Experience Design, online glossary at <http://www.nathan.com/ed/glossary/> (18.9.2011)
- Shneiderman, B. (1976). Exploratory experiments in programmer behavior. *International Journal of Computer and Information Sciences*, 5, 123-143.
- Shneiderman, B., Alavi, M., Norman, K., & Borkowski, E. Y. (1995). Windows of opportunity in electronic classrooms. *Communications of the ACM*, 38(11), 19-24.
- Shneiderman, B. (2002). *Leonardo's laptop: Human needs and the new computing technologies*. Cambridge, MA : MIT Press.
- Shneiderman, B. & Plaisant, C. (2005). *Designing the user interface*, USA:Pearson Education Inc.
- Shorkey, C. T. and Crocker, S. B. (1981). Frustration theory: a source of unifying concepts for generalist practice. *Social Work*, 26(5), 374-379.
- Singh, S.N. & Dalal, N.P., (1999). Web home pages as advertisements. *Communications of the ACM*, 42(8), 91-98.
- Stanley, R. O. & Burrows, G. D. (2001). Varieties and functions of human emotion. In R. L. Payne & C. L. Cooper (Eds.). *Emotions at work: Theory, research and applications in management*. (pp. 3-19). Chichester, England: Wiley.
- Starker, A. (1989). *Children using computers*, Oxford:Blackwell.
- Stewart, D. W. (1984). *Secondary Research: Information Sources and Methods*. Beverly Hills, CA: Sage Publications.
- Ståhl A., Sundström, P., & Höök, K., (2005). A Foundation for Emotional Expressivity, In *Proceedings of Conference on Designing for User eXperience (DUX '05)* (pp. 33-35). New York: American Institute of Graphic Arts.

- Suvinen, H. & Saariluoma, P. (2008). User Psychological Problems in a Wiki Based Knowledge Sharing Portal. In P. Kellenberger (Ed), *IEEE Computer Society*, (pp. 552-557), Athens: IARIA (ICIW2008).
- Thomas, R.M. (1951). Effects of Frustration on Children's Paintings, *Child Development*, 22(2), 123-132, Blackwell.
- Tractinsky, N., and Zmiri, D. (2006). Exploring attributes of skins as potential antecedents of emotion in HCI. In P. Fishwick (Ed.), *Aesthetic computing*. (pp. 405-422) Cambridge, MA: MIT Press.
- UPA (2006) (Usability Professionals' Association): "Usability Body of Knowledge", <http://www.usabilitybok.org/glossary> (18.9.2011)
- Valli, R. (2001). Kyselylomaketutkimus. In J. Aaltola & R. Valli (Eds.) *Ikkunoita tutkimusmetodeihin I: metodin valinta ja aineistonkeruu virikkeitä aloittelevalle tutkijalle*. (pp. 110-113). Jyväskylä: PS-kustannus, Gummerus Kirjapaino Oy.
- Weare, K. (2004). *Developing the Emotionally Literate School*. London: Paul Chapman Publishing Ltd.
- Wensveen S., Overbeeke K., Djajadiningrat T. & Kyffin S. (2004). Freedom of Fun, Freedom of Interaction. *Interactions*, 11(5), 17-20.
- Weller, M., Pegler, C., & Mason, R. (2005). Use of innovative technologies on an e-learning course. *Internet and Higher Education*, 8(1), 61-71.
- Yu, F. Y., Chang, L. J., Liu, Y. H., & Chan, T. W. (2002). Learning preferences towards computerized competitive modes. *Journal of Computer Assisted Learning*, 18, 341-350.
- Zhang, D., Zhao, J. L., Zhou, L., & Nunamaker, J. F. Jr. (2004). Can e-learning replace classroom learning? *Communications of the ACM*, 47(5), 75-79.
- Zimmerman, J. (2003). Exploring the Role of Emotion in the Interaction Design of Digital Music Players, In *Proceedings of DPPI'03*, (pp. 152-153). New York, NY, USA: ACM.

APPENDIX 1: QUESTIONNAIRES FOR THE FIRST DATA SET IN YEAR 2002 (CONNET)

KYSYMYKSIÄ CONNETIN OPETUKSESTA LUKUVUONNA 2001-2002

Seuraavassa muutamia kysymyksiä Connetin viime lukuvuoden 2001-2002 toimintaan liittyen. Kysely on lähetetty kaikille Connetin viime vuoden opiskelijoille. Kyseeseen vastaaminen on täysin vapaaehtoista ja vastaukset käsitellään nimettöminä. Vastausten perusteella pyrimme kehittämään Connetin opetusta paremmin opiskelijoiden toiveita vastaavaksi.

Vastaa kysymyksiin niiden kokemusten perusteella, joita viime lukuvuoden aikana Connetissa opiskellessasi sait. Kysymyksiä on paljon ja voit vastata vain niihin, jotka itsesi kannalta koet oleellisimmiksi. Lähetä vastauksesi sähköpostitse vastaamalla suoraan tämän viestin lähettäjälle. Kiitos vastauksestasi!

1. Mitä haluaisit muuttaa Connetissa?
2. Mitkä teknisiä taitoja vaativat alueet opiskelussa tuntuivat vaikeimmilta?
3. Miten kurssitarjonta on vastannut tarpeisiisi? Mitä/millaisia kursseja haluaisit lisää, mitkä voisi jättää pois?
4. Millaisia aikatauluja ja suoritusmuotoja pidät parhaimpina Connetin opetukselle? Pitäisikö kurssien olla kokonaan/osittain suoritettavissa milloin vain lukuvuoden aikana? Missä määrin haluaisit opetuksen olevan virtuaalista/lähiopetusta?
5. Miten kurssien toteutus on mielestäsi onnistunut? Arvioi vastatessasi esim. seuraavia seikkoja:
 - ensimmäisten kurssien sopivuus
 - kurssien sisällöt
 - kurssien vaativuus
 - kursseille ilmoittautumiskäytännöt
 - kurssien aikataulut ja opiskelutahti
 - kurssien työmäärä/opintoviikot
 - kurssisuoritusten arviointi ja palaute kurssin pitäjiltä
 - muu, mikä?
6. Miten hyvin Connetin kurssien verkkomateriaali on vastannut tarpeisiisi?

7. Onko kurssimateriaalia ollut mielestäsi tarpeeksi ja helposti saatavilla? Onko se ollut laadullisesti riittävää?
8. Miten harjoitustöiden toteutus on mielestäsi onnistunut? Arvioi vastatesasi esim. seuraavia seikkoja:
 - harjoitustöiden sisällöt
 - harjoitustöiden laajuus ja vaatavuus
 - ryhmätöiden työvälineet: miten ja millä välineillä haluaisit tehdä harjoitustöitä yhdessä muiden yliopistojen opiskelijoiden kanssa (sähköpostitse vai jotenkin muuten, esim chatissa, keskusteluryhmissä)?
9. Miten hyvin videoluennot ovat mielestäsi onnistuneet? Arvioi vastatesasi esim seuraavia seikkoja:
 - luentojen sisältö
 - luennoitsijoiden asiantuntevuus ja esiintyminen
 - tekninen toteutus
 - luentojen pituus
10. Miten hyvin tiedonvälitys on toiminut? Oletko saanut/löytänyt helposti tarvitsemaasi tietoa opetuksesta? Olisitko halunnut jostain asiasta enemmän tietoa/opastusta?
11. Miten hyvin on mielestäsi toteutunut opintojen ohjaus ja neuvonta opiskeluun/kursseihin liittyvissä käytännön asioissa?
12. Mielipiteesi WebCT:stä verkkotyövälineenä?
13. Mielipiteesi viime lukuvuoden (01-02) Connetin nettisivuista?
14. Missä asioissa Connet mielestäsi kehittyi lukuvuonna 2001-2002?
15. Mihin ongelmiin ei löydetty ratkaisua (viime lukuvuoden 01-02 aikana)?
16. Mitä Connetin opiskelutapa vaatii opiskelijalta?

17. Mitkä opetusmuodot sopivat mielestäsi Connettiin?

- videoluennot livenä
- verkosta imuroitavat luennot
- harjoitustyöt ryhmissä
- harjoitustyöt yksin
- essee
- kirjatentti
- ryhmätentti
- kotitentti sähköpostin välityksellä
- oppimispäiväkirja
- verkkolukupiiri
- portfolio
- seminaari
- opiskelijakongressi
- muu, mikä?

