
# Software Piracy Among University Students

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# Abstract

Software piracy has been an ongoing issue for decades and it has a tremendous economic impact on software business. Software piracy seems to be especially common among young people, who often are technologically oriented and happen to be students.

The purpose of this study was to map out what kind of a role software piracy plays among the students of the University of Oulu. The goal was also to find out how common software piracy is and how the software piracy rates differ among different subpopulations as well as finding out the reasons for software piracy. The study was of quantitative nature and a survey was conducted in order to gather data. In addition, a conceptual model was proposed and its purpose was to map out which factors influence the attitudes and intentions regarding pirating software, and the questions of the survey were partly based on the conceptual model. The aforementioned survey was distributed to the students of the University of Oulu as an online link via email.

This study examined and compared the demographic factors as well as the reasons and purposes behind software piracy. The results of this study indicate that age and gender have statistical significance with software piracy. When it came to reasons, expensiveness was the most significant reason, which was in line with previous literature. The study also investigated the views of university students regarding software piracy. The connections in the conceptual model were explored as well: the factors presented in the conceptual model were found to be correlated although the strength of the correlation varied greatly. In addition, all of the connections in the model had statistical significance.

***Keywords***

software piracy, university students, quantitative study

***Supervisor***

Seppo Pahnila, university lecturer

# Foreword

I became interested in this topic when I was writing my Bachelor's thesis, which was about software piracy prevention methods in software business. Software piracy seems to be a constant hot topic, and it will probably continue to do so in the future as well. What I find fascinating about this topic is its complexity; software piracy is a multi-faceted issue, and it will be interesting to see what kind of forms it will take in the future.

The writing process of this thesis was very grating in the beginning, to be honest. In the beginning it was rather difficult to narrow down the topic and the scope of this study, but fortunately as I made progress with this thesis the writing process became a lot easier. Overall this has been a very educational process to me despite its stressfulness: I have learned a lot about this topic as well as scientific research itself.

I would like to thank my thesis supervisor Seppo Pahnila for his advice and feedback regarding my thesis. I feel that without his help I probably would have been lost with my thesis, and after our meetings I always felt that I had learned something and gained necessary guidelines in order to make progress. I would also like to thank the students who participated in my survey as well as my friends who participated in the pilot tests of the survey.

Lastly, I would like to thank my significant other Juho for his support during this process. Without him I probably wouldn't be where I'm now.

Johanna Korhonen

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# Contents

# 1. Introduction

Software piracy has been a major concern in the world of business for decades. It has assumed many forms and there have been various attempts at tackling it but to no avail. Software still continues to be a major economic concern on an international level: according to the Business Software Alliance (BSA), unlicensed software resulted in losses of $400 billion (Business Software Alliance, 2016). However, according to the same report there seems to be a downward trend in software piracy rates worldwide.

There have been attempts at curbing software piracy, but so far they have proven inefficient. Software piracy has often been fought with stricter policies, for example, but studies show that are not the best course of action. Instead, Jaisingh (2009) found out that stricter piracy policies may lead to increases in piracy instead of decreasing them. Software piracy is such a multifaceted issue and there is no clear cut solution for it.

There have been a number of studies regarding software piracy among university students (Cronan, Foltz, & Jones, 2006; Morgan, Neal, & Maris, 2008; Spark, 2010). Studies have explored various demographic factors and their relation to software piracy. The studies have examined, for example, gender, age, academic discipline, level of household income, and personal computer experience, among many others. However, the results have been so far been rather inconsistent; there is no clear consensus whether some factors have a relationship with software piracy. For example, Spark (2010) confirmed in her study that gender had a strong relationship with the intention to pirate software. However, some other studies haven't found a significant relationship between gender and software piracy: for example, Hsieh & Lee (2012) found no differences between genders. This study aims to find out how the software piracy rates differ between genders among the students of the University of Oulu and see how the results compare to the past studies.

Studies have also investigated the reasons behind software piracy. Some studies have researched the attitudes regarding software piracy and reasons behind pirating software. Sang, Lee, Kim, & Woo (2015) found out in their study done on Korean and American students that cost and availability were very significant factors for both groups. The importance of costs has been confirmed by other studies, too: Konstantakis, Palaigeorgiou, Siozos, & Tsoukalas (2010) found out that students mentioned their student status and lack of income as justifications for software piracy. Siponen & Vartiainen (2007) confirmed the significance of high cost of genuine software in their study. This study also aims to find out what kind of reasons students have for software piracy as well as purposes of pirated software.

## 1.1 Research questions and methods

The study aims to find out what sort of significance does software piracy have among university students and what kind of reasons they have for software piracy. The main research question was the following:

- What kind of role does software piracy play among university students?

The main question also has the following supporting questions:

- How common is software piracy?
- How do the piracy rates differ between different subpopulations e.g. are there differences between genders, age groups, majors?
- What kind of reasons are there for software piracy?

The study was of quantitative kind and was conducted as a survey. The survey which addresses the research questions was distributed to the students of the University Oulu as an online link via email. The survey data was collected with Google Forms, and SPSS was used in the analysis of the data. The questions of the survey were also based on a conceptual framework derived from existing literature and it served as a basis for the survey along with the research questions described above.

## 1.2 Scope of the study

This study focused on the students of the University of Oulu. On a global scale there have been software piracy related studies done on university students, but there weren't many done on Finnish students, and seemingly none have been done on the students of the University of Oulu.

## 1.3 Structure of this thesis

In the second chapter we will review the literature related to the topic of this thesis. We will discuss software piracy in general; its significance in today's world, piracy rates, economic impacts etc. After that we will discuss the cultural dimensions of national culture and their effect on software piracy rates. Some of the dimensions have been used in explaining differences on views regarding software piracy, and there are studies which explore the cultural dimensions and evaluate whether they can be used for explaining software piracy rates by nations. After discussing the dimensions of national culture we will move on to discussing intellectual property rights. The global history of the subject will be touched, but the focus is on Finnish legislation in its current form. The intellectual property rights will be followed by the main subjects of this study, software piracy among students and reasons for pirating software. In the former we will discuss how software piracy has been studied worldwide and what have been the crucial findings of these studies. The literature review chapter will be concluded by addressing the literature regarding reasons for software piracy.

In the third chapter the research methods of this study will be presented. Firstly we will discuss the differences between quantitative and qualitative research and explain what sort of research methods this study utilizes. This chapter will also present the theoretical framework on which the survey used in this study was based on. The fourth chapter is dedicated to presenting the results of the survey as well as analysing them. We will go through the demographics of the data while analysing it and also mirroring it against the research questions of this study.

In the fifth chapter we will discuss the aforementioned results and mirror them against previous literature. We will compare how the results of this study compare to those presented in the literature review, and we will discuss whether they are similar or not. Finally, the sixth chapter will conclude this thesis. The final chapter will briefly summarize this study and its findings while also giving pointers to future research.

# 2. Literature review

In this chapter the previous literature related to the study will be reviewed. Firstly, we will present the literature regarding software piracy in general, with the focus being on the economic impact of software piracy. Second, the cultural dimensions coined by Geert Hofstede will be presented and their possible relationship with software piracy will be discussed. Third, laws regarding intellectual property will be discussed with the focus being on Finnish legislation but while also providing some historical insight regarding copyright laws. Fourth, the literature regarding software piracy among students will be reviewed. Finally, the reasons for software piracy among students will be discussed.

## 2.1 Software piracy in general

Software piracy is a significant economic concern in software business on a global scale. According to 2016 survey conducted by the Business Software Alliance (BSA), unlicensed software cost businesses more than $400 billion in 2015. However, despite the tremendous losses there seems to be a global downward trend when it comes to piracy rates. In 2015 39 per cent of all software globally was unlicensed, which is a four-per cent drop over a decade. According to the survey the average rates of unlicensed software were the lowest in Western Europe and North America, 28% and 17% respectively, while Asia-Pacific and Central and Eastern Europe have the highest rates with the former standing at 61% and the latter at 58%. The regional differences were stark; for example, the average for European Union was 29% while the BRIC countries (Brazil, Russia, India, and China) stood at 64%. For comparison, the rate of unlicensed software for Finland was 24%, a one per cent drop from 2013. (Business Software Alliance, 2016)

However, BSA's estimates have met some criticism. According to Leung (2013) the BSA estimates the potential gains from eradicating software piracy, but BSA's estimates ignore the substitution between piracy and outside options and thus are tremendously inflated. The same study states that the true cost of piracy is only 15% of BSA's estimated cost of piracy. (Leung, 2013) In addition, Png (2010) suggests that BSA statistics should be used with caution in academia and government policies. According to the study, BSA's methodologies changed around 2002-2003 and that change had its effect on published piracy rates. BSA's statistics are often taken at face value, and the study suggests that in future research the biases in BSA's statistics should be taken into account.

Gomes, Cerqueira, & Almeida (2015) derived eight stylized facts in five different dimensions regarding software piracy from existing literature. In the economic dimension they present three stylized facts: first, Gross Domestic Product (GDP) per capita affects software piracy negatively, meaning that increase in GDP leads to decrease in software piracy rates; second, income inequality affects software piracy negatively; and third, Human Development Index (HDI) affects software piracy positively.

Andrés & Goel (2012) examined the effects of software piracy on medium-term growth while using cross-country data from 2000-2007. As expected, they found out that software piracy does affect economic growth and the greater the software piracy, the lower the economic growth. However, the authors also point out that the relationship between piracy and growth is not linear since the decrease in economic growth diminishes with piracy. The explanation for this is that low piracy rates reduce investments while the increasing piracy rates have some positive spillovers which reduce the decline of growth. (Andrés & Goel, 2012)

Rasch & Wenzel (2015) studied the impact of software piracy on prominent and non-prominent software developers in markets based on a two-sided platform business. Prominent pieces of software are known by users well in advance of adopting a platform and they play a major role in users' adopting decisions. Conversely, non-prominent pieces of software are not well-known and thus do not influence users' adopting decisions. Users often take only prominent software into account when adopting a platform. The authors found out that prominent pieces of software suffer from higher piracy rates, and higher levels of software protection might not be beneficial. Relatively well-known pieces of software were not hurt by low levels of piracy protection whereas less known products were hurt. Prominent developers face harsher competition compared to their non-prominent counterparts and the competition intensifies in the presence of low software protection, making the license fees more affordable for prominent developers. (Rasch & Wenzel, 2015)

Curbing software piracy is not an easy task. Jaisingh (2009) examined the effect of piracy policies created by alliances such as the BSA on innovation in the presence of piracy. Counterintuitively, stricter piracy policies that increase the perceived cost may lead to an increase in piracy instead while also decreasing the quality of the product. The study also found out that in a monopoly setting stricter piracy policies act as disincentives to innovation. In a competitive setting, on the other hand, stricter policies were incentives for innovation without losing quality. (Jaisingh, 2009)

Multiple factors that affect software piracy have been identified. Nill, Schibrovsky and Peltier (2010) studied a set of potential determinants of illegal software installations among mid-level business managers in Germany. They derived a set of factors from previous literature, and according to their study one of those factors is knowledge of external consequences of software piracy i.e. consequences either to the industry or for the violator. Educating consumers about the effects of software piracy on software industry and economy as a whole is, according to BSA, one crucial step for reducing software piracy. Some studies suggest that there is a correlation between trade regulations and piracy, although other studies have contrary results. Fear of personal legal consequences is another factor; the perceived threat of punishment is suggested to have a decreasing effect on individual's desire for pirating software. The access to illegal software has also been found to be a contributing factor: the greater the availability of unauthorized software, the higher the rates of piracy. Attitudes toward software piracy also play a major part: often consumers view software piracy as acceptable since nothing tangible is actually stolen. The final factor to be examined is social norms; the relationship between collectivism and piracy has been studies, but Germany is not categorized as a collectivist culture.(Nill, Schibrowsky, & Peltier, 2010)

The goal of the study was to examine software piracy in a country which spends a lot of money in IT software yet has low piracy rates, and the results differed from previous literature in a number of ways. They found out that personal attitudes, knowledge of consequences and fear of personal legal consequences had a significant impact on

software piracy. On the other hand peer-orientated social norms were found not to have a significant impact. The discrepancies between study results highlight the need for greater cross-cultural studies on software piracy. (Nill et al., 2010)

Software piracy can be separated into two categories: commercial piracy and end-user piracy. An example of commercial piracy would be, for example, buying something from the black market, in which the reseller gains the profits and thus competes with legal distributors. End-user piracy, on the other hand, is much more difficult to detect: in this case the consumers use software which was not legally sold. (Gomes et al., 2015)

Sudler (2013) states that since digital and Internet paradigm shifts have fundamentally altered supply chain ecosystems which have opened doors to new types of piracy a new approach is needed. After all, digital rights management (DRM) has proven to be ineffective, and all software piracy prevention methods have been broken. In many cases DRM approaches have been easily compromised. In fact, studies have shown that DRM measures may actually discourage consumers from buying the genuine product; measures like authentications, regional settings and limitations on installations often are inconvenient for legitimate buyers. In addition, employing DRM technologies may inflate company costs; implementing DRM and funding the IT services related to its maintenance may quickly erode profits and even threaten a company's business model. (Sudler, 2013)

Sudler (2013) also suggests that instead of attempting to eliminate online piracy, solutions should be aiming at maximizing revenues while in the presence of 'managed' piracy, meaning that it should be kept within acceptable limits. In addition, appropriate technologies should be combined with new business models designed for the new supply chain ecosystems. For example, Apple has approached online piracy with their iTunes Match service, which essentially leverages piracy without punishing the consumer for it.

