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Artificial intelligence as a socio-technical system in business school environment from students' perspective

Case Turku School of Economics

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Artificial intelligence (AI) and various tools utilising it have become more and more popular during the last few years. With the number of tools increasing their availability, has also become better, and many new usages have been found. AI tools have found their way in higher educational environments as well with students using them in different ways.

Previous studies regarding AI use in higher education environments regard AI mainly as a technology that affects education, but it should also be seen as a change force affecting pedagogical, ethical, social, cultural, and economic aspects of education. Therefore, in this thesis socio-technical system theory, chosen as the framework, gives a perspective that regards AI as a system that next to the technical aspects considers the social aspects and the environment in which the system is embedded in, equally important. AI has been previously identified as a socio-technical system. Socio-technical systems framework used in this study was originally designed to give proper guidelines to map and analyse these complex systems. However, this specific framework has been previously used mainly in a business context but interest for broadening the environments where it is used has also been stated.

The aim of this thesis is to find out how AI appears as a socio-technical system in the context of business school studies in order to clarify students' perceptions on AI's effect on higher education studies. As the case context for this Turku School of Economics was chosen to get more rigid data with less uncontrollable variables.

By gathering data from interviews with business school students from Turku School of Economics and analysing it with theory-driven thematic analysis, different themes explaining this system were found. Major findings include the following: 1) the ways in which AI is used by students 2) the effect that AI has to social dynamics 3) the lack of quality in the regulations regarding AI use in studies 4) the challenges it provokes according to the interviewed students. This thesis takes part in the recent discussion on AI use in higher education environments as well as gives new basis for future studies regarding AI as a socio-technical system. This thesis also answers to the call on expanding the use of this particular framework with it successfully implemented in this context.

Key words: Artificial intelligence, Socio-technical systems, AI in higher education.

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1 Introduction

1.1 Background & motivations

Artificial intelligence (AI) has been around for quite some time but in the past few years even more than ever as chatbots and other similar products have gained huge attention. These tools are now available to anyone with an internet connection and a device that can harness that connection. As almost everyone carries either a mobile phone or a laptop capable of such things AI is now at the reach for the big public. Due to this sudden change in availability and increase in the ways that AI can be utilized in everyday life it has almost become a staple in the toolbox that we use to solve new problems and develop new solutions to old problems. As these services are more attainable to the big public the power of AI is also being harnessed to trump obstacles in multiple new areas of life. On of these areas is studying. Due to studies being more and more done on digital platforms and using devices like e.g. laptops, tablets, and mobile phones and AI's ability to complete tasks like online searching, producing and formatting text, and solving problems it may bring or may have already brought a huge change in the act of studying and also to the way that we inherently interpret studying as a whole concept.

As AI can be seen as one of the most influential technologies affecting our futures (Dwivedi et al., 2021) there is an urgent need to research it further to understand its effect on our lives and to assess the impact it may have on the future. AI is also constantly evolving and therefore it needs to be research holistically to get more lasting results that would benefit us in the future as well (Duan et al., 2019; Davies et al., 2017).

As AI as a concept was formed already in the 1950s it has been studied already quite a lot. However, we have come a long way from what AI meant in the 50s and especially during the last decades the development of AI has taken massive leaps and therefore researching these new aspects of AI is crucial (Borges et al., 2021).

AI has been adopted in numerous parts of our daily lives one of them being education. For example, AI is used in teaching, studying and administrative tasks in educational environment (Chen et al., 2020). This being said the research has for now mainly focused on AI in educational environment as a broader concept considering teaching, learning, studying, assessment and administration all at once (Chiu et al., 2023; González-Calatayud et al., 2021) and it would be beneficial to explore these dimensions on their own to gain more detailed knowledge on the matter. Therefore, in this thesis the student dimension is studied further.