18. Mikä oli hyvää Connetin opetuksessa?

19. Mikä oli huonoa Connetin opetuksessa?

20. Mille Connetin kursseille osallistuit viime lukuvuonna 01-02?

21. Ikäsi ja sukupuolesi?

Kiitos vastauksestasi!

APPENDIX 2: QUESTIONNAIRES FOR THE FIRST DATA SET IN YEAR 2004 (CONNET)

Id
Nimi
Ikä
Sukupuoli
Pääaine
Yliopisto
Aloitusvuosi
Opiskeluvaihe
Connet-aloitus
Connet-opintoviikot
Muita virtuaaliopintoja
Saan opintoihini riittävästi ohjausta
Kurssien työmäärä on liian pieni opintoviikkoihin nähden
Opettajat/ohjaajat ovat helposti tavoitettavissa
Assarit ovat helposti tavoitettavissa
Videoneuvottelussa tai chatissa/ircissä minun on vaikea esittää kysymyksiä tai kommentoita
Connet-opiskelujen aloittaminen on helppoa
Keskustelu tekniikan välityksellä on yhtä luontevaa kuin kasvotusten
Tekniset ongelmat haittaavat opiskelua
Minulla on ollut vaikeuksia saada verkkomateriaali käyttöni
Kirjallinen kurssimateriaali on helposti saatavilla
Connet-kurssit ovat sisällöltään mielenkiintoisia
Connetin kurssit ovat paikallisia kursseja työteliäämpiä
Verkko-opinnoissa opiskelija on liian yksin
On motivoivaa ratkaista aitoja ongelmia
Yritysyhteistyötä pitäisi lisätä merkittävästi
Monitieteisyys on motivoivaa
Yritysongelmat ovat mielenkiintoisempia kuin perustutkimukselliset ongelmat
Inhimillinen teknologia on tärkeää
Minusta on mukava käyttää connetin verkkoympäristöä
Connetin verkkoympäristö vaikeuttaa kurssien suorittamista
Etsimäni tiedon löytäminen Connetin verkkoympäristöstä on helppoa
Etusivulla on mielestäni liikaa tietoa
Tunnen Connetin verkkoympäristön sisällön hyvin
Minulle on tärkeää saada kurssi-ilmoittautumisestani nopea kuittaus
Haluan tutustua muiden opiskelijoiden harjoitustöihin
Törmään verkkoympäristössä liian usein virheilmoituksiin
Käyntien määrä hiekkalaatikolla
Mikä vuosikymmen tulee mieleesi Connetin verkkoympäristössä
Tiesitkö, että Connetin verkkoympäristöä kutsutaan Hiekkalaatikoksi

Käyttänyt: "opetus"-sivu
Käyttänyt: Chat/IRC
Käyttänyt: FLE/Tiedonrakentelu
Käyttänyt: ZWiki
Käyttänyt: DialogiinPakotus
Käyttänyt: FLE/Jammailu
Käyttänyt: opintorekisteri
Käyttänyt: etusivun CogNews
Toivoo: kurssitarjonta
Toivoo: kurssi-ilmoittautuminen
Toivoo: tenttitulokset
Toivoo: tentti-ilmoittautuminen
Toivoo: kalenteri
Toivoo: henkilökohtainen lukujärjestys
Toivoo: yleinen chatti/irkki
Toivoo: kurssikohtainen chatti/irkki
Toivoo: yleiset keskustelualueet
Toivoo: kurssikohtaiset keskustelualueet
Toivoo: oma kotisivu/esittelysivu
Toivoo: oma harjoitustyöportfolio
Toivoo: muiden opiskelijoiden kotisivut/esittelysivut
Toivoo: muiden opiskelijoiden harjoitustyöt
Toivoo: muuta kognitiotieteeseen liittyvää sisältöä
Logo: sopiva
Logo: hyvin tunnistettava
Logo: vastaa connetin ideaa
Logo: ei ollenkaan sopiva
Logo: kliseinen
Logo: mitä se esittää?
Logo: en osaa sanoa

Oletko ilmoittautunut Connet-kurssille, mutta jättänyt sen suorittamatta, miksi?

Luettele viisi hyvää asiaa Connetissa

Luettele viisi huonoa asiaa Connetissa

Mitä muuta haluaisit sanoa Connet-opiskelusta?:

APPENDIX 3: QUESTIONNAIRE FOR THE SECOND DATA SET (TAX ADMINISTRATION)

Verohallinto kysely

Verkko-opiskelun ongelmat

Tutkimuksessani tutkin verkko-opetusta ja sen käyttäjissä herättämiä tunnetiloja. Verkkokursseilla opiskelijoiden keskeyttämismäärät ovat suuremmat verrattuna perinteisin tavoin järjestettyyn opetukseen. Tutkimukseni avulla yritän selvittää selittääkö käyttäjien tunnetilat ja niiden vaikutukset osan tästä ilmiöstä. Tutkimus selvittää kuinka tunteet ovat mukana vaikuttamassa opiskelijoiden käyttäytymiseen verkko-opiskelussa. Tutkimuksen tulosten avulla on mahdollista kehittää jo olemassa olevia verkko-oppimisympäristöjä käyttäjäystävällisempään suuntaan ja luoda uusia ympäristöjä jotka eivät herätä käyttäjissään negatiivisia tunnetiloja. Kyselyn tuloksia käytetään parantamaan Vero-opiston tarjoaman verkko-opiskelun selkeyttä ja käytettävyyttä sekä osana väitöskirjan tutkimusmateriaalia.

Yksittäisten vastaajien tiedot eivät ole tunnistettavissa. Vastaukset käsitellään ehdottoman luottamuksellisesti ja ne tulevat vain tutkijoiden käyttöön tieteellisen väitöskirjatutkimuksen tekemiseen. Vastausten avulla saadaan tärkeää tietoa Vero-opiston toiminnasta joten kaikki vastaukset ovat tärkeitä.

Kyselyn vastausaika päättyy: keskiviikkona 19.3.2008

Kyselyyn vastaamiseen menee noin 20 min.

OSIO 1

Perustiedot

Ikä _____

Sukupuoli

- Nainen
 Mies

Koulutus

Virkanimike _____

Työkokemus verohallinnossa vuosina _____

Opiskeletko / Oletko opiskellut Vero-opiston koulutusohjelmassa?

- Kyllä
 En

Ensimmäisen verkko-kurssin opiskelun aloitusaika (kk/vuosi) _____

Kuinka monta verkkokurssia olet suorittanut

WOPPI-kampuksella _____
avoimella _____
moodlella _____

Mikä sai sinut aloittamaan opiskelun Vero-opiston verkkokursseilla?

Oletko aikaisemmin opiskellut verkkokursseja muualla kuin Vero-opistossa?

- Kyllä
 En

Kokemus tietokoneen ja Internetin käytöstä

Arvioi tietokoneen ja Internetin käytön kokemustasi vastaten seuraaviin väittämiin.

Työ

Olen käyttänyt tekstinkäsittelyohjelmaa (esim. Word)

Erittäin paljon	Paljon	Vähän	En yhtään
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Olen käyttänyt esitysgraafikkaohjelmaa (esim. Powerpoint)

Erittäin paljon	Paljon	Vähän	En yhtään
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Olen käyttänyt taulukkolaskentaohjelmaa (esim. Excel)

Erittäin paljon	Paljon	Vähän	En yhtään
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Olen käyttänyt tilasto-ohjelmistoa (esim. SPSS)

Erittäin paljon	Paljon	Vähän	En yhtään
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Olen käyttänyt piirto-ohjelmistoa (esim. Paint)

Erittäin paljon	Paljon	Vähän	En yhtään
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Olen käyttänyt kuvankäsittely-ohjelmistoja (esim. Photoshop)

Erittäin paljon	Paljon	Vähän	En yhtään
-----------------	--------	-------	-----------

Olen käyttänyt Internetiä

Erittäin paljon Paljon Vähän En yhtään

Olen hakenut tietoa Internetistä hakukoneen (esim. Google) avulla

Erittäin paljon Paljon Vähän En yhtään

Olen hakenut tietoa tietokannoista (esim. kirjasto)

Erittäin paljon Paljon Vähän En yhtään

Olen käyttänyt muita verkko-opiskeluympäristöjä kuin WOPPI-kampusta (esim. WebCT, Optima, moodle, FLE, ym.)

Erittäin paljon Paljon Vähän En yhtään

Olen käyttänyt verkkopankkipalveluja

Erittäin paljon Paljon Vähän En yhtään

Olen käyttänyt yhtä tai useampaa käyttöjärjestelmää

Kyllä
 En

Mitä käyttöjärjestelmää olet käyttänyt?

