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THE EFFECTS OF INFORMATION TECHNOLOGY ON STUDENT LIFE DURING THE COVID-19 PANDEMIC

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ABSTRACT

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The emergence of COVID-19 pandemic in early 2020 is very likely going to be one of the defining moments of the current generations. Its global impact has been severe and the governments around the world have been forced to take exceptional measures. As the situation is still evolving and largely unexplored, a research into the caused phenomena is warranted. This master's thesis focuses on the students in the University of Jyväskylä and their use of information technology both in their studies and their social life during the COVID-19 pandemic. The viewpoints of information overload and "infodemic" (an information overload during an epidemic) are also examined in this thesis. In the theoretical background, existing frameworks from several fields are incorporated to the study, including the adoption of new technology, cognitive processes, and remote learning. The study presents a wide overview of how the social distancing measures taken during the pandemic have affected the students and how they have been able to adapt to the situation. The findings suggest that students are technologically capable of studying in an online environment and have adapted reasonably well, but not completely without issues. Even with the advanced technological possibilities that are available to us, studying is still largely a social experience, and the technological solutions cannot completely replace it. Due to the uncertainty of the situation and the excessive amount of information, an increase in anxiousness and frustration was also growing over time in the students. For these reasons, the remote systems should be kept as simple as possible, so they are easy to adopt and are not a source of further stress. Remote learning and working are here to stay, but they are not and will probably never be a complete solution to every scenario.

Keywords: remote learning, COVID-19, infodemic, adoption of new technology

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COVID-19-pandemian syntyminen ja leviäminen ympäri maailman vuoden 2020 alussa tulee todennäköisesti olemaan yksi aikamme merkittävimpiä sukupolvikokemuksia. Sen maailmanlaajuinen vaikutus on ollut huomattava ja valtiot ympäri maailman ovat joutuneet tukeutumaan poikkeuksellisiin toimenpiteisiin. Koska tilanne kehittyy yhä ja sen vaikutukset ovat pitkälti vielä kartoittamatta, aiheutuneen ilmiön tutkiminen on perusteltua. Tämä pro gradu -tutkielma keskittyy Jyväskylän yliopiston opiskelijoihin ja heidän tapoihinsa käyttää informaatioteknologiaa koronaviruspandemian aikana niin opinnoissaan kuin vapaa-ajallakin. Tutkielmassa käsitellään myös informaatiotulvan ja ”infodemian” (informaatiotulva epidemian aikana) vaikutuksia opiskelijoihin. Tutkimuksen teoreettinen taustamateriaali sisältää aiempia viitekehyksiä muun muassa uuden teknologian omaksumisen, kognitiivisten prosessien sekä etäopimisen osa-alueilta. Tutkimus esittää yleisen katsauksen siitä, kuinka sosiaalista etäisyyttä ylläpitävät tekijät ovat vaikuttaneet opiskelijoihin ja kuinka he ovat kyenneet sopeutumaan tilanteeseen. Tulosten pohjalta voidaan todeta, että opiskelijat ovat teknologisesti kykeneviä opiskelemaan verkkoympäristöissä. He ovat myös onnistuneet sopeutumaan tilanteeseen nähden hyvin, mutta eivät kuitenkaan ongelmitta. Edistyneistä teknologiaratkaisuista huolimatta opiskelu nähdään edelleen myös vahvasti sosiaalisena kokemuksena, eikä sitä pystytä korvaamaan riittävän hyvin teknologia-avusteisesti. Tilanteen epävarmuuden ja useista lähteistä tulevan informaatiotulvan vuoksi myös opiskelijoiden ahdistuneisuuden tunne ja turhautuminen kasvoi tilanteen edetessä. Näistä syistä etäopiskelujärjestelmät tulisi pitää mahdollisimman yksinkertaisina, jotta ne olisi helppo ottaa käyttöön eivätkä vain ylimääräinen stressin lähde. Etäopiskelu ja -työskentely ovat tulleet jäädäkseen, mutta ne tuskin koskaan tulevat olemaan ratkaisu jokaiseen tilanteeseen.

Asiasanat: etäoppiminen, COVID-19, infodemia, uuden teknologian omaksuminen

FIGURES

TABLES

TABLE OF CONTENTS

1 INTRODUCTION

For over a year, the COVID-19 pandemic has affected our everyday life in all imaginable ways. COVID-19 is an infectious respiratory illness, which was declared a Public Health Emergency of International Concern on 30th of January and later on a global pandemic on 11th of March 2020 by the World Health Organization. (BBC News, 2020). The first outbreak of the disease was reported in late December 2019 in China, from where it eventually spread to Europe during the spring of 2020. This type of a situation was something the world had yet to experience during this ongoing modern, technology-dependent era we are currently living in. As in every other country, it quickly had an effect on almost every industry imaginable. In the case of education, the measures included the adoption of extensive social distancing, which forbade normal, face-to-face modes of studying we have become accustomed to. Among the measures taken at universities, the outright ban on contact teaching was likely the most significant action. Even with the quite recent rise of several online teaching methods and possibilities, many courses were still reliant on contact teaching and had to quickly adapt to the situation.

1.1 Motivation and research question

COVID-19 has defined the year 2020 and will also very likely imprint the future in many ways. The future of travel, mass events, meetings, general hygiene measures, and several other aspects of life is yet to be determined. While experts have been predicting a similar global event (BBC, 2018), most people and nations were completely unprepared. Even though there have been other similar events before – such as SARS in 2002 and swine flu in 2009 – the scale of COVID-19 was something we had never experienced before in a modern time. This means that up until now, not much attention has been paid to a scenario where almost everything has to be performed remotely. For example, there may be preparations for situations where remote working is not possible, but not to

situations where it is suddenly the only option. A paradigm shift of this scale means that all of this is still very much an unexplored territory. That fact alone should already mean that there is a good reason to examine this more closely.

The unprecedentedness of the situation also means there has been no studies made about the subject either. Finding out the most troublesome aspects of the transition to online studies could help everybody in the future. When the pandemic comes to an end, some of the measures with a positive effect to the quality of life could be left implemented instead of returning back to the old methods. At the moment, it seems that the most important thing would be to find out what were the most critical issues people experienced due to the abrupt change, and what measures can be taken to alleviate the issues and the stress caused by the alterations. The effects of this crisis will probably also shape our future in several ways as the preparation against COVID-19 and potential future pandemics is taken by the governments and authorities.

Since the popularization of the internet, remote and online studies have been possible to some extent. Yet still, several courses heavily rely on traditional contact teaching and mass lectures. Both technological and psychological reasons behind this should be investigated. Informal observations made during the spring also suggested that there could be significant differences in preparation across the different faculties.

The primary objective of this research is to examine the impact onto the university students. This led to the following research questions and subquestions being placed:

- How has the COVID-19 pandemic affected university students?
    - How well were the remote studies facilitated by the use of information technology?
    - How have students upheld their social life?
- What were the biggest issues students faced when forced to take on remote learning?
    - How can these issues be minimized?

1.2 Measures taken at the University of Jyväskylä

As the pandemic evolved quickly and there is no universal reference point due to the unique nature of the situation, some reference points should be established. Because the study focuses mainly on the reactions and feelings of the students, which are highly situational, the most important developments of the situation in Jyväskylä should be described. This progression of events was similar in other Finnish universities and should be generalizable to whole Finland.

The first public indication of reaction in the University of Jyväskylä was in late January when the recommendations by the Foreign Ministry of Finland recommended against traveling to China (University of Jyväskylä, 2020a). However, the first clearly notable measures only took place in early March,

when the bulletins that were initially focused to staff turned into updates that applied to everybody. The development was rapid as it only took less than three weeks to move from "five days of remote working when returning from an epidemic area" (University of Jyväskylä, 2020b) to a complete shutdown of contact teaching (University of Jyväskylä, 2020e). Basically, this period was the time that students and university personnel had in their hands to prepare for the shift to remote studies. Below, a timeline of all major measures is shown to demonstrate the development of the situation (Table 1).

TABLE 1 A timeline of measures taken in the University of Jyväskylä

Date	**Measures taken**
February 4, 2020	Following the travel recommendations by the Foreign Ministry of Finland, trips to China should be cancelled (University of Jyväskylä, 2020a)
February 25	Finnish authorities announce Iran, South Korea and areas of Italy as additional epidemic areas. Five days of remote working recommended when returning or being in contact with a person returning from an epidemic area. (University of Jyväskylä, 2020b)
March 4	Certain areas of Austria and Germany are added as epidemic areas. All foreign trips should be considered carefully. Public events with over 30 people are to be held online. (University of Jyväskylä, 2020c)
March 10	Remote work recommendation updated to 14 days. (University of Jyväskylä, 2020c)
March 13	After March 16 only essential contact teaching is allowed. After March 17 only essential personnel allowed at the university. (University of Jyväskylä, 2020d)
March 14	First suspected case of COVID-19 in the university. (University of Jyväskylä, 2020e). All contact teaching suspended; upcoming exams postponed. (University of Jyväskylä, 2020f)
March 16	*Finland declares a state of emergency. Several restrictions take place, including a complete closure of university buildings on March 18. (Valtioneuvosto, 2020a)*
April 4	The continuation of restrictions until May 13. (University of Jyväskylä, 2020g)
May 5	Limited re-opening: only the most essential research and studies allowed at the university after May 14. (University of Jyväskylä, 2020h)
May 20	Electronic exam rooms to be opened on May 25. (University of Jyväskylä, 2020i)
May 28	Partial return to contact teaching and working at the campus in August, with new students prioritized. Group size may not exceed 50 persons. Majority of the courses are still to be held online. (University of Jyväskylä, 2020j)
June 16	*The state of emergency in Finland comes to an end (Valtioneuvosto, 2020b)*
July 31	Student restaurants at the university open in August. (University of Jyväskylä, 2020k)
August 24	Face masks are mandated in contact teaching. (University of Jyväskylä, 2020l)
September 24	Masks recommended "widely" by the City of Jyväskylä. Recommendation to postpone the socializing events of students. (University of Jyväskylä, 2020m)
September 29	Current restrictions continued until December 14. (University of Jyväskylä, 2020n)
November 5	Restrictions continued until March 14, 2021. (University of Jyväskylä, 2020o)

2 LITERATURE REVIEW

The following chapter starts by going through the general history of remote learning and some of its early concepts and frameworks. As the change was sudden and unexpected, it also includes a look into change resistance and how it can be managed. In addition, mental and psychological viewpoints are examined, especially from the perspectives of stress, distractions, and social life. Finally, one of the aspects that has especially characterized the COVID-19 pandemic is the concept of an 'infodemic', which is investigated at the last stages of this chapter.

Due to the unforeseen nature of the subject, the sources that apply exactly to this type of sudden and involuntary adoption of technology were – and still are – very limited. However, there has been extensive research into online remote learning for almost three decades. The scope of the literature review can further be supplemented by additionally including human-centered material from psychological studies. These have less technological inclination but are important to include when the situation is investigated from a cognitive perspective. The reviewed literature forms a backbone for the study, so the reasons why people adopt or reject remote learning can be examined.

Information overload was initially considered as a somewhat separate entity to this, but the feeling of becoming overwhelmed and confused due to the new situation also applied to the study environments remarkably lot. The importance of proper information and how it is delivered should not be underestimated, especially when most of the information is nowadays consumed digitally.

2.1 History of remote studies

Even though we may think that remote courses have only been possible since the Internet has become a ubiquitous and an essential part of our life, it is hardly the truth. The history of distance education has surprisingly long roots

and the first attempts of proper remote courses go all the way back to the 18th century, when the first remote courses were held via mail and with the help of publication of study material in newspapers. These courses were unsurprisingly slow in pace and the lacked the potential for quick feedback. By the year 1900, proper remote courses were already established at several universities. (Holmberg, 2005)

As Internet started to gain popularity and the world slowly became more connected, the remote courses also started to utilise the potential of e-mail. The use of e-mails in remote teaching reduced the response time between the participants drastically and was the first step towards real-time remote learning. (Holmberg, 2005). Even with the quick developments, the teaching remained asynchronous as the rudimentary online capabilities could not yet handle real-time teaching, at least in a large scale (Galusha, 1995).

Piccoli, Ahmad and Ives (2001) outline a framework for virtual learning environments (Figure 1). This virtual learning environment is defined as free of time, place, and space constraints, and can be seen as one of the earliest fundamental definitions for the synchronous, real-time remote teaching. The model also posits that for the virtual environment to work, it needs the students and instructors to have enough motivation and capabilities to use it. In addition to this human dimension, the courses also need to be designed correctly. There needs to be considerations about proper learning model for the online environment as simply moving the traditional classroom to virtual environment may not always be the optimal choice. The same principle applies to the content of the course. (Piccoli et al., 2001)

Learner control and interaction refer to the possibilities given to the students. A high level of learner control allows for more freedom for the student, but it can also be a balancing act between positive study results and learner satisfaction. The amount of interaction required should also be considered. If the online course lacks proper interaction or its pace is not suitable, it can quickly lead to a decrease in learner satisfaction. (Piccoli et al., 2001)

In addition to the above factors, Siewiorek and Swarz (1998) point out that the technology must also meet the basic requirements for an information system. These desired system traits from a user viewpoint include factors such as reliability, availability, and ease of use. From the provider viewpoint the service should most importantly be easily maintainable (Siewiorek & Swarz, 1998).

Together, the human and design dimensions form the dimension of effectiveness for a virtual learning environment. This dimension includes the subdimensions of performance, self-efficacy, and satisfaction. If the enabling factors are adequate, these factors of effectiveness should be on a high level, which make the online studies enjoyable to be involved in (Piccoli et al., 2001).

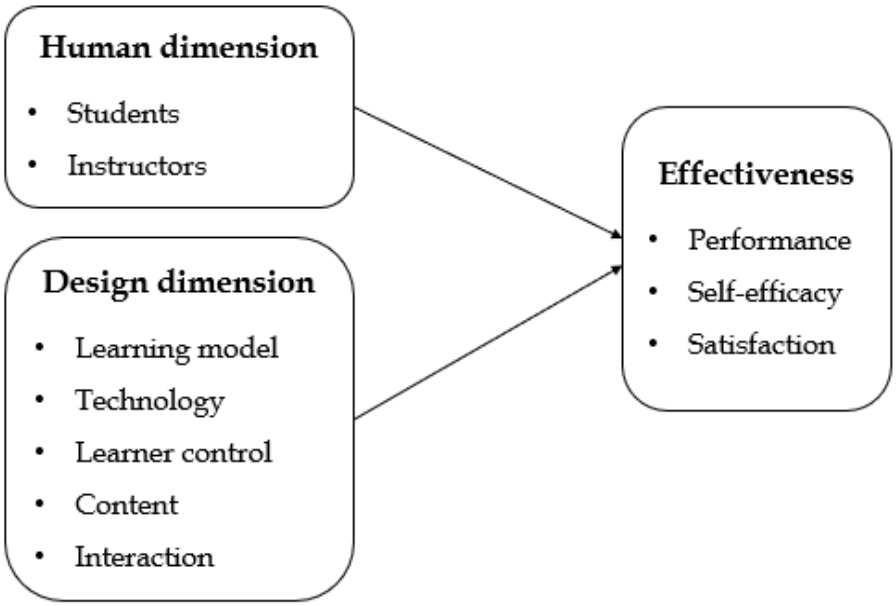

FIGURE 1 Framework for virtual learning environments (Adapted from Piccoli, Ahmad & Ives, 2001)

Another viewpoint comes from Galusha (1995), who investigates the barriers to distance learning and divides them into three categories: learner barriers, faculty barriers and organizational barriers, with additional course considerations as well. Learner barriers include feelings relating to the student itself. These feelings include features such as isolation, lack of available support and inexperience. The learning issues caused by the instructors and the university are considered as faculty barriers and include everything from the lack of training to negative attitudes toward remote teaching. Finally, there are organizational barriers, which include all the technical or financial issues, such as the quality or amount of equipment and available infrastructure of each course participant.

