Information and communication technologies in the life of university freshmen: An analysis of change

Verhoeven, Jef C., Heerwegh, Dirk. & De Wit, Kurt (2010) "Information and Communication Technologies in the Life of University Freshmen: An Analysis of Change", Computers & Education, 55 (1), 53-66. doi: 10.1016/j.compedu.2009.12.002

Jef C. Verhoeven, Dirk Heerwegh, Kurt De Wit

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Abstract

The passage from secondary school to university puts students in an environment with different expectations. Not only the expectations towards learning might change, but also towards ICT competences and computer use. The purpose of this article is to find out whether freshmen, after six months at the university, changed their self- perception of ICT competences and computer use in comparison with their behaviour at secondary school, and what factors can explain the self-perception of ICT competences and computer use in secondary school, in the university and their possible change. Based on a panel research among 714 freshmen of a large university, this article answers the following questions: *1) What is the self-perception of ICT competences among freshmen and is there a change in this self- perception six months after entering the university? 2) How often and for what purpose do freshmen use a computer and is there a change in the frequency of the use of a computer? 3) What factors might influence this attitude, behaviour, and possible change?* In function of the basic components of Unified Theory of Acceptance and Use of Technology (Venkatesh, Morris, Davis & Davis, 2003) hypotheses were developed and tested to answer these questions. Students who consider the computer to be a useful instrument, have control over the computer, possess a certain level of Internet competence, and are at ease with computers are more likely to have the skills needed to maintain a computer, to develop a web site, and to use basic ICT skills. The predictors have little influence on Internet usage. The same predictors contribute modestly to the explanation of the different frequencies of computer use, and a few of the predictors explain parts of change in ICT skills and frequency of computer use.

Keywords

Pedagogical issues

Post-secondary education

Media in education

Country-specific developments

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1. Introduction

Ever since the 1980s, personal computers have increasingly become a part of daily life, so it is often taken for granted that all first-year students in university (freshmen) are very familiar with them. Not all universities offer introductory courses in using a PC, and only some faculties offer special courses in the ICT programmes they use in research. Because of time constraints, it is understandable that universities focus on their specialized fields of study and on training students in them. Nevertheless, more than one research report has shown that there is a large range of ICT capacities among university students (van Braak, 2002; Lee, 2003; Palaigeorgiou, Siozos, Kostantakis & Tsoukalas, 2005). This does not diminish the expectation of teachers that all students are able to use ICT as they have become important instruments for university education. All of the students are presumed to know how to work with a PC and to surf on the Internet. This means that the learning environment as well as the instruments needed for studying are changing. Indeed, university education is not the same as secondary-school education. When students enter university, they are confronted with some important changes, such as having to take more responsibility for their own study behaviour, having to adapt to a more rapid pace of learning, having to accept receiving less response to their efforts, and having to live more independently than they had been accustomed to in secondary school.

Another important change in students' lives is the use of a PC for studying. Secondary schools in some countries may well have integrated the use of a PC in everyday teaching, but this is not the case in all secondary schools in Belgium, where the current study was undertaken. Most secondary

schools have computers available and use them regularly, but they have not become a routine part of class life.

The growing presence of PCs in universities has created a new awareness of the necessity to act differently in this new environment (Kaminski, Switzer & Gloeckner, 2009). This is a challenge not only for the teaching staff but also for the students who have to adapt to this new learning environment (Jamieson, Fisher, Gilding, Taylor & Trevitt, 2000). Moreover, research has shown that the perception of the learning environment by students might well strongly influence achievement. For instance, Lizzio, Wilson & Simons (2002) conclude that "Students' perceptions of their current learning environment were a stronger predictor of learning outcomes at university than prior achievement at school."

Since the computer has become so important for university education, we set out to investigate whether there was a change in ICT competence and in the frequency of computer use of students after six months at university and what factors might contribute to explaining this change. In answering these questions, we first provide a theoretical framework that might help to understand why freshman use ICT and why this use might change. Second, we will describe the research design and the main indicators we used. Third, we will present figures on the access freshmen have to computers and the internet in their changing learning environment. Fourth, we will consider the factors that might account for the level of the ICT skills and the frequency of computer use by students at the time of registering and six months later. Fifth, we will determine whether ICT skills and frequency of computer use change between registration and six months later, and we also will look for the reasons of those changes. Finally, sixth, we will present a discussion and a conclusion.

2. Theoretical background

For an explanation of confidence in ICT skills and use of ICT by freshmen, we will rely on a social psychological theory about acceptance and use of information technology. This theory focuses on the explanation of access to, and use of, ICT and finds its inspiration in the perceived usefulness of a new technique and the relative comfort of learning it. Using a variety of social psychological theories, Venkatesh, Morris, Davis & Davis (2003) constructed a Unified Theory of Acceptance and Use of Technology (UTAUT). An important source of inspiration was the work by F. D. Davis (1989; Davis, Bagozzi & Warshaw, 1992), who tried to predict the acceptance of computers. For this purpose, Davis constructed two indexes, one to measure the perceived usefulness of technology, which refers to "the degree to which a person believes that using a particular system would enhance his or her job performance", and another to measure the perceived ease of use, that is, "the degree to which a person believes that using a particular system would be free of effort". Davis found a strong relationship between the usefulness of a system and the usage of a system, and this relationship was much stronger than the relationship between the ease of use of a system and its use. This approach was later called the Technology Acceptance Model (TAM), which strongly influenced the development of UTAUT.

Two other variables were added to the design of UTAUT: social influence and facilitating conditions. Social influence has been defined as "the degree to which an individual perceives that important others believe that he or she should choose the new system" (Venkatesh et al., 2003: 451). Facilitating conditions may be described as "the degree to which an individual believes that an organisational and technical infrastructure exists to support use of the system" (Venkatesh et al., 2003: 453).

According to Venkatesh et al. the intention to use new information technologies will be directly influenced by the four variables above. In addition to these four variables, three other variables – self-efficacy, anxiety, and attitude – were included in the model, not as direct determinants of the behavioural intention to use new information technology, but as indirect determinants mediated by perceived ease of use. Self-efficacy may be defined as the degree to which a person believes that he or she can do a job with or without the help of a third person. Anxiety shows the degree to which a person is afraid to use or apply new information technology. The third variable, the attitude towards using technology, refers to “an individual's overall affective reaction to using a system” (Venkatesh et al., 2003: 455). The seven variables together will be the basis of the explanation of the usage of new technology (see also Carlsson, Carlsson, Hyvönen, Puhaikanen & Walden, 2006; Marchewka, Liu & Kostiwa, 2007; Wu, Tao & Yang, 2007; Fuselier, Durlabhji & Cucchi, 2008; Wills, El-Gayar & Bennett, 2008; van Raaij & Schepers, 2008). Although these variables play a very important role in the explanation of the acceptance and use of technology, Venkatesh and his colleagues were aware that some situational variables, such as gender, age, and experience, could play an important role too in the explanation of the acceptance of ICT (Sutton, 1991; Janssen Reinen & Plomp, 1997; Volman & van Eck, 2001; Colley & Comber 2003; Losh, 2004).