Linux
 Windows
 MS Dos
 Unix
 OS
 Jokin muu, mikä _____

Olen käyttänyt skanneria (kuvanlukijaa)

Kyllä
 En

Olen tehnyt HTML-sivuja

Kyllä
 En

Olen käyttänyt langatonta GSM- Internet – yhteyttä matkapuhelimen tai GSM-data – kortin avulla

- Kyllä
 En

Vapaa-aika

Olen siirtänyt HTML-sivut palvelimelle näkyväksi Internetissä

- Kyllä
 En

Harrastan tietotekniikkaa vapaa-ajallani

- | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|
| Erittäin paljon | Paljon | Vähän | En yhtään |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Olen käyttänyt tietokonetta opiskelussa

- | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|
| Erittäin paljon | Paljon | Vähän | En yhtään |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Olen käyttänyt sähköpostia

- | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|
| Erittäin paljon | Paljon | Vähän | En yhtään |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Olen osallistunut Internetin keskustelupalstoilla käytävään keskusteluun

- | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|
| Erittäin paljon | Paljon | Vähän | En yhtään |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Pelaan verkossa toimivia tietokonepelejä vapaa-ajallani

- | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|
| Erittäin paljon | Paljon | Vähän | En yhtään |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Olen käyttänyt tietokoneella Internetin videoneuvottelulaitteistoja

- | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|
| Erittäin paljon | Paljon | Vähän | En yhtään |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Olen käyttänyt tietokoneella pikaviestiohjelmia (esim. messenger, skype)

- | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|
| Erittäin paljon | Paljon | Vähän | En yhtään |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Olen käyttänyt MAC – tietokonetta

- Kyllä

En

Olen muokannut kuvia ja digikuvia tietokoneella

Kyllä
 En

Olen muokannut digitaalisia videoita tietokoneella

Kyllä
 En

Olen äänittänyt ja/tai muokannut digitaalista ääntä tietokoneella

Kyllä
 En

Olen tallentanut tietoa CD-ROM-/CD-/DVD- levyille

Kyllä
 En

Olen kopioinut CD-ROM-/CD-/DVD- levyn

Kyllä
 En

Olen luonut PDF-tiedostoja eri dokumenteista

Kyllä
 En

Olen ohjelmoinut jollakin ohjelmointikielellä

Kyllä
 En

OSIO 2

WOPPI-oppimisympäristön toiminnallisuus, käytettävyys ja käyttäjäkokemukset

Kuvaile WOPPI-oppimisympäristöä (WOPPI-kampus ja WOPPI-avoin) vastaten seuraaviin väittämiin.

Toiminnallisuus

WOPPI-oppimisympäristö toimii nopeasti

Täysin samaa mieltä	Jokseenkin samaa mieltä	Jokseenkin eri mieltä	Täysin eri mieltä
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Kurssien sisältö oli suunnittelu huolellisesti

Täysin samaa mieltä	Jokseenkin samaa mieltä	Jokseenkin eri mieltä	Täysin eri mieltä
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Opiskelumateriaali oli laadukasta

Täysin samaa mieltä	Jokseenkin samaa mieltä	Jokseenkin eri mieltä	Täysin eri mieltä
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

WOPPI oli helppokäyttöinen

Täysin samaa mieltä	Jokseenkin samaa mieltä	Jokseenkin eri mieltä	Täysin eri mieltä
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

WOPPI toimi odotusten mukaisesti

Täysin samaa mieltä	Jokseenkin samaa mieltä	Jokseenkin eri mieltä	Täysin eri mieltä
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

WOPPI:n käytön opetteluun kului paljon aikaa

Täysin samaa mieltä	Jokseenkin samaa mieltä	Jokseenkin eri mieltä	Täysin eri mieltä
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

WOPPI:n ilmoitukset olivat ymmärrettäviä

Täysin samaa mieltä	Jokseenkin samaa mieltä	Jokseenkin eri mieltä	Täysin eri mieltä
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

WOPPI:n virheilmoitukset ovat tietoa antavia

Täysin samaa mieltä	Jokseenkin samaa mieltä	Jokseenkin eri mieltä	Täysin eri mieltä
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Ohjeita ongelmatilanteisiin oli helppo löytää tarvittaessa

Täysin samaa mieltä	Jokseenkin samaa mieltä	Jokseenkin eri mieltä	Täysin eri mieltä
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Ohjeita ongelmatilanteisiin on saatavilla riittävästi

Täysin samaa mieltä	Jokseenkin samaa mieltä	Jokseenkin eri mieltä	Täysin eri mieltä
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

WOPPI-oppimisympäristössä käytetyt termit ovat selkeitä

Täysin samaa mieltä	Jokseenkin samaa mieltä	Jokseenkin eri mieltä	Täysin eri mieltä
---------------------	-------------------------	-----------------------	-------------------

mieltä mieltä eri mieltä eri mieltä

WOPPI on luotettava toiminnoiltaan

Täysin samaa mieltä Jokseenkin samaa mieltä Jokseenkin eri mieltä Täysin eri mieltä

WOPPI:ssa tapahtuu paljon häiriöitä

Täysin samaa mieltä Jokseenkin samaa mieltä Jokseenkin eri mieltä Täysin eri mieltä

WOPPI:n tietoturva on kunnossa

Täysin samaa mieltä Jokseenkin samaa mieltä Jokseenkin eri mieltä Täysin eri mieltä

Käytettävyys

Löysin tarvitsemani tiedot helposti

Täysin samaa mieltä Jokseenkin samaa mieltä Jokseenkin eri mieltä Täysin eri mieltä

Tiedot olivat johdonmukaisessa paikassa

Täysin samaa mieltä Jokseenkin samaa mieltä Jokseenkin eri mieltä Täysin eri mieltä

WOPPI:n rakenne on selkeä

Täysin samaa mieltä Jokseenkin samaa mieltä Jokseenkin eri mieltä Täysin eri mieltä

WOPPI:n ulkoasu on miellyttävä

Täysin samaa mieltä Jokseenkin samaa mieltä Jokseenkin eri mieltä Täysin eri mieltä

WOPPI:n ulkoasu on yhtenäinen

Täysin samaa mieltä Jokseenkin samaa mieltä Jokseenkin eri mieltä Täysin eri mieltä

WOPPI:ssa käytetty tekstin ulkoasu (fontti) oli helppolukuinen

Täysin samaa mieltä Jokseenkin samaa mieltä Jokseenkin eri mieltä Täysin eri mieltä

Kurssitarjontaa on riittävästi

Täysin samaa mieltä Jokseenkin samaa mieltä Jokseenkin eri mieltä Täysin eri mieltä

Kursseille on tarjolla tarpeeksi ohjausta

Täysin samaa mieltä Jokseenkin samaa mieltä Jokseenkin eri mieltä Täysin eri mieltä

Tarvitsemani kurssit löytyivät helposti

Täysin samaa mieltä Jokseenkin samaa mieltä Jokseenkin eri mieltä Täysin eri mieltä

Opin liikkumaan kurssin sisällössä helposti

Täysin samaa mieltä Jokseenkin samaa mieltä Jokseenkin eri mieltä Täysin eri mieltä

Erilaiset ongelmat WOPPI:n kanssa vähensivät opiskelumotivaatiotani

Täysin samaa mieltä Jokseenkin samaa mieltä Jokseenkin eri mieltä Täysin eri mieltä

Käyttäjäkokemukset

Verkkövälitteiset kurssit turhauttavat minua

Täysin samaa mieltä Jokseenkin samaa mieltä Jokseenkin eri mieltä Täysin eri mieltä

Kurssit tekevät työtehtävien suorittamisesta aiempaa miellyttävämpää

Täysin samaa mieltä Jokseenkin samaa mieltä Jokseenkin eri mieltä Täysin eri mieltä

Kurssien käytössä on ärsyttäviä piirteitä

Täysin samaa mieltä Jokseenkin samaa mieltä Jokseenkin eri mieltä Täysin eri mieltä

Kurssien opiskelun aloittaminen pelottaa minua

Täysin samaa mieltä Jokseenkin samaa mieltä Jokseenkin eri mieltä Täysin eri mieltä

Verkkovälitteisen järjestelmän käyttö oli ajoittain väsyttävää

Täysin samaa mieltä Jokseenkin samaa mieltä Jokseenkin eri mieltä Täysin eri mieltä