## 2.2 Cultural dimensions and software piracy

The dimensions of national culture coined by Hofstede (2001) can be used in describing and explaining the differences in software piracy between different countries. The dimensions are as follows: power distance (PDI), and the basic issue in this is human inequality, which is handled differently in different countries; uncertainty avoidance (UAI), which can be described as a level of stress in a society when the future is unknown; individualism versus collectivism (IDV), which describes the relationship between the individual and collectivity in a society; masculinity versus femininity (MAS), which is about the division of emotional roles between men and women; and lastly, long-term versus short-term orientation (LTO), which is the fifth dimension and which can be described as the choice of focus for people's efforts and the maintenance of links to the past while dealing with the challenges of the present and future. In addition, in 2010 a sixth dimension called indulgence versus restraint (IND) was added (Hofstede, G., Hofstede, G. J., & Minkov, 2010).

Finnish culture can be explored through these dimensions. Finland scores low on the power distance dimension, meaning that, for example, superiors are accessible and equal rights and independence are valued. Finland can be described as an individualistic society with an IDV score of 63, which means that loosely knit social frameworks in which people take care of themselves and their immediate family are preferred. Finland can also be considered a feminine country, which means the dominant values are caring for others and quality of life and the focus is on wellbeing, not on status. However,

Finland scores high on the uncertainty avoidance dimension and countries which have high UAI tend to maintain rigid codes of belief and are not tolerant of unorthodox ideas. Finland also scores low on the long-term orientation dimension, which means that Finnish culture can be described as normative. In addition, Finland scores relatively high on the indulgence vs. restraint dimension, which indicates that Finland is an indulgent country. High indulgence score means that people tend to realize their impulses and desires, and they possess a positive attitude and place a lot of importance on leisure time. (Hofstede, G., Hofstede, G. J., & Minkov, 2010; Hofstede, 2001)

Husted (2000) studied the effect of cultural dimensions on software piracy. The study found out that software piracy is significantly correlated to GNP per capita, income inequality, and individualism. However, the only cultural dimension to be related to software piracy was individualism, which was rather surprising, and power distance, uncertainty avoidance and masculinity were found to have no significant relationship with software piracy. Yang, Sonmez, Bosworth, & Fryxell (2009) also confirmed the importance of individualism regarding the reduction of software piracy in their study: the higher the individualism in a country, the lower the piracy rates. They also found out that alongside individualism culture economic wellbeing and ICT advancement are significant factors when battling software piracy. Bagchi, Kirs, & Cerveny ( 2006) also confirmed the link between high collectivism and high piracy rates. However, they also found out in their study that piracy was higher in countries with high UAI scores.

Shin, Gopal, Sanders, & Whinston (2004) also discussed the importance of individualism vs. collectivism regarding software piracy. In a very collectivistic society sharing your resources with others is a social norm, sometimes even a virtue, and sharing software is easy, thus making highly collectivistic and technologically advanced regions the top offenders when it comes to high piracy rates. This cultural dimension also poses a number of challenges when it comes to battling piracy since initiatives to counter piracy can be thwarted by opposing cultural norms. Shin et al.,( 2004) thus state that it may be easier for software industry to adapt into the cultural intricacies of nations rather than forcing cultural shifts among nations.

Moores (2008) studied the relationship between economic wealth, culture and declining software piracy rates, and the study results also confirmed that software piracy rates are tied to the economic wealth and individualism of a country. Furthermore, the study also found out that in countries with high corruption high PDI and low UAI may potentially slower the decline of software piracy. In addition, the study suggests that the role of uncertainty avoidance may be specifically important in explaining the ongoing decline in software piracy.

## 2.3 Intellectual property rights

If we look at the history of copyright, the roots of copyright reach back to 17$^{th}$ century England when publishers together formed the Stationers Company, which was given the exclusive rights to publishing work. The Copyright Act was coined in 1709, and the act guaranteed the author of the work the right to control the copies for 14 years. The US Copyright Act of 1790 was modelled after the English one, but, unlike its paragon, protected solely the American authors, meaning that foreign authors were exempt from copyright protection laws. The most of the other developed countries already recognized international copyright at the time. (Varian, 2005) The Berne convention for the protection of literary and artistic works was adopted in 1886, but the United States did not join the convention until 1988, approximately a hundred years after the birth of the convention. For comparison, Finland joined the convention in 1928. As of January 2017

a total of 172 countries have joined the convention. (World Intellectual Property Organization, 2017)

Legislation regarding copyright and software varies greatly: some countries have very lax legislation when it comes to the protection of intellectual property while other countries are very strict about the subject matter. In addition, despite the existence of copyright laws there may be a lack of material and human resources needed for implementing the copyright laws in a satisfactory manner. For example, in Greece, Italy and Spain there is a lack of protection of copyrighted software, penalties are negligible and prison terms are rarely imposed in cases of copyright violations. (Andrés, 2006)

In the Finnish legislation computer programs are protected by copyright laws and they are compared to literary works when it comes to intellectual property, and the owner of the copyright is the one who has created the work (Tekijänoikeuslaki 1 Luku 1§). Copyright laws have been applied to computer programs since 1991 (Laki tekijänoikeuslain muuttamisesta, 34/1991).

In Finnish legislation the duration of copyright protection lasts for 70 years after the death of the creator of the copyrighted work (Tekijänoikeuslaki 4 Luku 43§). In the case of computer programs the source code of the program is copyrighted; however, the ways the program functions or looks like are not protected under copyright law, meaning that the user interface and architecture of the program are not protected. (Takki, 2002)

Using a work in a way that is against the copyright legislation is a copyright violation. It is also forbidden to bypass the effective technical protection measures. However, in the case of a legal physical copy the measures are allowed to be circumvented if watching or listening to the work in question is not otherwise possible. Copyright violations, depending on factors like intentionality and the harm caused to the copyright owner, may lead to a prison term of two years maximum, which is the strictest possible penalty. For copyright infringement the penalty is a fine. In addition, the convict may also be ordered to pay compensation for the harm caused to the copyright owner. However, in this case the legal obligation to compensation requires intentionality and negligence. (Tekijänoikeuden tiedotus- ja valvontakeskus, n.d.)

## 2.4 Software piracy among students

Students' attitudes and behavior regarding software piracy have been directly or indirectly well-researched, as the existing literature often uses students as their subject group. Morgan, Neal and Maris (2008) specifically targeted student attitudes regarding piracy. In their paper, they examine the student perceptions of ethical issues regarding the use of information systems. They designed a survey in which they described different scenarios such as intrusion of privacy by hacking, different scenarios relating to software piracy and violation of software licenses, and instructed the students taking the questionnaire to evaluate the "ethicalness" of the described behavior. (Morgan et al., 2008)

Morgan et al. (2008) reviewed their results to show that students saw hacking into computer systems and intrusion of others' privacy more unethical than software piracy. Additionally, if the goal of the piracy was not to make profit, only two fifths deemed it unethical. Morgan et al. saw also a trend -- consistent with other studies according to them -- where older students rated piracy to be more unethical more often compared

with the younger students, and that female students rated scenarios as more unethical compared to the male students.

Spark (2010) explored the demographic factors of intentions of pirating software among university students in her study while also comparing her results to previous literature. The study was conducted as a voluntary and anonymous questionnaire which was distributed to the students of the University of Witwatersrand, South Africa. The questionnaire targeted both undergraduate and postgraduate students across all faculties of said university. The study focused on six different variables and their possible correlation with the intention to pirate. The variables examined in this study were age, gender, price of software, level of household income, academic discipline, computer ownership, and personal computer experience. (Spark, 2010)

The study results on software piracy have been rather contradictory, which can also be seen from Spark's paper. For example, some studies have found a significant relationship between age and intention to pirate while other studies have found no such relationship between the two. Spark (2010) found out that all the variables except academic discipline and level of household income had a significant relationship with the intention to pirate, gender and level of study having the strongest relationship. Spark (2010) also compares her findings to those of prior research, examining whether or not they confirm her results.

Cronan et al. (2006) used a survey to examine demographic characteristics of students in addition to their awareness of university computer usage policies. 34% of the study's respondents admitted to committing some form of computer piracy. They found out that the students who were more familiar with computers reported more software misuse, e.g. copying software or distributing unauthorized copies. They also found out that the software misuse rates of those students who studied computer information systems as their major subject eclipsed those of all the other majors. There were differences between the software misuse rates between females and males with the latter committing more misuse compared to the former. Younger students were also reported to have committed more misuse compared to their older counterparts, but the authors of the study called for caution when interpreting the results due to bias towards younger respondents. The results were noted to be fairly consistent with past research. (Cronan et al., 2006)

Hsieh & Lee (2012) explored the developed attitudes toward unauthorized software copying among Taiwanese users of both under and over legal age (18). There were 209 participants in the study, 100 of which were college students over the age of 18 and 109 were underage high school students. The study found out that high school students were less likely to break the law and they followed societal moralities more conservatively. College students, on the other hand, displayed more tolerant judgment towards unauthorized software copying, thus making age a significant factor in the study. However, their study found out no significant differences between male and female respondents when it came to the legality and degree of ethical behavior for unauthorized software copying. (Hsieh & Lee, 2012)

Students are a very common sample group in studies concerning online piracy, mostly due to their accessibility. However, the practice has met some criticism; some argue that results of these studies cannot be generalized to other social groups because students tend to have more lax norms concerning piracy. (Krawczyk, Tyrowicz, Kukla-Gryz, & Hardy, 2015)

Krawczyk et al. (2015) explored in their paper whether or not the individual and social norms of students differ from those of the general population when it comes to views regarding intellectual property. In their research, they designed a set of stories which were based on six dimensions: physicality, meaning that whether or not the story concerning the act of piracy included moving of a physical object; the availability of alternatives, i.e. whether a feasible and legal alternative existed at the time of the act; the breach of protection, which could be something ranging from opening a backpack to cracking Digital Rights Management; sharing; peer, i.e whether the owner of the object was a peer or a remote entity; and loss, meaning if direct loss is caused to anybody. A set of 18 stories was used in the study, and the respondents had to evaluate their acceptability on a scale ranging from totally unacceptable (1) to fully acceptable (4). Two sets of respondent groups were used in the study: one consisted of students of the University of Warsaw while the other consisted of followers of four popular Facebook fan pages of organizations which endorse authorized acquisition of content. (Krawczyk et al., 2015)

Krawczyk et al. (2015) concluded in their study that while the students may display somewhat more lax overall judgement the social norms follow similar patterns across different subpopulations. They found out that general norms and in-group norms did not differ in the two analyzed groups, meaning that the views of the students do not differ from other adults.

## 2.5 Reasons for pirating software

In their paper Sang et al. (2015) examined which factors predict the intentions of college students to download digital content via unauthorized peer-to-peer file sharing sites. In their study they compared the results of American and Korean students to each other while also exploring the possible effect of cultural contexts on said results. The study was conducted as an online survey, and the sample group consisted of both American and Korean undergraduate students.

The study found both similarities and stark differences between the two groups. For example, their study found out that a much higher number of Korean students participate in illegal downloading compared to their American counterparts. American students were more likely to consider the moral or ethical implications of illegal downloading when deciding whether to download illegally whereas Korean students were more likely to consider the support from their reference group. However, cost and availability were significant factors for both American and Korean students, even more strongly for the latter group. To summarize, there were differences between the two groups, and the findings of their study suggest that cultural differences possibly play a part in people's intentions to participate in illegal downloading of software. (Sang, Lee, Kim, & Woo, 2015)

Hsieh & Yeh (2012) compared the attitudes of Taiwanese and American undergraduates regarding unauthorized software copying (USC). The research was conducted as a survey which was distributed to native-born Taiwanese living in Taiwan and native-born Americans residing in the United States, and all the students were in IS-related fields. There were 133 respondents, 84 of which were Taiwanese and the rest were from the US. The study found out that American respondents were more accepting towards unauthorized software copying, while their Taiwanese counterparts were more intolerant. The overall results were consistent with previous literature, showing the

effect of cultural differences on views regarding unauthorized software copying. (Hsieh & Yeh, 2012)

Konstantakis, Palaigeorgiou, Siozos and Tsoukalas (2010) studied attitudes, behaviors and corresponding reasoning of computer science students in Greece regarding software piracy. They conducted the study as a qualitative research, and they organized semi-structured interviews with 30 male students and 26 female students. All of the respondents reported using pirated software, and they admitted that they hadn't even thought about intellectual property rights when using pirated software. The students also did not show any remorse for using pirated software while also acknowledging the immorality of their actions. Instead, they adapt their personal reasoning to suit their individualistic interests and actions. The students rationalized the use of pirated software by saying that can't bear the cost of genuine software. Student status and lack of regular income were often mentioned as justifications. The study also found that the respondents had little to no knowledge of intellectual property laws. They also had distinct opinions regarding digital products: most regarded software products as mere tools with limited lifespans while, for example, books incorporate emotional value and inherent intellectual rights. The respondents also displayed indifference towards the interests of the parties affected by software piracy. However, the students were determined to defend their rights if they were in the position to be affected by software piracy. (Konstantakis et al., 2010)