Although quite a lot of researchers followed the UTAUT line, there are also some who reduced this approach to the more simple TAM model, sometimes supported by some other variables (Padilla-Meléndez, Garrido-Moreno & Del Aguila-Obra, 2008; Lee, 2008; Lau & Woods, 2009; Selim, 2003; Teo, Lee, Chai &Wong, 2009; Chatzoglou, Sarigiannidis, Vraimaki & Diamantidis, 2009; Liu, Chen, Sun, Wibble & Kuo, 2010; Sanchez-Franco, 2010), and others who kept the nucleus of TAM and constructed around this nucleus a more complex model based on other theories (Schepers, de Jong, Wetzels & de Ruyter, 2008; Liu, Liao & Pratt, 2009; Tao, Cheng & Sun, 2009; Sørebø, Halvari, Gulli & Kristiansen, 2009; Wang & Wang, 2009; Lee, 2010). Most of these researchers are interested in the acceptance of new technology (for instance, new teaching technology, web based learning, etc.), and only a few look at the acceptance of more widely spread ICT techniques as using the computer or using the Internet (e.g. Padilla-Meléndez et al., 2008; Teo et al., 2009). Most are interested in the explanation of the intention to use ICT technologies (Lee, 2008; Lee, Yoon & Lee, 2009; Sanchez-

Franco, 2010; Lau & Woods, 2009; Cho, Cheng & Lai, 2009; Teo et al., 2009; Chatzoglou et al., 2009; Liu et al., 2010; Sanchez-Franco, Martinez-Lopez & Martin-Velicia, 2009; Sørbø et al., 2009; Lee, 2010). Others do not only study the intention to use new technologies, but also the application of these technologies (Selim, 2003; Padilla-Meléndez et al., 2008; Liu et al., 2009; Tao et al., 2009; van Raay & Schepers, 2008; Wang & Wang, 2009). Although most researchers rely on facilitating conditions, this concept may cover different phenomena. Lee (2008), for instance, mentions intra- and extra organisational factors, Lee et al. (2009) instructor characteristics, and teaching materials, Chatzoglou et al. (2009) management support, Fuselier et al. (2008) perceived behavioural control and organisational support, and Schepers et al. (2008) refer to perceived tutor and peer support.

Besides UTAUT, several other explanatory models were developed relying upon the robustness of the two central variables of TAM, perceived usefulness and perceived ease of use of new technologies. We only refer to three of them. Tao et al. (2009) apply TAM, agency theory, expectation confirmation theory, and includes learning and emotion factors. Having made TAM the kernel of his theory, Lee (2010) applies the expectation confirmation model, the theory of planned behaviour (TPB), and the flow theory (an extreme form of involvement in an activity) (see also Sanchez-Franco et al., 2009; Sanchez-Franco, 2010; Lee, 2010; Liu et al., 2009). Schepers et al. (2008) draw a line between social support and self-consciousness to psychological safety, and these factors, together with communication with a tutor or peers, might determine TAM.

Although the TAM model was very influential other approaches have been developed by researchers to study the use of ICT in education. We refer to two alternatives. Yang and Tsai (2008) focus on the personal belief system in a web-based context. This is composed of the personal epistemology, the social-cultural belief, and the belief about web-based learning. This personal belief system may

influence the personal preferences of students toward the web-based learning environment. McGill and Klobas (2009) looking for the performance impacts of learning management systems rely on the technology-to-performance chain (TPC). They suggest that learning outcomes are dependent on the fit between the technology for which the task is used and the task. For a student, this means the fit between the help for study offered by this technology and what he or she wants to attain by this study. This task-technology fit might be determined by task characteristics, technology characteristics, and individual characteristics. Task-technology fit might have a direct influence on learning outcomes and indirectly on the utilization of the technology via expected consequences of utilization, attitude toward utilization, social norms, habits, and facilitating conditions.

Research has shown (Tao et al., 2009: 930) that two central variables of UTAUT and TAM, i.e. perceived usefulness and perceived ease of use of a new technology, are very important for the explanation of the intention to use ICT and ICT competence. Therefore we opted for an approach that strongly relies on some basic concepts of UTAUT and TAM. Although UTAUT is about the acceptance and use of technology, we hypothesized that the main variables of this theory could also help to explain the frequency of computer use by students, their self-perceived ICT competence, and the possible change of both during the first six months at the university. Usage of information technology is a more general concept than frequency of computer use. But it is not unreasonable to hypothesize that a specification of the usage of information technology might be influenced by variables that are fruitful to explain the usage of information technology. Moreover, if we can agree that computer usage is served by the competences of the actor to work with a computer, it is also reasonable to formulate the supposition that the main variables of the UTAUT might contribute to understand why some students attain more ICT competences and others do not. Our data will be used to assess whether this assumption is correct or incorrect. Although it should not be taken for granted that all variables that have proven to be helpful for the explanation of some behaviour or attitude will be instrumental for the explanation of change of this behaviour or attitude, we conjectured that they may be good candidates. For instance, it makes sense to expect that students who are convinced that computers are useful and who have a strong control of computers will use the computer more and develop more ICT

competences during the first six months at the university. The selection of these variables will be explained in the next section.

3. Methodology

To determine the change of the frequency of computer use and the self-perception of ICT competence, we needed two moments of observation and so chose one at the time of registration and another one six months later. Using an online questionnaire we approached all of the freshmen who were registering in one of the large Belgian universities during September and October 2004. 1,827 (or 36.8%) of the 4,960 registered freshmen responded to this questionnaire. In March-April 2005, we launched a second online questionnaire to the same students, which was answered by 2,212 of the 4,960 (or 44.6%).

This university, situated in a small town (about 80,000 inhabitants), attracts about 30,000 students (among them about 3000 foreigners, mostly graduate students) and employs about 5,000 researchers. It is a comprehensive university composed of 14 faculties spread over the town, but all connected with a fast broadband access to the Internet. This broadband network does not only connect the university buildings, but also the housing of the students. The teaching system is supported by a digital learning platform, that might bring students closer to all kinds of ICT applications.

In order to receive as many questionnaires as possible, the students received three reminders for each questionnaire. Although in principle, each student can access a computer at many places

throughout the university and receives a personal password for e-mail on registration, we checked additionally whether the online nature of the questionnaire had interfered with students answering the questionnaire. Therefore, after the first questionnaire, we sent a questionnaire on paper to a sample of 300 freshmen, who had not answered the web questionnaire, of whom 164 (54.6% of the sample) responded. All confirmed that they had a computer, and 98% had access to the Internet, which implied that the online nature of the survey did not preclude obtaining responses from a large proportion of the student population.

Because we were interested in studying changing attitudes and behaviour concerning self-perceived ICT competence and the use of ICT in the life of these young students, we needed the answers of the same persons at the two moments of observation. Among our respondents, we found 714 students (14.4% of the student population) who had answered both questionnaires (2004 and 2005). This sample needed to be checked for representativeness and, where necessary, a weight calculated for some variables. Our weight variable recalculates the figures in function of the distributions of the students according to their gender, housing, and field of study. Indeed, gender might have an influence on attitudes and behaviour towards ICT (Sutton, 1991). Housing might be influential as well, because the equipment and the position of students living at home with their parents (more chance having to share the computer with an other member of the family) might be different from those living in rooms. Field of study is also relevant, because in some fields of study freshmen have to attend courses relying strongly on the use of the computer. Although a significant deviation from the distribution of the population for secondary education of the students and the employment position of the parents was found, we did not include these variables in the weight variable because the groups concerned were small (see Appendix A).

One might wonder why automated tracking of computer use was not used instead of on-line questionnaires. The main reason was that we wanted to approach as many freshmen as possible living all over the country and we were interested in their personal vision on their computer use and ICT competences not only at the university, but also in their secondary school.

3.1. Dependent variables

Both of the questionnaires focused on the description of the use of ICT and attitudes toward the use of ICT. The first questionnaire concerned this phenomenon as it was experienced in the last year of secondary school; the second questionnaire was focused on the same behaviour and attitude but after six months at university. The same instruments, but adapted to the situation of secondary school in the first questionnaire and to the university in the second questionnaire, were used for measuring the frequency of use of ICT and the attitudes toward the use of ICT. In addition to the questions asked in both questionnaires, the first questionnaire contained some questions about the use of computer and internet by the parents of the students, the persons (relatives, teachers, friends) who taught them something about ICT, the status of their computer equipment and software, library visits, plans for housing at the university, and some learning styles. The second questionnaire contained some questions that were not asked in the first questionnaire: it included questions about the living situation of the students, additional learning styles, and the results of the semester exams.