Kursseilla annetut ohjeet raivostuttivat minua

Täysin samaa mieltä Jokseenkin samaa mieltä Jokseenkin eri mieltä Täysin eri mieltä

Verkkokurssien suunnittelija on osannut ottaa huomioon käyttäjän tunteet

Täysin samaa mieltä Jokseenkin samaa mieltä Jokseenkin eri mieltä Täysin eri mieltä

Verkko-opiskelussa on ahdistavia piirteitä

Täysin samaa mieltä Jokseenkin samaa mieltä Jokseenkin eri mieltä Täysin eri mieltä

Ohjaus kursseilla oli masentavaa

Täysin samaa mieltä Jokseenkin samaa mieltä Jokseenkin eri mieltä Täysin eri mieltä

Opiskelu verkkovälitteisen järjestelmän välityksellä tuotti ajoittain iloisia tuntemuksia

Täysin samaa mieltä Jokseenkin samaa mieltä Jokseenkin eri mieltä Täysin eri mieltä

Opittavat asiat olisi ollut vastenmielisempää opiskella kirjasta

Täysin samaa mieltä Jokseenkin samaa mieltä Jokseenkin eri mieltä Täysin eri mieltä

Kurssit voivat olla ajoittain kiehtovia

Täysin samaa mieltä	Jokseenkin samaa mieltä	Jokseenkin eri mieltä	Täysin eri mieltä
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Tunnen itseni ihmisenä pätevämmäksi kun huomaan oppineeni hallitsemaan työssä tarvitsemaani tietokoneohjelman

Täysin samaa mieltä	Jokseenkin samaa mieltä	Jokseenkin eri mieltä	Täysin eri mieltä
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Tunnen ylpeyttä tietokoneohjelman käyttötaidoistani

Täysin samaa mieltä	Jokseenkin samaa mieltä	Jokseenkin eri mieltä	Täysin eri mieltä
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Turhaudun helposti jos ohjelman käyttö ei onnistu

Täysin samaa mieltä	Jokseenkin samaa mieltä	Jokseenkin eri mieltä	Täysin eri mieltä
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Turhautuminen saa minut helposti luopumaan kokonaan ohjelman käytöstä

Täysin samaa mieltä	Jokseenkin samaa mieltä	Jokseenkin eri mieltä	Täysin eri mieltä
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Olen ylpeä suoritettuani verkkokurssin

Täysin samaa mieltä	Jokseenkin samaa mieltä	Jokseenkin eri mieltä	Täysin eri mieltä
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Verkko-opiskelu tekee minut tyytyväiseksi

Täysin samaa mieltä	Jokseenkin samaa mieltä	Jokseenkin eri mieltä	Täysin eri mieltä
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Tunnen toisinaan uppoutuvani verkkokurssiin

Täysin samaa mieltä	Jokseenkin samaa mieltä	Jokseenkin eri mieltä	Täysin eri mieltä
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Katson voivani luottaa verkkokurssien tietoturvaan

Täysin samaa mieltä	Jokseenkin samaa mieltä	Jokseenkin eri mieltä	Täysin eri mieltä
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Minua nolottaisi kertoa opiskelusta työtovereilleni

Täysin samaa mieltä	Jokseenkin samaa mieltä	Jokseenkin eri mieltä	Täysin eri mieltä
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

OSIO 3

Tunnetiloja

Miten tyytyväinen olit Vero-opiston verkkokurssilla opiskeluun

En lainkaan tyytyväinen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Olen erittäin tyytyväinen	<input type="checkbox"/>
-------------------------	--------------------------	--------------------------	--------------------------	---------------------------	--------------------------

Kuvaile Vero-opiston verkkokurssien käytöstä saamaasi tunnetilaa tarkemmin omin sanoin jollakin tunnesanalla tai lyhyellä tunneilmaisulla (älä kuitenkaan käytä sanaa "tyytyväinen").

Mitkä ominaisuudet Vero-opiston verkkokurssien opiskelussa synnyttivät tämän tunnetilan?

Onko Vero-opiston verkkokurssissa mielestäsi jotain erityisen hyviä ominaisuuksia?

Onko Vero-opiston verkkokurssissa mielestäsi jotain puutteita tai haluttuja muutoksia?

Onko / Oliko WOPPI:iin tutustuessasi ensimmäisiä kertoja jotain tekijöitä tai ominaisuuksia, joita oli hankala ymmärtää tai käyttää?

Onko jotain mikä estää WOPPI-kampuksen käyttösi tulevaisuudessa kokonaan?

Opiskellessasi Vero-opiston verkkokurssilla, tuliko eteen jotain minkä vuoksi jäit tekemäsi kurssin / työn kesken tekemättä sitä valmiiksi?

Saavutitko opiskelulla hakemasi hyödyn?

Millaista odotit opiskelun olevan Vero-opiston verkkokurssilla?

Sujuiko opiskelu odotustesi mukaisesti?

Millaista odotit verkko-opetuksen olevan?

Oletko tyytymätön saamaasi verkko-opetukseen?

Oliko kursseilla annettu henkilökohtainen tuki ja palaute hyödyllistä?

Jatkatko verkkokursseilla opiskelua tulevaisuudessa?

Mitä hyötyä ja mahdollisuuksia uskot opiskelusta sinulle olevan?

Mitä mahdollisia ongelmia opiskelusta uskot sinulle olevan?

OSIO 4

Suhtautuminen tietokoneeseen ja uuteen tekniikkaan.

Tietokoneet saavat oloni

Hyvin miellyttäväksi Hyvin epämiellyttäväksi

Kun tietokoneen käytön aikana ilmenee ongelmia, tunnetko itsesi

Rentoutuneeksi Levottomaksi

Kun ongelmia tulee tietokoneen tai ohjelman kanssa, miten kykeneväinen tunnet olevasi korjaamaan ongelman?

Innostuneeksi Avuttomaksi

Millaiseksi tietokoneen käyttäjäksi luokittelet itsesi?

Varmaksi Pelokkaaksi

Käyttöongelmat eivät nujerra minua

Vahvasti samaa Vahvasti

mieltä eri mieltä

Tietokoneongelmat saattavat pyöriä päässäni.

Vahvasti samaa mieltä Vahvasti eri mieltä

Olen usein tuntenut itseni helpottuneeksi uusien tietokoneavusteisten apuvälineiden vuoksi työelämässä.

Vahvasti samaa mieltä Vahvasti eri mieltä

Olen usein tuntenut itseni helpottuneeksi uusien tietokoneavusteisten apuvälineiden vuoksi vapaa-ajallani.

Vahvasti samaa mieltä Vahvasti eri mieltä

Kun töissä otetaan käyttöön uusi sovellus tunnen oloni

Innostuneeksi Turhautuneeksi

Uusien asioiden oppiminen aiheuttaa minulle pettymyksiä

Vahvasti samaa mieltä Vahvasti eri mieltä

OSIO 5

Tietokoneen ja tietoverkkojen käyttö opiskelussa

Vastaa seuraaviin väittämiin mielipiteesi mukaisesti

Käyttämäni tietokonesovellukset ovat helppokäyttöisiä

Erittäin paljon Paljon Vähän Ei yhtään

Pidän tietokoneen käytöstä

Erittäin paljon Paljon Vähän Ei yhtään

Pidän Internetin käytöstä

Erittäin paljon Paljon Vähän Ei yhtään

Yritän välttää tietokoneiden käyttöä

Erittäin paljon Paljon Vähän Ei yhtään

Tietokone syventää oppimiskokemuksiani

Erittäin paljon Paljon Vähän Ei yhtään

Tietokoneen käyttö tuottaa minulle aitoa iloa

Erittäin paljon Paljon Vähän Ei yhtään

Teekö tietokone ja tietoverkkojen käyttö: Opiskelun kiinnostavammaksi

Erittäin paljon Paljon Vähän Ei yhtään

Teekö tietokone ja tietoverkkojen käyttö: Sinut tyytyväiseksi

Erittäin paljon Paljon Vähän Ei yhtään

Teekö tietokone ja tietoverkkojen käyttö: Sinut turhautuneeksi

Erittäin paljon Paljon Vähän Ei yhtään

Teekö tietokone ja tietoverkkojen käyttö: Sinut ahdistuneeksi

Erittäin paljon Paljon Vähän Ei yhtään

Teekö tietokone ja tietoverkkojen käyttö: Sinut vihaiseksi

Erittäin paljon Paljon Vähän Ei yhtään

Teekö tietokone ja tietoverkkojen käyttö: Sinut motivoituneemmaksi opiskelussasi

Erittäin paljon Paljon Vähän Ei yhtään

**Tekeekö tietokone ja tietoverkkojen käyttö:
Opiskelun joustavammaksi**

Erittäin paljon Paljon Vähän Ei yhtään

**Tekeekö tietokone ja tietoverkkojen käyttö:
Opiskelun vaatiman työmäärän suuremmaksi**

Erittäin paljon Paljon Vähän Ei yhtään

**Tekeekö tietokone ja tietoverkkojen käyttö:
Opiskelun vaatiman työmäärän pienemmäksi**

Erittäin paljon Paljon Vähän Ei yhtään

**Tekeekö tietokone ja tietoverkkojen käyttö:
Opiskelun tehokkaammaksi**

Erittäin paljon Paljon Vähän Ei yhtään

Kuvaile ärsyttävin mieleesi jäänyt kokemus WOPPI:n käytössä.