Siponen & Vartiainen (2007) investigated the moral attitudes of Finnish computing students regarding unauthorized copying of software while mirroring the results against theoretical reasons offered by computer ethics scholars. Various studies regarding software piracy have suggested a number of reasons for pirating software, and seven reasons were mapped out from the existing literature: non-exclusive nature of software; "everyone does it"; the easiness of copying software; the belief that unauthorized copying of software does not harm anyone; high cost of software; low quality of software; and the low risk of being caught. These seven literature-based reasons were used as a basis for studying student's reasons for pirating software. (Siponen & Vartiainen, 2007)

The study consisted of both qualitative and quantitative questionnaires, and the questionnaires were distributed to Finnish university students, and a total of 249 students filled in the questionnaires. The results were clear: more than half of the respondents mentioned the expensiveness of software as a reason. The second most popular answer was the minimal risk of getting caught, which was followed by the easiness of copying. The argument "everyone does it" came in fourth place, and other reasons placed fifth. Less than ten percent of respondents cited the argument that unauthorized copying of software does not harm anyone as a reason for pirating, and the two least popular answers were low quality and non-exclusive nature of software. The respondents were also asked if their piracy was focused on products of a specific company and whether they would change their mind about software piracy if their earned income was dependent on software development. Only 6.1% answered positively to the former question while more than half answered positively to the latter question. (Siponen & Vartiainen, 2007)

From the qualitative section of the study three different categories of reasons emerged from the students' answers: purpose of use, economic reasons, and legal reasons. The first one consisted of 21 responses, and one of the given samples stressed that the use of unauthorized software is unacceptable for business purposes while another sample thought that the licensing fees were too high. Economic reasons garnered seven

responses, and the respondents cited their lack of money and the desire to save money as reasons for pirating. Lastly, legal reasons consisted of two answers, which deemed the existing copyright laws as old-fashioned. (Siponen & Vartiainen, 2007)

In addition to cultural differences, there might be a link between personality traits and intention to pirate software. Tan Ming Ming, Jabar, Tieng Wei, & Sidi (2015) investigated personality traits as a factor in students' intentions to pirate software through proposing an enhanced version of the Theory of Planned Behaviour (TPB) model in their preliminary study. The personality traits used in their study were extraversion, agreeableness, conscientiousness, neuroticism and openness, which are the elements Big Five Inventory (BFI). The research was conducted as a questionnaire which was distributed to 40 computer science students. In the original TPB model attitude towards behavior, subjective norms and perceived behavioral control all affect intention which leads to actual behavior, but in this study the aforementioned Big Five personality traits were added in as a fourth factor and the intention was specifically replaced with intention to pirate software and the actual behavior has been eliminated from the model.

Undergraduate Malaysian computer science students were chosen to participate in this study, and they took part in a survey. Descriptive statistics were employed in order to describe the profile of the participants. 95% of participants were male and the rest were female, the respondents' age ranged from 19 to 26 with the mean being 22.9 years. The majority of the students had moderate academic achievement with an average CGPA, and the majority of the respondents (65%) were international students. 17.5% were Malays and 5% Chinese. Muslims made up 80% of the participants, 10% were Hindus 7,5% were Buddhists and 2,5% were Christians. The analysis of the results confirmed the reliability of both the Big Five personality variables and the TPB elements in software piracy, and these findings could be utilized in future research regarding software piracy. (Tan Ming Ming et al., 2015)

# 3. Research methods

This chapter will present the research methods utilized in this study. Firstly qualitative and quantitative research methods are compared, and survey as a data collection method will be discussed. In addition, the theories relevant to this study will be presented, and a conceptual model derived from the theories will be presented.

## 3.1 Qualitative vs. quantitative research

Quantitative and qualitative research both are different approaches to scientific research. The differences between the two have been discussed for a long time, and often they have been presented as two opposing approaches by, for example, deriving classifications and textual descriptions of their attributes and juxtaposing them against each other. However, rough divisions aren't really helpful when it comes to practical research, and they should be considered as broad guidelines instead. Indeed, qualitative and quantitative approaches can be difficult to distinguish from each other in a definite manner. They are seen as complements to each other rather than two competing approaches. (Hirsjärvi, S., Remes, P., & Sajavaara, 1997)

The basis in qualitative research is describing real life, and the aim is to examine the target in a comprehensive way and gather the material in real, natural situations. In this approach the humans themselves are the preferred instrument in gathering information; humans are thought to be able to adapt to different situations in a flexible way. The basis lies in detailed and comprehensive analysis of the material, not testing theories or hypotheses. (Hirsjärvi, S., Remes, P., & Sajavaara, 1997)

In quantitative research, however, theories and hypotheses play a major part and the laws of cause and effect are the focus. The background of this paradigm lies in so-called realistic ontology, according to which the reality is built upon objectively stated facts. In quantitative research the definition of concepts is also important. The material should also be applicable in numeric measurement, and conclusions are derived from statistical analysis. (Hirsjärvi, S., Remes, P., & Sajavaara, 1997)

This study will utilize quantitative research methods. The study can be described as an empirical cross-sectional study, and the modelling is based on a theoretical framework derived from previous literature. Empirical research can be defined as research that is focused on measuring or observing a target whereas cross-sectional studies only describe a particular study situation.

## 3.2 Survey as a data collection method

Surveys are very useful in gathering large amounts of data because they can reach a lot of people and various issues can be examined. It is also an effective data collection method because it saves both time and effort. If the survey has been designed well, the data can be quickly processed and analysed. There are lots of measures for statistical analysis and reporting, which means that the researchers don't have to develop their own analysis methods. However, the data gathered from surveys is often considered as superficial and the studies utilizing it as basic, theory-wise. In addition, it is impossible to know how seriously the respondents have taken the survey, meaning that whether or

not they have answered carefully and truthfully. Misunderstandings are also difficult to control: designing a good survey takes a lot of time and effort and it requires a lot of knowhow of the researcher designing it. It is also difficult to know how knowledgeable the respondents are about the subject of the survey. In addition, the lack of respondents may in some cases become very significant.(Hirsjärvi, S., Remes, P., & Sajavaara, 1997)

This study utilized survey as a data collection method. A link to an online survey was distributed to the students of the University of Oulu via email. The language of the survey is English because with English even the international students can be reached. The questions of the survey are based on previous literature, and the aim of the survey is to map out the importance of software piracy among the students of the University of Oulu. The aim is both to find out how prominent the phenomenon is among the students as well as the reasoning behind software piracy. The results of the survey are analysed and they are mirrored against those of previous literature.

The survey was initially designed to contain approximately 20 questions and have the duration of 10 minutes. The questions were based on topics that had risen from the literature, and the theories and the framework presented in this chapter served as a base. Before the survey could be conducted, the survey needed to be pilot tested. The pilot test was conducted with five people whose age ranged from mid-twenties to late thirties and were either students or had graduated. The participants had their background in Information Processing Science, and they described their computer expertise as above average or excellent. The pilot tests were done successfully and the feedback was applied to the survey, the question that needed to be changed the most was the one asking major: in the first version the question was open-ended, but in the final version was the major had to be chosen from a list. All the other changes were mostly redefining and clarifying the phrasing of the questions, but mostly the participants had no issues with understanding the questions. After doing the changes the pilot test was conducted again on the survey in order to ensure its usability.

The final version of the survey had four parts, and in the first part the questions were related to the background information about the respondents and contained eight questions. The first question was gender, and in addition to the male-female binary the respondents could also choose either “other” or “prefer not to answer” if they wished so. The second question was age, and the respondents had to choose an age group which corresponds to their age, and there were 7 options in total: 18-21, 22-25, 26-29, 30-33, 34-37, and 38+. After that the nationality of the respondent was asked, and the question was open-ended. The respondents had to choose their major subject from a list, but there was also an “other” option if any of the possible majors in the University of Oulu had been forgotten from the list. The respondents also had to describe their computer expertise, and the options were poor, below average, average, above average, and excellent, and the respondent had to choose one that best described them. The two last questions of this section revolved around computer usage: the frequency and the spent time. In the former the students had to choose which option best described the frequency of their computer usage, and the options ranged from less than once a week to multiple times a day. In the latter question they had to choose the option that represented the time they spend a week using a computer, whether it was less than an hour or more than 25 hours a week.

The second part of the survey consisted of only one question, and the answer would determine whether the respondent would proceed to part three or go straight to fourth and final part of the survey. The question was whether the respondent had pirated

software during their university studies, and if they answered yes, they proceeded to the third part of the survey. If not, they proceeded straight to the final part.

In the third part there were two questions: in the first one the respondent had to check all the reasons for pirating software that applied to them. There were 6 predetermined answers but there also was an "other" option if they wanted to maybe elaborate on their reasoning. These were partly based on the study by Siponen & Vartiainen (2007). The second question, however, was dedicated to the purpose of pirating. The type of the question was similar to the previous one: check all that apply with the possibility of adding other answer. In this case, however, there were only four predetermined options.

The fourth and final part of the survey consisted of 34 statements that utilized the Likert scale, and the respondents had to use a scale of 1 to 5 to evaluate their opinion regarding the statements presented in this section. 1 indicated strong disagreement, 2 moderate disagreement, 3 neutral, 4 moderate agreement, and 5 meant strong agreement. The statements were used to measure the students' opinions regarding software piracy, and the topics ranged from perceived benefits of pirated software through sanctions to the attitudes of students. After completing this section, the respondents sent their answers.

## 3.3 Theories of planned behaviour and reasoned action (TPB and TRA)

The theory of reasoned action (TRA) has been widely applied in academic research. The theory was coined by Ajzen & Fishbein (1980), and the theory has been used as a model for predicting behavioural intentions and/or behaviour. The theory suggests that behavioural intentions, which also are correlated with behaviour, are "a function of salient information or beliefs about the likelihood that performing a particular behaviour will lead to a specific outcome" (Madden, Ellen, & Ajzen, 1992). Essentially, the theory suggests that intentions determine one's behaviour, whereas intentions in turn are determined by subjective norms and behavioural attitudes. In addition, personal attitudes are influenced by outcome expectations and behavioural beliefs whereas normative beliefs and motivation to comply determine subjective norms. (Moores, Cha, & Chang, 2006)

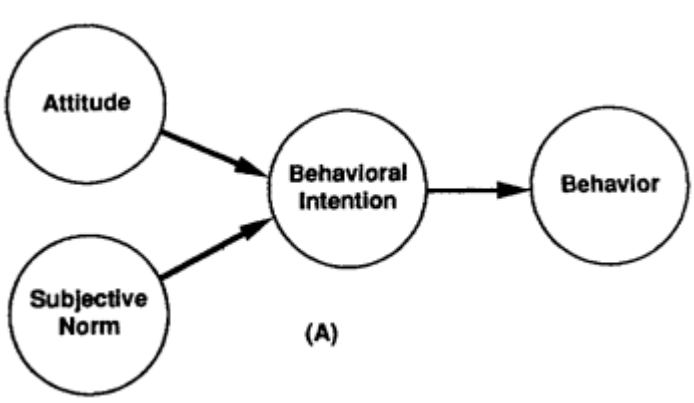


**Figure 1.** Theory of reasoned action (TRA). (Madden et al., 1992)

The theory of planned behaviour (TPB), on the other hand, has been derived from the theory of reasoned action. TRA had received some criticism, and according to the critics of TRA behaviour involves more than intention. Based on this a third determinant of intention and behaviour was introduced: perceived behavioural control. (Moores et al., 2006) Perceived behavioural control has both a direct effect on behaviour and an indirect effect through behavioural intentions (Madden et al., 1992).

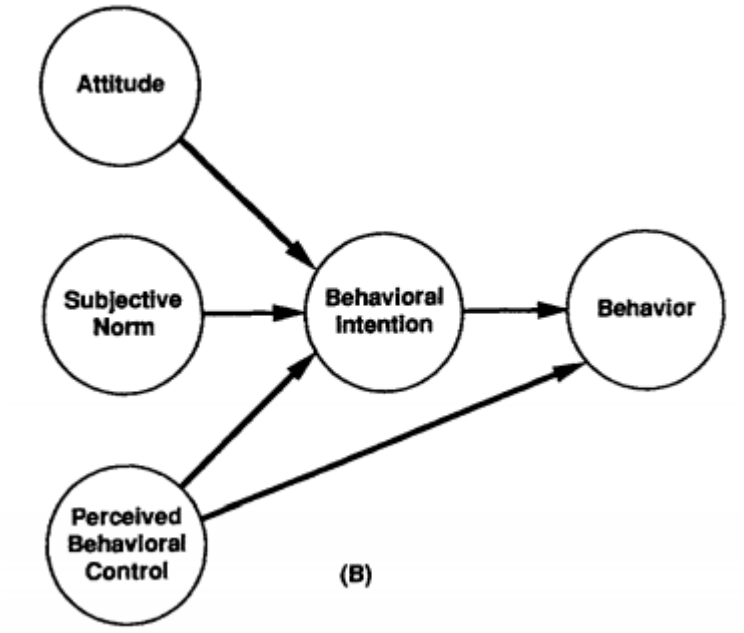


**Figure 2.** Theory of planned behaviour (TPB). (Madden et al., 1992)

Madden et al. (1992) compared the two theories against each other in their study. They found out that the inclusion of perceived behavioural control greatly enhanced the prediction of intentions and target behaviour, meaning that TPB explained a lot more variation than TRA. The study also found out that increased precision in predicting target behaviour has a relationship with the magnitude of perceived behavioural control. However, their study concluded that TRA is applicable when the target behaviour is wilful, but TPB proves to be more useful in predicting behaviour when the target behaviour is not under volitional control. (Madden et al., 1992)

## 3.4 Rational choice theory

The decision-making process can be explained in multiple different ways, and the rational choice theory (RTC) is one of them. RTC aims to explain how individuals make their decisions when faced with multiple options. The theory suggests that an individual will determine their actions by evaluating the costs and benefits of their options. The theory has been applied in various contexts and has been used in explaining individual, social, and economic behaviours. (Bulgurcu, B., Cavusoglu, H., & Benbasat, 2010) The rational choice theory was originally developed by Becker (1968), and the roots of the theory lie in criminology; it was used in explaining the behaviour of criminal offenders.