AI has also been identified as a socio-technical system for a longer time but the research on AI has been mainly on the technical aspects of it (Dwivedi et al., 2021;Collins et al., 2021). The prior research on AI as a socio-technical system has focused on AI's adoption on business related circumstances to more value out of this technology (Dwivedi et al., 2021;Brock & von Wangenheim, 2019). Previous literature states that there is a need for better understanding of AI as a socio-technical system (Collins et al., 2021) and to also research this in other contexts as well. On top this the social aspects of these socio-technical systems should especially be studied further to understand the whole system better (Ghaffari et al., 2019). By conducting this research on AI as a socio-technical system in the specific context of this thesis we should be able to understand AI and the socio-technical dynamics around it better which would be important as new adaptations AI are constantly emerging (Dwivedi et al., 2021).

The purpose of this research is to find insight on the change that AI has brought to studying. As studying varies hugely depending on the level of studies and the field of studies this research focuses solely on higher education studies and even further to business school studies. This choice was done to get more narrow focus so that the results would give more actual insight instead of just random data points that would not serve the purpose of this research. Also, it is necessary to note that the scope of this research is limited to the usage of AI in studying not in education as a whole. Therefore, AI is not considered in this research from teaching point of view or from educational perspective. Instead, the focus is on the usage and user experience of AI among business school students regarding their studies.

Moreover, this research focuses on studying AI and its usage in business school studies as a socio-technical system (STS) utilizing the socio-technical system theory as a framework throughout the research. Selection of socio-technical system theory as a framework was done to emphasize the connection between AI and the students using it and to gain insight into this interconnectedness of the parts of such system and the system as a whole instead of just focusing on either social or technical side of the system. The aim of this study is to explore the current situation of AI usage in business school studies and how the system consisting of AI and business school studies as an institution actually works as a system and then consider the findings to gain insight on the matter and to give ideas for future research.

1.2 Research questions

The purpose of this thesis is to research AI as a socio-technical system in a business school environment from the perspective of students. To be able to achieve this goal, one main research

question and three sub-questions were found to work as a guideline throughout the thesis so that this thesis could live up to its purpose. The aim of these questions is to clarify the objective of this thesis and to also narrow down the scope of the research to be more precise and focused. In the next part the research questions are listed and their objectives explained.

- Main research question (RQ1): How do business school students perceive AI as a socio-technical system in the context of business school studies?
    - Sub-question 1 (SQ1): How is artificial intelligence utilized in studying, and how do students perceive its impact on their studies?
    - Sub-question 2 (SQ2): What social aspects are related to business students' experience of AI?
    - Sub-question 3 (SQ3) Are there any significant challenges in the alignment of the social and the technical sides of this socio-technical system, and if so, how could these be addressed in the future?

The main research question's purpose is to clarify the situation of AI in the business school environment. RQ1 aims to give clarity on the bigger picture of AI as a socio-technical system in business school environment by exploring the relationship between AI and students and the environment in which this system is embedded. The main question may be partly answered with the answers to the sub-questions as they were formed to enlighten different aspects of this socio-technical system.

Reasoning behind SQ1 is to give clarity to students' actual usage of AI and their perception on the impact of AI as they have witnessed the change from the time before mainstream AI and the time after it. The answer to SQ1 should also give intel on the relationship between students and AI. SQ2 was formed to research the social dynamics that affect the relationship between students and AI. By finding an answer to SQ2 it should be possible to understand this STS better which leads us to the SQ3. After defining this STS and evaluating its state and dynamics I try to answer SQ3 by assessing the current alignment of the social and the technical sides of this STS to give suggestions for future development and direction for research surrounding this theme.

This thesis aims at finding answers to these questions by utilizing prior literature on the topic to create the basis for the actual research. The qualitative research will try to provide answers and intel

on these questions by the means of semi-structured interviews the data of which will afterwards be analysed using the methodology and methods demonstrated in the further section.