APPENDIX 5: FACTOR ANALYSIS STRUCTURE MATRIX FOR SECOND SET OF DATA

Structure Matrix

	Factor			
	1	2	3	4
Kursseilla annetut ohjeet raivostuttivat minua	,765	-,455		
Verkko-opiskelussa on ahdistavia piirteitä	,763	-,445		
Verkkovälitteiset kurssit turhauttavat minua	,756	-,485		,409
Ohjaus kursseilla oli masentavaa	,726	-,432		
Kurssien käytössä on ärsyttäviä piirteitä	,707	-,435		
Verkkovälitteisen järjestelmänkäyttö oli ajoittain väsyttävää	,589			
Kurssien opiskelun aloittaminen pelottaa minua	,487			
Verkko-opiskelu tekee minut tyytyväiseksi	-,487	,795	,566	
Kurssit voivat olla ajoittain kiehtovia		,719		
Olen ylpeä suoritetuani verkkokurssin		,706	,646	
Tunnen toisinaan uppoutuvani verkkokurssiin		,699		
Opiskelu verkkovälitteisen järjestelmän välityksellä tuotti ajoi	-,410	,680		
Verkkokurssien suunnittelija on osannut ottaa huomioon käyttäjän	-,525	,561		
Tunnen ylpeyttä tietokone-ohjelmankun huomaan oppineeni hallit		,407	,850	
Tunnen itseni ihmisenä pätevämmäksi		,450	,714	
Turhautuminen saa minut helposti luopumaan kokonaan ohjelman käy	,404			,794
Turhaudun helposti jos ohjelman käyttö ei onnistu				,680

Extraction Method: Principal Axis Factoring.

Rotation Method: Promax with Kaiser Normalization.

APPENDIX 6: VARIABLES USED IN FACTOR ANALYSIS IN ARTICLE VI

Computer skills (section 1):

- I have used word processing software (i.e Word)
- I have used data analysis software (i.e Excel)
- I have used presentation software (i.e Powerpoint)
- I have used statistic software (i.e SPSS)
- I have used drawing software (i.e Paint)
- I have used picture manipulation software (i.e Photoshop)
- I have used Internet
- I have used searched from the Internet using a search engine (i.e Google)
- I have searched information from data bases (i.e library)
- I have used other e-learning environments than the web administration e-learning environment
- I have used web bank services
- I use computers on my freetime
- I have used computers in my studies
- I have used email
- I have participated to conversations in Internet
- I play Internet games in my freetime
- I have used video conferencing equipment on the Internet
- I have used instant messaging programs (i.e messenger, skype)

Relationship towards new technology and computers (section 4):

- Computers make me feel like?
- When there are problems with computers, how do you feel?
- When there are troubles with computers or programs, how able do think you are to fiw it?
- What kind of computer user you classify yourself?
- Usability problems don't get me down.
- Computer problems can go around in my head
- I have often felt myself relieved with new computer devices in my work
- I have often felt myself relieved with new computer devices in my freetime
- When new software is introduced at work I feel like
- Learning new things cause my disapointments

Using a computer and network for studying (section 5):

- Computer softwares that I use are easy to use
- I like using computers
- I like using Internet

I try to avoid using computers

Computer deepens my learning experience

Using a computer produces me pure joy

Does computer and using the internet make: learning more interesting

Does computer and using the internet make you satisfied?

Does computer and using the internet make you frustrated?

Does computer and using the internet make you feel anxiety?

Does computer and using the internet make you angry?

Does computer and using the internet make you more motivated with your studies?

Does computer and using the internet make you studies more flexible?

Does computer and using the internet make the amount of work bigger needed for studying?

Does computer and using the internet make the amount of work less needed for studying?

Does computer and using the internet make your studies more efficient?

ORIGINAL PAPERS

I

SOME EMOTIONAL OBSTACLES FOR E-LEARNING

by

Juutinen, S., & Saariluoma, P. 2006

In Proceedings of Digital learning India 2006, New Delhi, India.

II

USABILITY AND EMOTIONAL OBSTACLES IN ADOPTING E-LEARNING - A CASE STUDY

by

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Usability and emotional obstacles in adopting e-learning – A case study

Track: Human Computer Interaction

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Abstract

Emotions are important in interaction and open a vital perspective to e-learning. E-learning courses have higher dropout rates than the traditional courses taught in classrooms, and it seems logical to ask whether emotional processes could explain a part of them. This research investigates how emotions are involved in students' behavior during e-learning courses. As human emotions are not independent of human cognitions and appraisal, we also consider here how cognitive difficulties affect emotional stances in e-learning on the ground of feedback collected from an e-learning course. However, here the main focus of emotion relevant cognitive processes is related to competence and usability. Usability problems lead either to frustration and shame or pride or self-confidence. It seems that the usability threshold divides subjects emotionally in e-learning environments.

1. INTRODUCTION

E-learning is a still fast growing area in education, but the complexity of the field makes it necessary to look for new perspectives. Much of e-learning research has concentrated on technical and software aspects (Annapoomima & Soh, 2004; Brusilovsky et al. 2005). Recently, increasing interest has been directed to user problems, and consequently, to emotional aspects of e-learning (Branco et al. 2005, De Villiers, 2004; Yu et al. 2002).

The possibilities that e-learning opens up for social development makes this area important, and, therefore, it is vital to ask what kinds of things may prevent people from using this new method for improving their lives. Undoubtedly, some of the obstacles are related to emotions and should be explained on the basis of human emotional processes (Hiltz & Wellman, 1997; O'Regan, 2003; Rosen & Weil, 1995). One can even think that technophobia is involved in the adoption of earlier services (Branco et al., 2005; Lam, 2000; Pickering & King, 1992). It is thus important to investigate how emotional processes are involved in the use of e-learning.

However, cognition appears before emotions (Power & Dalgleish, 1997). Therefore, it is logical to ask, what kinds of cognitive factors may lead to negative emotional stances towards e-learning and eventually to its abandonment. It is particularly interesting to look at the relations of competence and usability in this context as emotions provoking factors.

2. RESEARCH METHODS

Case description: The Connet human technology network was established in 2001. It is a part of the Finnish Virtual University program as a cognitive science and cognitive technology teaching network. Connet has eight Finnish universities in this network. All the students from these participating universities are allowed to study in the network. These eight universities form a multidisciplinary teaching network. The background curricula include cognitive science, cognitive technology, psychology, philosophy, information systems science, computer science, work science, education, educational psychology and new media. The curriculum is very strongly problem-based. The most frequently used technologies in the Connet courses are Internet and e-mail. Also whiteboard, blogs and chat boards are being used. Each teacher can choose what technique to use in their course.

Data and analysis: The Connet students answered to the questions during two academic years, in 2002 and 2004. The students answered these open questions through e-mail and were asked to comment with their views on and experiences of the Connet network study and development ideas. Questions were sent to all the students in the Connet network by e-mail. All in all there were 50 students' answers included to the analysis. The groups of students were not the same in both years. Students took different types and amount of courses during their Connet studies. Their answers were qualitatively analyzed to identify the cognitive reasons for emotional reactions behind dropping out from the e-learning courses. The most frequently cited reasons and emotions in the students' answers in both years are discussed below.

3. RESULTS

In both years, the most frequently mentioned reason for dropping out from a Connet course was lack of time. The students regarded their own time management skills inadequate, and the e-learning courses seemed to be the easiest to drop. In their opinion, e-learning courses are not seen as binding as the traditional classroom courses due to the anonymity of the students in e-learning courses.