Similarly to Piccoli et al. (2001), the additional "course considerations" of Galusha (1995) note that course-related factors such as low-quality content and a lack of proper pacing can also become issues when attempting to hold online courses. In other words, traditional contact teaching should be tailored to fit online form as the material or pace used in contact teaching may not be sensible in a distance learning environment.

2.2 The adoption of new study methods

The technology adoption lifecycle by first demonstrated by Rogers (1962) divides users into five groups of people, with varying eagerness to adopt new innovations or systems. The people are distributed along a bell curve, which suggests that when it comes to new technology, roughly 1/6 of the people can be seen as the innovators (the 1st group of people) and early adopters (2nd group). These people are the ones who are most interested about new products and even take part in their development.

On the other end of the curve, there's another 1/6 of people, who are the reluctant "laggards". These people prefer to stay in the older ways of doing things and refuse to adopt new technology. The remaining 4/6 of the people are the majority, who are set somewhere in between these groups. This majority can further be divided into early and late majority for more specific categorizing. In the case of this pandemic, there was no realistic option to stay in the old ways of contact teaching as it became almost completely forbidden. Everyone, even the laggards, had to adopt the new measures rapidly as the only realistic alternative option in this situation would have been to not study at all.

The unified theory of acceptance and use of technology – or UTAUT for short – states that there are four key constructs for a successful acceptance of new technology. These are performance expectancy, effort expectancy, social influence and facilitating conditions. (Venkatesh, Morris, Davis G. & Davis D., 2003)

Performance expectancy attempts to define how much the new technology improves the execution of the tasks users desire to carry out. The constructs of performance expectancy include factors such as how useful and advantageous the new service is when compared to the old way, how well the new service will suit the tasks and which kind of additional external motivations there are to encourage the use of a new system. Performance expectancy can often be seen as one of the strongest indicators when it comes to the adoption of the new technology. (Venkatesh et al., 2003)

Effort expectancy is perhaps the simplest construct as it simply expresses how much effort the system or technology requires to use. Oppositely, it can be explored from the viewpoint of complexity: how difficult is the system to learn and understand? (Venkatesh et al., 2003)

For the purposes of this study, the construct of social influence might be the least relevant of these four determinants, but the opinions of the influential people and the social pressure do have an effect to acceptance of technology. (Venkatesh et al., 2003). The effects of this determinant may be reflected in the perceived attitude of teachers and peers.

Facilitating conditions are the only direct determinant of use as its constructs dictate how possible the system is to use. In case the user experiences issues, the guidance and support should be readily available. There should also

be compatibility with the existing ways of working so the new system is easily fitted into the existing environment. (Venkatesh et al., 2003)

The updated version of the framework, UTAUT2, has three additional constructs to the original UTAUT (Venkatesh, Thong & Xu, 2012). Of these, it can be hypothesized that hedonic motivation is not properly applicable in this case as everybody were forced to study remotely and had no alternative choice. This means that the hedonistic viewpoints should not be a determinant of use in this case. Similarly, price is not an applicable construct either as all the applications and tools were free for the students to use. Therefore, it could be excluded in this case along with hedonistic motivation.

However, the habit construct of UTAUT2 can be applied as some students may have had earlier experience from remote learning and online courses. This can mean that students that are more technologically adept also thrive when that is the only option, but students who are not used to it may struggle.

When a study based on UTAUT framework was done about freshmen students at a Belgian university, the researchers found out that the students who already had a better understanding of computers and found them useful, were also more comfortable with the computer- and ICT-related assignments they had to do in the university. This was mainly attributed to the construct of performance expectancy (Verhoeven, Heerwegh & De Wit, 2010), but habit could also be seen as a factor, even though it was not specifically discussed in the study. As the scope of the COVID-19 situation studied in this paper is not too dissimilar to the study of Verhoeven et al. (2010) the constructs can easily be applied to current situation including online teaching environment and the tools it utilizes.

2.3 Cognitive processes and interactions with technology

A new, unexpected situation is always challenging on mental health. Oreg (2003) determines that there are six main reasons which may contribute to change resistance. People resistant to change often display one or several of the following factors: they do not want to feel that their control of the situation is lost (reluctance to lose control), they may want to stick to old dogmas and habits (cognitive rigidity, reluctance to give up old habits), they may lack the mental strength to handle the stress (lack of psychological resilience) or the uncertainty (intolerance to the adjustment period) caused by the change. They may also simply just favor a well-defined and familiar environment (preference for low levels of stimulation and novelty).

Stress and negative emotions caused by technology have also been a subject of research for a long time. Technostress was originally defined as "inability to cope with new computer technologies in a healthy manner" (Brod, 1984), but the term has later been expanded to mean stress caused by technology in general (Weil & Rosen, 1997). Tarafdar, Tu, Ragu-Nathan B., and Ragu-Nathan T. (2007) discuss the creators of technostress. The push for increased productivity

and availability, along with the need to learn complex systems are perhaps the most interesting conditions mentioned by Tarafdar et al. (2007).

Ayaagari, Grover and Purvis (2011) name several sources of technostress. These include the characteristic of the job or the role, relationship with the organization, career issues, organizational factors, the conflicts between work and home environments and the invasion of privacy due to technology.

Shepherd (2004) finds out that less technologically capable users experience more technostress than other users. In line with the research by Oreg (2003), it was found that the losing control of the established patterns may cause high amounts of stress. Most common causes of stress included difficulty of keeping up, hardware failure and computer crashes. However, a lack of interaction with a human was not seen as an issue. Swift availability of help and peer support were seen as the top methods to cope with technostress.

Battarbee and Koskinen (2005) studied user experience as interaction in the pre-social media era. The study is based on MMS messaging which has since become obsolete, but the concepts remain valid in the current social media environment. In the study, the researchers note that the social interaction over technology can take a form of co-experience, where the interesting experiences people encounter are lifted and shared with other people. To reciprocate, other people who receive the message can react to it in various ways (Battarbee & Koskinen, 2005).

Current interaction methods may also create new ways and styles of social interaction, where existing services are reimagined or completely repurposed to allow for something new. The researchers point out that new uses for technology will naturally tend to occur when people are given time to explore it (Kurvinen, Koskinen & Battarbee, 2008).

Juutinen (2011) studies the emotional aspects of e-learning and finds out that the initial reactions to an online course can have a significant effect when it comes to course completion and student happiness. One example are the online courses, which often have a big initial attendance, but in many cases only a fraction of the attendees finishes the course. One identified reason for this was an initial negative reaction at the start of the course, which then spiralled into a negative feedback loop and eventually ended in the abandonment of the course Juutinen demonstrates this by presenting a pride-frustration model that contains separate positive and negative feedback loops. If, while studying, students experience moments that can be considered as negative, their negative feedback loop should be interrupted as soon as possible or their motivation to keep learning will quickly stop. The reasons for these negative emotions can be the failures experienced during the course or problems with technology. Age and technophobia were also found to be factors – older students found e-learning and the required technology more difficult and less appealing. People with worse technical skills also became frustrated faster than their more technologically adept peers. (Juutinen, 2011)

2.4 Remote learning and working

The individuality of people means that the reactions to e-learning are unique as well. Saariluoma et al. (2010) note that for example, to a person that is more technologically adept, the increased use of technology can be a very positive experience. On the other hand, having negative experiences about the tools can cause a negative reaction in general. From the viewpoint of usability, users need to feel that they are capable when it comes to accomplishing tasks. (Juutinen, 2011). This is also consistent with the findings by Oreg (2003) that were discussed in the previous chapter.

What comes to working life, Raišienė et al. (2020) investigated the happiness of remote workers in Lithuania during the pandemic. According to the researchers, women saw it more as an opportunity for healthier lifestyle, valued the increased time management and a chance to balance work and personal life. Men were not as interested in working from home and even saw it as a threat to their careers as they were more inclined to believe they could not show their skills or competency like at the workplace. Age was also a factor, where younger people adapted much better and on average found more pros than cons from the situation. Older people were the opposite and emphasized the negative sides: they missed social contacts and felt less motivated.

Research by Song and Gao (2019) also shows some support in relation to the Lithuanian research. People were generally unwilling to bring work to home as it blurred the limits of those two environments. Having additional distractions at home could also cause more stress than what would normally be experienced in a normal situation at the workplace. Therefore, the positive effects to personal well-being were not seen as too significant when working from home.

A study conducted in Aachen University compared the teaching of mathematics in a classroom environment and via an online course. A clear, statistically significant difference was observed between the teaching methods, where online course participants were performing worse. Many of the issues raised by the students were related to different limitations the online teaching method had. Due to limitations, time and location flexibility were not a factor in this experiment, which caused decreased motivation among the students. (Dondorf, Breuer & Nacken, 2016). It can be argued that time and location flexibility are the most important aspects of remote working. Limiting those factors could very well be the cause for worse performance of the students.

Chen, Kaczmarek and Ohyama (2020) studied dentistry students' attitudes towards online classes and noted that interactive lectures boost effectivity. Having breakout rooms also had a positive impact on student engagement. To prevent 'Zoom fatigue', there was a suggestion to cluster online lectures to the early day, when the students are still more alert. Ungraded quizzes for purely self-improvement purposes were also mentioned as a useful tool. Likewise worth noting was the fact that students had a strong dislike towards non-recorded live

lectures, where participation was mandatory at a specific time. This kind of a 'simulation' of live lectures was regarded as unnecessary in an online environment. (Chen, Kaczmarek & Ohyama, 2020).

Al-Fraihat, Joy & Sinclair (2019) created an E-learning system success (EESS model), which comprehensively investigates different questions of remote learning. The questions used in the research of Al-Fraihat et. al (2019) were also used as a basis for the questionnaire that was carried out for the purposes of this thesis. The original questions are included in Appendix 3. In the study, they found out that variance in a high-quality educational system, along with well-working communication, positive approach from the learner, and frequent usage were the main contributing factors for e-learning success. Interactivity features along with proper self-assessment and self-evaluation materials also made e-learning more accessible and welcoming. (Al-Fraihat et al., 2019)

A doctoral dissertation by Seibold (2007) determines that courses held in an online environment are not equal to the traditional courses. They provide a completely different skill set: while online studies are great for flexibility and cost-saving for example, the typical benefits of a contact teaching lecture are missing or at least lacking. The benefits include team-building skills and interactivity that are hard to replicate in an online environment.

Smith and Mitry (2008) note their concern regarding the decreasing quality of courses in an online environment, especially when it comes to for-profit universities. These universities may provide a diluted version of the academical content to their students in order to maximise profits. (Smith & Mitry, 2008) Similar issues – albeit likely in a smaller scale – can occur even in non-profit universities. The lucrative option of cutting costs during a pandemic could be a very trivial thing to do when almost all courses are held online. The reliance to online studies may also still have a certain stigma, which does drag down the perception towards online studies. If the public opinion considers online courses or even a complete online degree to be attainable too easily, it will negatively affect the value of the degree in the eyes of an employer. (Columbaro & Monaghan, 2009)

2.5 Infodemic and mental health

Infodemic is a portmanteau from the words 'information' and 'epidemic'. The World Health Organization has defined infodemic as "too much information, including false or misleading information in digital and physical environments during a disease outbreak" (WHO, 2020a). If the situation is investigated from an information technology perspective, this is an essential component to include.

The term 'information epidemic' was first used in 2003, during the SARS outbreak (Rothkopf, 2003). In the text, Rothkopf compares the spread of information to the disease itself and notes that like the epidemic, the infodemic also has its symptoms, known carriers, and cures. As the world is more connected

than in 2003, the amount of information available has also grown exponentially. This has made the current COVID-19 -related infodemic much more challenging. Facts, speculation, rumours and outright false information (or 'fake news') have become more difficult to distinguish from each other. (WHO, 2020b)

Gao et al. (2020) researched mental health issues in China and found a significant increase in anxiety and depression during the pandemic, which could be attributed to the amount of social media exposure. The most active social media users had their mental health affected most negatively. The fear and uncertainty of social networks was 'infectious' and as different information kept appearing, more and more people started to voice their concerns in social media, which lead to further exposure. The researchers suggested that a more attention should be paid into monitoring and filtering out false information, and accurate information should be promoted instead.

While the epidemic usually is the cause for the infodemic, there have been opposite relations as well, when sudden reactions to new information can affect the course of the epidemic itself. This can especially be seen when misinformation and a general news overload changes the way people react and behave. One example of this was a CNN prediction, which had predicted a lockdown in the Lombardy region of Italy. As the locals heard about a potential lockdown, they quickly evacuated the region and overcrowded the public transport. This completely undermined the efforts of local health authorities and might have led to a vast increase in the cases Italy experienced. (Cinelli et al., 2020) The researchers suggest that the way people receive information and how they then process and act based on it needs to be taken into account in the future when epidemiologist are predicting and creating more accurate epidemic models.

Social isolation has been a significant issue during the pandemic and already during the earlier SARS outbreak almost two decades ago. The isolation has also forced mental health and medical services to be handled online, which was almost out of consideration before the pandemic. (Pfefferbaum & North, 2020). Another thing to point out is that the social interaction is so essential to people that even healthcare workers (who were the most motivated to follow the guidelines) broke their isolation orders to reduce their "emotional distress" during the SARS pandemic. The progress and development of online services has allowed new opportunities like video calls which have certainly helped, but the need to meet people in real life still exists.

Savolainen (2007) states that filtering and withdrawing are both very common methods to cope with information overload. Information filtering means that the information which needs to be processed is chosen more selectively. For example, a person does notice an article regarding the specific issue but chooses to avoid reading it. This can also work in an opposite way: if the headline of an article does not seem captivating or the issue has already become familiar, it is more likely skipped. The withdrawal strategy is about reducing the sources of information completely and is therefore a stricter approach than just filtering. This can mean that the person will avoid some news outlets completely and carefully considers where to look for information. (Savolainen, 2007)

3 RESEARCH METHOD

The initial starting point of the study was to go through existing literature regarding remote learning and epidemics. As applicable material regarding the combination of these two areas turned out to be very limited, the emphasis was placed on the technological matters and remote learning instead of the more psychological reactions to a pandemic for example. Next, the focus turned into finding existing frameworks that would apply to this situation. Based on the frameworks, a questionnaire was formed. Many questions were adapted from the study of Al-Fraihat et al. (2019) as the e-learning scope the researchers studied aligned well with this study.