1.3 Thesis structure

In the following chapters 2 and 3 previous research on AI and socio-technical systems are introduced more thoroughly. This is done by delving into the definitions of these concepts and then further into previous research of both in the context of studying on a higher education level. Chapter 2 is dedicated to AI whereas chapter 3 to socio-technical systems and also the development of the framework of this study based on the socio-technical systems theory. In chapter 3, also previous research on AI as a socio-technical system is explored to further explore the selected frameworks suitability. Chapter 4 is a methodology chapter where selected methodology and research methods are introduced and the decisions regarding these are explained and justified. This chapter also considers data collection, research ethics and data analysing method. Finally, the evaluation of the methods is presented. Chapter 5 presents the results of the research followed by chapter 6 with conclusions and a discussion on the findings as well as a few limitations. In the last part of the thesis references and appendixes are listed.

2 Artificial intelligence in higher education studies

2.1 Definition of AI

To explore the dimensions of AI it is necessary to define it first. For many people AI is quite a difficult concept to wrap their heads around even though they might be able to utilize it and know about its applications or adaptations (Dwivedi et al., 2021). This might be due to the fact that even though AI has existed for over half a century it has changed its form and the way it is perceived during the years by development and increased opportunities of use. Science has come a long way from what Alan Turing started in the 1950s and what then was first defined as artificial intelligence by John McCarthy as "the science and engineering of making intelligent machines" (Collins et al., 2021).

Even though AI has now raised its head in everyday use it has also been researched already for over 50 years. Since McCarthy's coming up with the term artificial intelligence it has developed remarkably during the latter half of the 20th century and the beginning of the 21st century. The next "era" of AI was met after the founding period of the 1950s in the late 1970s when knowledge engineering and expert systems were the culmination of AI so far. This so called first golden age of AI was followed by a slump in AI research caused by e.g. difficulties with gathering information on expert systems. However, this slump was overtaken by the second golden age of AI which happened in the 1980s due to the innovation of neural networks and their influence on this field of science. There was still a lack of belief in AI's capabilities on becoming part of our daily lives which then lead to the end of the second golden age of AI and to the next slower period of AI research. In 2006 began the third golden age which is still actively going on. The main driver for this period of time have been parallel processing and the continuously increasing popularity of GPUs (Graphics Processing Unit). Besides GPUs the innovations of mobile internet and especially deep learning gave AI a huge push forward. (Zhang & Lu, 2021).

Zhang & Lu (2021) also defined the drivers and technologies that have enabled AI to reach the level of development that it has seen during this third golden age of AI. They name big data, algorithms, machine learning, national language processing, hardware and computing visions as the enablers of AI in the 21st century. According to Zhang & Lu's review (2021) big data and hardware (e.g. GPUs) are the prerequisites for AI which fuel the other enablers with a huge amount of learning material and the actual device capable to process these amounts of data.

As the capabilities and the hidden potential of AI has been discovered further, more definitions have emerged (Collins et al., 2021). Collins et al. (2021) found 28 different definitions used in studies considering AI. This embodies immaculately the difficult and multidimensional nature of AI. They also point out that the difficulty of defining AI with a definitive concept leads often to studies leaving the definition completely without regard (Collins et al., 2021). The same issue was found in another literature review conducted by Bearman et al. (2023). As Collins et al. (2021) point out it is of course not reasonable to demand a definition and a whole section of a study to be reserved for AI in all situations, but they also note that with the lack of defining and cumulating knowledge onwards this problem will not be fixed.

As previously noted, due to the vast development of AI throughout the years the definitions of AI have also lived with the changes in this field. To have a sense of definition for the AI in the 21st century Dwivedi et al. (2021) highlight in their multidisciplinary review a definition by Russel & Norvig (2016) who defined AI as systems mimicking cognitive functions usually associated with human traits e.g. learning and problem solving. Another, slightly more recent, definition that Dwivedi et al. (2021) consider as potentially more thorough is the definition introduced by Kaplan and Haenlein (2019) who describe AI in the context of its capabilities to interpret and learn from external data to reach certain outcomes via flexible adaptation.