3.1. Problems with competence in technology

Technology was a source of frustration for the students but also gave them sense of pride for their competence. These kinds of feelings were reported in 20 out of 50 students' answers, or in 44%. Students had problems with the e-learning environment, e-mail and also experienced a need for home equipment. E-learning environment problems were related to the usability of tools. The software used for the courses was changed quite frequently and this created a lot of frustration but also positive reactions. Here are three of the students' comments: *"After finally having learned the old software, I had to start learning a new one."*, *"The tool is not user friendly"*, *"I had problems finding what I was looking for"*.

Course materials also divided the students. For some they were a source of frustration, for others irritation and also of joy. These kinds of emotions were reported in 30 out of 50 students' answers, or in 60%.

There were opinions about the material availability and quality. Availability of the books was sometimes very poor. Here are two of the students' comments: *"It was hard to get the material; all the books you need for the course were not available in the library. You have to do special arrangements to get them, but might not have money to buy them after all."*, *"The courses were mostly based on traditional books, and those books are not available in the local library."*

Apart from the book availability problem, the students were pleased with the material and also with its availability, especially on the web. Here is what two of the students said: *"The availability of the material has been excellent and has been corresponding to the content of the courses. Also the quality."*, *"The web material was good. Material gave a good overall picture and gave new thoughts for working with my essay."*

4. DISCUSSION

The data implies that usability problems have their emotional consequences, but that they are not straightforward. When students come across usability or organizational problems such as those reported above, their reactions are emotional, and this leads them to negative participation decisions. We can mostly characterize the negative emotions in terms of frustration.

Frustration is a common phenomenon among people using computers (Drennan et al. 2005; Hara & Kling, 2000; Shneiderman et al. 1995; Zhang et al. 2004). As the data suggests, frustration arises from failures while using the technology, from not finding what one is looking for and not getting from the teaching what one is expecting. Often frustration leads to dropping out from the course undertaken. This effect, which is due to emotions, can take place in traditional classroom teaching courses (Weare, 2004), and as the results suggest it also can take place in e-learning courses. Other negative emotions include irritation, embarrassment and shame. Students get irritated when they cannot find what they need or want, when material availability is poor or the technology does not work properly or when it makes it hard or even impossible to study.

On the other hand, a sense of pride for succeeding in an e-learning course was notable. This may be due to the fact that e-learning demands more from the student (Hiltz & Wellman, 1997; Kumar et al. 2001) than traditional teaching and requires more work in an unfamiliar learning environment; the students take pride for their own accomplishments. Feelings of embarrassment were prevalent at the beginning of the e-learning experience, but the successful students got used to the new systems and the required learning habits, and consequently less embarrassment was felt afterwards. Embarrassment / shame emotion has been associated with the felt difficulty and therefore it is a significant factor in the beginning of learning

(Ingleton, 1995). A successful learning process turns shame and negative emotions into pride and self-confidence.

5. CONCLUSION

This study focuses on the emotions that arise from an e-learning experience and on how these might affect students who drop out from the courses. The study doesn't attempt a straightforward comparison between traditional classroom teaching and e-learning, i.e., how all the found results would have affected students in traditional courses. The results show that emotional aspects of computing are important to analyze when introducing an e-learning course. The outcome may be shame and frustration with dropout on the one hand, and pride and self-confidence with success on the other.

References

- Annapoomima, M. S., & Soh, P. H. (2004). *Determinants of Technological Frames: A Study of E-learning Technology*. 2004 IEEE International Engineering Management Conference, Singapore.
- Branco, P., Firth, P., Encarnacao, M., & Bonato, P. (2005). *Faces of Emotion in Human-Computer Interaction*. CHI 2005, Portland, OR, USA.
- Brusilovsky, P. (2004). *KnowledgeTree: A Distributed Architecture for Adaptive E-Learning*. WWW 2004, New York, NY, USA.
- De Villiers, R. (2004). *Usability Evaluation Of an E-learning Tutorial: Criteria, Questions and Case Study*. SAICSIT 2004, Stellenbosch, South Africa.
- Drennan, J., Kennedy, J., & Pisarski, A. (2005). Factors Affecting Student Attitudes Toward Flexible Online Learning in Management Education. *Journal of Educational Research*, 98(6), 331-338.
- Hara, N., & Kling, B. (2000). Students' distress with a web-based distance education course. *Information, Communication & Society*, 3(4), 557-579.
- Hiltz, S. R., & Wellman, B. (1997). Asynchronous learning networks as a virtual classroom. *Communications of the ACM*, 40(9), 44-49.
- Ingleton, C. (1995). Gender and Learning: Does Emotion Make a Difference? *Higher Education*, 30(3), 323-335.
- Kumar, A., Kumar, P., & Basu, S. C. (2001). *Students perceptions of virtual education: An exploratory study*. IRMA 2001, Toronto, Ontario, Canada.
- Lam, Y. (2000). Technophilia vs. Technophobia: A Preliminary Look at Why Second-Language Teachers Do or Do Not. *Canadian Modern Language Review*, 56(3), 389.
- O'Regan, K. (2003). Emotion and E-learning. *Journal of Asynchronous Learning Networks*, 7(3).
- Pickering, J. M., & King, J. L. (1992). *Hardwiring weak ties: individual and institutional issues in computer mediated communication*. CSCW '92: Proceedings of the 1992 ACM conference on Computer-supported cooperative work, New York, NY, USA.
- Power, M., & Dalgleish, T. (1997). *Cognition and Emotion*: Hove: Psychology Press.
- Rosen, L. D., & Weil, M. M. (1995). Computer availability, computer experience and technophobia among public school teachers. *Computers in Human Behavior*, 11(1), 9-31.
- Shneiderman, B., Alavi, M., Norman, K., & Borkowski, E. Y. (1995). Windows of opportunity in electronic classrooms. *Communications of the ACM*, 38(11), 19-24.
- Yu, F. Y., Chang, L. J., Liu, Y. H., & Chan, T. W. (2002). Learning preferences towards computerized competitive modes. *Journal of Computer Assisted Learning*, 18, 341-350.
- Zhang, D., Zhao, J. L., Zhou, L., & Jr., J. F. N. (2004). Can e-learning replace classroom learning? *Communications of the ACM*, 47(5), 75-79.

III

EMOTIONAL OBSTACLES FOR E-LEARNING - A USER PSYCHOLOGICAL ANALYSIS

by

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IV

**AGE AS AN EMOTIONAL OBSTACLE IN E-LEARNING
EXPERIENCE**

by

Juutinen, S., Saariluoma, P., Jokivuori, P.

Submitted

V

**EMOTIONAL REASONS FOR DROPPING OUT FROM
E-LEARNING COURSES**

by

Juutinen, S.

Submitted

VI

**TECHNOPHOBIA AS AN EMOTIONAL OBSTACLE IN
E-LEARNING**

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Technophobia as an Emotional Obstacle in E-learning

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Abstract

E-learning has its difficulties, but it is still a strongly growing area in education and training. Technophobia is a growing problem with continuously increasing technology around us. While more and more teaching is given through different technological equipment, more troubles the people feeling negatively towards them will have. Frustration and anxiety are known to be part of the computer user's life; almost all of the users at some point feel themselves frustrated. Frustration causes people to withdraw from the frustrating situation and make them not to go through again the frustrating situation. This causes problems in e-learning when students don't want to continue learning in frustrating environment and makes them to be afraid or reluctant towards the computer.

1. Introduction

E-learning is here to stay. But not everyone wants to use it. The problems behind the reluctance may lay in fear of the technology that is being used for e-learning purposes. Systems and software used in different e-learning facilities vary, but the one thing they all have in common is the technology. In traditional classroom teacher teaching learning, this technology is not necessarily needed for learning, but in e-learning neither the student nor the teacher can escape it. This causes some people to develop several negative emotions towards the new learning media. [9] These emotions may be an obstacle in the students learning abilities and willingness to learn in e-learning or even using it. These kinds of students are in danger of losing some of their possibilities in nowadays educational environment when they lose one learning channel that is quite important nowadays both in educational and in business environment.

Cause for this fear may come from the past negative experiences with technology or computers and can be applied even other parts of their lives with reluctant behavior towards all the other technology assisted issues in the society. When the experience in using technology is low, the skills usually are also low and the willingness to even learn to more or become better user is low. These kinds of learners and technology users usually associate all

the technology negatively and their behavior can also be called technophobic [3].