Paternoster & Simpson (1996) specified and tested a rational choice model of corporate crime. Their model included measures of perceived costs and benefits of corporate crime, perceptions of shame, persons' evaluation of the dishonour of the act, and contextual characteristics of a particular organization. They found out in their study that organizational factors, moral evaluations, and sanction threats affect corporate crime. Their findings suggest that in addition to being a powerful and independent source of social control the moral considerations also condition the impact of more rational factors. They also found out in their study that even when the costs are directed at the individual are controlled the costs and benefits accrued by the company may have an impact on individuals' intentions to commit corporate crime. (Paternoster & Simpson, 1996)

Paternoster & Simpson (1996) suggested a number of strategies for dealing with corporate crime. They found out that enforcement efforts directed towards the organization were a powerful enough deterrent for those who make decisions within the organizations, meaning that legal sanctions applied to the organization can deter those act on its behalf. In addition, the results suggest that enforcement efforts directed at the individual also served as a deterrent: threats of criminal and civil sanctions directed at the individual held back the intention to commit corporate crime. Moral appeals were found to have the potential to be a powerful source of corporate social control, and strengthening the business ethics of corporate managers can be a very effective crime-control strategy. (Paternoster & Simpson, 1996)

Li, H., Zhang, J., & Sarathy (2010) applied the rational choice theory in order to examine the way cost-benefit assessments, personal norms and organizational context factors drive the employees' intention to comply with Internet use policies. The results of their study suggest that the competing influences of perceived benefits, formal sanctions and security risks affect employees' compliance intentions.

Higgins (2007) examined the links between low self-control, rational choice, value, and digital piracy. The results of the study suggest that low self-control and rational choice theory can be applied and integrated in order to understand and explain the intentions to participate in digital piracy. However, the study has some noteworthy limitations: the study used responses to a scenario as the dependent measure instead of an actual measure of behaviour. The study also used data from one university in the United States, which limits international generalization. Despite the limitations of the study low self-control, rational choice theory, value, and digital piracy seem to have a connection, which should be investigated more. The study in this case was cross-sectional, but a longitudinal study might yield some interesting results.

## 3.5 Conceptual framework

Based on the theories represented before, a conceptual framework can be proposed. The theories shared some common elements, which were combined in the framework presented below. The framework describes which elements influence the attitudes and intentions of an individual.

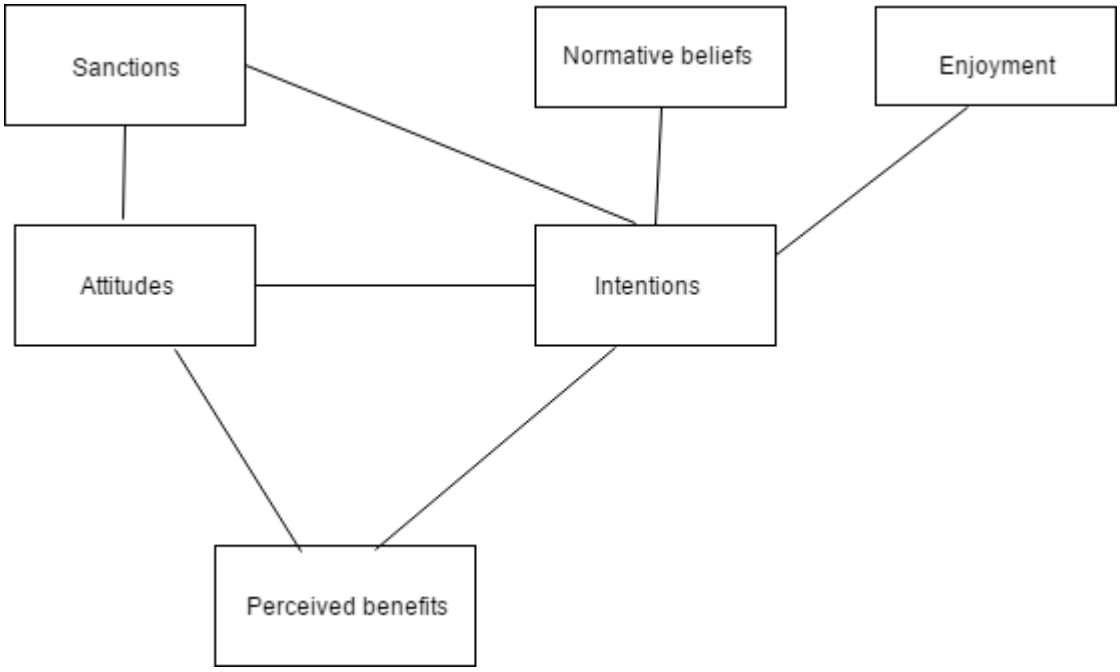


**Figure 3.** Conceptual framework.

The conceptual framework presented above essentially combines elements from the theories of reasoned action and planned behaviour with those of the rational choice theory. Like in TRA and TPB, intentions are influenced by attitudes. The attitudes and intentions are based on the theories discussed in this chapter.

Another factor which influences the intentions of the individual is normative beliefs. In this case, the normative beliefs are based on the concept of subjective norms presented in both the TRA and TPB. The normative beliefs are one of the factors which determine one's intentions to commit certain behaviour, in this case software piracy.

Perceived benefits and sanctions, however, are based on the rational choice theory. It is said that the costs and benefits influence the decision-making process of an individual. Individuals can benefit from software piracy in many different ways, whether it be saving time and money or learning a new skill with pirated software, for example. Comparing the costs and benefits plays a major part in rational choice theory, and thus they are included in this model, although they are represented by sanctions and perceived benefits.

However, sanctions also influence the attitudes and intentions behind software piracy. Sanctions are a major part of piracy discourse; the harshness of legal sanctions for piracy-related crimes is a controversial theme, and while some people do not pay attention the possibility of sanctions when pirating the sanctions also are enough to become a deterrent to some people.

Enjoyment, on the other hand, is has a significant place in the Self-Determination Continuum coined by Ryan & Deci (2000): it is one of the relevant regulatory processes associated with intrinsic motivation and intrinsic regulation. In intrinsic motivation the motivation itself lies in the enjoyment of the work itself instead of involving instrumentalities, and the actions stem from the self. (Ryan & Deci, 2000) Thus enjoyment plays a significant part in the conceptual model.

# 4. Results and analysis

In this chapter we will present the results of the survey and analyze them. Firstly the demographics of the study will be presented, which will be followed by reasons and purposes for pirating software. After reasons and purposes the answers to the Likert-scale questions will be discussed. The rest of the chapter is dedicated to the analysis, which is divided into Chi-Square tests and correlation tests.

## 4.1 Demographics

An online link to the survey was distributed via email, and in total 429 students answered in the survey. There are approximately 12 000 students in the University of Oulu, so the answer rate was 3,757%. 69% of respondents were male, 27% were female and the rest of the respondents either answered "other" or did not want to disclose their gender. Most of the respondents, 44,3%, were 22-25 years old, and the second largest age group was 26-29 with 19,3%. 18-21 came in third with 16,6% of respondents. Students older than 30 years old were a minority: 30-33 had 7,7%, 34-37 only 4,9% and students at least 38 years old 7,2%.

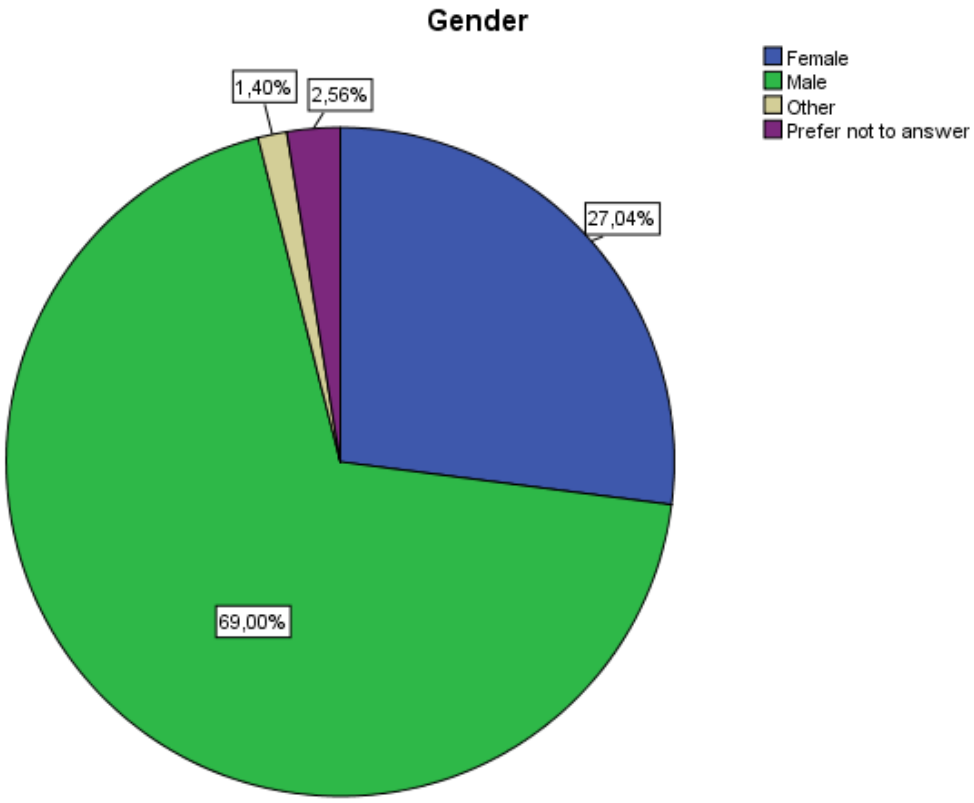


**Figure 4**. Pie chart which displays the gender distribution.

The respondents were mostly Finnish: 93,9% of respondents reported their nationality to be Finnish. The rest of the respondents were individuals from various countries, e.g.

China, Russia, Spain etc. When it came to major, 14,7% of respondents consisted of students of information processing science, making them a majority. The second largest group was business students with 8,9%, and computer science and engineering (CSE) students came in third with 7%. Other notable majors regarding number of participants were mechanical engineering, medicine, physics, and electrical engineering with 6,8%, 6,3%, 5,4%, and 4,7%, respectively. All in all, the number of responses between majors varied greatly, with some majors having only a couple of respondents while others had dozens.

When it came to the highest completed education, a majority of 45,9% reported matriculation examination, vocational school or equivalent to be their highest completed education. 44,3% of respondents reported that Bachelor's degree was their highest completed their education, 9,3% of respondents had completed their Master's degree.

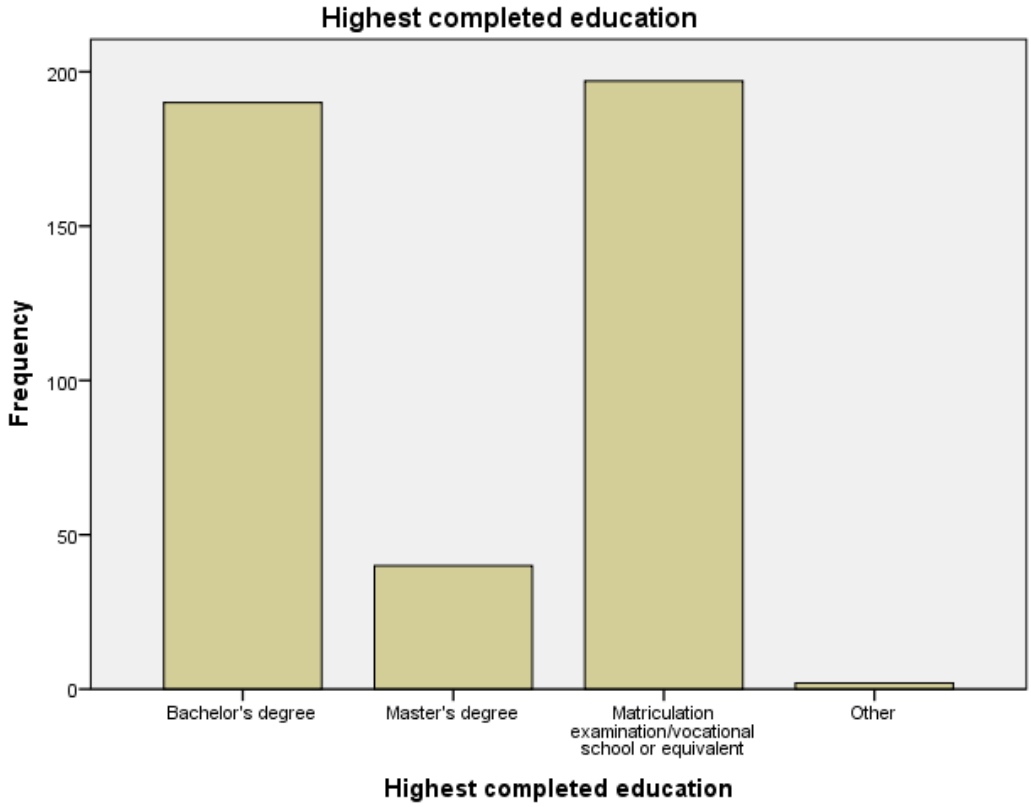


**Figure 5.** Bar chart of highest completed education

Most of the respondents, 41,0%, described their computer expertise as above average. 29,6% reported their computer skill level to be excellent, while 28,0% deemed their expertise to be average. Only 1,4% of respondents described their computer expertise as below average, and none of the respondents described their to be poor.