As noted above, we are interested not only in the description of the changes of behaviour and attitudes of students but also in the reasons for these changes. Relying on UTAUT, the following explanatory model was constructed, but, as will be shown, not all of the variables of the UTAUT model were included, and other measuring instruments were used.

(here Figure 1)

The *frequency of computer use* for study, chatting, gaming, and other forms of recreation was measured by the question: “How often on average did you use the computer for [study] during the last academic year/the last six months at the university?” The following answers were possible: “daily, two or three times a week, weekly, monthly, less than once a month, never”. This question had to be answered four times, once for each type of computer use. To measure the change of frequency, we calculated the difference between the frequency of 2005 and 2004 (scale scores between -4 and +5).

The second dependent variable, *self-perceived computer competence (skills)*, was measured by four scales in both 2004 and 2005. These scales are based on items suggested by Van Braak (2004). Although computer competences may be much richer than what was presented in this list, they are very basic for the future development of ICT competences of the actors. These 19 items were used to measure four types of ICT skills (basic ICT skills, maintenance skills, website building skills, and Internet skills). This set was subjected to an exploratory factor analysis (EFA) with Mplus 4.0. Six items were removed because they either loaded on more than one factor or did not load on any of the factors. To evaluate the fit of the four-factor model, a confirmatory factor analysis (CFA) was conducted in Mplus 4.0. This analysis indicated the need to allow one error covariance between two items measuring different skills in spreadsheets. Since the items measured abilities within the same type of software, this error covariance was acceptable. The model fit was adequate with a TLI (Tucker Lewis Index) value of .992, an RMSEA (Root Mean Square of Error Approximation) value of .05, and an SRMR (Standardized Root Mean Square Residual) value of .048. TLI values above 0.90, RMSEA values below .08, and SRMR values below 0.10 are traditionally considered to indicate good model fit (Vandenberg & Lance 2002).

Since the same 19 survey items were repeated in the second survey, it was possible to test whether the structure found in 2004 would be retrieved in 2005. A CFA applied the same factor structure on the data from 2005, and the model fit was adequate (TLI = .995, RMSEA = .046, SRMR = .043), indicating that the data configuration was equal (“configural invariance”). A stronger test of

equivalence was provided with a multiple group CFA (MGCFA). This model was applied simultaneously on the data from both surveys. The model specified the same number of factors in each survey ("configural invariance"), with identical factor loadings ("metric invariance") and identical thresholds ("scalar invariance"). Furthermore, factor variances and covariances were constrained to be equal across the two surveys. Due to the repeated-measures design, residuals were allowed to covary across time between pairs of variables reflecting the same survey item. Figure 2 shows the MGCFA model applied to both surveys simultaneously. The model fit was acceptable with an RMSEA value of .048 and a TLI value of .993 (N = 665). Thus, the same factor structure occurs in both surveys, making it appropriate to compare the factor scores from the two surveys. To measure the self-perceived increase or decrease of ICT confidence, the scores of 2004 were subtracted from those of 2005 (scale scores between -4 and +5).

(Here Figure 2)

In summary, we constructed these four Likert scales (see also Figure 2) for both of the surveys: 1) a scale to measure the ability to maintain a computer (e.g. I can install a virus scanner; 2) a scale to measure the basic skills to work with a computer program (e.g. I can make some simple calculations with a spreadsheet program (Excel, Lotus, …); 3) a scale to measure the competence to develop a website (e.g. I can publish a page on the web (FTP); and 4) a scale to measure the ability to use the Internet (e.g. I can search for web pages using search engines (Google, Altavista, …)).

3.2. Independent variables

Six independent variables (measured in 2004) were checked for their influence on the use of ICT and self-perceived computer confidence. Five of them are part of the UTUAT model, and all scales have a Likert construction (scores 1 to 5). We opted for five variables that have proven to contribute strongly to the explanation of the acceptance of information technology, i.e. perceived usefulness, perceived ease of use, anxiety, facilitating conditions (in this research reduced to internet competence of the student), and gender (Venkatesh et al., 2003; Davis et al., 1992; Wu et al., 2000). The sixth explanatory variable, attending or not attending a compulsory ICT oriented course, may also be seen as one of the facilitating factors. Moreover, we checked the same model, but instead of the variable 'gender' we introduced the variable social class of the parents. This variable is in our analysis represented by a dummy variable where 1 represents the students with one or both parents having a blue collar position, and 0 the other students.

Both surveys contained 14 items translated from those used by Selwyn (1997) to measure performance expectancy or usefulness, effort expectancy or perceived ease of use, and anxiety. Because Selwyn's results showed the expected factor structure, a CFA was conducted imposing a three-factor structure on the data. The model also specified which items should load onto which factors. The fit of the model was adequate (TLI = .989, RMSEA = .057, SRMR = .032).

Since the same 14 survey items were repeated in the second survey, here, too, it was possible to test whether the structure found in 2004 would be retrieved in 2005. Again the CFA showed that the model fit was acceptable as judged by two of the three fit indexes (TLI = .974, RMSEA = .099, SRMR = .048) indicating configural invariance. The stronger test of the MGCFA model applied to both surveys simultaneously is shown in Figure 3. The model fit was acceptable with an RMSEA value of .063 and a TLI value of .985 (N = 677). Hence, we concluded that the same factor

structure is found in both surveys, also for the 11 variables, so it is appropriate to compare the factor scores from Survey 1 to Survey 2. To measure the increase or decrease of the three previous scales, the scores of 2004 were subtracted from the scores of 2005 (scale scores between -4 and +5).

Three Likert scales were constructed (see also Figure 3) in both surveys: 1) *performance expectancy*, the first independent variable, was measured by what Selwyn (1997) called a scale of "perceived usefulness" or usefulness of computers (e.g. Computers can allow me to do more interesting and imaginative work); 2) *effort expectancy* refers to the same phenomenon as Selwyn's "perceived control" and Davis' "perceived ease of use" (e.g. If I get problems using the computer, I can usually solve them one way or the other); and 3) *anxiety*, Selwyn's affective component, has four items (e.g. Computers make me feel uncomfortable). A high score expresses a high degree (5) of computer anxiety; a low score (1) indicates a lack of fear about using a computer.

(here Figure 3)

Facilitating conditions, here reduced to a scale of *Internet competence*, were captured on a scale composed of eight items, but after factor analysis reduced to five items (Cronbach $\alpha = .62$) (e.g. I find

almost always what I am looking for on the WWW; I use logical expressions (AND, OR ,…) to find documents on WWW)

Using CFA, the model fit was assessed and found to be adequate (TLI = .986, RMSEA = .044, SRMR = .026). These items were measured only in 2004. Therefore, no analysis was conducted to investigate whether the same factor structure could be retrieved in 2005. Likewise, no analysis on change is possible. This scale constitutes the fourth independent variable in the analyses.

By controlling for gender and social class we will shed some light on the digital divide (Attewell, 2001), reformulated by others as the digital differentiation approach (van Dijk, 2006). Over the years, the meaning of gender for the access or use of ICT has been changing. Around ten or more years ago, some authors (Sutton, 1991; Janssen et al. 1997) described a society in which we could find a group of, mainly male, ICT-interested users and an other group, composed of mainly women, who were reluctant to use ICT. In the meantime, the situation has changed. The gender gap has not totally disappeared but has diminished considerably but under some conditions this gap re-emerges (Colley & Comber 2003; Venkatesh et al., 2003; Losh, 2004; van Braak, 2004; Becker, 2006; Wang,Wu & Wang,2009). The same holds for the gap in ICT use between the social classes. Losh (2004) states that although women and poorly educated people (blue collar workers) increased their computer and ICT access, some gaps between the different social classes have remained or grown (see also Becker, 2006). This development supports researchers who leave the 'digital divide approach' for the 'digital differentiation approach' (van Dijk, 2006; Peter & Valkenburg, 2006). The latter approach suggests that gaps may be closed at a particular moment, but open again at an other moment. What actors do with ICT is not so much determined by ICT, but by the actors themselves. This approach suggests that whatever the access to ICT might be, there might be a different behaviour pattern among the actors. We will, therefore, look for possible differentiated behaviour among the two gender categories, and among working class students and other students.