The assumption for this research is that the computer using skills affect on the students' behavior and emotions that they deal with while using e-learning system. Also the attitudes towards any new technology and computers affect to the e-learning experience. Here the students who have negative attitudes towards the technology and computer are labeled as technophobic.

2. Emotions in e-learning

Emotions have a big impact to learning in traditional teaching [24] and in e-learning [2,8,9]. The emotional connection between emotions and learning results in e-learning courses has been under research strong implications to this have been found [7,8,9]. Attitudes towards e-learning have been both negative and positive, always depending who you are asking from. Frustration using computers is a common phenomenon nowadays around the world with almost everyone who has operated a computer at some point [2]. For some users frustration level grow to the extent of developing technophobia. Technophobia can be apparent even with people who are using the computer [3], not just with the ones that don't use the computer at all. The computer self-efficacy and attitudes play big role in frustration levels [13]. Frustration has been researched to take up to 1/3-1/2 of time spent on the computer [14] and this should be considered while planning courses and timetables.

People react in different ways to different situations. Partly these reactions are learned and based on people's previous experiences. Some people associate positive emotions to new technology and others think of technology as a negative issue. The difference among these two groups is that they associate the same technology in a completely different emotional context [20]. People's emotional reactions don't stay unchanged; they are in a constant change during their whole life [17]. Someone who has been reacting very negatively towards technology can later even like using technology. People's emotional contexts can thus change. This kind of process may be referred to as emotional learning [20].

Learning is not purely a cognitive phenomenon [1]. It is a process that is closely linked to students'

social and emotional needs, as well as to the context of their learning environment [20]. Especially in e-learning, a positive experience of using the system is the most important reward. It motivates the users to execute their needs in that certain user context. A hard-to-use service is not encouraging, and people will only use it if they are forced to.

Anxiety is a normal emotion experienced at some point in every human's life [22]. Purpose of anxiety is to motivate to seek solution for the perceived danger or problem. Anxiety can cause people to react several ways, usually it causes people to have poor concentration, worry, to be overactive and have uncontrollable thought processes [22]. These symptoms make learning process a lot harder than it would be with positive emotions. Frustration causes the users to have diminished abilities with respect to attention [11], memory retention [10], learning [15] and thinking creatively [5]. It may cause the users to get frustrated with the same system in the future also or make them not to use the system at all in the future.

3. Technophobia

As technology develops, it demands people to develop their working habits. For some this is a normal way to work. When there is new technology, they take it in to their everyday life functions and their work. But for others, this kind of development and demand for new technology is terrifying. They are very reluctant to adopt any kind of technology to their actions; even it sometimes would help their life enormously. This kind of people are said to have technophobia. This kind of fear towards technology has been seen in everywhere and obviously with increasing amount of technology surrounding us, the technophobia is showing up with more people and more widely than ever.

Defining technophobia is essential at this point. There are many definitions of technophobia, but the most commonly cited definition is the one proposed by Jay [6] who defines it as:

1. a resistance to talking about computers or even thinking about computers
2. fear or anxiety towards computers
3. hostile or aggressive thoughts about computers

With his definition, the technophobia research area fairly broad. More recent update for the definition is from Rosen and Weil [18]:

1. anxiety about current or future interactions with computers or computer-related technology;
2. negative global attitudes about computers, their operation or their societal impact; and / or
3. specific negative cognitions or self-critical internal dialogues during actual computer interaction or when contemplating future interaction.

The label computerphobic (or technophobic) describes individuals who range from severe reactions on all dimensions to mild discomfort on a single dimension.

This definition shows how technophobia can be apparent, even with the people who are using computers [3] not just with the ones that don't use the computer at all.

Technophobia has implications to design and development. The use of new services is always in small quantities in the beginning. As the service becomes popular among the big user groups then it has the possibility to become the "next hot thing". New services have been thought to be somehow informal ways to transform data and information, especially in the corporate world. This is what happened to email in the 1980s. It was considered to be an element of reducing productivity [4] and was predicted as companies carefully measure the effect, they would terminate email use [16]. This obviously did not happen and nowadays email is a "big player" in information distribution business, especially in companies and educational institutes. This shows how email was intimidating even for researchers, who thought the new messaging system will take the time from efficient work time and somehow disturb the workers. Now we know better, but without the people who weren't reluctant towards the new technology, email would be unused today.

For new technology usage in education, the teachers are the link between the students and the technology. For example computers have a lot to offer nowadays to teaching but it still is being underused by teachers. This is due to the attitudes and the lack of knowledge how to take the advantage of the computers in teaching also they are experiencing lack of confidence in their own computer skills, they think they don't to have enough pedagogical skills to teach students with computers and some teachers think that there is nothing technology could bring more into their teaching [12,3]. But the problem is not just the teachers at school, to be able to use the assistance of technology and computers in their teaching, the teachers need the support and assistance of the other personnel in school. They need to get the funding from the principle of the school and support from the computer administrators. Also some other personnel may be needed, based on the school the teacher is in. It is seen that the administrator is sometimes the falling point for the lack of technology usage [12]. They are not supportive in their actions or are questioning the need of computers in some subjects. Usage of the technology also brings troubles among sex differences, there are signs showing that computers are used more by boys and male teachers than girls and female teachers [23]. This may give the boys advantage over the girls when moving to higher levels of school. From the atmosphere that

comprises of an anxious model and gender-biased classroom practices the children will get unintentional signals that the computing is a genderized activity [21]. This role model impact is described by Rosen and Weil [19]:

“With these fears, negative cognitions, and negative attitudes, teachers will not be able to provide confident role model to the students as they attempt to teach the students how to use the machines. As earlier work has shown, these students will likely become the next generation’s technophobic adults.” The future will show how the equality will work among the school staff and students as the technology continues developing to more hidden and hopefully easier to use.

So it is not just the fear of technology that makes technology underused or e-learning courses have high dropout rates. It is also all the things going around them. But having technophobia will not make it easier to handle all this technology around the learning process, since it arouses lots of emotions that are discouraging to learning. From these emotions, fear and anxiety are the most common ones [3]. These emotions can drive the user away from the technology for a long time or make the using unpleasant.

4. Technophobia in e-learning

Students in e-learning courses tend to react on usability problems with fairly strong emotions [7,8,9]. Students’ learning results in e-learning are affected by the way they react on the problems in learning and technique. The positively reacting students are more equipped to overcome bigger and more problems than the negatively reacting and thinking ones [9]. The frustration-pride model [9] indicates the positive and negative cycles in e-learning experience. The students who manage to keep their attitude and thinking positive despite the setback in studying are more likely to be able to finish their courses with positive experiences.

Fear of technology plays a big role in e-learning studying. In most e-learning courses the main learning device is the computer, with which every student have to work with and if they have fear or anxiety towards computers or any new technology, it makes their e-learning career fairly difficult.

5. Research

The students of the e-learning system were sent an invitation through e-mail to respond to a questionnaire in spring 2008. The questionnaire was to be completed on the Internet. A questionnaire included rating scale questions and open questions. All the respondents have been using for their studies the e-learning system under research.

Respondents

The respondents, 354 in all, who participated in the study, had been studying the same e-learning system. Respondents had been studying in e-learning system diversity of times. Respondents were working in all over the organization in several types of tasks. Of the participants, 320 were women and 34 men, and they were between 23 to 63 years of age.

The questionnaire

The questionnaire was divided into 5 different categories. The categories were: 1. Basic information, 2. E-learning system usability, functionality and user experiences, 3. Emotions, 4. Relationship towards new technology and computers, 5. Using a computer and network for studying. These categories measured different areas of the e-learning experience. In the answers of the questionnaire, the participants stated their experience of using the e-learning system as a training facility. The answers are the respondents’ subjective opinions regarding the usability of the e-learning system.

Computer skills variable is formed from the section 1 in the questionnaire, where the respondents answered about their computer usage and basic skills with the computer. Attitude towards computers is formed from the section 4 of the questionnaire and the attitude towards using computer in studying is formed from the section 5.

Method

In the analysis, answers from sections 1, 4 and 5 were used. Section 1 included basic questions about the users and their experience in using computers and other technology at home and at work. Section 4 included questions about how the respondents feel about the computer and new technology and section 5 was about how the respondents feel using the computer and internet for studying. The questions were 1-4 rating scale questions. The variables were named as follows; Section 1 = Computer skills, Section 4 = Emotions towards computers and Section 5 = Using computer for studying.