**How would you describe your computer expertise?**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Below average | 6 | 1,4 | 1,4 | 70,4 |
| | Average | 120 | 28,0 | 28,0 | 69,0 |
| | Above average | 176 | 41,0 | 41,0 | 41,0 |
| | Excellent | 127 | 29,6 | 29,6 | 100,0 |
| | Total | 429 | 100,0 | 100,0 | |

**Table 1.** The frequencies of the answers to the question "How would you describe your computer expertise?"

88,6% of respondents reported to use a computer multiple times a day, 5,1% only once a day, 4,4% several times a week, 1,6% a couple of times a week and less than one percent answered that they use a computer more rarely than once a week.

**Frequency of computer usage**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | less than once a week | 1 | 0,2 | 0,2 | 1,9 |
| | a couple of times a week | 7 | 1,6 | 1,6 | 1,6 |
| | several times a week | 19 | 4,4 | 4,4 | 100,0 |
| | once a day | 22 | 5,1 | 5,1 | 95,6 |
| | multiple times a day | 380 | 88,6 | 88,6 | 90,4 |
| | Total | 429 | 100,0 | 100,0 | |

**Table 2**. Frequencies of the students' computer usage.

Most of the students, 62,5%, answered that they use a computer at least 25 hours a week. The second largest group was those who use computer 20-25 hours a week with 13,8% of respondents. 8,4% spend 10-15 hours a week on a computer, 7,2% 5-10 hours, 6,1% 15-20 hours, and 1,6% only spend 1-5 hours a week using a computer. Only 0,5% spend less than an hour in a week.

**How many hours a week do you use a computer?**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | less than an hour | 2 | 0,5 | 0,5 | 100,0 |
| | 1-5 hours a week | 7 | 1,6 | 1,6 | 1,6 |
| | 5-10 hours a week | 31 | 7,2 | 7,2 | 99,5 |
| | 10-15 hours a week | 36 | 8,4 | 8,4 | 10,0 |
| | 15-20 hours a week | 26 | 6,1 | 6,1 | 16,1 |
| | 20-25 hours a week | 59 | 13,8 | 13,8 | 29,8 |
| | 25+ hours a week | 268 | 62,5 | 62,5 | 92,3 |
| | Total | 429 | 100,0 | 100,0 | |

**Table 3**. Frequencies of the answers to the question "How many hours a week do you use a computer?"

## 4.2 Reasons and purposes for pirating software

The respondents were asked if they had pirated software during their university studies, and the answers divided quite equally: 52,2% of respondents reported that they had pirated software while 47,8% answered that they hadn't. If the respondents answered no, they proceeded straight to last part of the survey while those who had answered "yes" proceeded to answer two questions which were about the reasons for pirating software and the intended purpose of the pirated software.

In the first question of this section the respondents had to check all the reasons for software piracy that applied to them. The options were "expensiveness of genuine software", "availability of pirated software", "minimal risk of getting caught", "everybody does it", "pirating software does not hurt anybody", and "software is intangible and should not be bound by ownership". There also was "other" option if the respondents wished to answer something not on the list of options.

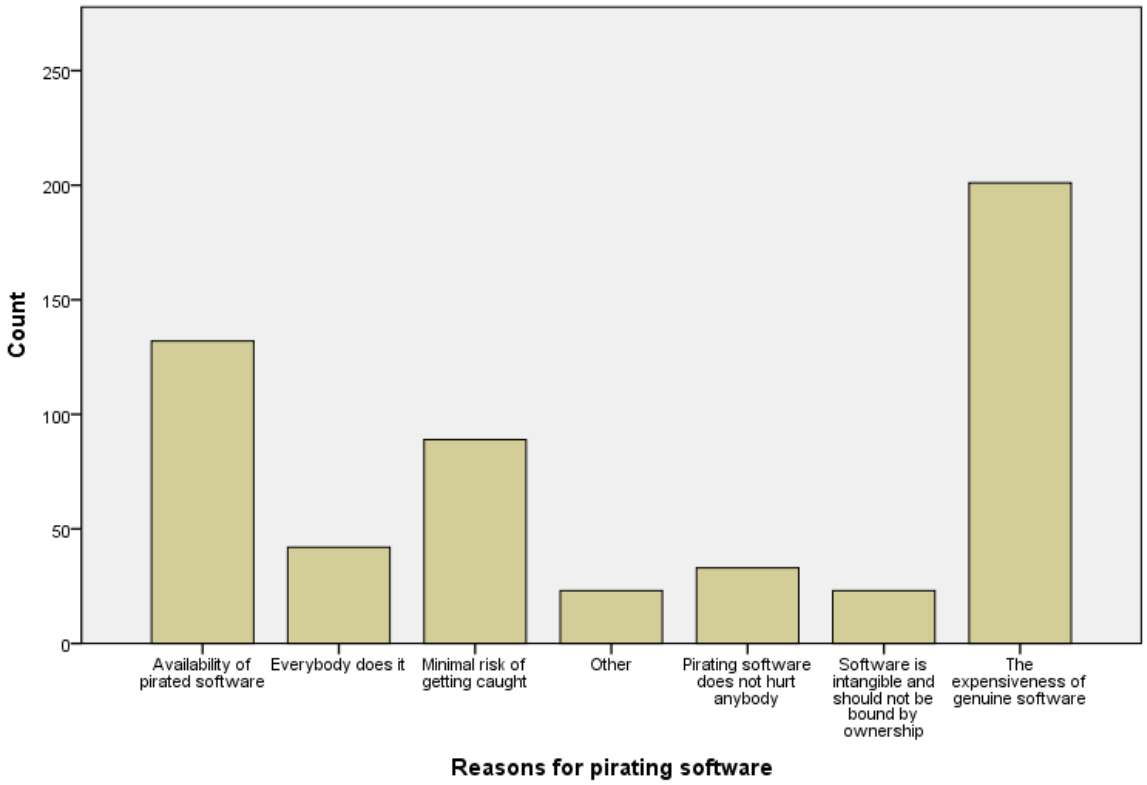


**Figure 6**. Bar chart which displays distribution the popularity of reasons for pirating software.

The expensiveness of genuine software was the most common reason, and 89,7%(201) had chosen it as one of their reasons for pirating software. The second most commonly chosen answer was the availability of pirated software with 58,9%(132). Minimal risk of getting caught was chosen by 39,7%(89) of the 224 participants of this section. "Everybody does it" was one of the reasons for 18,8%(42), while 14,7%(33) reported "pirating does not hurt anybody" as one of their reasons. Only 10,3%(23) thought that software is intangible and should not be bound by ownership.

The "other" option of the question also gained quite a few answers, 10,3%(23) chose this option and elaborated their reasoning. The respondents reported various reasons for their software piracy. Some of the respondents answered that the student versions of computer programs were somehow lacking and offered only a limited experience compared to the full version, and thus they chose to pirate the full version of the software. The availability of genuine software was also one of the reasons: in some cases the genuine version was difficult to obtain, in some cases near impossible, especially if the software was very old. Some of the respondents also wanted to test if the software was compatible with their computer or whether they liked the software before committing the genuine version.

Licensing or lack thereof was also mentioned as one the reasons: in some cases the licensing was poor and not easily transferable, and in one case the respondent mentioned that their faculty had no licenses for software they needed for a mandatory assignment. In addition, sometimes the respondents had resorted to pirating because they wanted to avoid digital rights management (DRM). One respondent mentioned that they wanted to be independent of bulky "parent" software like the digital distribution software Origin from Electronic Arts (EA), and another example was Social Club by

Rockstar Games. The respondent also wanted to be independent of physical media or other limiting factors despite owning the legitimate product in some cases.

The second question of this section concerned for what purpose the respondents had pirated software. There were four options: trial, entertainment (e.g. games), study/learning purposes, and work-related purposes. Like in the question before, this question also had the "other" option if they wished to report something else as a purpose for pirating software.

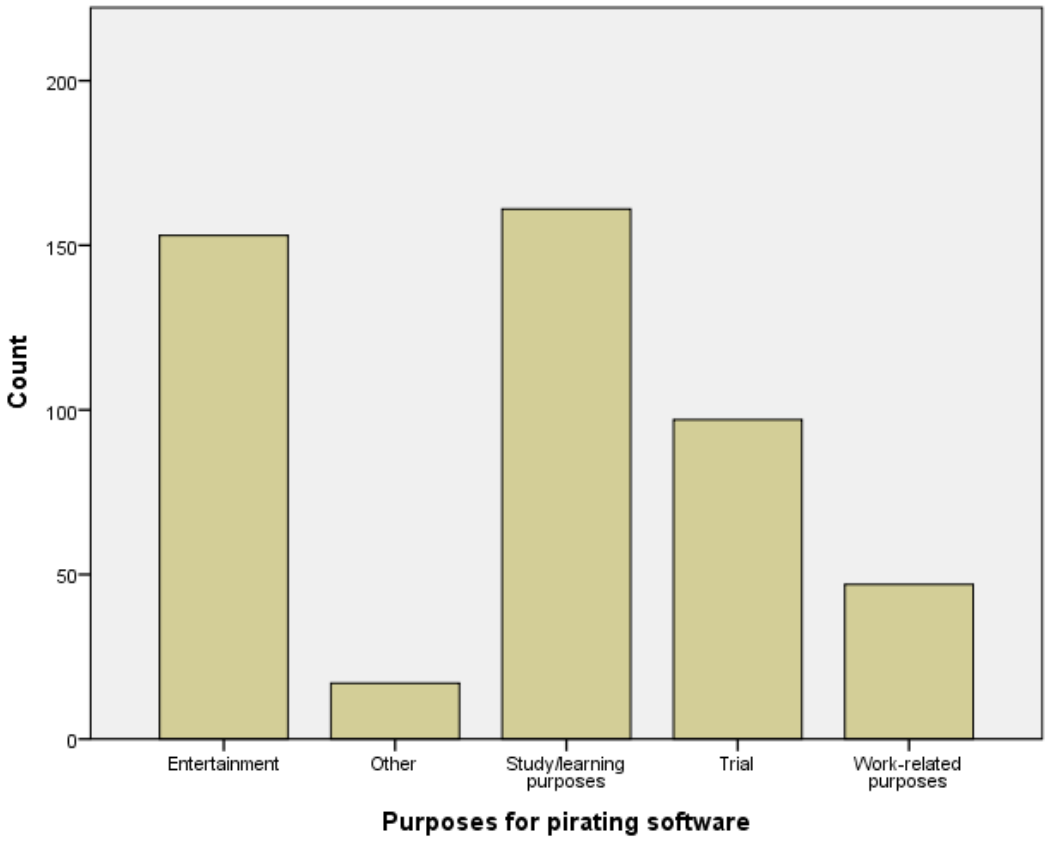


**Figure 7.** Bar chart which displays which purpose options were the most popular.

Study/learning purposes were the most commonly chosen option, 71,9%(161) had chosen this one as a purpose. The second most common purpose was entertainment with 68,3%(153), which was followed by trial with 43,3%(97). Only 21%(47) chose work-related purposes. The "other" option was chosen by 7,6% (17) of respondents.

Similarly to the previous question the "other" option also gathered various interesting answers. Some stated the general use of an operating system as a purpose. Some also mentioned hobbies like photography, art, or video editing as one their purposes. A few respondents also mentioned trying out games before purchasing them, and some mentioned that they have actually pirated software they had previously bought since the pirated version worked better with modded content or it generally ran better. One respondent also mentioned that they pirated just for the fun of it and that they enjoyed disassembling EXE files and reverse engineering them.

## 4.3 Views regarding software piracy

The fourth and final part of the survey consisted of 34 statements which utilized the Likert scale. The participants had to evaluate their views regarding statements using a scale of 1 to 5, 1 signifying strong disagreement, 2 moderate disagreement, 3 neutral, 4 moderate agreement, and 5 strong agreement. The statements were based on the conceptual model, but also general attitudes regarding software piracy were measured.

24,7% were neutral regarding the usefulness of software piracy, especially in their studies. The majority of participants either strongly or moderately disagreed with the statement "I find pirated software to be useful, especially in my studies" with 22,4% and 21,9%, respectively. The majority thought that using pirated software has not helped them in their studies: 38,7% strongly disagreed with the statement "Using pirated software has helped me in my studies." A majority of 35,4% also strongly disagreed that using pirated software has enhanced their effectiveness. However, most of the participants would pirate software if it somehow proved to be useful in their studies: 30,8% somewhat agreed and 27% strongly agreed.

When it came to the enjoyment, most of the respondents (37,5%) did not think that using pirated is fun, and 32,4% were neutral on the subject. The pleasantness of using pirated software gained similar answers: most of the participants either strongly disagreed or were neutral with the statement "Using pirated software is pleasant" with 33,6% strongly disagreeing and 32,2% being neutral. 34,5% also strongly disagreed that using pirated software is wise, and 45% strongly disagreed that using pirated software brings them joy overall.