3.1 Format and analysis

As the study was concentrating to experiences of the students, it was done as a qualitative study, which allows for more in-depth approach to the investigated issue. (Hirsjärvi et al., 2009). A semi-structured format was chosen for the interview. This allowed the participants to talk about their own experience more freely, but also kept the interviews in a similar format and thus allowed for better comparisons. In addition to the open interview questions, students were also asked to self-evaluate their technological skills and interest towards new technology by selecting a number from a 1-10 scale. In another section, the participant was presented a set of situations relating to studying and would then describe these situations with a most appropriate emotion. Both of these sections were included to supplement the open questions asked and to provide less ambiguous answers to certain areas of the study.

The interviews were held during October-November 2020 and there were 31 interviews in total. Fifteen of the interviews were collected by personal recruitment and the remaining sixteen students were reached via a smartphone application Jodel and its @JyväskyläänYliopisto (University of Jyväskylä) sub-

channel, where people were asked to take part to the study. Students attending their first year of studies were deliberately left out from the research, as they did not have a reference point to 'normal' studying in university and thus their contribution would have likely been marginal in this case.

Initially, it was considered that the study should include representatives from all six faculties of the university. Due to difficulties in finding enough participants from all faculties, this approach was eventually abandoned. However, there was at least one participant from each faculty.

Because the social distancing recommendations that were in place during the time of the interviews, participants were given the option to either meet in person or to have the interview done remotely over Zoom. Majority of the interviews were conducted remotely, and only two of the interviews were done in person.

The interviews were all conducted in Finnish. After an interview was done, a complete transcription of it was made for analysis purposes. As the transcription was in Finnish, the quotes used in this paper were translated from Finnish to English as they were selected and used in the paper. The translation to English has been done in a way that attempts to preserve the original sentiment and form of the answer as well as possible. If this has not been reasonably achievable, additional context is given in brackets. Furthermore, various hesitations, filler words and other irrelevant parts of the answers are often omitted from the translated quotes. These kinds of linguistic factors did not seem to provide any added value for this kind of study.

To analyse the answers, a conventional content analysis approach was used. According to Hsieh and Shannon (2005), this method is preferable and the most suitable option when the study focuses on researching a specific phenomenon. In this case, the sudden change to remote learning and all the subsequent reactions elicited was the phenomenon that was being studied.

As per the conventional content analysis guidelines, answers of each interview were grouped and categorised based on the words and themes that were often mentioned in the answers. This approach allowed the most common themes to be easily investigated. The categories were not predetermined as they were mostly based on the data itself and the observable patterns that could be noted from the data.

3.2 Scope

Due to the novel characteristic of the COVID-19 pandemic, its issues could very well be approached from several directions. In this research, the attention was focused on the university students studying in the University of Jyväskylä, Finland and their way of handling the situation. As there was no comparable reference point in history (the most similar epidemics were SARS and 2009 swine flu, neither of which affected university studies in Finland), it was decided that a more general approach should initially be made, instead of focusing

into some specific subsection of the student life. For this reason, the questions spanned many areas. The open-ended questions allowed the students to raise up the most essential factors by themselves. With a too narrow focus, there was a possibility that the interviews could have missed some of those crucial elements.

The key focus points of the research were the factors regarding studies and social life during the time of the pandemic. The aspect of information overload was initially only focusing to the study-related information but was later on expanded to separate questions as the factor was thought to be too important to be overlooked. These questions were focusing on the news reporting and the feelings elicited by the situation in general.

4 RESULTS

In this chapter the results of the study are presented in the order of the questionnaire itself. The opening part includes general information of the participants and a brief look into the faculties they are studying in. The self-assessed technological aptitude is also explored quickly and compared to the faculties. From there, the focus is shifted to various study-related questions, which all are separated into specific subsections.

After the focus on studies, the questions regarding social life with the help of technology are examined. This part includes questions about the importance of social life and potential of online services to replace real-life interactions. Finally, the concepts of information overload and infodemic are investigated before moving onto final takeaways and thoughts about the future of remote studies and remote working.

4.1 General information and demographics

There were 31 participants in total, of which ten were male (32%) and 21 were female (68%). The age of the participants varied between 20 and 32 years (Figure 2). Most of the students were on their fourth or fifth year of studies and had already attained at least a bachelor's degree, which made the data set relatively uniform in that sense. As was already stated in the previous chapter, freshmen students were intentionally left out of the study as they had not had the chance to study under normal circumstances and could have not answered to several questions.

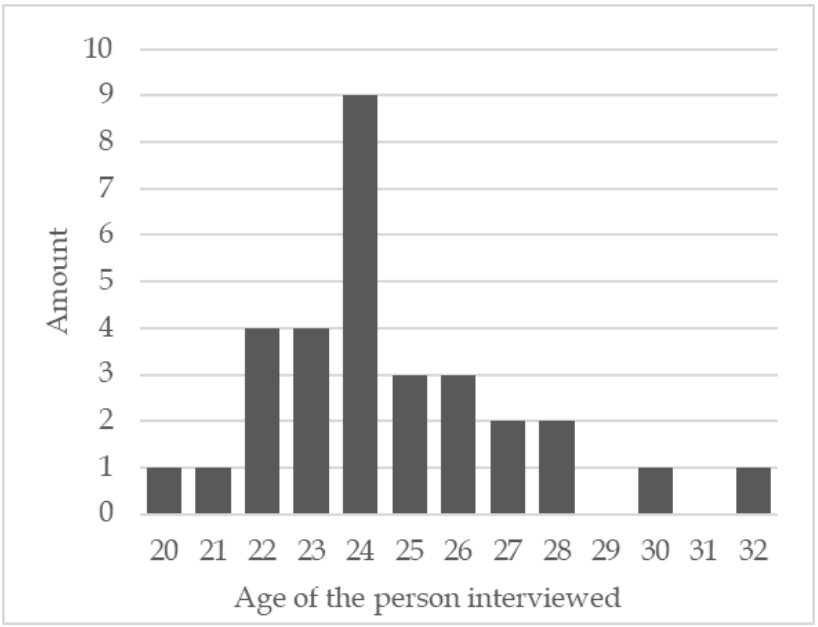

FIGURE 2 Age distribution of the participants

Most students came from the Faculty of Information Technology (11 participants) and the faculty of Education & Psychology (9 participants). The Faculty of Sport & Health Sciences and the School of Business and Economics were the ones with least representation, with only one and two participants, respectively. Nevertheless, all faculties were represented at least to some extent. (Table 2). The essential background information about each student can be found from Appendix 1. Similarly, all the questions asked in the interview of this study are listed in Appendix 2.

TABLE 2 Participants from each faculty

Faculty	**Number of participants**
Information Technology	11
Education & Psychology	9
Mathematics & Science	4
Humanities & Social Sciences	4
Business and Economics	2
Sport & Health Sciences	1

4.1.1 Technological preparedness and previous expertise

Before the study, it was hypothesized that the fundamental differences between the studied subjects and differences between faculty practices also cause varying outcomes regarding online studies. To separate these factors from the technical proficiency of the students (later "tech-savviness"), the participants were asked to self-assess their level of computer skills and their willingness to adopt new technology.

It was expected that information technology students would rate themselves higher than the students in other faculties, but no obvious relations between either of these factors were found. Although four IT students did rate themselves highly in tech-savviness, the majority considered themselves to be average in skills. Similarly, the willingness to adopt new technology could not be related to the studies.

As an example, the student in interview 18 answered the lowest numbers to both of the self-assessment questions but did not experience any major issues during the remote studies. On the contrary, the student felt excited when using technology even if the student's initial self-estimation could have suggested otherwise.

> I lag behind when it comes to all the technical gadgets (…) Luckily, I bought a new computer just before corona. It's easy to use and I've even been excited to use it. (Interview 18)

Therefore, even with this limited analysis, it can be presumed that the field of study or the self-perceived skill levels regarding technology are not a major determinant when it comes to the adoption of online teaching. This finding goes along with Venkatesh et al. (2000) who state that self-efficacy is not a significant determinant factor when it comes to the intention of using technology.

4.2 Initial reactions

The second part of the questionnaire was the most expansive part and focused on the different segments of university studies, including students, teachers, tools, and course structures. The most frequent findings and factors are examined by grouping them under common themes.

In all interviews people initially felt that the decision to stop contact teaching and move to remote teaching in March 2020 was a sensible thing to do. Outside of that, there were no discernible common themes in the initial reactions that could be broadly applied to everybody. Instead, the overall reactions were split remarkably equally into positive, neutral, and negative.

4.2.1 Positive reactions

Students who found the situation positive were pleased that there was no need to go to the campus and there was an actual possibility to study at home. Generally, these were the students who were already more comfortable with working from home due to the nature of their studies or that they had used remote tools in a work environment before. Additionally, the students who were already finalizing their studies also felt more relieved as there was no need to attend the few remaining courses at the campus anymore.

Another group of people who embraced the situation were the students who had life outside Jyväskylä, such as work, relationship or even home in another city. These people applauded the increase in freedom which allowed them to live elsewhere more easily.

> My studies are so far done that I only have a couple of courses left. I'm mostly just doing my thesis anyway so there's no difference to me. My girlfriend started her studies in Tampere, it's good that she doesn't need to travel there. (Interview 3)

Some who were more unfamiliar with remote studies and who were used to lectures with mandatory attendance, took the situation as a refreshing change to normal. They did not believe the situation would last very long – many expected it to be over before summer – and thought that few months would not be unendurable, even if the remote studies would not work well.

> I thought that if this situation is only going to last this spring, it will be just fine. (Interview 14)

4.2.2 Neutral and negative reactions

Some students could not really tell how they felt about the state of affairs. The situation was often described as "uncertain", "weird" and "confusing". In addition, the sudden change and therefore a lack of information worried the students. Others did not have a noticeable reaction at all and simply carried on with the new study methods without questioning them too much.

> The situation sucks, but what can you do? Good thing is that now I can focus on the studies when there's no student events to distract me. (Interview 6)

The most common negative reaction was the loss of drive to study more. One student described the reaction as "paralysis". Hysteria and a fear of the pandemic also took hold of some students. The concern regarding the novel disease brushed studies aside and consequently, there was less motivation to keep studying.

> I reacted badly; the studies dragged me down and I eventually abandoned the courses" (Interview 11)

> [I reacted to the situation] mostly by paralyzing. It was weird because I knew I had to get credits but I couldn't. (…) The teachers were confused as well, it made the feeling of not being in control worse. (Interview 21)

Some of the students expressed their need to have a well-defined studying place outside home, so they can concentrate better. Places like university and library were considered familiar places for studying, which helped to get into the studying mood.

> It was really difficult. For me it is important to get outside of home to study. When two people study in a same apartment it becomes really challenging as you can't go to a library or anywhere. (Interview 15)

The lack of social contacts was also mentioned several times as a reason for negative feelings, but this side of the situation is explored separately in a later chapter.

4.2.3 Thoughts after six months

In general, most students got used to the situation over time and started to become more comfortable with remote studies. The increase in resources and preparation in relation to online lectures was noted by several students. However, while the general quality of the studies was considered to be better than in the spring, getting accustomed to the remote studies was not reflected in the personal attitude.

> Maybe it's working better now when everybody is familiar with it, it's not so weird anymore. A new normal as they say. In some cases it's bothering me, like if a lecturer shows a video and you can't see it properly. (Interview 4)

> It's been going really well; all the remote courses are done really well. I actually learned something instead of just going through the courses like I did in the spring. The teachers have also taken better control of all the systems, I respect them for doing that. (Interview 13)

4.3 Personal attitude and motivation

Initially, 13 students stated that they felt positively about the situation and further 14 could be considered as neutral. As many initially considered the remote studies to improve their options, the general mood was cautiously optimistic. To some faculties where there had usually been fewer chances for remote studying, the situation was a moment of exploring a completely new way of working, whereas students in more technologically aligned faculties did not feel like there was a huge change as they had already been used to the recorded lectures, for example.

Only four of the students had a negative attitude at the initial stages of the remote studies. The listed reasons for negative emotions in the beginning were the lack of options, being unfamiliar with the situation and suspicions about technology. The categorized reasons are below in Table 3.

TABLE 3 Reasons behind the attitude in spring of 2020

Category		**Example quotes**
Reasons for positive attitude	Curiosity	"I was curious about it (…) like maybe I can create a fancy studying environment for myself" (Interview 19)
	Increased possibilities	"A positive thing was that you did not need to be there in person" (Interview 6)
	Necessity	"It felt necessary and still does" (Interview 10)
	Optimism	"It's going to be temporary, so let's make the best out of this" (Interview 25)
Reasons for negative attitude	Preconceptions	"I was distrustful of technology" (Interview 11) "I knew that I'm not an IT person" (Interview 31)
	Unpreparedness	"Suddenly all the deadlines arrived at once and I couldn't make them" (Interview 21)
	Shock	"It was a buzz of absurdity to see everything close down so suddenly. It took a long time to adapt, and I didn't even realize how frustrated or anxious I was." (Interview 26)
	Bewilderment	"[There was] Confusion and uncertainty regarding the situation, alongside with other stress" (Interview 13)

Even if the students accepted the new ways of studying as seen previously, they were not overly thrilled to study in that manner anymore. After six months the situation had turned upside down, as now only four of the students had a clearly positive feeling about the remote studies. All of the positively thinking students explained their attitude stemming from improved quality of the online courses and just simply getting adapted to the new situation.

> I was sceptical at first, as I did not know how much progress there had been [with the online courses]. But as the school began again, I had good feelings about it. (Interview 5)

Ten students expressed neutral or mixed reactions. They felt like some positive steps were made on the side of the studies, but they were undone by other developments mostly on the mental side. 17 students had a mainly negative attitude at this point and similarly to the neutral opinions, the most often mentioned reasons were related to a feeling of becoming bored or frustrated by the situation. All of these categorizations are shown in Table 4.