Other variables relevant to understanding the digital divide or digital differentiation are age and education (Colley et al., 2003; Wang et al., 2009). Because the interviewed students have almost the same age and the same secondary school background, we cannot check the impact of these variables.

In addition to these variables, we will also check whether the kind of training in different faculties might influence the use and attitude towards ICT. We assumed that students who had to sit in a compulsory ICT oriented course (e.g. bioengineering, civil engineering, physics, mathematics, medicine, etc.) would rely more on computers for their studies than would other students. This might influence computer use frequency and the number of functions it is used for but also the ICT skills of the students. Regression analyses will be used to determine whether and to what degree these variables explain computer-use frequency and self-perceived computer confidence of students as well as changes in these variables after six months at the university.

In the following sections, we will describe the data and our analysis, starting with the access students have to a personal computer and the Internet.

4. Access to computers and the Internet

Almost all students (99%) registering at the university in our study in 2004 had a computer at home and 67% had this computer in their personal room. Six months later, in 2005, the same number had a computer at home, but only 30% had it for their personal use. But life had changed for these students:

67% of them lived in student housing and most of them had a computer in their room. Only 3% of those living in student housing had no computer in this place but did have one at home.

In 2004, 96% of the students had Internet access at home; and in 2005 all of the students except 2 had such a link: 63% had access both at home and at their rooms at the university: 1% only in their rooms, and 35% only at home. Although there is certainly still not equal access to universities for students from working-class families, our figures show that as far as basic computer equipment is concerned there is no difference between working-class students and others, not even as far as Internet access at home and at the university is concerned ($\chi^2 = 5.6$; $df = 3$; $p = .13$). This does not mean that all ICT differences have disappeared since 8% of the working-class students had no broadband access to the Internet whereas this was the case for less than 3% of the others ($\chi^2 = 7.179$; $df = 1$; $p = .007$).

In secondary school, 95% of the students used the computer for study mostly at home and only 3% at school. At the university, these figures are 37% and 2%, respectively, and 60% for using the computer most of the time in their rooms ($p < .0001$). Home was also the most important place for using the computer for chatting, games and other hobbies in secondary school. Of course, for most students living away from home, this changed in the university to their rooms, and, for those living with their parents, home was still the main place for this activity.

Although the students did not integrate computer use in daily school life (see table 1), a large part (82%) of the students used ICT in some courses in secondary school. At the university, only 52% of the students attended one or more courses in which ICT was central. Nonetheless, ICT played a more important role in their life at the university because the computer and Internet became important teaching instruments (for instance, with the use of the electronic blackboard). Only 42% of the interviewees used the computer daily or two or three times a week while studying in secondary school, whereas six months later at the university this figure was 83%. In other words, at the university the PC

became a basic instrument for the students. This does not mean that the students had no other PC experience than studying with them. In the last year of secondary school, the PC was used for chatting by most of the students and by a smaller group for gaming and other hobbies.

(here Table 1)

5. What factors explain self-perceived ICT competences?

About 52% of the variance in *computer maintenance* skills in 2004 is explained by our model. Six months later it was still 45%. All six explanatory variables play a significant role. This is clearly so for gender (β = -.476 and -.373) and effort expectancy (β = .384 and .326) (see Table 2). Male students and students who think they have control over a computer score higher for computer maintenance. This is also positively influenced by those who believe that computers can enhance their productivity, those who are not afraid to handle a computer (see also van Raaij & Schepers, 2008), those who know how to use the Internet, and, in 2004, those who have to attend a compulsory ICT oriented course during the first semester. This last variable had no significant influence in 2005. We assume that maintaining a computer is very basic for all students, also for those who use the computer daily without attending a compulsory ICT related course.

Developing WWW sites is not very popular among students (see Table 3). About 29% of the variance in 2004 and 30% in 2005 is explained by our model. Four variables of the model play a significant role. Developing WWW sites is mainly an activity of male students. Moreover, those who believe that they

can solve all kinds of computer problems and know how to use the Internet are more involved in developing web sites. It is interesting to note that ICT oriented students, six months after arriving at the university, are more convinced than the other students that they know how to develop web sites.

(here Table 2)

(here Table 3)

At the time of registration not all of the students had a thorough command of all *Basic ICT skills* nor is there significant improvement in this situation six months later (Table 2). In 2004 and 2005, the basic ICT skills were more in the hands of those students who found computers useful and had good command of the computer, who were at ease with a computer (see also van Raaij & Schepers, 2008) and were able to use the Internet properly, and who studied an ICT related course. These variables explained 28% of the variance in the use of basic ICT skills among students in 2004 and 25% in 2005. Note that we did not find a difference between male and female students as far as the command of basic ICT skills is concerned.

Since students have widely accepted the *use of the Internet* (chatting, using Google or Yahoo, etc.; average score 4.85 on 5 in 2004 and 4.88 in 2005; see Table 3), the proposed model does not offer a strong explanation of the variance in the phenomenon. In 2004, about 13% of the variance in Internet use was explained by the model, and in 2005 it was 11%. Only the variable anxiety can be used as a predictor of Internet use in 2004 and 2005, but in 2004 this was supported by the capacity to use the information of the Internet.

When we replace gender in our model by social class, we find slightly lower R^2's for the four forms of self-peceived ICT competences, but our data do not show many difference between working-class students and others. Similar self-perceived ICT competence is reported by students across social

class. The only exception was that working class students reported slightly higher ability levels to maintain a computer than other students in secondary school ($\beta = 0.218$, $p = 0.15$). To keep the costs low, they probably have to take care of their computer on their own more than their more fortunate peers. Nevertheless, this difference was no longer present six months later at the university. At that point in time, both working class students and others attain the same and, in comparison to six month earlier, higher level for computer maintenance (see table 2).

6. What factors explain computer use frequency?

In comparison with the former part of our analysis, the model is rather weak for explaining the frequency of computer use. Indeed, the theoretical model was developed to predict the intention to accept new information technology. This is not the case here. All students are familiar with ICT, although not all of them used it frequently. This observation supports the basic principles of the social differentiation approach: the use of ICT is not only determined by the availability of the material equipment, but by a willing actor (Peter et al., 2006). This model can explain about 24% of the variance in frequency of computer use for games when students enter the university. Six months later this figure is 13%. The same change is visible for the explained variance in frequency of computer use for other forms of recreation: 16% in 2004 and 12% in 2005. For the wider-spread forms of computer use like the use of a computer for study and chatting, our model contributes much less to the explanation of the variance in 2005. Only 7.5% of the variance in frequency of computer use for study in 2005 is explained by our model, and for chatting 6.3%. But before the students entered the university this model can explain 15% of the variance of the frequency of computer use for study and only 7% for chatting. Our model does not seem to contribute very much to the explanation of the frequency of use of computers once a particular new technology is widely accepted.

(here Table 4)

The most fruitful are the predictors of our model in predicting the frequency of computer use for study. Table 4 shows that computers are more frequently used for study by women before they enter the university and by those who know how to use information on the Internet and think that computers are useful. Less important as a predictor but still significant is a low level of anxiety for computers. Six months later we see some differences. It is still so that women and students who find a computer useful, use the computer more frequently than others for study.

When the students entered university, the computer was an instrument for daily chatting for about 42% of them, and 41% did it once or more a week. Six months later these figures were 54% and 31%, respectively (see Table 1). Most of the students no longer had to learn how to chat. This explains also why only a few of our predictors play a role. In 2004, the students with a high appreciation of the usefulness of a computer, a lower level of anxiety for computers, a higher level of knowledge about using the Internet properly, and attending a field of study with a compulsory ICT related course, were more likely to chat frequently. In 2005, this was more the case for students with high Internet competence, a high opinion about the usefulness of a computer but with a low command of the use of a computer, and attending a compulsory ICT related course. Chatting seems to be possible without much computer knowledge, and both sexes appear to chat equally frequently.