46,4% didn't think that other students have recommended pirated software to them. 35% also strongly disagreed that their friends had recommended pirated software to them, but 24,9% also somewhat agreed. In addition, 33,6% strongly disagreed that people in their social circles had recommended pirated software to them. However, similarly to the previous statement, a rather large portion, 23,8%, also somewhat agreed. 46,6% also strongly disagreed that their peers have recommended pirated software to them.

However, in the case of the statement "I will pirate software at some point in the future" the answers were very mixed: 23,1% remained neutral, 21,9% strongly disagreed, 20% somewhat agreed, 17,7% somewhat disagreed, and 17,2% strongly agreed. However, when asked whether they will pirate software frequently in the future, the answers were more clear: 50,3% strongly disagreed with the statement "I will pirate software frequently in the future." The majority of the participants somewhat agreed or strongly agreed that they will pirate software if needed with 30,8% and 30,1%, respectively.

| | I will pirate software at some point in the future | I will pirate software frequently in the future | I will pirate software if needed |
|---|---|---|---|
| strongly disagree | 21,9% | 50,3% | 13,3% |
| somewhat disagree | 17,7% | 20,7% | 11,2% |
| neutral | 23,1% | 15,6% | 14,7% |
| somewhat agree | 20,0% | 6,5% | 30,8% |
| strongly agree | 17,2% | 6,8% | 30,1% |

**Table 4**. Percentage distribution of answers to the statements "I will pirate software at some point in the future"; "I will pirate software frequently in the future" and "I will pirate software if needed."

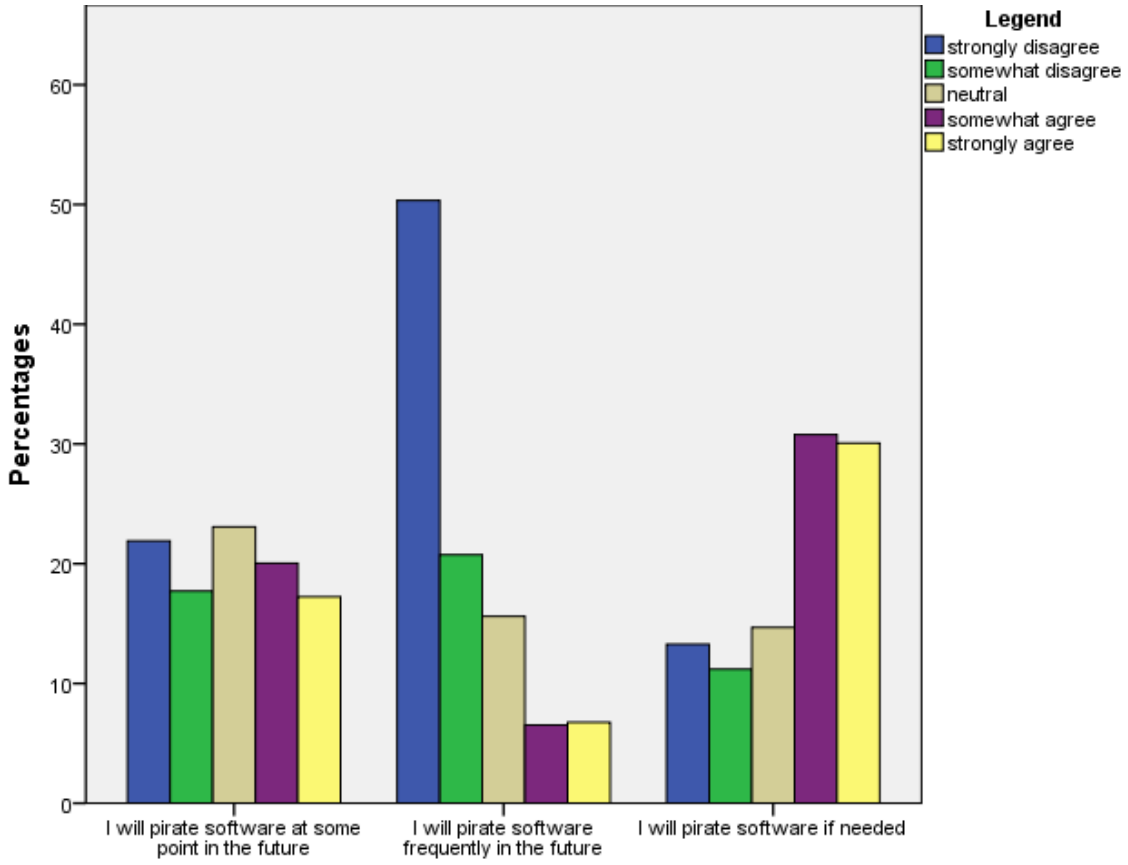


**Figure 8.** A clustered bar chart of intention-related statements and the distribution of answers.

When asked about the possible benefits of using pirated software, 34,7% of respondents strongly agreed that using pirated software helps them save money. However, 41,5% strongly thought that using pirated software does not make them feel content. Answers were rather mixed when asked whether they thought that using pirated software is time-saving: 28,4% strongly disagreed, 22,4% remained neutral, and 19,1% somewhat agreed. The statement "I have somehow benefitted from pirating software" yielded

mixed results: on one other hand 27% strongly disagreed, on the other hand 26,8% somewhat agreed. 17,5% strongly agreed and 17% answered neutral.

Some of the statements concerned possible sanctions. 29,6 respondents strongly disagreed with the statement "I am afraid of getting caught" and 21% somewhat disagreed while 20,7% somewhat agreed. However, most of the respondents answered that they are aware of potential sanctions with 41,7% somewhat agreeing and 31,7% strongly agreeing. The participants mostly disagreed with the statement "I do not care about potential sanctions" with 33,1% strongly disagreeing and 28,4 somewhat disagreeing. The participants answered similarly to the statement "I do not care about the Finnish legislation regarding software piracy" with 31,5% strongly disagreeing and 26,8% somewhat disagreeing. 27,7% somewhat agreed that they know what the organization's policies regarding software piracy are like while 22,6% somewhat disagreed, and the rest of the responses were pretty equally distributed on the answer options.

| | I am afraid of getting caught | I am aware of the potential sanctions | I do not care about potential sanctions | I do not care about the Finnish legislation regarding software piracy | I know what the organization's policies regarding software piracy are like |
|---|---|---|---|---|---|
| strongly disagree | 29,6% | 6,5% | 33,1% | 31,5% | 16,8% |
| somewhat disagree | 21,0% | 8,2% | 28,4% | 26,8% | 22,6% |
| neutral | 17,5% | 11,9% | 15,9% | 17,0% | 16,8% |
| somewhat agree | 20,7% | 41,7% | 13,1% | 14,5% | 27,7% |
| strongly agree | 11,2% | 31,7% | 9,6% | 10,3% | 16,1% |

**Table 5**. Percentage distribution of the answers to the statements "I am afraid of getting caught"; "I am aware of the potential sanctions"; "I do not care about potential sanctions"; I do not care about Finnish legislation regarding software piracy" and "I know what the organization's policies regarding software piracy are like."

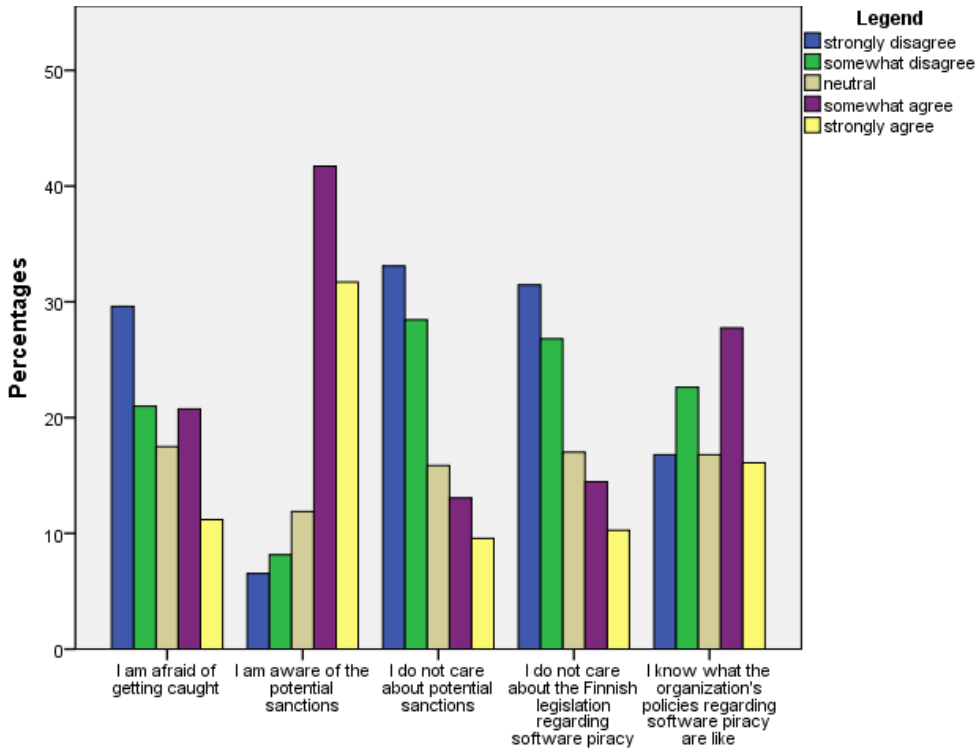


**Figure 9**. A clustered bar chart of the answers to the sanction-related statements.

There were also statements regarding the respondents' friends and their views on software piracy. 48,5% strongly agreed that their friends have pirated software at some point. Most of the respondents also agreed that they have discussed pirating software with their friends with 36,8% strongly agreeing and 30,8% somewhat agreeing. In addition, most of the respondents also strongly disagreed that their friends have encouraged them to pirate software, 26,1% strongly disagreed and 23,8% somewhat disagreed and 22,4% remained neutral. Most of the participants, 33,1%, remained neutral regarding the statement whether their friends view software piracy in a positive light while 23,3% somewhat disagreed and 23,1% somewhat agreed.

The last statements were about the respondents' own personal views regarding software piracy and its acceptability. 27% of participants were neutral about the statement "I do not find software piracy acceptable" while 24% somewhat agreed and 21,9% somewhat disagreed. 37,8% somewhat agreed that pirating software is acceptable in some cases and 24,5% strongly agreed with the statement. Most of the students strongly disagreed with the statement that all software should be free. Most of them also thought that it is okay to pirate software if it is for the greater good with 25,6% somewhat agreeing and 18,2% strongly agreeing. 42,9% strongly agreed that in the future they might purchase software they have previously pirated. Finally, 51,7% strongly agreed that if their income were higher they would purchase more genuine software.

## 4.4 Analysis of the results

In this section we will analyze the results of the survey and attempt to find meaningful patterns from the data. First the results of the Chi-Square tests will be analyzed, which will be followed by results of the correlation tests.

### 4.4.1 Chi-Square tests and crosstabulations

In the previous literature the relationship between gender and software piracy has been studied widely. However, the results have so far been mixed; some studies have found no relationship between gender and software piracy while other studies have confirmed such relationship. The cross tabulation of gender and the question "Have you pirated software during your university studies?" reveals how the different genders answered the question, and in order to find out whether they have a significant relationship a Chi-Square test was conducted. In the original data there were four options for gender, but the "other" and "prefer not to answer" options were combined in order to ensure the validity of the test.

| | | | Gender | | | |
|---|---|---|---|---|---|---|
| | | | Female | Male | Unknown | Total |
| Have you pirated software during your university studies? | No | Count | 79 | 118 | 8 | 205 |
| | | Expected Count | 55,4 | 141,4 | 8,1 | 205,0 |
| | | % of Total | 18,4% | 27,5% | 1,9% | 47,8% |
| | Yes | Count | 37 | 178 | 9 | 224 |
| | | Expected Count | 60,6 | 154,6 | 8,9 | 224,0 |
| | | % of Total | 8,6% | 41,5% | 2,1% | 52,2% |
| Total | | Count | 116 | 296 | 17 | 429 |
| | | Expected Count | 116,0 | 296,0 | 17,0 | 429,0 |
| | | % of Total | 27,0% | 69,0% | 4,0% | 100,0% |

**Table 6.** Cross tabulation of gender and the question "Have you pirated software during your university studies?"

**Chi-Square Tests**

| | Value | df | Asymptotic Significance (2-sided) |
|---|---|---|---|
| Pearson Chi-Square | 26,639[a] | 2 | 0,000 |
| Likelihood Ratio | 27,022 | 2 | 0,000 |
| N of Valid Cases | 429 | | |

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 8,12.

**Table 7.** Chi-Square test for gender and the question "Have your pirated software during your university studies?"

As we can see from the Chi-Square test table (Table 7), there is a statistically significant relationship between the aforementioned variables ($\chi^2$ (2) = 26,639; p < 0,001).

Another variable is age, which, like gender, is a controversial variable regarding its possible relationship with tendencies to pirate software. The age groups 30-33, 34-37 and 38+ were combined into one group for analysis, 30+. Like in the previous case, cross tabulation and Chi-Square test was conducted with the question "Have your pirated software during your university studies?"

| | | | Age | | | | |
|---|---|---|---|---|---|---|---|
| | | | 18-21 | 22-25 | 26-29 | 30+ | Total |
| Have you pirated software during your university studies? | No | Count | 42 | 89 | 27 | 47 | 205 |
| | | Expected Count | 33,9 | 90,8 | 39,7 | 40,6 | 205,0 |
| | | % of Total | 9,8% | 20,7% | 6,3% | 11,0% | 47,8% |
| | Yes | Count | 29 | 101 | 56 | 38 | 224 |
| | | Expected Count | 37,1 | 99,2 | 43,3 | 44,4 | 224,0 |
| | | % of Total | 6,8% | 23,5% | 13,1% | 8,9% | 52,2% |
| Total | | Count | 71 | 190 | 83 | 85 | 429 |
| | | Expected Count | 71,0 | 190,0 | 83,0 | 85,0 | 429,0 |
| | | % of Total | 16,6% | 44,3% | 19,3% | 19,8% | 100,0% |

**Table 8**. Cross tabulation of age and the question "Have you pirated software during your university studies?"

From the table 8 we can see how the answers differed between different age groups.