2.2 AI in education

2.2.1 AI in education in general

When Knapper (1986) proposed that in the future university graduates will be using computers in all sorts of daily life scenarios he was more than right. Educational world has evolved with digitalization and all of the new technologies available for teaching and learning and education in general is very much digitalized with learning being done with e.g. internet accessible devices and remote teaching delivered via these devices. As in many other instances as well, AI has also found its place in educational environment and educational AI may be the next force to transform the way teaching and learning are devised and experienced (Bates et al., 2020).

In their systematic literature review Chiu et al. (2023) identified four dimensions where AI has a role in education the outcomes of which affect both teachers and students. The dimensions are learning, teaching, assessment, and administration which all have their unique roles for AI. In the dimension of learning AI is applicated in assigning tasks based on individual competences, producing conversations between the human and the machine, giving feedback on the basis of

analysing student work and increasing adaptability and interactivity in digital environments. For teaching Chiu et al. (2023) identified three roles for AI as a provider of adaptive teaching strategies, tool for enhancing teachers' ability to teach, and a supporting tool for teachers' professional development. For assessment two roles were highlighted: providing automatic marketing and predicting students' performance. Finally, for administrative purposes AI was found to have three main roles: improving the performance of management platforms, providing convenient and personalised services and supporting educational decision-making with evidence. By utilising AI according to these roles three outcomes were found for teachers and four for students. Increased working efficiency, teaching competence, and attitude toward AI were identified as outcomes for teachers whereas for students the outcomes were increase in motivation and engagement, academic performance, 21st century skills and non-cognitive aspects. Even though some of these outcomes were more common than others it seems clear that AI has a significant impact on education in multiple dimensions.

2.2.2 AI in higher education

As the research conducted for this thesis is set in higher education environment it is necessary to explore AI more specifically in higher education environment on top of the broader view on the general education environment. To begin with, higher education institutions and their stakeholders have identified a need to implement state of art technologies to keep evolving and to keep on track with the development of our digitalised society (Moscardini et al., 2022) which has led to development on this field. Al-Haimi et al. (2021) name higher education as a sector that has the potential to gain vast benefits from the adaptation of AI but also note that there are multiple aspects of AI in higher education that still require further research for institutions to be able to reach these vast benefits that AI might have to offer. When applied to higher education the applications of AI can be seen on different levels. According to Bates et al. (2020) these levels can be divided into two categories: strategic and institutional applications; and direct teaching and learning applications. This complements the categorisation AI in education by Chiu et al. (2023) even though there are also differences on the adaptation of AI in different levels of education. Even though these applications of AI in higher education can be identified and their effect to some extent noticed, the impact in general still is significantly lesser than on other fields where AI has taken over. According to Bates et al. (2020) this is due to the fact that it generally takes educational institutions longer to adopt new innovations and technologies than other institutions. This is another reason for the urgent need for further research on AI in education as it would boost the adaptation processes. Bates et al. (2020) also argue that to reach the potential AI has to offer for higher education it is critically

necessary to understand not only AI as a technology but also teaching and learning as a larger concept and the relationship between these and the implemented AI. As Zawacki-Richter et al. (2019) point out it is important to realise AI's effect on education not only as a technology but also as a change force affecting pedagogical, ethical, social, cultural, and economic aspects of education. Although AI in higher education environment has been left with lesser attention in research there are still some publications revolving around AI. However, few of these publications actually discuss AI in higher education but rather themes around it with references to AI (Bearman et al., 2023).