> I'm not advocating for the remote studies (...) but as it all went on, I got used to it and started to think that this is the new norm we follow this spring. So, I just kind of adjusted over time. (Interview 9)

At first it was nice; I did not feel like it's impossible study from home. But yeah, I became numb quite quickly, and I did not really like it in the end. The initial excitement went away as deadlines approached and I started to feel more anxious. (Interview 12)

TABLE 4 Reasons behind the attitude in autumn of 2020

Category		**Example quotes**
Reasons for a positive attitude	Adjustment, accustomization	"My attitude has changed [towards more positive] as I've gotten used to this, but I still prefer campus" (Interview 8)
	Positive development	"Course designs were improved" (Interview 31)
	Acceptance	"There's nothing you can do. If the situation would allow normal lectures but they would still not be held, then it would bother me" (Interview 19)
Reasons for a negative attitude	Repetitiveness	"Lack of options are starting to eat away the appeal" (Interview 1), A sense of boredom is increasing. A lack of change is probably the reason." (Interview 13)
	Worse results	"I did not learn as well; the interaction was missing" (Interview 2)
	Disappointments	"At summer it looked better, but then the rug was pulled from under our feet" (Interview 30)
	Reduced options	"I am tired. I have started to miss going to the campus" (Interview 26)
	Lack of socializing	"The lack of human contacts and just being walled in at home. It affected my psyche; human is a social animal" (Interview 29)
	Uncertainty	"I enrolled for courses that should start soon and I still don't know how they are going to be arranged" (Interview 27)

4.4 Impact to courses

Seven out of the 31 students reported significant impact to the courses they attended. These students could then be divided into two subgroups based on Galusha's learning barriers (1995). Four of these students experienced mainly faculty barriers and had full courses or at least large portions of courses cancelled because the contents of the course normally required significant amount of contact teaching and could not be moved to an online in such a short notice. The students that belonged in this category were students of chemistry, biology, and ethnology, all of which have courses with a very practical and "hands-on" approach.

> It affected me a lot. The labs were cancelled which caused a delay to my studies. Finally, on 3rd of August the courses restarted, even though I was supposed to do them in spring. (…) No contact teaching, just essays and independent assignments instead of exams. (Interview 25)

The remaining three students reported dropping out from the courses on their own initiative as completing them became more difficult or less appealing. The mentioned reasons included increased workload of a course and a lack of motivation to attend online courses. These can easily be seen as learner barriers as –according to the students themselves – the faculty could still hold the courses adequately.

> I dropped out from a couple of courses as I couldn't cope with the remote studies. They took a lot of effort and you had to do things from your own initiative. Now it all irks me a bit. (Interview 11)

Still, majority of the students could continue their courses remotely, some even without any noticeable delay. These stories were not particularly interesting to look at, as in most cases students were just stating the fact without further analysis or discussion.

4.5 Remote learning tools and programs

The University of Jyväskylä mainly used Zoom and Microsoft Teams to hold online lectures. All 31 students had used Zoom and 17 had used Teams as well. These were generally considered as easy to use, with only some minor issues in the beginning. The technical problems that were experienced during remote studies are examined later in an own chapter along with distractions and other possible issues.

In addition to the most common answers mentioned above, it was interesting to see the large scale of different software and applications that students considered to be a part of their remote learning environment (Table 5). Almost half of the answers included group working tools such as Google Docs. Roughly one out of three students specifically said Moodle, but it is worth noting that some simply referred to "university tools" in general. This could mean that the total number can be somewhat misleading and can probably be slightly higher than the results imply.

Communication applications such as Discord, WhatsApp and Skype were similarly included by two students as their remote learning tools, with several others wondering should these communication applications be included as "remote learning tools". This implies that the split between programs used for studying and programs mostly used for leisure was somewhat diminished, which could also be seen later when students were asked about their social life.

TABLE 5 Remote learning tools mentioned by the students

Application	Main use case	Mentions
Zoom	Remote lectures	31
Microsoft Teams	Remote lectures	17
Google Docs / Drive	Group work	10
Microsoft Word / Office	Group work	5
Google Meet	Communication	6
Skype	Communication	3
Discord	Communication	2
WhatsApp	Communication	2
Moodle	Learning management	9
Sisu, Koppa, Moniviestin etc.	University-specific tools	7
Specialized software (such as Aiforia)	Faculty-specific tools	4

4.6 Courses and teachers

There was a consensus that from a technical viewpoint, the online lectures worked as well as their traditional counterparts. Only one of the interviewed students lamented the lack of conversation and considered online tools to be significantly worse and suggested that technology was at least partially to be blamed.

> They [courses] were adequate. Things did not change a lot, some just read the stuff from the slides so there's no difference in having things done remotely. Regarding the lecture recordings, it's perhaps even easier to watch the lecture in Zoom as you only see the slides and not the whole auditorium. (Interview 11)

However, when the course required anything other than simple lectures, more negative opinions were raised. It was thought that the limits of Zoom and Teams were reached when more complex events were held. Given examples included demonstrations, laboratories, and seminar-style meetings, where active discussion and presenting data are in a more important role than in the lectures that tend to be more one-sided.

> The demos and labs did not work well. In order to learn properly you simply could not do it all remotely. (Interview 18)

4.6.1 Instructions and assistance

In case the students experienced issues, the most common way to seek help was to use Google to find an answer to a problem (14 mentions in total). The existence of tutorials and other help material made by the university was acknowl-

edged in many responses, but those were rarely used in the end. In addition to students finding help on their own, students also relied on their teacher or IT-support provided by the university (6 mentions). Another option were their fellow students or family members (5 mentions).

22 students said that the instructions given for the course were minimal or they did not read any instructions at all.

4.6.2 The influence of teachers and course instructors

During the spring, the attitude of both sides generally seemed to be more forgiving and tolerant of the issues that were encountered. The course instructors were also seen as having a positive attitude that helped the students to settle in.

> Sometimes there were technical difficulties, but everybody took the situation lightly. One communication skills teacher wasn't technologically very talented but did well under the circumstances. (Interview 3)

> It's been going well. (…) Especially in the spring the adjustments were done quickly. And they have been asking "how's it going" a lot. It feels comforting because you have not been able to see any of the other students and there's just black screens in Zoom. (Interview 27)

However, in the few cases where the teacher had a negative reaction towards remote teaching, the students often responded to it by adopting a similar mindset.

> Most had a really good attitude, just a few didn't. In one course everything was "stranded" by the course organizer, we only got a message that basically said, "write an essay, I can't be bothered to teach you [this way]". That attitude was reflected in me. (Interview 1)

4.6.3 Stress caused by the change

When students were asked how the remote learning methods affected their mental wellbeing and stress levels, the results were heavily leaning towards negative. 16 students considered to be more stressed due to the situation and further twelve were neutral or cited the general situation as the cause for the increased amount of stress.

> More stress than ever before, good thing that I have friends and other people to make it easier. (…) The remote studies as well as the general situation affected me. (Interview 25)

In some answers, the uncertainty and constant changing of the situation was cited as a reason for the stress. That along with the increased threshold to

ask questions made many students feel like they had less control over the situation.

> When you have been able to study from home, you may feel better mentally. But some courses have unclear instructions; there are several teachers, and one may tell you something that contradicts the information given earlier by another teacher. Some of those courses are more understandable when done as contact teaching. (Interview 5)

4.6.4 Amount of information

There was a mixed response when students were asked about the information they received regarding the courses. The students who did not follow the communication actively did not feel too burdened by the amount of information. On the other hand, those who followed more actively, did feel like there was too much information and it was difficult to distinguish the most important details.

Additionally, some answers suggest that the course-related information alone probably could have been tolerable, but as the burden that is experienced cannot be easily separated from all the other, pandemic-related information, the total amount of information received affected studies too.

> It varied. When the deadlines approached, I activated. Sometimes I just checked the videos a day before the exam. The "information swelling" did not inspire me to look for more information. (Interview 12)

> It was mostly the situation around the world in general. I don't know if the study methods themselves caused too much information overload to me personally. (Interview 2)

4.7 Problems and distractions

A wide variety of distractions were listed in the interviews, but these all could be grouped into just a few categories. The most common distractions were related to technology, but with the root cause being either the quality of infrastructure, the mistakes of the lecturers, or most commonly the students themselves. The only major, non-technological problem experienced was the lack of potential to "escape" home to a dedicated studying place so a peaceful environment can be established. These factors and the amount of their occurrences are presented in a separate table (Table 6).

The most frequently mentioned issue was the temptation to switch to more relaxing ways of spending time. Streaming services, television, and gaming platforms were all easily accessible at home, which made concentrating to studies tougher.

> I knew that new Netflix series were released and when the sofa and TV remote were too close, there was really a big temptation to have an extended break after a few hours of studying (Interview 13)

> WhatsApp was the communication channel [I used] and sometimes you kind of got carried away with it. There were also many times when I also had a browser open during a lecture and I did my own stuff there. That was definitely a distracting thing. (Interview 11)

However, the technological issues were not the only distractions students faced at home. Household chores such as cleaning, cooking, and doing laundry were also diverting focus from studies and sometimes even seen as more appealing.

> There were no tech issues, but I thought that "I could do laundry or clean up now". You don't have similar issues during a real lecture. (Interview 22)

> I couldn't concentrate at home if I noticed my home was dirty or messy, I had to fix that. (Interview 31)

Technical issues were also regarded as distracting and problematic in numerous responses. Issues relating to reliable internet connection and audio playback issues were regularly mentioned, along with concerns involving the proper functionality of their own peripheral devices (such as headsets and video cameras).

> Before the lecture there was always the hassle of making sure that the internet works, checking if the microphone is on and not muted… You know, things like that. (Interview 8)

> I had some tech issues, like the internet connection was lost suddenly, or I could not hear what somebody was saying. (Interview 19)

While students mentioned these technical issues relatively often, they were not always considered as actual problems. Their impact was repeatedly downplayed, and momentary glitches were largely accepted as a somewhat unavoidable part of an online environment. Nevertheless, few students also included comments about the lecturers' inexperience with the technology and online classrooms. Human mistakes and lack of experience were the main contributing factors in all of these answers regarding university personnel.

> There were communication issues with staff, sometimes I could not get into a zoom lecture, […] the starting time [of the lecture] was set incorrectly – it was starting at 2 AM instead of 2 PM – so the lectures are scheduled at midnight. Then some people had low-quality equipment, which also caused problems. (Interview 20)

Finally, the lack of a proper studying place was a problem for a roughly one quarter of the participants. These students required a specific place to study and

did not feel that they could concentrate at home as well as in they would in a university environment.

> I had troubles getting started. I am usually studying at the library and when you have to do that same stuff at home there was no starting routine. Kind of general laziness, I guess. (Interview 9)

TABLE 6 Issues experienced during remote learning

Issue	**Amount**	**Percentage**
More external distractions at home	16/31	51.6%
Technical issues	12/31	38.7%
No dedicated place to study	8/31	25.8%
Lecturer had significant problems	3/31	9.7%

4.8 Emotions regarding remote studies

In order to get more tangible results regarding the studies, students were also asked to describe how they felt about selected scenarios relating to their academic life. The core affect theory by Russell and Barrett (1999) was used as a basis for the questions presented in this chapter.

This part of the interview had six different scenarios, all of which are common in the university world. Each one of the normal scenarios was accompanied by its online counterpart. The results are outlined in the following table (Table 7) and the questions are listed above the table. Adjectives in bold text were given as examples for the student, but they could also pick another descriptor for the scenario. The participant could choose several adjectives, which causes the total sums to vary between questions.

> Question B21: How do you feel emotionally when you…?
>
> a) study at the university (in person)
> b) study from home (using technology)
> c) return assignments for traditional courses
> d) return assignments for online courses
> e) work on a group project in person
> f) work on a group project online
> g) give presentations in front of a live crowd
> h) give presentations in an online classroom
> i) attend a traditional lecture in person
> j) attend an online lecture
> k) ask a question during a traditional lecture
> l) ask a question in an online lecture

TABLE 7 Adjectives used to describe various studying scenarios

Adjective in Finnish	English translation	a	b	c	d	e	f	g	h	i	j	k	l
ahdistunut	**anxious**	0	4	0	1	0	1	2	4	0	2	1	4
energinen	energetic	3	0	0	0	1	0	0	0	0	0	0	0
helpottunut	relieved	0	0	3	5	0	0	0	1	0	0	0	0
hermostunut	**nervous**	0	2	2	2	0	4	6	6	0	0	1	6
iloinen	**happy**	10	0	7	4	11	1	0	0	2	1	1	0
innostunut	**excited**	8	2	4	4	15	4	7	2	6	0	8	0
jännittynyt	**tense, nervous**	1	0	0	1	1	4	22	10	0	1	16	8
keskittynyt	focused	1	0	0	0	1	1	0	0	1	4	1	1
masentunut	**depressed**	0	0	0	0	0	0	0	0	0	0	0	0
motivoitunut	motivated	2	0	0	0	3	2	0	0	0	0	0	0
neutraali	neutral	3	2	1	1	0	1	0	0	4	2	3	2
rauhallinen	**calm**	10	5	1	0	3	3	3	7	10	11	5	6
rauhaton	uneasy	0	1	0	0	0	0	0	0	0	0	0	0
rentoutunut	**relaxed**	0	4	2	1	3	1	2	0	2	5	0	1
stressaantunut	**stressed**	1	5	10	10	1	7	4	7	1	2	1	2
surullinen	**sad**	0	0	0	0	0	1	0	0	0	0	0	0
turhautunut	frustrated	0	2	0	0	0	3	0	1	0	1	0	1
tylsistynyt	bored	0	1	0	0	0	0	0	0	0	1	0	0
tyytyväinen	**content**	13	5	12	10	4	2	0	1	6	4	3	3
uupunut	**fatigued**	0	4	0	1	0	1	0	0	3	2	0	0
varautunut	**reserved**	0	0	1	2	0	4	1	2	0	3	1	5
varovainen	cautious	0	0	0	0	0	0	0	0	0	0	0	1
vetelä	**lethargic, lazy**	3	13	0	0	0	1	0	1	6	8	0	0
Total amount:		*55*	*50*	*43*	*42*	*43*	*41*	*47*	*42*	*41*	*47*	*41*	*40*

4.8.1 Studying in general

Students felt "happy" and "excited" when they were asked how they feel about studying at the university. Many explained the joyful and active emotions coming from the fact that one can go to the campus just to see friends and socialize with them before, during, and after the lectures. "Calm" and "content" were also common answers. These mostly had similar reasoning behind them, but a few students also – again – noted that concentrating was much easier at the campus.

> **Studying normally:** Content, happy, calm. If I had to pick one, it would be happy. There's the social side: friends and other people are nearby, and you get a certain rhythm. (Interview 8)

The contrast to studying at home was massive as the more passive emotions took hold and "lethargic" became the most common answer by far. However, this was also positively reflected in the answer "relaxed" as students also enjoyed the chance to stay home.

> **Studying remotely:** Lethargic. There are less distractions at the university, so you get into a sort of "study vibe" there. At home you easily start to feel lazy and be like "let's look at this later in the evening" (Interview 23)

Feelings of stress and anxiety increased as well, partly due to the increased difficulty in concentrating. The extensive reliance on technology and the repetitive nature of online studies also caused worries to some. There were signs of the concept of "Zoom fatigue" (Chen, Kaczmarek & Ohyama, 2020), where the constant similarity of online sessions eventually causes disinterest.

> **Studying remotely:** Fatigued, lethargic. Because I must keep staring at the screen all the time. (Interview 26)

> **Studying remotely:** Fatigued. Likely because I have been studying like this [remotely] for the last six months. (Interview 27)

4.8.2 Returning assignments

Assignments were mostly returned online even before the pandemic, so as expected, the change between the scenarios was quite minimal and the vast majority did not see a significant difference between these two scenarios. However, a few students noted minor differences in their emotions. Even though students frequently used the same adjectives, there was sometimes an additional notion that with online studies, the assignments felt more repetitive and less rewarding.