**Chi-Square Tests**

| | Value | df | Asymptotic Significance (2-sided) |
|---|---|---|---|
| Pearson Chi-Square | 13,408[a] | 3 | 0,004 |
| Likelihood Ratio | 13,615 | 3 | 0,003 |
| N of Valid Cases | 429 | | |

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 33,93.

**Table 9**. Chi-Square test for the aforementioned variables.

From the Chi-Square test table above (Table 9) we can see that there is a statistically significant relationship between the two variables ($\chi^2$(3) = 13,408; p = 0,004).

Based on these tests we can conclude that the Chi-Square tests confirm that age and gender have statistically significant relationship with software piracy among university students.

## 4.4.2 Correlations

The proposed conceptual model will be used as a basis in analyzing correlations, and we will examine the relationships between the elements of the model, e.g. the relationship between sanctions and intentions.

**Correlations**

| | | I will pirate software at some point in the future | I am afraid of getting caught |
|---|---|---|---|
| I will pirate software at some point in the future | Pearson Correlation | 1 | -,170** |
| | Sig. (2-tailed) | | 0,000 |
| | N | 429 | 429 |
| I am afraid of getting caught | Pearson Correlation | -,170** | 1 |
| | Sig. (2-tailed) | 0,000 | |
| | N | 429 | 429 |

**. Correlation is significant at the 0.01 level (2-tailed).

**Table 10**. Correlations of "I will pirate software at some point the future" and "I am afraid of getting caught."

In table 10 there are the correlations for the statements "I will pirate software at some point in the future" and "I am afraid of getting caught." Pearson's r is -0,170, which means that there is a weak negative correlation between the two. However, the p-value is $p < 0{,}001$, meaning that there is statistical significance between the two. The former statement is related to the intentions in the conceptual model while the latter represents sanctions.

Next the relationship between sanctions and attitudes will be examined.

**Correlations**

| | | I am aware of the potential sanctions | I do not find software piracy acceptable |
|---|---|---|---|
| I am aware of the potential sanctions | Pearson Correlation | 1 | 0,083 |
| | Sig. (2-tailed) | | 0,084 |
| | N | 429 | 429 |
| I do not find software piracy acceptable | Pearson Correlation | 0,083 | 1 |
| | Sig. (2-tailed) | 0,084 | |
| | N | 429 | 429 |

**Table 11.** Correlations of "I am aware of the potential sanctions" and "I do not find software piracy acceptable."

From table 11 we can see that there is no correlation between the answers to the statements "I am aware of the potential sanctions" and "I do not find software piracy

acceptable." In this case Pearson's r is close to zero, which indicates that there is no correlation between the two. In addition, the p-value is > 0,05, which indicates that there is no statistical significance in this case. The former statement is related to the sanctions in the conceptual model while the latter is about attitudes of the individuals.

Next normative beliefs and intentions are examined.

**Correlations**

| | | My friends have recommended pirating software to me | I will pirate software if needed |
|---|---|---|---|
| My friends have recommended pirating software to me | Pearson Correlation | 1 | ,200** |
| | Sig. (2-tailed) | | 0,000 |
| | N | 429 | 429 |
| I will pirate software if needed | Pearson Correlation | ,200** | 1 |
| | Sig. (2-tailed) | 0,000 | |
| | N | 429 | 429 |

**. Correlation is significant at the 0.01 level (2-tailed).

**Table 12**. Correlations of "My friends have recommended pirating software to me" and "I will pirate software if needed."

From the table 12 we can see the correlation test results for statements "My friends have recommended pirating software to me" and "I will pirate software if needed." Pearson's r = 0,200 and p-value < 0,001, which means that there is statistical significance between them. The statement "My friends have recommended pirating software to me" represents normative beliefs while the other represents intentions.

According to the conceptual model enjoyment and intentions have a link, and thus they are examined.

**Correlations**

| | | Using pirated software is fun | I will pirate software at some point in the future |
|---|---|---|---|
| Using pirated software is fun | Pearson Correlation | 1 | ,421** |
| | Sig. (2-tailed) | | 0,000 |
| | N | 429 | 429 |
| I will pirate software at some point in the future | Pearson Correlation | ,421** | 1 |
| | Sig. (2-tailed) | 0,000 | |
| | N | 429 | 429 |

**. Correlation is significant at the 0.01 level (2-tailed).

**Table 13**. Correlation of "Using pirated software is fun" and "I will pirate software at some point in the future."

In table 13 you can see the correlation between "using pirated software is fun" and "I will pirate software at some point in the future." According to the table there is moderate correlation between the two, and since $p < 0{,}001$ there is a statistical significance. In this case the statement "Using pirated software is fun" represents enjoyment while the latter represents intentions.

**Correlations**

| | | I find pirated software to be useful, especially in my studies | I think pirating software is acceptable in some cases |
|---|---|---|---|
| I find pirated software to be useful, especially in my studies | Pearson Correlation | 1 | ,427** |
| | Sig. (2-tailed) | | 0,000 |
| | N | 429 | 429 |
| I think pirating software is acceptable in some cases | Pearson Correlation | ,427** | 1 |
| | Sig. (2-tailed) | 0,000 | |
| | N | 429 | 429 |

**. Correlation is significant at the 0.01 level (2-tailed).

**Table 14**. Correlation of "I find pirated software to be useful, especially in my studies" and "I think pirating software is acceptable in some cases."

Table 14 displays the correlation test results of "I find pirated software to be useful, especially in my studies" and "I think pirating software is acceptable in some cases." The Pearson's correlation indicates moderate correlation, and the p-value is $p < 0{,}001$, which again signifies statistical significance. In this case we explored the link between perceived usefulness and attitudes.

Next the link between perceived usefulness and intentions was explored.

**Correlations**

| | | I would pirate software if it somehow proved to be useful in my studies | I will pirate software at some point in the future |
|---|---|---|---|
| I would pirate software if it somehow proved to be useful in my studies | Pearson Correlation | 1 | ,657** |
| | Sig. (2-tailed) | | 0,000 |
| | N | 429 | 429 |
| I will pirate software at some point in the future | Pearson Correlation | ,657** | 1 |
| | Sig. (2-tailed) | 0,000 | |
| | N | 429 | 429 |

**. Correlation is significant at the 0.01 level (2-tailed).

**Table 15.** Correlation of "I would pirate software if it somehow proved to be useful in my studies" and "I will pirate software at some point in the future."

Table 15 displays the correlation between "I would pirate software if it somehow proved to be useful in my studies" and "I will pirate software at some point in the future." Pearson's r is quite close to 1, which indicates rather strong correlation. In addition, p-value is $p < 0{,}001$, which means there is statistical significance.

**Correlations**

| | | I will pirate software at some point in the future | I think pirating software is acceptable in some cases |
|---|---|---|---|
| I will pirate software at some point in the future | Pearson Correlation | 1 | ,577** |
| | Sig. (2-tailed) | | 0,000 |
| | N | 429 | 429 |
| I think pirating software is acceptable in some cases | Pearson Correlation | ,577** | 1 |
| | Sig. (2-tailed) | 0,000 | |
| | N | 429 | 429 |

**. Correlation is significant at the 0.01 level (2-tailed).

**Table 16**. Correlation of "I will pirate software at some point in the future" and "I think pirating software is acceptable in some cases."

As we can see from table 16, there is a moderate correlation between "I will pirate software at some point in the future" and "I think pirating software is acceptable in some cases." In addition, $p < 0{,}001$, which means that there is statistical significance.

For comparison, those who hadn't pirated software were chosen from the data and a similar correlation test was conducted.

**Correlations**

| | | I will pirate software at some point in the future | I think pirating software is acceptable in some cases |
|---|---|---|---|
| I will pirate software at some point in the future | Pearson Correlation | 1 | ,550** |
| | Sig. (2-tailed) | | 0,000 |
| | N | 205 | 205 |
| I think pirating software is acceptable in some cases | Pearson Correlation | ,550** | 1 |
| | Sig. (2-tailed) | 0,000 | |
| | N | 205 | 205 |

**. Correlation is significant at the 0.01 level (2-tailed).

**Table 17**. Correlation of "I will pirate software at some point in the future" and "I think pirating software is acceptable in some cases" when the data set includes only those who hadn't pirated software

In table 17 we can see that there is a moderate correlation between the statements, and $p < 0{,}001$, which indicates statistical significance. As we can see, there isn't a notable difference in the values of the correlation test.

# 5. Discussion

The aim of this research was to study software piracy among university students, and the study was done on the students of the University of Oulu. The target was to find out what kind of role software piracy plays among them. In addition, the target was to find out how common software piracy is and how the software piracy rates differ by factors like, gender, age etc. Another important aspect of this study was to find out what kind of reasons the students have for software piracy.

## 5.1 Software piracy and students

The relationship between various demographic factors and software piracy has been discussed in previous literature, and studies have yielded mixed results regarding the significance of certain demographic factors and software piracy. For example, gender is one of those controversial factors: some studies have confirmed that there is a relationship between the two while others have debunked it.

In this study's case, however, the results of the Chi-Square tests presented in the previous chapter do indicate that there is a statistical significance between gender and software piracy. Morgan et al. (2008) found out in their study that females were more likely to deem a behavior more ethical compared to their male counterparts. Spark (2010) examined the demographic factors and their relationship with the intention to pirate software, and she found out that gender had the strongest relationship with intention to pirate. Cronan et al. (2006), however, found out in their study that males commit computer misuse more often compared to females. However, Hsieh & Yeh (2012) found no significant relationship between gender and the degree of ethical behavior for unauthorized software copying. This study confirms that there is a dependency between gender and software piracy. However, it is important to remember that Chi-Square test doesn't tell much about the strength of the relationship between the variables or the substantive significance in the population. The sample size was also rather large (N =429), which might affect the results of the Chi-Square test. It is also important to remember that in this study the gender distribution was skewed towards males, 69% were male and 27% were female.

Another examined factor is age. According to Spark (2010) there is also a significant relationship between age and intention to pirate software. Cronan et al. (2006) also found out in their study that younger students were more likely to commit computer misuse, although they noted that their study might have been biased towards younger students. Morgan et al. (2008) also noted a trend in their study that older students were more likely to deem software piracy unethical than their younger counterparts. Hsieh & Lee (2012) also found a significant relationship between software piracy and age, although their result may not be comparable since they compared high school students and college students, and the older students actually displayed more tolerance towards unauthorized software copying.

In this study the results of the Chi-Square test confirmed that there is a statistically significant relationship between age and software piracy. However, like in the case of

gender, the results of the test must be interpreted with caution. It is also important to note that most of the respondents were from the younger end of the age spectrum, skewing the data on the younger side.

Other studies have also studied the relationship between major subjects and software piracy. Spark (2010) found out that academic discipline had a significant relationship with the intention to pirate software. On the other hand, Cronan et al.(2006) found out that those who studied computer systems reported significantly more computer misuse compared to other academic subjects. Analyzing the relationship between major subject and software piracy was also one of the aims of this study, but due to the low response rates of some majors the results wouldn't have been representative regarding this aspect.

Few studies have been conducted on the subject of nationality and software piracy rates among students. Similarly to major, there were too few respondents with other nationalities for meaningful and valid analysis; 93,9% of respondents, an overwhelming majority, were Finnish and the rest were individuals of various nationalities. However, it would be an interesting subject to see how the software rates would differ by nationality, and thus the cultural differences could be taken into account.

## 5.2 Reasons for software piracy

Another major target of this study was to explore what kind of reasons the students of the University of Oulu have for pirating software. Sang et al. (2015) found out in their study done on American and Korean students that cost and availability were the most important reasons for software piracy. Konstantakis et al. (2010) also came to similar conclusions: in their study the students mentioned their student status and lack of income as justifications for software piracy.

The answer options on the question regarding reasons for software piracy in this study were partly based on a study by Siponen & Vartiainen (2007). The expensiveness of genuine software was overwhelmingly the most popular reason for software piracy, which was followed by minimal risk of getting caught and easiness of copying. The argument "everyone does it" placed fourth in the results of their study.

The results of this study are in line with the other studies: the expensiveness of genuine software was by far the most popular answer of all the answer options. The second most popular reason was the availability of pirated software. Minimal risk of getting was the third popular reason for software piracy, which is a quite similar result to the one by Siponen & Vartiainen (2007). Similarly, the argument "everybody does it" was the fourth most popular reason. Overall the results of this study regarding reasons for software piracy seem to confirm those of previous literature.

However, there were few studies done on the purposes for pirated software. There was little discussion on the purposes of pirated software, although the purposes behind illegal downloading remain an interesting research subject, and it would be interesting to see in-depth studies regarding them.

## 5.3 Conceptual model and the results

In this study a conceptual model was proposed in order to examine the connections between the factors that influence the intentions to pirate software as well as the underlying attitudes behind them. In order to explore the connections between the factors, sum variables were created and correlation tests were conducted. See Appendix A for the survey questions.