Playing games on the computer is much less popular among students than using the computer for study and/or chatting. The group that uses a computer daily for games is almost the same when entering university as six months later and accounts for about 8 or 9% of the students (Table 1). Among students, gaming seems to be overwhelmingly a male form of recreation when they enter the university and also six months later. When students enter the university, gaming also seems to be more popular among the students who believe in the usefulness of computers.

The computer is a little more popular among the students for other forms of recreation than gaming, but, here, too, the increase of students using a computer for recreation is much less than the increase of the frequency of use of the computer for study or chatting. When students enter university, gender is the most important predictor of using the computer for recreation. Six months later, this is still the case. The probability that the students use a computer more frequently for recreation is the highest among male students. Moreover, when the students entered university, computer use for recreation is found to be most frequent among students who think that computers can be useful, who have a high degree of control over the computer, and who believe in their ability to use the information of the Internet properly. Six months later, these predictors do not play a significant role except for the high score on Internet competence. Moreover, students who do not attend a compulsory ICT related course are more likely to use the computer more frequently for other forms of recreation.

Replacing gender in our model by social class does diminish the explanatory power of this model in comparison with the model in which gender is included. The frequency of use of the computer for study, chatting, and games is about the same for working class students and other students. But in secondary school working class students (score 2.2 out of 5) use the computer significantly ($p=.05$) less than the other students (score 2.7) for other forms of recreation (hobbies). This model explains 15% of the variance, and social class offers the strongest contribution. Our figures ($\beta = -.612$; $p = .002$) show that a computer is less used for hobbies among working class students than among other students in secondary school, although, six months later at the university, this difference had disappeared.

7. Changes in ICT skills and the frequency of computer use.

Before we answer the question of why we see changes in frequency of use of the computer and in ICT skills, we will give a short description of what has changed.

Matriculating in the university meant for most students a change of their learning environment. Most of them left their family home and went to live on their own. At the same time, remarkable changes occurred in ICT use and in the attitude towards ICT. Bowker's test of symmetry shows that computer use is significantly more frequent at the university than in secondary school for study ($p < .0001$) and chatting ($p < .0001$) but not for games ($p = .402$) or other forms of recreation ($p = .0535$). Gamers and students who used the computer for other forms of recreation did not change their pattern of behaviour (see Table 1).

Most of the students already had a good understanding of the use of the Internet before they came to the university. The average score in secondary schools and in the university is almost the same (4.85 and 4.88) (see Table 3). Chatting, e-mail communication and using Google and other search engines were and are part of their life. Attending the university did not change that behaviour. Nevertheless, when they arrived at the university they were less confident about their capacity to maintain the computer (score = 3.64) than six months later (score = 3.98). This means that they could handle the virus scanner better, change the resolution of the display of a computer, install a computer, etc. The use of basic skills to handle a computer did not change very much once they started at the university (scores = 3.67 and 3.7). These figures show that many students still did not know how to make graphs or do simple calculations in spreadsheets, automatically create a table of contents for a report, or make a presentation with PowerPoint or a similar program. There are still things to learn for some of them. Students are the least familiar with techniques for creating a website, and most do not know how to put a page on the Internet and how to create a page for the Internet. And although the average score at university increased significantly to 2.32 on 5 in comparison with the score in secondary school, it is still below the middle of the scale.

During the six months after matriculation, there is also change in the explanatory variables. The students scored 3.7 on the scale of usefulness of computers in the beginning of the academic year and 3.43 six months later ($p < .0001$) and 3.09 on the scale of control over the computer and 3.28 six months later ($p < .0001$). Why they became more critical about the usefulness of computers deserves more research. Close research of the items of the index for usefulness of the computers has shown that the scores on the 4 items decreased in 2005, but we did not find a special reason why this positive attitude could have diminished, except a more critical attitude towards computers that might have risen during the first six months at the university. Students scaled low on the anxiety scale (1.72 on 5), and this low score was almost the same (1.69 on 5) six months later ($p = .39$). The following analysis will use only the scores of 2004 because we want to know the link between some attitudes at the time of entering the university and ICT skills and computer use at that moment and six months later, after the students have become more familiar with their new learning environment.

Although UTAUT is meant to explain why people want to accept and use new information technology, we hypothesized that this theory could also be successful in explaining why students perceive increasing ICT skills in themselves in the use and/or maintenance of computers and/or the Internet and so would use these tools more often. More particularly, we focused on the usefulness and the control of computers, computer anxiety, and Internet competence. We also hypothesized that gender and social class could be important additional variables because men and women, or members of different social classes often show different attitudes towards ICT and might use them differently. And since some fields of study offer compulsory ICT related courses, we also hypothesized that students of these fields of study would act differently. Contrary to our expectations, our data show that this model is not very strong in explaining the **change** in opinions and/or behaviour of these freshmen over a period of six months. The data explain 6.4% (computer maintenance) or less of the variance in change of self-perception of the ICT competences of the actors and their frequency of

computer use (see Tables 2 and 4). No significant change is visible (see table 3) as far as the use of the Internet and basic skills are concerned, and our model does not contribute whatsoever to the explanation of the improving capacities among students to develop a website (see table 2), although the latter are still small (see table 3). Similar low figures for the explanation of the change in the frequency of use of the computer for games (2.1%), for other forms of recreation (3.2%), for chatting (3.6%), and for study (5.5%) occur (see table 4).

Gender plays a significant role in the explanation of change in the frequency of computer use for study, games, and other forms of recreation but not for chatting (Table 4). The data show that the men changed the frequency of use of the computer for study and other forms of recreation more after six months at the university than did the women but they are still behind the women. The change in frequency of computer use for games is more visible among women, but six months later they still scored lower than did the men. However, women used the computer equally as often as did the men for chatting at the moment of registering at the university and six months later, and, although chatting increased considerably in 2005 in comparison with 2004, both the men and the women increased their chatting equally. This is not surprising as students living in rented rooms away from their hometown would be expected to use their computer to contact friends. The change of time spent on the computer for study benefits the most from our explanatory model: students attending a compulsory ICT related course, men, those who score high on computer anxiety and low on Internet competence contribute the most to this change.

At this university social class has only a minor influence on frequency of computer use. Only the time spent on the computer for other forms of recreation or hobbies has significantly ($p < .05$) changed for working class students (score 0.67) in comparison with other students (score 0.13), not for study, chatting or games. Social class ($\beta = 0.417$; $p = .02$) contributes significantly only to the explanation of the rise of computer use for other forms of recreation, and this is because working class students start to resemble the other students more as far as this item is concerned. In secondary school the working

class students had a score of 2.2 out of 5 in comparison with a score of 2.7 for the other students ($p<.05$); at the university this score was the same for both (2.8). The other variables of our model did not contribute significantly to the explanation of the rather small increase of computer use for hobbies. Moreover our model explains no more than 3.3% of the variance.

Wondering about the reasons for the low contribution of our model to the explanation of change in ICT skills and computer use, we formulated the following hypotheses. First, the score of some of the measured phenomena was already very high in 2004, which made it almost impossible to increase in 2005 (e.g., as regards Internet use); second, fruitful variables for the explanation of attitudes and behaviour may well not be able to explain changes in these attitudes and behaviour.