> **Traditional course:** "excited, content because I have done it" (Interview 11)
> **Online course:** "the same as previously, but returning the assignment isn't as rewarding" (Interview 11)

> **Traditional course:** "often [I feel] happy, there's a sense of accomplishment" (Interview 21)
> **Online course:** "it's exhausting in a certain way, because you know it continues with a next course that has a similar task" (Interview 21)

Another point that was raised was that the constant repetitiveness could also lead to a more relaxed approach and lowered standards when completing the assignments. As there was less palpable peer pressure to perform and more text-based individual work, cutting corners with the task could be seen as appealing.

> **Traditional course:** "Just get it over with, the tasks are always as annoying in any case" (Interview 18)

> **Online course:** "It's maybe a bit easier, and the tasks are done a bit better when you go work at the university… Maybe I've lowered my personal criteria a bit when working at home" (Interview 18)

Another minor notion from some students was that it was slightly harder to ask for help with the assignments, which was a cause for increased stress as students could feel more uncertain about the subject taught. This could be due to the asynchronous nature of emails, which makes the asking for guidance to require more effort, but with no guarantees of the speed of the response.

> **Online course:** "I'm excited if the tasks are more on the creative side, otherwise I'm stressed and reserved as it's more difficult to ask for help over email." (Interview 5)

4.8.3 Group projects

Group projects were often seen as a social event and moving them online caused a significant reduction in positive emotions. In an online setting, students became more stressed and reserved. The reasons for this included the lack of nonverbal communication, reduced pace, technological problems and even trust issues towards another group members as their actions or inactions could not be observed. When working with several people, it was also more difficult to understand who was speaking, especially if they were not familiar before.

> **Normal group project: "**I'm excited, but also kinda tense. But it's tense in a positive way" (Interview 2)

> **Online group project:** "I'm more negatively aligned, way more tense. There's no similar group dynamic, it feels like the others are not concentrating and it's harder to have a discussion." (Interview 2)

Only one student considered to be more motivated and "more efficient" in a remote setting. In all other responses, there was no change, or it was towards a more neutral or a negative emotion.

4.8.4 Giving presentations

22 of 31 students (71%) felt that giving presentations in front of a live crowd was at least somewhat stressful. However, this number dropped to just 10 out of 31 when asked about the online alternative. The possibility to talk without seeing other people eased the anxiety and these students felt calmer. The possibility to have own "secret" notes was also a reason for the more positive reactions.

> **Online presentation:** Clearly less nervous and tense [than during a normal presentation]. Reading your own notes live is challenging and you can't properly focus on that situation. But when you are online it's easier to just stare at your own slides, as

> there's no need to look at others and you can just read your own notes in peace. So not that stressful at home. (Interview 23)

Six of the seven students that felt "excited" about presentations held in person reacted more negatively to the online presentations. They were more nervous about the reliability of the technology and interestingly more concerned by the lack of nonverbal feedback, such as facial expressions of the crowd.

> **Online presentations:** Anxious. You don't get visual feedback. You can't hear properly with headphones over ears, so you don't really even get a grasp of your own voice. You can't get any reaction about how the others will receive the presentation, and that makes you nervous. (Interview 1)

4.8.5 Attending lectures

Differences between traditional and online lectures were small. The most notable difference was that six of the students felt "excited" when attending a normal lecture, but none of the students felt similarly about an online lecture. The online lectures were thought as more dull and less inspiring, as they lacked the social experience of actually seeing other people.

> **Normal lecture:** Relaxed, excited, content. (Interview 26)
> **Remote lecture:** lethargic, especially if it's just passive listening. You sink to the bottom of the sofa quite easily. (Interview 26)

4.8.6 Asking or answering questions

Parallel trends to the presentation scenario could be seen here. Asking or answering questions in person made most responders feel somewhat nervous but the online environment made students again feel more at ease. However, as was with the presentations, some also felt the opposite way and it was actually more intimidating to ask or answer a question online. This was mainly caused by two factors: having to ensure the technology worked as it should and due to the lack of direct response from the audience. In other words, the lack of visible audience worked both ways. The following quotes illustrate these two opposing views well.

> **Asking questions online:** "Neutral, it's just like talking in person with someone" (Interview 9)
> **Asking questions online:** "Anxious, stressful. I don't know why, maybe because you see there's like 100 people attending, which can be more than in the normal lectures. I'm nervous about how I sound like, there's no body language, and the presentation is all about how I speak. No eye contact or reactions from others." (Interview 30)

4.9 The use of information technology in social life

Students used a wide variety of services to sustain their social life. Most of these services were already widely used before the pandemic. A prime example of this is the instant messaging service WhatsApp that was mentioned by nearly all of the students. Perhaps a bit surprisingly, the second in popularity was Zoom, which was mentioned by 17 students. Snapchat was third before Instagram and Facebook. Rest of the results can be seen from the table below (Table 8).

TABLE 8 Services used to maintain social life

Application or service	**Mentions**
WhatsApp	29
Zoom	17
Snapchat	15
Instagram	13
Facebook	13
Discord	12
Skype	6
Jodel	4
Teams	4
Telegram	4
TikTok	2
Facetime, Google Duo, Hangouts, IRC, PSN (PlayStation Network), Tinder, Yitzy	1

4.9.1 Adoption of new services

13 out of 31 students (42%) were still using all the new services at least relatively often. Ten students (32%) had stopped using at least one of the new services and eight (26%) did not use the new services at all anymore or did not adopt any new services in the first place.

From the responses, it could clearly be noticed how Zoom was also adapted to be used for social events outside lectures. Another service that gained popularity was Discord, a gaming service, which was also the platform for several unique use cases. Additionally, the video calls feature also became a more often used feature in other applications too, even though the concept of video calls has existed for years already. This can possibly be attributed to the video call feature being "popularized" by Zoom.

Two similar key factors were identified that positively affected the adoption of new services. Zoom was adopted as a video conferencing tool even for leisure purposes as students knew everybody in their social groups very likely had it installed as well. The benefits of the program could also be assessed during each lecture so the threshold to adopt it was lowered.

> [The adoption] of Zoom came from the studies, I noticed that it was simple and easy to use so I started using it more. (Interview 13)

The second major reason for adoption was that the majority of the social group was already using the service and they did not want to miss out. This was most clearly noted with Discord as half of the students that reported using it had not previously used the service.

4.9.2 Repurposing services

In addition to just adopting new services, they were also adapted to fit the new needs of the students. The possibilities to send audio and video to a group of people easily – along with the other additional features provided by the services – allowed for innovative new event concepts.

21 of 31 students (68%) said that the pandemic helped to create a new way of spending time online. This number includes the students that also actively used at least one of the services to uphold their social life. In addition, there were six students (19%) that had heard about these online events taking place but were not interested in them or only tried them once. Four students (13%) did not adopt any new ways to spend time.

In most cases, the frequency of these events dropped as the COVID-19 situation got better over the summer and the possibility to attend real-life events increased. Re-engaging with these virtual events was still at progress during October 2020, and in many responses, students said that they were not yet sure how much they will adopt these possibilities again. Due to the inconclusive nature of this data, no analysis can be made about this side of the phenomenon. The categories that were observed are however outlined in Table 9.

TABLE 9 New experiences made possible by information technology

Event type	**Example(s)**
Organised online event	Gaming nights and other events by student associations, attending "webinars" (online seminars)
Unorganized get-together	"Friday beers" with friends, following a live sporting event together, knitting together over a video call
Virtual version of a real-life event	Remote workouts, remote graduation, remote wedding planning
Adoption of a new feature	Use of video calls in WhatsApp and other instant messaging services

4.9.3 Replacing in-person human interaction

Generally, students felt that information technology cannot replace real human interaction. Several people did however remark that the online tools and services can work as a supplementary method and act as a substitute to a certain extent. Still, none of the students could see it as a primary way of social interaction. The biggest potential was seen in gaming-related events as they are inherently technological, but otherwise the potential of online socializing was limited.

> [they replaced real-life interaction] Badly. Maybe the biggest gaming things are nice, but they can't replace the seeing of people in person. I wouldn't even classify them as a same thing. (Interview 2)

Only two out of the 31 students said that studying is clearly the primary reason they go to the campus and socializing only plays a small part. Everybody else thought the social experiences are a significant reason when going to a campus. Some even considered socializing to be more important than the actual lectures and studying in general.

> Not completely, but especially the Friday night sessions… occasionally I got the vibe that everything was like it is normally (Interview 1)

> They don't really replace it. Like if my friends are attending the same Zoom-lecture… you don't get the same pre- and post-lecture interaction with the friends (Interview 23)

4.10 Infodemic and information overload regarding news

This chapter discusses the concept of information overload in the context of news. The excessive amount of information relating to COVID-19 has been a major factor during the pandemic. Different kinds of information – some of it true, some of it unverified, and some of it outright false – has been spreading since the beginning of reporting about the "mystery disease" in China.

Due to these reasons, the final part of the interview concentrated on the information side of the pandemic. Students were asked questions about the amount of news they have followed, the news sources they have used and their opinion about the amount and reliability of the news.

4.10.1 News sources

Almost all students (87%) reported using the state media Yle (yle.fi) as their main source of news related to COVID-19. Other popular sources were Hel-

singin Sanomat (hs.fi), followed by the popular tabloids Ilta-Sanomat (is.fi) and Iltalehti (iltalehti.fi). Social media was not mentioned very often as a source, as the most popular mention was Facebook with only five mentions. The rest of the sources mentioned are outlined in Table 10 below.

Virtually all media was consumed in a digital form. The digital media was the main source of information for everybody, although a handful of responses noted that they read a traditional newspaper as well in addition to the digital format.

TABLE 10 Online news sources used to find COVID-19 related information

News source:	**Mentions:**	**Percentage:**
Yle	27	87.0%
Helsingin Sanomat	18	58.0%
Ilta-Sanomat	13	41.9%
Iltalehti	12	38.7%
MTV	5	16.1%
THL (directly)	5	16.1%
Facebook	5	16.1%
Instagram	4	12.9%
Keskisuomalainen (local newspaper)	3	9.7%
BBC	2	6.5%
"Social media" (unspecified)	2	6.5%
Jyväskylä.fi (official city website)	2	6.5%
Other sources: Reddit, Savon Sanomat, Twitter, Guardian, Wall Street Journal, WHO, Worldometer, Ylilauta, "friends"	1	3.2%

4.10.2 Trustworthiness and accuracy of the information

Students generally considered the state media Yle to be a reliable source. However, in many responses people emphasized the uncertainty of the situation which had caused contradicting information to spread. This meant that it was more difficult to keep up with the latest information and validate it.

> The information from Yle and the government is trustworthy, but other facts around it are more ambiguous and need filtering. (Interview 5)

> The tabloids clickbait, which is an immoral thing to do during this time. I want to believe that Yle and Helsingin Sanomat get the facts right but can't know that with 100% certainty either. (Interview 25)

Furthermore, some students noted that the amount of conflicting information coming from several sources and circulating around the internet polarizes people, which causes increased tensions in the society as these conflicting opinions and thoughts collide.

> It's a little bit apocalyptical, and I'm worried about the amount of disinformation. This is a really suitable ground for all the conspiracy theories which we have seen pop up. The click baiting headlines, the yellow media [sensationalist journalism] and their ways of communication worry me. (Interview 13)

4.10.3 Information overload

According to Savolainen (2007) the main methods used to coping with the overload of information are filtering and withdrawing. The filtering strategy attempts to eliminate information that is irrelevant or unusable and the withdrawal method takes an active approach of reducing the sources of information until a tolerable level of information is reached. Both strategies were utilized by the students but categorising them was difficult as the words used were often ambiguous or conflicting to Savolainen's (2007) categorisation. For example, students talked about "*filtering news*", when they were actually withdrawing from complete news *sources*.

> First it was good that it [COVID-19 pandemic] was reported, but then it started to come from everywhere and nobody told what is going on in the world anymore. Now I filter what news I want to read and leave out the ones with worst quality. (Interview 24)

Based on the responses, the students clearly suffered from information overload. Over two out of three responses did mention that the amount of information was too immense at least in some way. The most common reactions are listed in Table 11.

> In the beginning I followed everything. Eventually I noticed that my whole thinking goes to corona and realized that as long as I know the main things, I'll manage and feel better. (Interview 2)

> Initially I followed the situation a lot. But now I have become exhausted and can't be bothered to check the news. I'll just quickly check the number of new cases but don't really feel like reading anything else. (Interview 16)

Usually filtering and/or withdrawing from news occurred after an emotional response elicited by the news. These reactions were not uncommon either as 42% of the students felt anxious or afraid and 26% felt angry or annoyed. The constant reporting of deaths, new cases and negative stories was cited as the main reason for the anxiousness and fear.

> The constant reporting of daily numbers makes me anxious sometimes, like they can't find a positive viewpoint. (…) The news are all just corona, it's all about deaths. (Interview 12)

> At first – during the spring – I followed more, and it made me anxious as everything was just corona" (Interview 27)

Repetitive and exaggerated nature of the news was the most often named reason for an angry response. These students felt that some of the news were blown out of proportion and were deliberately making the situation look worse than they perceived it.

> It's mostly just unnecessary hysteria, s*** has hit the fan. I feel frustrated and disinterested about it all. (Interview 11)

> The amount [of the covid-related news] annoys me because it feels like there's never anything else. Sometimes it's all just stirring up fear and horror. At some point it makes you read things critically. (Interview 26)

TABLE 11 Grouped statements regarding information overload

Statement	**Times mentioned**	**Percentage**
There was an overload of information	21	67.7%
The information was confusing or misleading	20	64.5%
Felt anxious or afraid due to the news	13	41.9%
Felt angry or annoyed by the news	8	25.8%

4.11 Summarising reactions to remote learning

From the interviews, several factors relating to remote learning were identified, both in a positive and in a negative sense. These key findings are briefly summarised in the following chapters. Only the factors that could be seen as having a direct connection to the technology used are included here. The more general benefits or disadvantages students experienced are briefly summarized in a later chapter, which is at the end of the results.

4.11.1 Positive sides of remote studying

The mentioned positive factors relating to the possibilities of information technology had several similarities and answers often overlapped each other. For this reason, unambiguously categorizing them was somewhat challenging. The categories were based on the reasoning behind the answer given by the students. These are also outlined in a separate table with example quotes of each aspect (Table 12).

The most clearly noticeable positive side was the freedom from time and place, and it can be easily seen as an all-encompassing answer to this question. However, when looked at more closely, the freedom from the time constraints did not just mean the ability to watch a recording later, although it was one of the most popular answers. The increased autonomy also meant that it was possible to combine working life and studies in an enhanced way. There was no need to spend any time changing between these two environments due to them both being in a remote form.