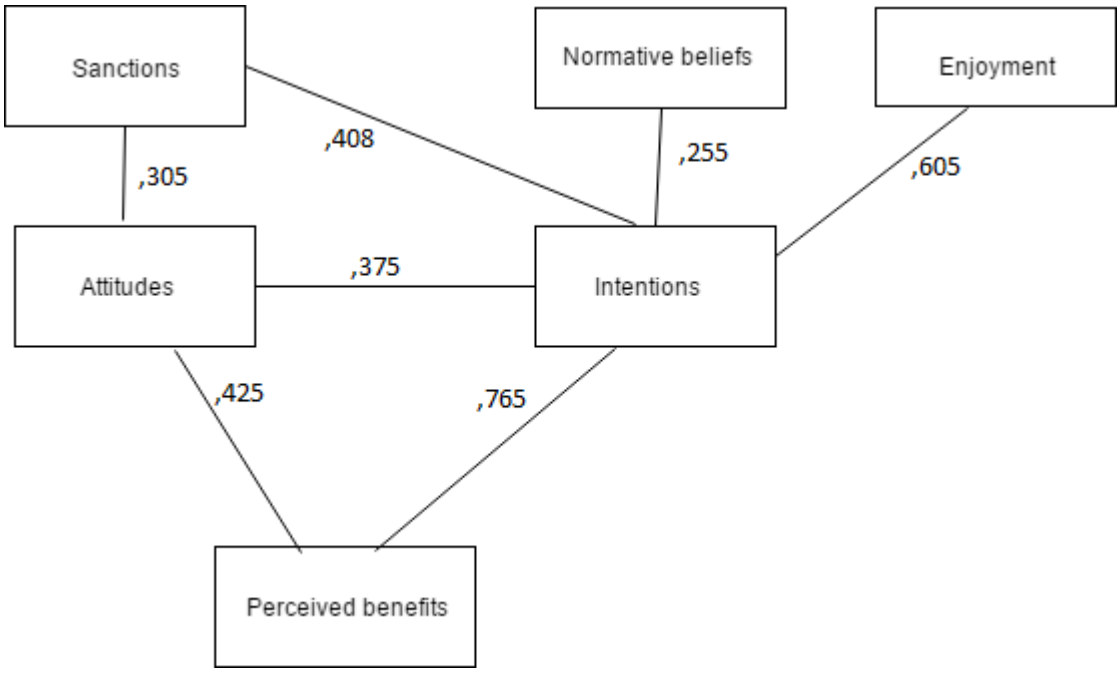


**Figure 10**. Conceptual model with correlation values added.

Figure 10 presented above displays the results of the correlation tests. The values of Pearson's correlations are added into the conceptual model, and we can see that there is some variation in the strength of the correlation between the different factors of the model. Overall the correlations seem to range from rather weak to rather strong, but most of them indicate quite moderate correlation. However, it is important to note that the p-value for all of the correlation tests was < 0,001, which, again, indicates statistical significance.

According to the results perceived benefits and enjoyment seem to have the strongest effect on the intentions to pirate software. Enjoyment also has moderately strong correlation with intentions, which was rather surprising. However, it is rather interesting that normative beliefs seem to have rather weak correlation with intentions.

Sanctions seem to have a similar effect on both attitudes and intentions, but the correlation is a bit weaker between sanctions and attitudes. Perceived benefits and attitudes seem to have a rather moderate correlation.

It is quite interesting how the correlation values differed between the factors in the conceptual model, and the results are quite surprising. For example, one might expect that the correlation between attitudes and intentions were stronger, but in this case it turns out to be on the weaker side. However, as already stated above, all of the factors had statistical significance between them. The above model with the correlations may help to illustrate the significance of different factors behind software piracy, and these factors and their relationship with software piracy could be addressed in future studies.

## 5.4 Limitations

It is important to notice that this study has a few limitations. Firstly, due to the quantitative nature of the data, the results are rather superficial. It is also impossible to know whether all of the participants of the survey took it seriously and answered truthfully and carefully. The sample was also skewed: when analyzing the link between gender and software piracy it is crucial to note that the gender distribution was very uneven. Same can be said about age distribution; far more young students responded to the survey compared to older students, and thus this study may be biased towards younger students. Analyses on nationality and majors were not done since there weren't enough respondents.

# 6. Conclusions

In this study we explored what kind of role software piracy plays among university students. Software piracy among students has been studied on an international level, but studies done on Finnish university students were scarce. This study also aimed to find out how common exactly software piracy is, and what kind of reasons the students have for software piracy. The demographic factors were also explored: one of the aims was to find out how piracy rates differ in different subpopulations.

In previous literature there doesn't seem to be a consensus on what factors have a significant relationship with software piracy. Take gender for example: some studies had found a significant relationship, but some studies haven't found such relationship. The literature cited in this study found a relationship between age and software piracy, often meaning that younger students were more likely to pirate, but some of the studies also noted that their studies were biased towards younger people.

Some studies have also explored the reasons behind software piracy. The results regarding reasons, contrary to the demographic factors, have been rather consistent: most of the studies mentioned the expensiveness of genuine software as the students' primary reason for software piracy. Availability of pirated software and easiness of pirating were also very common reasons for software piracy.

In this study a conceptual model was proposed, and the conceptual model aims to explain which factors influence the intentions to pirate and the attitudes behind them. A survey was designed based on the model, and the survey was distributed to the students of the University of Oulu as an online link via email.

The survey garnered a rather large amount of responses. The results of this study indicate that there does seem to be statistical significance between gender and software piracy, although it must be noted that the gender distribution of the data was strongly skewed towards males. This study also found out that age seems to have such a relationship, too, although one must bear in mind that the sample was again skewed towards younger students. When it came to reasons for pirating software, the study followed the footsteps set by previous literature: expensiveness of genuine software was the most significant factor, followed by the availability of pirated software. The purposes for pirated software were also surveyed: study and learning purposes alongside entertainment purposes were by far the most popular ones.

The factors which influence the intentions and attitudes when it comes to software piracy were also explored in this study. All of the factors were found to be correlated in some way, but the correlations ranged from rather weak to rather strong. However, all of them turned out to be statistically significant. The model illustrates the relationships between the factors and may help to understand their significance in one's decision-making.

## 6.1 Practical implications

This study may help to understand better and validate the results of the previous literature regarding the motivators, reasons, and paradigms behind software piracy. This assists in understanding the phenomenon and may possibly aid in finding solutions for mitigating software piracy.

## 6.2 Future research

In future research the relationship between major subject and software piracy could be explored more. Unfortunately, it wasn't feasible in this study, but that is one aspect that future studies could cover. In addition, cultural differences and their relation to software piracy rates could also be studied more in the future. Additionally, there were few studies done which examined the purposes the users had for pirating software, and future studies could explore them in an in-depth way, too.

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# Appendix A. Survey questions

**Your gender (single choice)**

- Male
- Female
- Other
- Prefer not to answer

**Age (single choice)**

- 18-21
- 22-25
- 26-29
- 30-33
- 34-37
- 38+

**Nationality (single line, open answer):**

_____

**Major (single choice)**

- Archaeology
- Architecture
- Biochemistry
- Biology
- Business
- Chemistry
- Cultural anthropology

- Dentistry
- Early childhood education
- Education
- Electrical engineering
- English philology
- Environmental engineering
- Finnish language
- Geography
- Geology
- German philology
- Health sciences
- History
- History of science and ideas
- Industrial engineering and management
- Information engineering
- Information processing science
- Information science
- Literature
- Logopedics
- Mathematics
- Mechanical engineering
- Medical technology
- Medicine
- Music education
- Nordic philology
- Physics
- Primary teacher education
- Process engineering

- Saami culture
- Saami language
- Special education
- Other... (field for open answer)

**Highest completed education (single choice)**

- Matriculation examination/vocational school or equivalent
- Bachelor's degree
- Master's degree
- Other... (field for open answer)

**How would you describe your computer experience? (single choice)**

- Poor
- Below average
- Average
- Above average
- Excellent

**Frequency of your computer usage (single choice)**

- Less than once a week
- Once a week
- A couple of times a week
- Several times a week
- Once a day
- Multiple times a day

**How many hours a week do you use a computer? (single choice)**

- Less than an hour

- 1-5 hours a week
- 5-10 hours a week
- 10-15 hours a week
- 15-20 hours a week
- 20-25 hours a week
- 25+ hours a week

**Have you pirated software during your university studies? (single choice)**

- Yes
- No

**What were your reasons for pirating software? (multiple choice + possibility for an open answer; skipped if negative answer to "Have you pirated…")**

- The expensiveness of genuine software
- Availability of pirated software
- Minimal risk of getting caught
- Everybody does it
- Pirating software does not hurt anybody
- Software is intangible and should not be bound by ownership
- Other (open answer)

**For what purpose have you pirated software? (multiple choice + possibility of an open answer; skipped if negative answer to "Have you pirated…)**

- Trial
- Entertainment (E.g. games)
- Study/Learning purposes
- Work-related purposes
- Other (open answer)

**What do you think of the statements presented below? Please use scale of 1-5. 1=Strongly disagree 2=Somewhat disagree 3=Neutral 4=Somewhat agree 5=Strongly agree**

I find pirated software to be useful, especially in my studies. [Perceived benefits 01]

- Likert scale 1-5 (strongly disagree - strongly agree)

Using pirated software has helped me in my studies. [Perceived benefits 02]

- Likert scale 1-5 (strongly disagree - strongly agree)

Using pirated software has enhanced my effectiveness. [Perceived benefits 03]

- Likert scale 1-5 (strongly disagree - strongly agree)

I would pirate software if it somehow proved to be useful in my studies. [Perceived benefits 04]

- Likert scale 1-5 (strongly disagree - strongly agree)

Using pirated software is fun. [Enjoyment 01]

- Likert scale 1-5 (strongly disagree - strongly agree)

Using pirated software is pleasant. [Enjoyment 02]

- Likert scale 1-5 (strongly disagree - strongly agree)

Using pirated software is wise. [Enjoyment 03]

- Likert scale 1-5 (strongly disagree - strongly agree)

Overall, using pirated software brings me joy. [Enjoyment 04]

- Likert scale 1-5 (strongly disagree - strongly agree)

Other students have recommended pirated software to me. [Normative beliefs 01]

- Likert scale 1-5 (strongly disagree - strongly agree)

My friends have recommended pirating software to me. [Normative beliefs 02]

- Likert scale 1-5 (strongly disagree - strongly agree)

People in my social circles have recommended pirated software to me. [Normative beliefs 03]

- Likert scale 1-5 (strongly disagree - strongly agree)

My peers have recommended pirated software to me. [Normative beliefs 04]

- Likert scale 1-5 (strongly disagree - strongly agree)

I will pirate software at some point in the future. [Intentions 01]

- Likert scale 1-5 (strongly disagree - strongly agree)

I will pirate software frequently in the future. [Intentions 02]

- Likert scale 1-5 (strongly disagree - strongly agree)

I will pirate software if needed. [Intentions 03]

- Likert scale 1-5 (strongly disagree - strongly agree)

Using pirated software helps me save money. [Perceived benefits 05]

- Likert scale 1-5 (strongly disagree - strongly agree)

Using pirated software makes me feel content. [Perceived benefits 06]

- Likert scale 1-5 (strongly disagree - strongly agree)

Using pirated software is time-saving. [Perceived benefits 07]

- Likert scale 1-5 (strongly disagree - strongly agree)

I have somehow benefitted from pirating software. [Perceived benefits 08]

- Likert scale 1-5 (strongly disagree - strongly agree)

I am afraid of getting caught. [Sanctions 01]

- Likert scale 1-5 (strongly disagree - strongly agree)

I am aware of the potential sanctions. [Sanctions 02]

- Likert scale 1-5 (strongly disagree - strongly agree)

I do not care about potential sanctions. [Sanctions 03]

- Likert scale 1-5 (strongly disagree - strongly agree)

I do not care about the Finnish legislation regarding software piracy. [Sanctions 04]

- Likert scale 1-5 (strongly disagree - strongly agree)

I know what the organization's policies regarding software piracy are like. [Sanctions 05]

- Likert scale 1-5 (strongly disagree - strongly agree)

My friends have pirated software at some point.

- Likert scale 1-5 (strongly disagree - strongly agree)

I have discussed pirating software with my friends.

- Likert scale 1-5 (strongly disagree - strongly agree)

My friends have encouraged me to pirate software.

- Likert scale 1-5 (strongly disagree - strongly agree)

My friends view software piracy in a positive light.

- Likert scale 1-5 (strongly disagree - strongly agree)

I do not find software piracy acceptable. [Attitudes 01]

- Likert scale 1-5 (strongly disagree - strongly agree)

I think pirating software is acceptable in some cases. [Attitudes 02]

- Likert scale 1-5 (strongly disagree - strongly agree)

I think all software should be free. [Attitudes 03]

- Likert scale 1-5 (strongly disagree - strongly agree)

I think it's okay to pirate software if it's for the greater good. [Attitudes 04]

- Likert scale 1-5 (strongly disagree - strongly agree)

I might purchase software that I have previously pirated. [Attitudes 05]

- Likert scale 1-5 (strongly disagree - strongly agree)

If my income were higher I would purchase more genuine software. [Attitudes 06]

- Likert scale 1-5 (strongly disagree - strongly agree)