Answers were analyzed using the correlation tables and graphs. In order to reduce number of variables used in analyzing, the factor analysis was used to identify most loaded components within each section. Calculating the mean of these correlated variables in sections made analyzing and interpreting the results easier. Analyzed variables were the mean of computer skills variables, the mean of attitude to computer variables and the mean of computer in studying. Statistical relationships between these variables were analyzed using the Spearman’s correlation method for ordinal data.

Analysis

Table 1. Correlations between the variables

Spearman Correlation Coefficients Prob > r under H0: Rho=0 Number of Observations		
	Emotions towards computers	Using computer for studying
Emotions towards computers	1.00000 343	0.42973 <.0001 342
Using computer for studying	0.42973 <.0001 342	1.00000 343
Computer skills	0.46242 <.0001 343	0.26580 <.0001 343

According to table 1 results there is a significant, positive correlation between the computer skills and attitudes generally towards computers (p-value < 0.0001) and using computers in studying (p-value < 0.0001). This means that, the worse the computer skills the students have, more negative is their attitudes towards the computers and new technology. This shows that the level of the skills in using the computers and other kind of every technology influences to the emotions that the students have about the technology. These emotional obstacles could be improved by teaching the basic skills better. But the problem with these kind of students is that they are usually very reluctant of learning new skills in this technology area, technophobia is taking over the willingness to learn.

Sections 4 and 5 are also correlating (p-value < 0.0001) significantly. This correlation shows that the students whose attitude towards computers and new technology is bad, they are not willing to use them in their studies either. This causes them to be very negative about e-learning, which requires them to use the computers and other technology all over the studying process.

This negative cycle that these students are in is defined in Juutinen and Saariluoma's [9] pride-frustration model. To be able to help the students with their fear of technology and using it, the source of their fears should be discovered.

Same connections are visualized in Figures 1,2 and 3. The graphs are made with SAS enterprise guide 4.1 by using scatter plot diagram. A graph displays the relationship between the two variables. In each of the graph, the pattern of dots starts from the lower left corner and continues to upper right corner; it suggests a positive correlation between variables. The tighter the pattern of values is the stronger the correlation is.

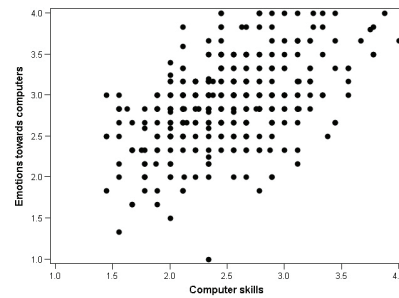


Figure 1. Correlation between variables Emotions towards computers and Computer skills

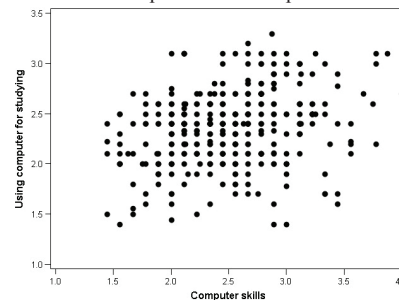


Figure 2. Correlation between variables Using computer for studying and Computer skills

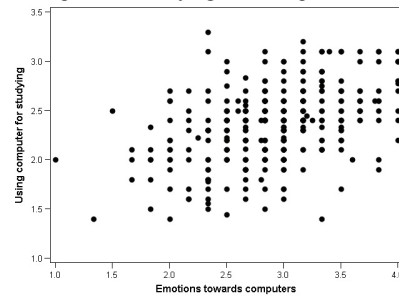


Figure 3. Correlation between variables Using computer for studying and Emotions towards computers

6. Conclusion

This research shows how the technophobia can cause troubles to students in e-learning. These students lack the basic computer and technology using skills and they are reluctant to learn to use any new technology equipment or learning methods. Their emotions towards the computers and e-learning systems are negative and problems in usage make them even worse. The negative cycle [9] causes the students to lose their interest in learning and looking for help. The key for these students would be good and fast technical support and tutors helping them to

get to the positive thinking mode and therefore to the positive cycle [9] that feeds the learning willingness and ability to handle the obstacles better.

Technophobia can be caused from several issues, and these reasons should be found out to make these students get also to the rising wave of e-learning studies. Otherwise they may be in great risk of dropping out from the development of the learning nowadays, whether it is in their education or at their work. Lifelong learning in today's society demands the usage of computers and technology.

10. References

- [1] Apps, J.W., *Mastering the Teaching of Adults*. Krieger Publishing Company, Malabar, FL, 1991.
- [2] Branco, P., P. Firth, M. Encarnação, and P. Bonato *Faces of Emotion in Human-Computer Interaction*. CHI 2005, Portland, OR, USA, 2005.
- [3] Brosnan, M., *Technophobia, The psychological impact of information technology*, Routledge, London, 1998.
- [4] Grudin, J., S. Tallarico and S. Counts, *As Technophobia Disappears: Implications for Design*, GROUP'05, Saibel Island, Florida, USA, 2005.
- [5] Isen, A.M., K.A. Daubman, and G.P. Nowicki, . "Positive affect facilitates creative problem solving.", *Journal of Personality and Social Psychology*, 1987, 52(6), pp. 1122-1131.
- [6] Jay, T., "Computerphobia. What to do about it.", *Educational Technology*, 1981, 21, pp. 47-48.
- [7] Juutinen, S. and P. Saariluoma, *Some emotional Obstacles of E-learning*, Digital Learning India, New Delhi, India, 2006.
- [8] Juutinen, S. and P. Saariluoma, Usability and emotional obstacles in adopting e-learning - A case study. In Khosrow-Pour, M. (ed.) *Managing world wide operations and communications*. New York: IGI Publishing, pp. 1126-1127, 2007
- [9] Juutinen, S., and P. Saariluoma, Emotional obstacles for e-learning - a user psychological analysis, *European Journal of Open, Distance and E-learning*, 2010/1, 2010.
- [10] Kahneman, D., *Attention and effort*, Prentice Hall, Englewood Cliffs, NJ, 1973.
- [11] Kitayama, S. and P.M. Niedenthal, *Heart's Eye: Emotional Influences in Perception and Attention*. Academic Press, New York, 1994.
- [12] Lam, Y., "Technophilia vs. Technophobia: A Preliminary Look at Why Second-Language Teachers Do or Do Not Use Technology in Their Classrooms", *The Canadian modern Language Review/ La Revue des langues vivantes*, 56(3), 2000.
- [13] Lazar, J., A. Jones, M. Hackley and B. Shneiderman, "Severity and Impact of Computer User Frustration: A Comparison of Student and Workplace Users", *Interacting with Computers*, 18(2), 187-207, 2006.
- [14] Lazar, J., A. Jones, and B. Shneiderman, "Workplace User Frustration with Computers: An Exploratory Investigation of the Causes and Severity", *Behaviour and Information Technology*, 25(3), 239-251, 2006.
- [15] Lewis, V.E., and R.N. Williams, "Mood-congruent vs. mood-state-dependent learning: implications for a view of emotion". In: Kuiken, D. (Ed.), *Mood and Memory: Theory, Research, and Applications*, Volume 4 of Special Issue of the Journal of Social Behavior and Personality (2), 157-171, 1989.
- [16] Pickering, J.M., and J.L. King, *Hardwiring weak ties: Individual and institutional issues in computer mediated communication*, Proc. CSCW 92, 356-36, 1992.
- [17] Power, M., and T. Dalgleish, *Cognition and emotion: From order to disorder*, Hove: Psychology Press, 1997.
- [18] Rosen, L.D., and M.M. Weil, "Computers, classroom instructions and the computerphobic university student", *Collegiate Microcomputer*, 8(4), 257-283, 1990.
- [19] Rosen, L.D., and M.M. Weil, "Computer availability, computer experience and technophobia among public school teachers", *Computers in Human Behavior*, 11(1), 9-31, 1995.
- [20] Saariluoma, P., *Käyttäjäpsykologia [User psychology]*, WSOY, Porvoo, 2004.
- [21] Saunders, J., "Closing the gender gap", *Executive Educator*, 15(9), 32-33, 1993.
- [22] Stanley, R. O., and G.D. Burrows, "Varieties and functions of human emotion", In R. L. Payne & C. L. Cooper (Eds.). *Emotions at work: Theory, research and applications in management*, Wiley, Chichester, England, 2001.
- [23] Starker, A., *Children using computers*, Blackwell, Oxford, 1989.
- [24] Weare, K., *Developing the Emotionally Literate School*, Paul Chapman Publishing Ltd., London, 2004.

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