8. Discussion

Relying on basic components of UTAUT (performance expectancy, effort expectancy, anxiety, facilitating conditions), gender or social class, and domain of study of the students, we sought an explanation of the varying frequencies of computer use and the differences in ICT skills in secondary school and in university. We used multiple linear and logistic regression analysis. Our model with gender proved to be fruitful for the explanation of the different ICT skills but less so for the explanation of different frequencies of computer use and weak for the explanation of the change of both between 2004 and 2005 (see also Marchewka, Liu & Kostiwa, 2007). In our model with social class, social class (one and/or both parents of a student are blue collar workers or not) only contributed significantly to the explanation of computer maintenance in secondary school, computer use for other forms of

recreation in secondary school and the increase of computer use for these forms of recreation at the university. After six months at the university working class students showed the same frequency of computer use for these forms of recreation as the others.

Before showing the main results of this analysis, we should make some reflections about the theory and parts of the methodology that are at the base of this project. UTAUT, although actually focused on the explanation of the acceptance of new information technology, contains important variables that might explain the frequency of use of the computer and the self-perception of ICT skills, even when most of the students have already embarked on the use of a computer. Our study has shown that the variables included in our model did contribute significantly to the explanation of several aspects of computer use and self-perception of ICT skills. Even the variable 'computer anxiety', often seen as not strongly present among youngsters, explained significantly the four aspects of self-perception of ICT skills, although it did not contribute anything to the explanation of the change in the capacity to maintain a computer or to develop a website.

This brings us to a second issue. We were interested in the process of change during the first six months of students at the university. This is an important period of adaptation for freshmen to a new environment. Our data has shown (see table 1 and 3) that there is significant change in some aspects of the frequency of computer use and the self-perception of ICT skills in a period of six months, but our data also show that our model is not very fruitful to explain this change. It is possible that the period between the two questionnaires was too short to see more change and probably also a larger contribution of this model to the explanation of this change.

Third, the instrument also deserves consideration for studying frequency of computer use and computer skills. Although there is no reason to believe that self-reporting of these phenomena is less reliable than for phenomena in an other environment, we should not forget that there might be a discrepancy between the data collected by an observer (or automated tracking) of the frequency of

computer use and the ICT skills of students and data reported by the interviewees themselves. What we collected is the judgement of the investigated actors, and this should be kept in mind when these data would be compared with data collected by an independent observer.

Fourth, in section 3 we reported that we checked for the possibility that students who do not own a computer or do not have a fast link with the Internet were underrepresented in our sample. The data supported our starting point that having sent our questionnaires by the Internet gave most of the students the possibility to answer our questionnaire. Nevertheless, this does not guarantee an unbiased sample.

Fifth, this research took place among freshmen in one university. This certainly has its consequences for the results of this research. Nevertheless, it is not unconceivable that students in other countries having the same access to ICT during secondary school and facing a similar use of ICT at the university may act according the pattern described above. Indeed, research in universities in other countries has shown that relationships between the most important variables of the UTAUT model are sometimes supported by the data, sometimes not. In a research among university students and others in Taiwan about the use of m-learning (delivery of learning to students anytime and anywhere) Wang et al. (2009) found a considerable support for UTAUT and additional variables. Marchewka et al. (2007) and van Raaij & Schepers (2008) in studies about the acceptance of course management software for a virtual learning environment in respectively an American university and a Chinese MBA program found not only support for the model but also disconfirmations. Outside universities, Wu et al. (2007) studied the acceptance of 3G services in Taiwan, Carlsson et al. (2006) the adoption of mobile services in Finland, and Wills et al. (2008) the acceptance of the electronic medical record among nurses in the USA. The three studies confirmed that performance expectancy was important for the

explanation of behavioural intentions, but effort expectancy played only a role in Finland and the USA. Future research will sort out which of the variables of this model and under what conditions they will contribute to the explanation of ICT acceptance and use.

Sixth, at the moment of the collection of our data, some of the current social ICT instruments connecting people (for example, Facebook, Twitter, etc.) did not exist or had just begun appearing, and are used by a lot of students today. This does not diminish the importance of the ICT instruments that were investigated in this study. Even in this fast changing ICT environment, the ICT competences that are researched are still fundamental stepping stones for a more advanced level of ICT use in a Web 2.0 environment.

9. Conclusion

Taking into account these limits, this research shows some interesting results concerning ICT related behaviour and opinions of freshmen. All freshmen face a new learning environment. They must take on more responsibility for their own study behaviour, are confronted with a more rapid pace of learning, receive less attention from their teachers, and so on. It is easily taken for granted that the PC belongs to the basic equipment of the student not only in university but also in secondary schools. To a certain extent, this is true. PCs are present in secondary schools and students are supposed to use them. Nevertheless, we wanted to know whether university students use the PC the same way as in secondary school: because the learning environment changes substantially, we hypothesised that students would also handle PCs and Internet differently than they did in secondary school. Our panel-research data confirmed this hypothesis.

Although almost all of the students could use a computer in secondary school at home, the computer also becomes a basic personal study tool for university students. While many students had

to share the computer and the Internet connection with other family members when they were in secondary school, this is generally not the case at university. A large proportion of freshmen has their own PC and an Internet link because they no longer live at home. Access to a PC and the Internet seems to be much easier now, and this, together with a changing function of the computer, contributes to an increase of its frequency of use. In secondary school, the computer was used mainly for recreation. Most of the time was spent on the computer for chatting, and a minority of the students also used a computer for playing games and other forms of recreation. Although the computer was also used for study in secondary school, the number of freshmen using the computer daily for study increased five fold during the first six months of university attendance. Chatting also increased but less than did the daily use of a PC for study.

This experience could contribute to the improvement of ICT skills. Our data confirmed this in part. Six months after registering in university, the freshmen had significantly more knowledge about the maintenance of a computer and the development of websites although the latter competence was not very widespread. However, there was no change at all as far as the use of Internet and basic ICT skills are concerned.

Students who considered the computer to be a useful instrument, who had control over the computer , who enjoy a certain level of Internet competence, and who were at ease with the computer were more likely to have the skills to maintain a computer, to develop a website, and to employ basic ICT skills. The same link for perceived usefulness and/or perceived ease of use of an ICT application was confirmed by other researchers for the intention to use other forms of ICT applications (Carlsson et al. 2006; Wu et al. 2007; Lee, 2008; Lee et al., 2009; Lee, 2010; Cho et al., 2009; Chatzoglou et al.,

2009; Teo et al., 2009; Wang et al., 2009; Liu et al., 2010) and/or for the use of other forms of ICT applications (Selim, 2003; Fuselier et al. 2008; Schepers et al., 2008; van Raaij & Schepers, 2008; Wills et al., 2008; Wang & Wang, 2009). The link between both explanatory factors, perceived usefulness and perceived ease of use, on the one hand, and intentions to use or the usage of ICT applications on the other hand, was not always direct: perceived ease of use might support perceived usefulness and through this factor intentions to use ICT applications or the usage of applications are supported (Padilla-Melendez et al., 2008; Liu et al., 2009; Sanchez-Franco et al., 2009; Sanchez-Franco, 2010;) Nevertheless, these variables had little influence on skills in using the Internet. This is probably because most of the students were already very familiar with the Internet in secondary school.

The same variables also contribute to explaining the different frequencies of computer use, but they do not explain a large proportion of the variances of these frequencies or of the change in ICT skills and frequencies of use of the PC between secondary school and university. Although this model has proven to be fruitful for the explanation of the self-perception of ICT skills and frequencies of use of the computer, other research shows that it is more helpful for explaining the acceptance of new information technology (Venkatesh et al. 2003).

Among the digital divides, different social-economic groups and gender categories are the most visible in our study. Although there still is a digital gap in our society based on socio-economical differences, our data suggest that this divide disappears in the university. Working-class children also had PCs, used them frequently, but spent less time at the computer for other forms of recreation in secondary school than other students, a difference that disappeared at the university. Working class students saw themselves more capable to maintain a computer than others, but this difference disappeared six months after arriving at the university. Other differences in ICT competences and computer use between working-class students and others were not found. The university seems to be a place where some, but not all differences between the social classes disappear. Digital differentiation based on gender was more markedly present among these students, but it took different

forms. The women spent less time on the computer playing games or engaging in other forms of recreation, but they used a computer much more for study. However, they thought they had fewer skills in maintaining the computer, developing websites, or applying basic ICT skills, but they did not think they were less capable in using the Internet (see also Sutton, 1991; Volman et al., 2001; Colley et al., 2003; Losh, 2004). The digital gap by gender among students is no longer a simple line between women who know less and do less with ICT than do men. These data support the digital differentiation approach (van Dijk, 2006).