Similarly, the freedom from a specific location did not just mean that students would study at home. A lecture or exam would have usually forced the student to stay in town, which can obviously restrict available options considerably. The remote options did allow students to have a trip hundreds of kilometres away from home or just a simple possibility to sleep a bit longer, as getting ready for the lectures only took a couple of minutes. In both cases the considered this to improve their wellbeing.

Other emotional and health reasons can also be pointed out as their own specific factors. Some students felt that lectures could very well be held online if the situation calls for it. Moving the lecture to be held online could be a better choice when the weather is challenging, or the lecture simply does not have much need for social interaction. One participant noted that students have often felt the pressure to attend mandatory lectures even while being sick to make sure they pass the course or avoid additional tasks. The pandemic forces us to rethink should this kind of behaviour be discouraged in some way to curb the spread of other infections and viruses. During the last year we have seen that the technology certainly allows it.

Finally, technology was seen as an important factor to learn in general. There was a sense that more meetings could be held remotely in the future, which means that learning the tools and the proper use of them could be beneficial in the working life later.

TABLE 12 Summary of the positive factors of remote learning

Perceived positive sides of remote learning	**Example quote(s)**
Ability to watch the lecture later as a recording	"There's more independence and a chance to do things at your own pace because the lectures are recorded" (Interview 17)
Not bound to a certain location	"I did one exam in a tent in Norway" (Interview 18)
Attendance not mandatory	"It's better to have a lecture online when actually being there wouldn't really make a difference" (Interview 25) "Nobody wants to come to a lecture if it's -30C outside, it almost feels like bullying from the teacher" (Interview 30)
Schedules and work were easier to arrange	"You could hop on, hop off, and again back on and do some work between studies" (Interview 2)
Freedom of choice	"If you're really tired or just having a bad day, it's much nicer to not be forced to go out there. You can just be at home and attend with your own rules" (Interview 19)
Reduced stress, especially in the morning	"You could attend a morning lecture from bed or while eating breakfast" (Interview 5) "I can just open the PC at home, there's no need for tedious morning routines" (Interview 12)
Not forced to attend if sick or feeling unwell	"People can practice social distancing (…) and you are not forced to attend a lecture if you are sick" (Interview 4)
(Unintended) learning of these online skills is useful	"The communication skills course was good. The way it had to be done online might actually become very useful in the future" (Interview 3)

4.11.2 Negative sides of remote studying

The most often mentioned negative things that could directly be attributed to information technology were perhaps a bit more wide-ranging than the positives. (Table 13) The most pressing issue was definitely the lack of proper social interaction, which was reflected in most of the answers in a one way or another. In addition to not being able to socialize normally, students also felt that the missing nonverbal feedback during online meetings was a substantial negative factor.

The lack of nonverbal feedback made communication more difficult and less appealing. Students felt that a natural, flowing conversation was harder to achieve as attaching to the conversation was challenging and one could not read the emotions or reactions of others.

Similar issues were reflected in group working as well. The dynamic side of working was reduced, and this caused increased anxiousness for the students as they could not be sure how other people reacted or if they even did anything to progress the task. The lack of dynamics also had an effect to the discussion during the lectures, as asking questions was not as easy and they could even go ignored if they were not noticed from the chat. Interrupting the lecture vocally was also considered to be more awkward, which reduced the eagerness to ask about something.

The adaptation stage in the spring was seen as especially challenging. Finding the proper balance for a reasonable workload was difficult as the replacement tasks were often in the form of essays. As the courses all had similar timeframes, this meant that there could be several essays with a same deadline.

Likewise, a couple of interviews noted that the difficulty of online exams was too high in the early stages. For example, the exam could have a strict time limit, which likely did well to prevent the possibility of searching the correct answers during the exam. Then again, it similarly prevented a legitimate thought process of finding a correct answer.

The problem with concentration was discussed more in detail earlier, but the additional stimuli at home and a closure of all dedicated studying places contributed to an increase in anxiety and stress.

Finally, the technological issues were also prevalent in many answers. Although students did not generally feel like they have too little technological skills, many answers noted that there were often some minor issues during lectures, which caused delays. Sometimes, the issues were unavoidable (like audio breaking up or lost internet connection) and other times caused by an attending person (such as microphone left open or a wrong file format).

TABLE 13 Summary of the negative factors of remote learning

Perceived negative sides of remote learning	**Example quote(s)**
Lack of proper social interaction	"No social contacts is the number one thing, you can't go to lectures to see people and online just isn't the same" (Interview 20)
Asking questions was harder	"The teacher might not notice a message in [Zoom] chat" (Interview 1) "I preferred dynamic live lectures where it is easier to interrupt the lecturer" (Interview 13)
Group work difficulties	"Group work was easier to do live because you could see that everybody is actually doing something" (Interview 3) "Group work was more difficult, because you don't get the same cues and reactions as you do in real life" (Interview 16)
Communication difficulties	"Language studies and the negotiation skills course were difficult, there was a lack of non-verbal communication" (Interview 11) "Even when the course was about discussion, in remote environment nobody was able to keep the discussion going or encourage it" (Interview 28)
The difficulty of studies increased	"Exams were too strict in the early phase, there was no time to think" (Interview 8) "The teachers might have thought that they [students] are at home and have plenty of time to do written assignments. Later they apologized for the amount of tasks given" (Interview 13)
Quality of teaching dropped or changed significantly	"Demos and labs were subpar"(Interview 19) "Learning of physical education skills was difficult at home" (Interview 24)
Concentrating at home was more difficult	It is difficult to concentrate on many things, there was a lack of a dedicated place for studying such as library or some quiet place in university (Interview 6)
Technical difficulties	"Tech issues mainly, like the connection was lost or the slides won't open and you just have to wait until it's fixed" (Interview 17)

4.12 The future of remote learning

To end the interview, students were asked to summarize their feelings and thoughts about the situation. 84% of the students clearly indicated that they believe remote learning possibilities in the future will be increased and developed further. They also generally had positive views toward this kind of progression. In several interviews, students hoped for the remote methods to be incorporated more closely to the "old normal" so there would be more possibilities and flexibility for the students.

> I believe and hope that the remote possibilities would stay, but on the other hand I also believe that we eventually return to the old normal instead of completely staying in remote studies. (Interview 4)

In some cases, students felt that a mass lectures are a thing of the past. As the course contents may remain largely unchanged for years, they could be distributed in the form of a video recording instead of forcing students to attend a lecture with little motivation.

> I would wish for more remote learning possibilities. Sometimes it is really frustrating to go to a lecture just for the sake of listening. If the content stays the same, you could just watch the old recordings. (Interview 16)

Even though the possibilities of remote studies were acknowledged, many hoped for a return to normal when it is possible. Along with the socialising reasons, concerns were raised that extensive use of remote teaching could be a way to cut costs, which would then lead to decreased social life.

> I'm afraid that the universities want to cut costs and go towards remote teaching due to that. More courses can be completed remotely in the future and I fear that the students may not even move to the university city from their hometown. (Interview 20)

Only one student reported attending to a course held in a hybrid format, where a part of the studies was online and the rest as contact teaching. This kind of a format was an exception rather than a norm. Similar format was suggested in the summarizing comments by some students. Applying this more widely might require some rethinking of the course contents. For example, Piccoli et al., (2001) and Galusha (1995) observed the importance of a well-designed online course, where success factors included proper pacing and frequency. Designing a course that is not just a mixture of "both worlds" and, for example, has more variance in the substance of the lectures could provide a good balance between the flexibility of remote learning and the social aspects of contact teaching.

> I believe that some teachers will understand that you can also hold courses remotely, and the flexibility will increase. In the business studies and communication studies the lectures are recorded but you still must attend. Yet, I hope that there would be at least small group meetings in the future. The teachers might be thinking that you can't have partially remote and partially contact teaching. (Interview 22)

4.12.1 Other notions by the students

In the final questions, students could list general matters that have been either positive or negative in this situation. In addition to the information technology viewpoints that were discussed above, other positive things included being happy about the "pausing" of the world. The pause was seen to benefit the nature of the world as well as the mental health of people.

The technological shift induced by the pandemic was also seen as a major positive factor. The "laggards" of technology adoption were now "finally forced to come online" (Interview 27). Students also believed that there will be a strong progress towards a more ecological society as business travel is reduced and remote meetings stay as a part of everyday life in new companies. Some even questioned the need for workplaces completely.

> "I could work from home even when I was somewhat sick. I had fever so if I had needed to go to the workplace, I would have taken a sick leave for that day. But in this case – as I didn't feel too sick to work at all – I could still do the same stuff from home without infecting others" (Interview 10)

> "The society must adjust. It is good to get rid of old constraints, and there will be no need to be on site in 2025. We'll then have less workplaces that are smaller." (Interview 30)

The negative side focused mainly on the lack of possibilities regarding travel and social life. While some did increase their domestic traveling, many were reserved when it came to traveling in the tourism sense. The ban on social events also strained the students and some were also worried the domino effect that would be caused to the restaurants and other businesses.

Other concerns included the opposite side of mental health issues. As people have had to remain socially distant, people have felt lonelier and more isolated. At the end of the interview, several students informally told that it was "nice to talk about my feelings" or "vent my emotions a bit".

> "Upholding social contacts needs much more work, there's no parties and so on. Lots of people are probably very alone." (Interview 27)

5 DISCUSSION

In this chapter, the results of the study are evaluated, and the research questions are answered with the support of existing frameworks and literature. Finally, the contributions and limitations of this study are reviewed, and some future research topics are suggested. The research questions of this master's thesis were:

- How has the COVID-19 pandemic affected university students?
    - How well were the remote studies facilitated by the use of information technology?
    - How have students upheld their social life?
- What were the biggest issues students faced when forced to take on remote learning and how these issues can be minimized?

In order to have an answer to these questions, a qualitative interview study was conducted to the students and results were examined with conventional content analysis. The answers reveal that the impact of COVID-19 has definitely been considerable for the university students, but they have still managed the situation well and adapted to the situation. The main identified issues were the reduced possibilities for interaction and increased amount of confusion and uncertainty.

Many of the problems are more or less connected to the element of social life. The number of interactions were reduced, and the remainder were constrained to the limitations of the technology, so all forms of communication were seen as more challenging. The reduced possibilities for interaction were most notable with the social distancing measures and socialising itself, but similar issues were observed during the lectures as well.

Outside of the university environment, there was plenty of pioneering with different methods of social interaction. Events such as "watchalongs", where a specific event would be watched together, could easily be moved online and were one of the typical ways of new social interaction methods facilitated by the potential of information technology. In several cases, a get-

together was moved online as such, which is a testament to the potential and flexibility of the modern technological capabilities. However, even if some of these ideas were considered as funny and exciting when they were first prototyped, most often the most ambitious ones were abandoned.

5.1 Eliminating change resistance

Oreg (2003) discussed about the factors of change resistance and noted a lack of control being one. In addition, the initial negative emotions may cause additional stress, which can then be associated with the new situation and be a cause for a negative feedback loop. (Oreg, 2003; Juutinen, 2011).

First, the reluctancy to change old habits. Changing established ways of studying was difficult as "old habits die hard". Regarding the studying habits, in several answers there was even a sense of conditioning to behave in a certain way. Most notably, some students believed they must have a separate place to study in order to get into a proper "study mode". Studying at home was perceived as much more difficult and for some, it also yielded worse results. These people likely prefer low levels of stimulation, which was one reason for a change resistance. This was not reflected much in the adoption of remote learning tools, but the students were still less content with the situation. The only reasonable way to improve the situation would be to offer more dedicated places for studying. During a pandemic these might be difficult to arrange as the measures taken have often closed these kinds of places.

The preference for low levels of stimulation is also quite closely related to the factor of maintaining control. As the situation all over the world was changing rapidly, there could very well be negative reactions towards the measures taken due to people thinking that they are losing their control over the situation. However, in the interviews this kind of a reaction was surprisingly rare and most just accepted the situation swiftly.

Stress and the ability to tolerate it are also general components that are intrinsically related to the process of change (Oreg, 2003). Although students were mostly adept in a technological sense, the increased strain coming from the stress caused by the pandemic in general was projected to the handling of studies too. In this sense, there is not much to be done as external stress factors are hard to eliminate.

5.2 Improving the adoption of new technology

According to Venkatesh et al. (2003), performance expectancy is seen as the strongest indicator for technology acceptance. Venkatesh et al. (2000) also state that having a specific attitude towards a system does not determine how well system is adopted. The same goes for self-efficacy and anxiety, which are

not direct determinants of intention either when it comes to accepting new technology. A person that might not be technologically adept can still accept a new service if other determinants support it. (Venkatesh et al., 2000)

Students considered online lectures to work sufficiently and properly, without any major problems. While many did experience technical issues or had to combat distractions, the efficiency of the studies was considered to be higher after an initial adjustment phase in the spring. This means that the performance expectancy regarding the studies was likely at a high level.

The systems did not require much effort to be used as often the lectures were behind a simple URL. Almost every person considered Zoom and other online lecture programs easy to use. A proper software design can help a lot when designing a platform for remote lectures.

Social influence did not really play a role in its traditional form. Instead of basing their sentiments on the opinions of their peers, students just preferred for more social contacts. In the summer, many of the COVID-related restrictions were eased and people were more comfortable to meet in person and were hoping for a more normal autumn. As that did not happen and more limitations were set again, the reaction to remote learning also turned towards negative.

Many of the negative emotions could also be boiled down to a lack of stimuli. The online lectures are a more restrained environment and the "Zoom fatigue" (Chen et al., 2020) phenomenon was clearly observed in these answers as well. As students are exposed to a similar format every day and week, the constant repetition will eventually cause boredom and inundation. The only solution to this would probably be jumping out of the typical format and designing the courses to have more variance in their content. Alternatively, a hybrid course format with remote and contact teaching could increase the motivation to study more actively.

The facilitating conditions are at an extremely high level in Finland. A fast 4G mobile network is available for 93% of the households (Traficom, 2021), which means that students are able to attend lectures almost everywhere. It is supplemented by a slower 3G network which may not allow live streaming but is sufficient for basic remote work such as downloading material, searching for information, and uploading assignments. An even faster 5G connection is also already available for 67% of the Finns, which further increases the opportunities and possibilities of remote learning. (Traficom, 2021) Perhaps partly due to this, students also have strong habits of using information technology. These habits were then reflected positively in this scenario, where new services had to be adopted quickly.

5.3 Emotions and core affect theory

When looking at the emotions regarding studying at the university, a shift towards unpleasantness and deactivation can clearly be noted, especially when asked about studying at home instead of studying at the university (Figure 3).

This one example demonstrates how students almost unilaterally considered the normal way of studying at the university to be pleasant. Only the level of activation varied between excited and calm, but the general reaction was positive. However, it is worth noting that the figure includes total mentions found in the data. If a student described their emotions by saying "happy *and* content", both of these emotions are counted separately instead of trying to fit them somewhere in between. This might inflate the numbers a bit, but it also shows that the emotions were definitely set firmly on the pleasant side.

Looking at the emotions of the "studying at home"-scenario, the movement towards deactivation is clear. Lethargic comes up as the most common choice and "stressed" – an unpleasant, activating emotion – also emerges. Comparable shifts could be seen in every other scenario as well, which again leads us to the same conclusion: remote studies do not provide enough stimuli to the students. And as the stimulation levels are low, it is easier to become attracted by the other external distractions at home. Even a messy home could cause more emotional response than a lecture, which makes it a distracting element. This is further proof of the dullness of online learning.

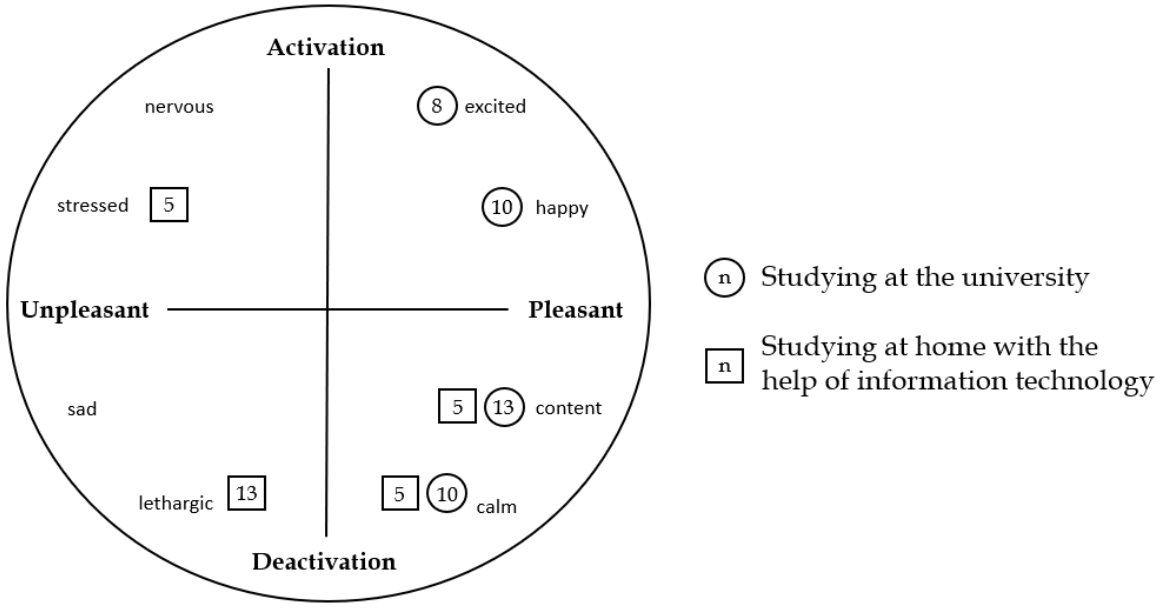

FIGURE 3 The most frequently mentioned emotions regarding university studying. Adapted from Feldman, Barrett, and Russell (1998).

The negative emotions such as stress and anxiety were most prevalent in the questions regarding information overload and the reporting of news. If a student felt negatively about these situations, they were also likely to have a negative attitude to studies in general. If the influence of these factors can be diminished or the attitude can be shifted towards more positive, there is a chance for the remote studies to be more accepted as well.

There were also other cases, where the emotions played an important role in the handling of the situation. Students felt positively when the lecturers took a more accommodating approach and assured that courses can still be held, even if it would be a learning experience for everybody. On the other hand, having a negative attitude and little consideration towards the course workload was also reflected in a similar fashion: the students' attitude became more negative and stress levels increased.

5.4 Contributions

This study has researched the impact of COVID-19 pandemic to university students, mainly focusing on the technological issues. As there has not been a precedence to this type of situation in a modern, technological era, the approach to the subject has been relatively broad. The lack of precedence also meant that there were no established methods to study this phenomenon. Therefore, in order to establish a better picture of the mindset of the students and to collect as much data as possible, a comprehensive questionnaire was considered necessary. The questionnaire attempted to encompass the whole technological side of student life, which meant not only including questions about studies, but the social life as well. In the answers, it was noted that these two parts of student life are deeply entwined and even inseparable to an extent.

Based on the existing literature and the findings of this thesis, it can be argued that if online studies are staying as a permanent part of the university studies, they should be approached completely differently than their traditional counterparts. While just copying the approach from traditional courses does work, the lack of actual interactivity means that less attention is paid to them by the students. In a similar fashion, the shortcomings of technology become apparent when the subjects taught are not purely theoretical. The social side of this equation clearly also shows that meetings held online cannot replace the real human interaction that can only be experienced face-to-face.

However, this does not mean that the potential of remote learning and working should be dismissed completely. Instead of creating complex services that aim to replace every single aspect of contact teaching, the design of these tools should be towards a simple, ubiquitous system that does not attempt to reinvent the wheel. A feature-creep makes systems more complex to use and as a result harder to adopt. This can then reduce the interest towards remote learning.

5.5 Limitations

While the research does include a great number of answers for an interview study and participants from every faculty of University of Jyväskylä, the overall representation of some faculties was still very small. Therefore, the comparisons were made at a general university level instead of analysing the whole faculty based on a single answer. However, qualitative analysis can still be made even from a small sample. (Hirsjärvi et al., 2009).

All interviewees were volunteers instead of a truly random selection, which can mean that the results are skewed towards the direction of people that felt like they had 'something to say'. In other words, the students that have been relatively unaffected by this change may not be represented properly as they have not considered participation to the study as important. On the other hand, and as some answers suggest, there may also be students that have been affected very deeply by the pandemic. These people may have become depressed and thus reluctant to be interviewed, which leaves out the other extreme end.

The interviewees were also asked to self-reflect on a 1-10 scale about their tech-savviness and how eagerly they are adopting new technology. As no reference to the scale was given (other than the user's own perception), the results may not accurately reflect their actual level of expertise. They did however serve as a reference point when analysing the answers.

Phrasing of some questions could have been improved as sometimes the students interpreted the questions in a different way, which was reflected in some answers. The interview format allowed to clarify the meaning of the questions in case the student misunderstood, so this was a relatively minor issue.

5.6 Future research

There are several possibilities for future research topics. Most importantly, there could be a more focused research onto some of the concerns and issues that were raised by the students in this study. For example, the impact of information overload and various other distractions could be studied more closely. Some students felt like it was hard to keep up with the studies as the attention was diverted to other things. A study that measures the attention span of the students could provide more information about this area.

Another possibility would be to focus more on a certain field of study. Although several studies have already been made about teleworking and remote studying, there has always been the possibility to work traditionally. The studies have often concentrated to fields of study that can be relatively easily moved online. In the case of COVID-19, every student was forced to move to distance learning, which then caused struggles especially in subjects that were

previously considered as impossible to teach online. In addition to the dentistry example of the literature review, similar issues were noted in the department of education, as well as with biology and chemistry. These all are areas with relatively more barriers in the path of successful online teaching, mostly due to the fact that there is often an obligatory need to observe or control something in person. Virtual reality could offer a solution to this, but it would need further investigation.

More research could also be done on the organisational side. This research was mostly concentrating on the students and their perception of the situation, but the issues faced by the university staff could also be investigated. One interesting point of study could be the technological skills of the teachers as many answers mentioned that if the teacher was not technologically proficient, it also frustrated the students a lot. Especially the older teachers likely have a lot of resistance to new methods because of the habits they are used to. How could these issues be alleviated?

Finally, a follow-up study with a similar approach could also be done later. Students have had the time to embrace new technology and new ways of teaching more thoroughly, which means that they could probably assess their remote teaching experiences in a more detailed way.

6 CONCLUSION

The goal of this master's thesis was to see what kind of impact the COVID-19 pandemic has had on university students and their studies. The more specific focus of the study was to examine this situation from the viewpoint of information technology, which included factors like remote studies, technology-enabled alternatives to social life and information overload. The students from University of Jyväskylä were interviewed about the different ways so

The interview itself was divided into four parts and the thesis is structured similarly. Chapters 4.2 to 4.8 mainly focus on the different matters regarding studies, chapter 4.9 to the social life and chapter 4.10 to the infodemic phenomenon. Finally, a summary is done in chapters 4.11 and 4.12. All of this is discussed and reflected to the literature more closely in chapter 5.

The students generally accepted the shift to online studies and for the most part they were even happy to do so. Eventually the similarity of online studies, lack of interaction and problems with concentration made the remote lectures duller and more frustrating, which understandably reduced the interest towards them. The need for socialisation was most clearly reflected in preference towards live lectures. Innovative prototyping of several new ways of interaction with the help of technology did also occur.

A vast majority of the students believed that the amount of online teaching and remote studies will increase and also improve as a result of this pandemic. Many also praised that in some faculties, a significant step was taken towards digitalization and the courses were finally modernised. When students looked at the bigger picture, many believed that the pandemic will also leave lasting changes in the world, both in the field of information technology and outside it.

REFERENCES

Al-Fraihat, D., Joy, M., & Sinclair, J. (2020). Evaluating E-learning systems success: An empirical study. Computers in Human Behavior, 102, 67-86.

Ayyagari, R., Grover, V., & Purvis, R. (2011). Technostress: technological antecedents and implications. MIS Quarterly, 831-858.

BBC (2018). What if a deadly influenza pandemic broke out today?. Retrieved 18 May from https://www.bbc.com/future/article/20181120-what-if-a-deadly-influenza-pandemic-broke-out-today

Brod, C. (1984). *Technostress: The human cost of the computer revolution.* Reading, Mass.: Addison-Wesley.

Cinelli, M., Quattrociocchi, W., Galeazzi, A., Valensise, C. M., Brugnoli, E., Schmidt, A. L., ... & Scala, A. (2020). The covid-19 social media infodemic. arXiv preprint arXiv:2003.05004.

Columbaro, N. L., & Monaghan, C. H. (2009). Employer perceptions of online degrees: A literature review. Online Journal of Distance Learning Administration, 12(1).

Coronavirus disease named Covid-19. (2020, February 11). BBC News. https://www.bbc.com/news/world-asia-china-51466362

Feldman Barrett, L., & Russell, J. A. (1998). Independence and bipolarity in the structure of current affect. Journal of personality and social psychology, 74(4), 967.

Gao, J., Zheng, P., Jia, Y., Chen, H., Mao, Y., Chen, S. & Dai, J. (2020). Mental health problems and social media exposure during COVID-19 outbreak. Plos one, 15(4), e0231924.

Hirsjärvi, S., Remes, P., & Sajavaara, P. (2009). Tutki ja kirjoita. 15. painos. Helsinki: Tammi, 202-204.

Holmberg, B. (2005). The evolution, principles and practices of distance education (Vol. 11). Bibliotheks- und Informationssystem der Universität Oldenburg.

Hsieh, H. F., & Shannon, S. E. (2005). Three approaches to qualitative content analysis. Qualitative health research, 15(9), 1277-1288.

Ilta-Sanomat (2020). Mysteerisairaus herättää huolta Kiinassa – 59 ihmistä sairaalahoidossa, 7 kriittisessä tilassa. . Retrieved 22 May 2021, from https://www.is.fi/ulkomaat/art-2000006364539.html

Juutinen, S. (2011). Emotional Obstacles of E-learning (Dissertation). Jyväskylä Studies in Computing 145). University of Jyväskylä.

Oreg, S. (2003). Resistance to change: Developing an individual differences measure. Journal of Applied Psychology, 88(4), 680–693. doi:10.1037/0021-9010.88.4.680

Pfefferbaum, B., & North, C. S. (2020). Mental health and the Covid-19 pandemic. New England Journal of Medicine.

Piccoli, G., Ahmad, R., & Ives, B. (2001). Web-based virtual learning environments: A research framework and a preliminary assessment of effectiveness in basic IT skills training. MIS quarterly, 401-426.

Raišienė, A. G., Rapuano, V., Varkulevičiūtė, K., & Stachová, K. (2020). Working from Home—Who is Happy? A Survey of Lithuania's Employees during the Covid-19 Quarantine Period. Sustainability, 12(13), 5332.

Rothkopf, D. J. (2003). SARS Also Spurs an 'Information Epidemic'. Newsday. Retrieved from https://www.proquest.com/docview/279705520

Russell, J. A., & Barrett, L. F. (1999). Core affect, prototypical emotional episodes, and other things called emotion: dissecting the elephant. Journal of personality and social psychology, 76(5), 805.

Savolainen, R. (2007). Filtering and withdrawing: strategies for coping with information overload in everyday contexts. Journal of Information Science, 33(5), 611-621.

Seibold, K. N. (2007). Employers' perceptions of online education (Doctoral dissertation, Oklahoma State University).

Siewiorek, D., & Swarz, R. (1998). Reliable computer systems: design and evaluation, 3rd Edition. Digital Press.

Shepherd, S. S. G. (2004). Relationships between Computer Skills and Technostress: How Does This Affect Me? Association of Small Computer Users in Education (ASCUE). (s. 225-231).

Smith, D. E., & Mitry, D. J. (2008). Investigation of higher education: The real costs and quality of online programs. Journal of Education for Business, 83(3), 147-152.

Song, Y. & Gao, J. (2019). Does telework stress employees out? A study on working at home and subjective well-being for wage/salary workers. Journal of Happiness Studies, 1-20.

Tarafdar, M., Tu, Q., Ragu-Nathan, B. S. & Ragu-Nathan, T. S. (2007). The impact of technostress on role stress and productivity. Journal of Management Information Systems, 24(1), 301-328.