10. Implications

Within a society where ICT is indispensable, all forms of higher education should invest in familiarising students with it (Puustinen & Rouet, 2009). Moreover, familiarity with all kinds of ICT is a condition for successful study at the university where more room will be offered to web based learning. Yang and Tsai (2008) stated that students would become “more adaptive to on line learning after years of higher education” and that this is connected with a higher belief in the usefulness of web-based learning. Our study suggests that, in order to achieve this, students first have to be convinced that ICT is useful. It also shows that students with more Internet skills use the computer more and master more ICT skills than do others. Moreover, students who have more control over the computer are also more likely to acquire more complex ICT skills (see also Fusilier et al., 2008). The university might well offer this kind of learning environment, but students would take more advantage of it if special programs were offered to support this development. As Conrad & Munro (2008) observed, simple exposure to the ICT instruments is not sufficient to improve ICT efficacy.

Acknowledgments

The authors have gratefully relied on the comment of three anonymous reviewers and Chin-Chung Tsai, co-editor, to improve a former version of this article.

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Figure 1: Explanatory model

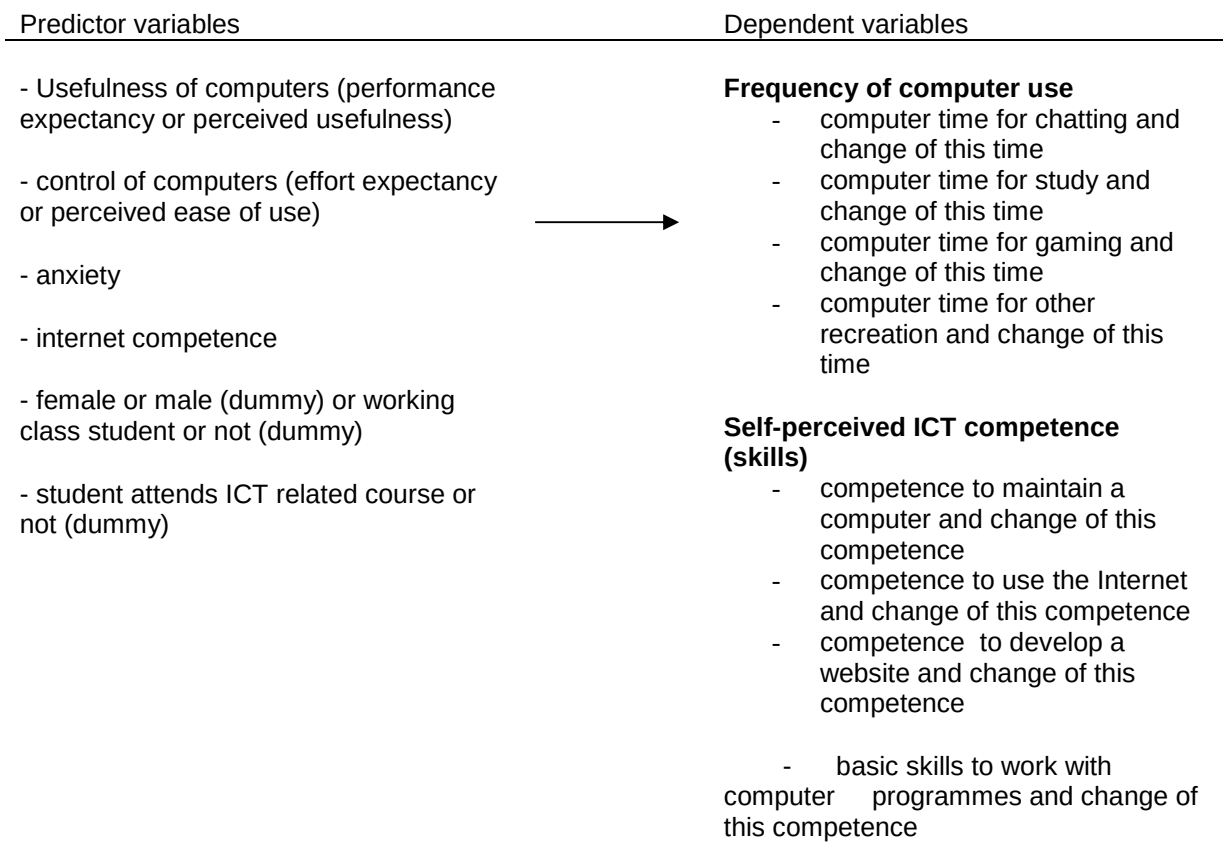


Figure 2: Results of the confirmatory factor analysis of ICT skills

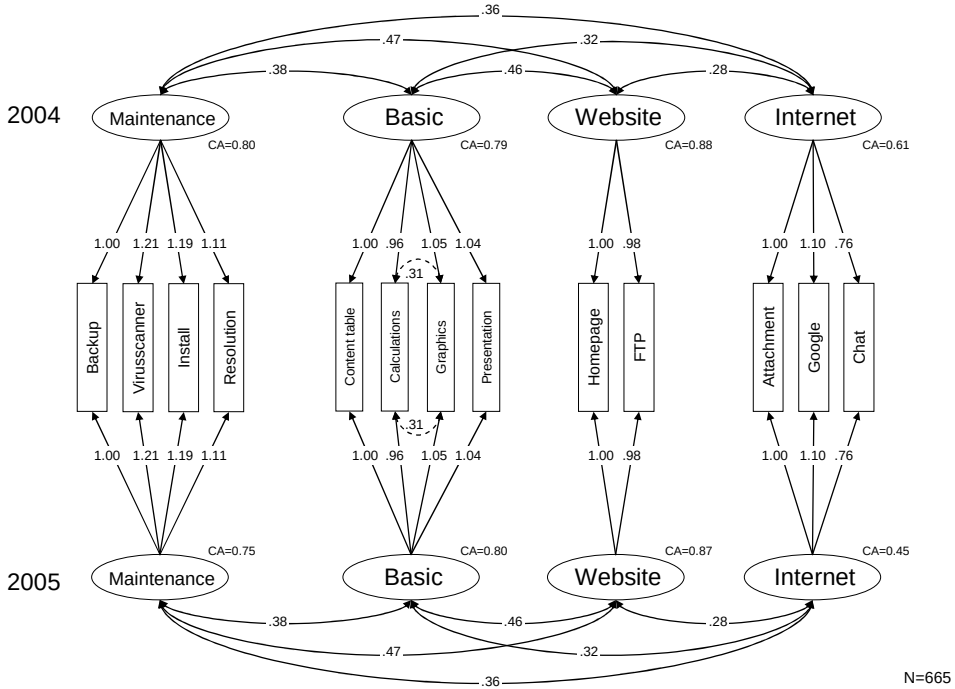
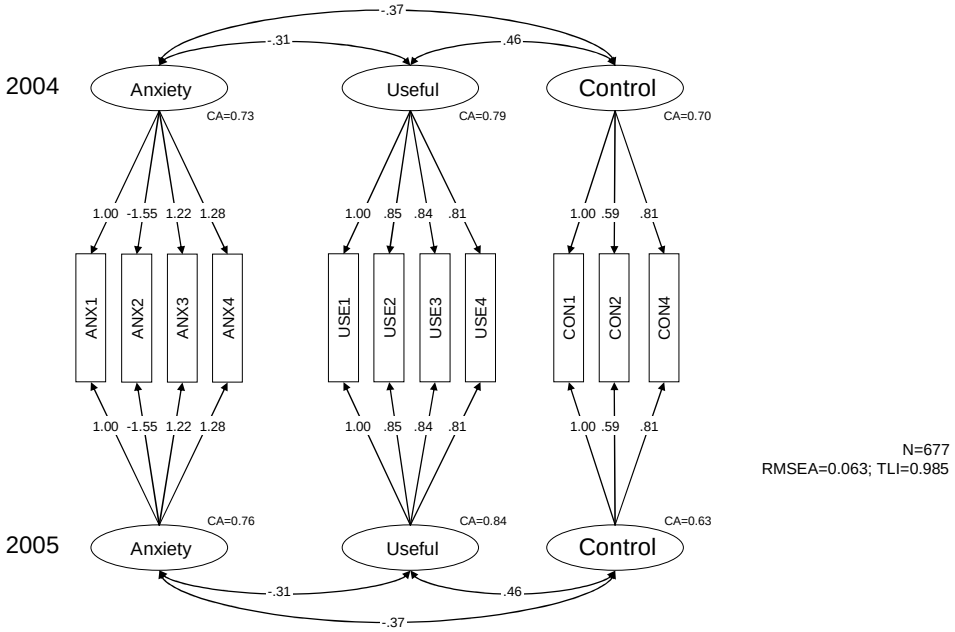