Traficom (2021). Nopea 5G saatavilla jo yli 1,8 miljoonaan kotitalouteen Suomessa. Retrieved 22 May 2021, from https://www.traficom.fi/fi/ajankohtaista/nopea-5g-saatavilla-jo-yli-18-miljoonaan-kotitalouteen-suomessa

University of Jyväskylä (2020a). Jyväskylän yliopiston ohjeistus koronavirustilanteeseen liittyen opiskelijoille. Retrieved 15 May 2021, from https://www.jyu.fi/fi/ajankohtaista/arkisto/2020/02/jyvaskylan-yliopiston-ohjeistus-koronavirustilanteeseen-liittyen-opiskelijoille

University of Jyväskylä (2020b). Jyväskylän yliopiston ohjeistus koronavirus-tilanteeseen liittyen henkilöstölle, yliopistossa työskenteleville ja opiskeleville. Retrieved 15 May 2021, from https://www.jyu.fi/fi/ajankohtaista/arkisto/2020/02/paivitetty-25-2-jyvaskylan-yliopiston-ohjeistus-koronavirustilanteeseen-liittyen-henkilostolle-yliopistossa-tyoskenteleville-ja-opiskeleville

University of Jyväskylä (2020c). Retrieved 15 May 2021, from https://www.jyu.fi/fi/ajankohtaista/arkisto/2020/03/koronavirusohjeistus-epidemia-alueelta-palaaville-oireettomille-henkiloille-5-vrk-n-etaopiskelukehotus-kaikkia-matkoja-tulee-harkita-huolellisesti

University of Jyväskylä (2020d). Retrieved 15 May 2021, from https://www.jyu.fi/fi/ajankohtaista/arkisto/2020/03/jyvaskylan-yliopisto-valmistautuu-laajamittaiseen-etatyoskentelyyn-ja-opiskeluun

University of Jyväskylä (2020e). Retrieved 15 May 2021, from https://www.jyu.fi/fi/ajankohtaista/arkisto/2020/03/copy_of_ylistonrinteella-nopeutetusti-etatyoskentelyyn-ja-etaopetukseen

University of Jyväskylä (2020f). Retrieved 15 May 2021, from https://www.jyu.fi/fi/ajankohtaista/arkisto/2020/03/jyvaskylan-yliopisto-keskeyttaa-kaiken-kontaktiopetuksen-valittomasti-ja-siirtyy-etaopetukseen

University of Jyväskylä (2020g). Retrieved 15 May 2021, from https://www.jyu.fi/fi/ajankohtaista/arkisto/2020/04/hallitus-jatkoi-rajoitustoimia-13-5-saakka-jyu-n-tilat-pysyvat-suljettuina

University of Jyväskylä (2020h). Retrieved 15 May 2021, from https://www.jyu.fi/fi/ajankohtaista/arkisto/2020/05/etaopiskelu-ja-tyoskentely-jatkuu-jyvaskylan-yliopisto-purkaa-rajoituksia-hallitusti-ja-vaiheittain

University of Jyväskylä (2020i). Retrieved 15 May 2021, from https://www.jyu.fi/fi/ajankohtaista/arkisto/2020/05/e-tenttitilat-avataan-rajatusti-kayttoon-25-5

University of Jyväskylä (2020j). Retrieved 15 May 2021, from https://www.jyu.fi/fi/ajankohtaista/arkisto/2020/05/jyvaskylan-yliopisto-siirtyy-elokuun-alussa-osittaiseen-lahiopiskeluun-ja-tyoskentelyyn

University of Jyväskylä (2020k). Retrieved 15 May 2021, from https://www.jyu.fi/fi/ajankohtaista/arkisto/2020/07/semma-avaa-lisaa-ravintoloitaan-porrastetusti-elokuun-aikana

University of Jyväskylä (2020l). Retrieved 15 May 2021, from https://www.jyu.fi/fi/ajankohtaista/arkisto/2020/08/jyvaskylan-yliopiston-korona-ohjeistus-opiskelijoille-24-8-alkaen

University of Jyväskylä (2020m). Retrieved 15 May 2021, from https://www.jyu.fi/fi/ajankohtaista/arkisto/2020/09/jyvaskyla-antaa-laajan-maskisuosituksen-koskee-myos-korkeakouluja-ja-normaalikoulua

University of Jyväskylä (2020n). Retrieved 15 May 2021, from https://www.jyu.fi/fi/ajankohtaista/arkisto/2020/09/jyvaskylan-yliopiston-koronaohjeistus-1-10-alkaen

University of Jyväskylä (2020o). Retrieved 15 May 2021, from https://www.jyu.fi/fi/ajankohtaista/arkisto/2020/11/jyvaskylan-yliopiston-toiminta-jatkuu-nykyisten-korona-ohjeiden-mukaisesti-14-3-2021-saakka-2013-laaja-maskisuositus-jatkuu-marraskuun-ajan

Valtioneuvosto (2020a). Hallitus on todennut yhteistoiminnassa tasavallan presidentin kanssa Suomen olevan poikkeusoloissa koronavirustilanteen vuoksi. Retrieved 15 May 2021, from https://valtioneuvosto.fi/-/10616/hallitus-totesi-suomen-olevan-poikkeusoloissa-koronavirustilanteen-vuoksi

Valtioneuvosto (2020b). Valmiuslain mukaisten toimivaltuuksien käytöstä luovutaan – poikkeusolot päättyvät tiistaina 16. kesäkuuta. Retrieved 15 May 2021, from https://valtioneuvosto.fi/-/10616/valmiuslain-mukaisten-toimivaltuuksien-kaytosta-luovutaan-poikkeusolot-paattyvat-tiistaina-16-kesakuuta

Venkatesh, V. (2000). Determinants of perceived ease of use: Integrating control, intrinsic motivation, and emotion into the technology acceptance model. Information systems research, 11(4), 342-365.

Venkatesh, V., Morris, M., Davis, G., & Davis, F. (2003). *User Acceptance of Information Technology: Toward a Unified View*. MIS Quarterly, 27(3), 425-478.

Venkatesh, V., Thong, J. Y., & Xu, X. (2012). *Consumer acceptance and use of information technology: extending the unified theory of acceptance and use of technology.* MIS quarterly, 157-178.

Verhoeven, J. C., Heerwegh, D., & De Wit, K. (2010). *Information and communication technologies in the life of university freshmen: An analysis of change*. Computers & Education, 55(1), 53–66. doi:10.1016/j.compedu.2009.12.002

Weil, M. M., & Rosen, L. D. (1997). Technostress: Coping with technology@ work@ home@ play (Vol. 13, p. 240). New York: J. Wiley.

World Health Organization. (2020a). Infodemic. Retrieved 11 May 2021, from https://www.who.int/health-topics/infodemic

World Health Organisation. (2020b). Managing the COVID-19 infodemic: Promoting healthy behaviours and mitigating the harm from misinformation and disinformation. Retrieved 11 May 2021, from https://www.who.int/news/item/23-09-2020-managing-the-covid-19-infodemic-promoting-healthy-behaviours-and-mitigating-the-harm-from-misinformation-and-disinformation

APPENDIX 1 – BACKGROUND INFORMATION OF PARTICIPANTS

#	Age	Gender	Faculty
1	27	male	Information Technology
2	24	female	Information Technology
3	28	male	Information Technology
4	24	female	Education and Psychology
5	25	female	Education and Psychology
6	24	male	Information Technology
7	26	male	Information Technology
8	22	female	Information Technology
9	22	male	Information Technology
10	24	female	Information Technology
11	30	male	Information Technology
12	25	female	School of Business and Economics
13	23	female	Education and Psychology
14	23	male	Humanities and Social Sciences
15	22	female	Mathematics and Science
16	24	female	School of Business and Economics
17	26	male	Education and Psychology
18	24	female	Mathematics and Science
19	25	female	Education and Psychology
20	24	male	Humanities and Social Sciences
21	20	female	Humanities and Social Sciences
22	28	female	Education and Psychology
23	23	female	Mathematics and Science
24	26	female	Sport and Health Sciences
25	21	female	Mathematics and Science
26	24	female	Education and Psychology
27	23	female	Education and Psychology
28	32	female	Humanities and Social Sciences
29	27	female	Information Technology
30	24	male	Information Technology
31	22	female	Education and Psychology

APPENDIX 2 – INTERVIEW QUESTIONS

Part A: Background questions

1. Age
2. Gender
3. Field of study
4. Year of study
5. General feelings
   a. How do you feel about COVID-19 as a global situation?
   b. How do you see yourself in this global situation and how it has affected your life?
6. How tech-savvy are you? (scale 1-10)
7. How keen are you to adopt new technology? (scale 1-10)

Part B: Effects on studies

1. How did you react to the sudden change to remote studying in March?
2. How do you feel about it now (in September-October 2020)?
3. How strongly did the pandemic affect your studies?
   - Were any courses cancelled / adapted to fit remote teaching? In which ways were they changed?
   - How did that make you feel? Was it positive or negative?
4. How much your studies have relied on remote teaching pre-COVID?

5. How well did the remote teaching tools work for you?
   a. How easy were they to learn and use?
   b. How were the tools from a learning perspective?
   c. What kind of previous experiences helped/discouraged you?
   d. How were the instructions given?
   e. If you had a problem, how did you seek advice?
   f. How well did you receive information during online courses?

6. Did you feel that the online tools fulfilled their purpose?
7. What was your initial attitude towards remote teaching in spring 2020?
8. How did you feel about remote teaching after actually studying that way for a while?
   - If there was a difference, what caused the change?
9. How effective was/is remote studying in relation to contact teaching?
   a. In spring 2020?
   b. In autumn 2020?
10. During which instances did you feel positively about remote studying?
11. During which instances did you feel negatively about remote studying?

12. How well did course instructors handle the new situation?
    a. How was the instructor's attitude towards remote teaching?
    b. How was the availability of the instructor(s)?
    c. How was the communication of the instructor(s)?

13. How did you like the online course formats and structures?
14. How well could you process the given information during lectures?
15. How was the communication during the lectures?
16. How was the communication with your peers?

17. How often you checked the progress of the online courses?
18. How did remote studying methods affect your mental stress levels?
19. How different was it to study remotely at home?
20. What issues did you face remote studies?

21. Which emotion(s) would best describe the following situations:
    a. Studying at the university
    b. Studying at home
    c. Returning course assignments for a traditional course
    d. Returning course assignments for a remote course
    e. Doing group work in person with others
    f. Doing group work remotely
    g. Holding a presentation in front of a crowd
    h. Holding a presentation over the Internet
    i. Attending a traditional lecture
    j. Attending an online lecture
    k. Asking/Answering a question during a traditional lecture
    l. Asking/Answering a question during an online lecture

Part C: Effects on social life

1. How was your social life during the spring?
    - Did you met people online instead of real life, did you meet less people than usually etc.?
2. How is your social life now?
3. In which ways did you uphold your social life during the spring?
4. In which ways do you uphold your social life now?

5. How much did you use IT and online services to maintain your social life?
    - Which online services did you use?
    - Do you still use them?
    - Why were they effective / not effective?
    - How did you end up using those services?
    - How well did the service work as an alternative to meeting in real life?

6. To which extent is visiting a campus area a social experience to you?
7. How well did the online alternatives replace this social experience?
8. How did your communication styles/patterns change during the spring?
    - Did you find new ways to socialize?
9. How are your communication styles/patterns now?

Part D: Receiving information & concluding questions

1. How much did you follow the news about COVID-19?
2. From which sources you usually got the news from?
3. How have you felt about the COVID-19 news?
4. How difficult has it been to find reliable and trustworthy information about COVID-19?

5. Where do you feel the situation is heading?
6. How do you feel this crisis will change the ways we teach and learn?
7. Name the most positive things of this situation.
8. Name the most negative things of this situation.
9. Any final comments that you would like to give?

APPENDIX 3 – QUESTIONS ASKED BY AL-FRAIHAT ET AL. WHEN EVALUATING E-LEARNING SYSTEMS SUCCESS

Technical System Quality		
1.	It is easy to use Moodle	Ease of use
2.	It is easy to understand the structure of Moodle and how to use it	Ease to learn
3.	Moodle meets my requirements and I can find the information I need	User requirements
4.	Moodle includes the necessary features and functions I need	System features
5.	Moodle is always available for me to perform learning activities	System availability
6.	Moodle is flexible to interact with	Flexibility
7.	All components within Moodle are fully integrated and consistent	Integration
8.	Moodle launches and runs right away	System reliability
9.	Moodle does not crash frequently	Fulfilment
10.	Moodle protects my information from unauthorized access by logging only with my account and password	Security
11.	Moodle provides me with a personalised entry page (e.g. showing my modules, recommending additional modules and courses)	Personalization
Information Quality		
12.	Moodle has provided me with sufficient and required information	Sufficiency
13.	Information and resources needed from Moodle are always accessible	Accessibility
14.	Information from Moodle is in a form that is readily useable	Usability
15.	Information in Moodle is concise and clear	Conciseness
16.	The structure of Moodle is well organized into logical and understandable components	Understandability
17.	The content of Moodle is up to date	Up to date content
18.	I perceive the design of Moodle (e.g. fonts, style, colour, images, videos) to be good and meets the quality standards	Content design quality
Service Quality		
19.	There are enough and clear instructions/training about how to use Moodle	Providing guidance services
20.	Moodle provides proper online assistance and help	Providing help
21.	The IT services staff is available and cooperative when facing an error at Moodle	Staff Availability
22.	The IT services staff understands the specific needs of students	Fair understanding
23.	I receive a satisfactory and timely response from the IT services staff	Responsiveness
Educational System Quality		
24.	Moodle provides interactivity and communication facilities such as chat, forums, and announcements.	Interactivity and communication
25.	I believe that communication facilities have been effective learning components in my study	Effective communication
26.	Moodle provides me with different learning styles (e.g. flash animation, video, audio, text, simulation, etc.) and they are interesting and appropriate in my study	Diversity of learning styles
27.	Moodle provides evaluation components and assessment materials (e.g., quizzes, assignments)	Evaluation components
Support System Quality		
28.	Moodle provides appropriate information about plagiarism issues when submitting assignments through the system,	Ethical issues
29.	Moodle provides information about behavioural considerations when communicating with students or with instructors	Behavioural considerations
30.	Moodle provides information about the accessibility of content, permission for viewing course materials, and any other personal data in the system	Legal issues
31.	If it is optional, I would still prefer to use Moodle as a supportive tool in the module	Promotion of the e-learning system
Learner Quality		
32.	I believe it is good to use Moodle	Learner's behaviour
33.	I have a positive attitude toward using Moodle	Learner's attitude
34.	I am not intimidated by using Moodle	Learner's anxiety
35.	My previous experience with e-learning systems and computer applications helped me in using Moodle	Learner's previous experience
36.	I am able to perform tasks in Moodle successfully	Learner's self-efficacy
Instructor Quality		
37.	I use Moodle as recommended by my instructors	Subjective norm

38.	I think an instructor's enthusiasm about using Moodle stimulates my desire to learn	Instructor's enthusiasm
39.	I receive a prompt response to questions and concerns from my instructors in Moodle	Instructor's responsiveness
40.	I think communicating and interacting with instructors are important and valuable in Moodle	Instructor's interactive communication
41.	Generally, my instructors have a positive attitude to the utilization of Moodle	Instructor's attitude
Perceived Satisfaction		
42.	I am satisfied with the performance of Moodle	Satisfaction with system performance
43.	I enjoy using Moodle in my study	Enjoyable experience
44.	Moodle satisfies my educational needs	Providing educational needs
45.	Overall, I am pleased with the experience of using Moodle	Overall satisfaction
Perceived Usefulness		
46.	Using Moodle enables me to accomplish my tasks more quickly	Accomplishing tasks quickly
47.	Using Moodle improves my learning performance	Improving learning performance
48.	Using Moodle helps me learn effectively	Effective learning
49.	Overall Moodle is useful	Overall usefulness
Use		
50.	I use Moodle frequently	Frequency of use
51.	I depend on Moodle in my study	Dependence on system
52.	I use Moodle regularly	Regular use
53.	On average, I spend a long time on using Moodle	Duration of use
Benefits		
54.	Using Moodle has increased my knowledge and helped me to be successful in the module	Increasing knowledge
55.	Moodle is a very effective educational tool and has helped me to improve my learning process	Improving learning process
56.	Moodle makes communication easier with the instructor and other classmates	Easier interaction and communication
57.	Moodle saves my time in searching for materials and cuts down expenditure such as paper cost	Time and cost saving
58.	Moodle has helped me to achieve the learning goals of the module	Achieving learning goals