Figure 3: Results of the confirmatory factor analysis of three independent variables



Unstandardized solution.

Table 1. Frequency of computer use (%) (N = 715)

Computer use	Frequency						
	Daily	2 or 3 times a week	Weekly	Monthly	Less than once a month	Never	Total
For study in 2004	9.42	32.69	35.63	17.80	3.39	1.07	100
For study in 2005	49.09	34.01	13.08	2.38	1.44	0.00	100
For chatting in 2004	41.70	27.70	13.56	4.79	3.25	8.99	100
For chatting in 2005	53.96	21.35	9.96	4.78	3.90	6.05	100
For games in 2004	8.02	13.94	17.45	16.68	19.26	24.65	100
For games in 2005	8.75	16.00	16.33	13.00	19.60	26.33	100
For hobby in 2004	13.86	18.05	29.71	13.96	13.11	11.29	100
For hobby in 2005	17.68	20.91	26.78	14.52	10.56	9.54	100

Table 2: Predictors of self-perception of ICT skills (regression analysis)

Predictors	Self perception of competence											
	Maintain a computer			Develop a site			Use basic ICT skills			Internet use		
	β 2004	β 2005	β change	β 2004	β 2005	β change	β 2004	β 2005	β change	β 2004	β 2005	β change
Intercept	1.326	2.199	0.909	-0.793	-0.511	-	1.791	1.913	-	4.382	4.859	0.513
Useful (Performance expectancy)	0.271***	0.206***	-	-	-	-	0.232***	0.178***	-	-	-	-
Control (Effort expectancy)	0.384***	0.326***	-	0.497***	0.458***	-	0.224***	0.246***	-	-	-	-
Anxiety	-0.266***	-0.194***	-	-	-	-	-0.214***	-0.161**	-	-0.117***	-0.118***	-
Internet competence	0.194***	0.121*	-	0.252**	0.318***	-	0.186*	0.169**	-	0.113***	-	-0.081**
Female	-0.476***	-0.373***	-	-0.320***	-0.434***	-	-	-0.145*	-	-	-	-
ICT course	0.134*	-	-	0.169*	0.177*	-	-	-		-	-	-
R^2	0.524	0.447	0.064	0.289	0.298	-	0.284	0.253	-	0.126	0.110	.031
F	124.52***	90.38***	7.63***	46.08***	48.25***	-	44.64***	38.11***	-	16.20***	13.97***	3.53**

$p < .05$ = * ; $p < .01$ = **; $p < .001$ = ***

Table 3: Average scores (1 to 5) of ICT skills in 2004 and 2005 and significance of differences between the average scores of 2004 and 2005

Confidence in his/her competence to	Mean score (1-5) (N)	t-value for difference 2004-2005 (N)
Maintain a computer 2004	3.64 (706)	-11.95*** (696)
Maintain a computer 2005	3.98 (703)	
Use the Internet 2004	4.85 (702)	-1.66 (699)
Use the Internet 2005	4.88 (713)	
Develop a website 2004	2.09 (710)	-6.11*** (708)
Develop a website 2005	2.32 (715)	
Use basic skills 2004	3.67 (706)	-0.89 (696)
Use basic skills 2005	3.70 (705)	

p> .0001 = ***

Table 4: Predictors of frequency of four forms of computer use (regression analysis)

Predictors	Frequency of computer use for											
	Study			Chatting			Games			Other forms of recreation		
	β 2004	β 2005	β change	β 2004	β 2005	β change	β 2004	β 2005	β change	β 2004	β 2005	β change
Intercept	-1.445	-1.531	1.619	-0.266	-1.213	1.029	-0.644	-1.043	0.488	0.397	-1.096	1.532
Useful (Performance expectancy)	0.478***	0.484***	-	0.244*	0.300**	-	0.308**	-	-	0.232*	-	-
Control (Effort expectancy)	-	-	-	-	-0.257**	-0.155*	-	-	-	0.246**	-	-0.204*
Anxiety	-0.288*	-	0.155*	-0.235*	-	-	-	-	-	-	-	-
Internet competence	0.492***	-	-0.187*	0.327*	0.333*	-	-	-	-	0.450***	0.478***	-
Female	0.854***	0.460**	-0.302***		-	-	-1.694***	-1.129***	0.368**	-0.695***	-1.045***	-0.315*
ICT course	-	-	0.239**	0.281*	0.541***	-	-	-	-	-	-	-
R^2	0.155	0.070	0.055	0.075	0.063	.036	0.237	0.130	.021	0.165	0.123	.032
F			6.56***			4.22***			2.42*			3.80***

$p < .05$ = * ; $p < .01$ = **; $p < .001$ = ***

Appendix A

Comparison of some variables of the sample (N = 714) and the population

Variables		N Sample	% Sample	N Population	% Population	Signifi-cance (χ^2)
Gender	Male	245	34.31	2202	44.40	p<.0001
	Female	469	65.69	2758	55.60	
	Total	714	100.00	4960	100.00	
Secondary school of student	Academic track	675	96.98	4523	95.30	p = .04
	Non-academic track	21	3.02	223	4.70	
	Total	696	100.00	4746	100.00	
Employment of parents	Non-labourers	684	96.75	4688	96.94	p = .78
	Both parents labourers	23	3.25	148	3.06	
	Total	707	100.00	4836	100.00	
	Non-labourers	552	78.08	4052	83.79	p = .002
	One or both parents labourers	155	21.92	784	16.21	
	Total	707	100.00	4836	100.00	
	Not working in education	552	78.08	3690	76.31	p = .30
	At least one of the parents working in education	155	21.92	1146	23.69	
	Total	707	100.00	4836	100.00	
Education of parents	Higher Education	510	73.91	3574	72.66	p = .44
	No higher education	180	26.09	1345	27. 34	
	Total	690	100.00	4919	100.00	
Scholarship	No right on scholarship	430	60.22	3024	60.97	p = .09
	Right on scholarship	284	39.78	1927	39.03	

	Total	714	100.00	4951	100.00	
Housing of student	Living in rented room	530	74.23	3312	66.77	p < .001
	Living at home	184	25.77	1648	33.23	
	Total	714	100.00	4960	100.00	
Domain of study	Positive sciences	128	17.93	1068	21.55	p = .0016
	Biomedical sciences	120	16.81	1004	20.26	
	Humanities	466	65.27	2884	58.19	
	Total	714	100.00	4956	100.00	
Introduction day	Student participated	530	74.23	3552	72.12	p = .239
	Student did not participate	184	25.77	1373	27.88	
	Total	714	100.00	4925	100.00	