A study by Balabdaoui et al. (2024) explored students' use of AI at a technical university. They identified various instances and applications of AI in students' usage most common ones being GitHub Copilot, ChatGPT, Grammarly, and Midjourney. For example, ChatGPT was described as a "study buddy". They note that after ChatGPT became publicly available in November 2022 the prominence of AI and especially Large Language models have increased significantly. Balabdaoui et al. (2024) report that majority of students make decisions about using AI-based solutions on their own which is in line with Bearman et al. (2023) notion on that the adaptation of AI technologies grants students with greater agency and authority. Students were found to be only mediocrely familiar with those AI tools that they were most familiar with and the ones that were more unfamiliar were reported as almost unknown (Balabdaoui et al., 2024). This implies that there is still a long way to go with adopting AI tools to students' usage to gain maximal benefits. However, the sentiment around AI was described as optimistic and students realising its potential as majority wanted AI to be more integrated in their studies. Chan & Hu's (2023) recent study on students' perceptions of Generative AI (GenAI) reports similar findings to Balabdaoui et al. (2024) as they also identified the optimism among students regarding AI and the level of familiarity of AI. What also affects students' adoption of AI is the preference to use newer technologies rather than dated ones (Kuleto et al., 2021).

2.2.3 Benefits and challenges of AI in higher education

Although there are obviously other benefits and challenges in implementing AI on higher education (e.g. administrative or teaching levels) this research is conducted to explore students' perspective and experience on AI and therefore it is reasonable to scope handling the benefits and challenges of adaptation of AI to students' level.

As Chiu et al. (2023) noted AI has many beneficial impacts on education but there are also challenges and risks that have emerged with the introduction of AI in educational field (Dwivedi et al., 2021). However, measuring these impacts is still quite difficult and it would be important to

develop further tools to improve testing and measuring these impacts to make easier to regenerate in different scenarios (Duan et al., 2019). Chiu et al. (2023) found that the beneficial impacts are more apparent with motivated or high achieving students. It has also been found that AI has the ability enhance learning on an individual basis in multiple ways (Kuleto et al., 2021). Kuleto et al. (2021) highlight skills development and collaborative learning as the main drivers for this enhanced learning.

For higher education students benefits that have been found reachable with AI are manyfold. One aspect of students' daily life that has enjoyed beneficial effects from implementation of AI is academic writing (Malik et al., 2023). Malik et al. (2023) discovered that students' have experienced benefits in checking grammar, detecting plagiarism, translating languages and planning on essay outlines. Besides these direct adaptations to schoolwork, AI has found to be a helpful tutor or a "study buddy" as GenAI technologies are the most commonly used among students (Balabdaoui et al., 2024). Reasons for this might be students' preference on newer technologies (Kuleto et al., 2021) and especially chatbots' ability to create a sense of social presence which positively impacts their adoption (R. Malik et al., 2021). GenAI has also been found beneficial for students due to its applications being available and able to be customized to their needs around the clock (Chan & Hu, 2023). In their research Chan & Hu (2023) identified five different benefits for students resulted by utilising GenAI. These benefits were personalised learning support, writing and brainstorming support, research and analysis support, visual and audio multi-media support, and administrative support. As all of these benefits are bound together by their nature as a supporting actor in studies it seems likely that GenAI tools are a good extension for the other more traditional tools used for studying but also that on their own they are not able to do everything.

In contrast for the benefits Chan & Hu (2023) also found specific challenges regarding GenAI in higher education environment. As challenges caused by adaptation of GenAI they name accuracy and transparency, privacy and ethical issues, holistic competencies, career prospects, human values, and uncertain policies. On a broader scale of AI in higher education setting the all-round trust in AI and its applications is found to be one of the main challenges on the topic (Balabdaoui et al., 2024). Balabdaoui's et al. (2024) discoveries on students' perception on issues revolving around AI are in line with previous notions as they highlight trustworthiness, accuracy, potential biases in AI outputs and ethical issues to be problems experienced by students when adapting AI tools. In a case of academic writing students' have also expressed concerns about AI's possible effects on soft skills such as creativity, critical thinking, and ethical practices when writing academic texts (A. R. Malik et al., 2023). Ethical issues have been one of the more common themes in discussion around AI

throughout the times in multiple areas – education being one of them. Bozkurt et al. (2021) argue that AI powered education systems without considering the ethical aspects can be viewed as black boxes.

All in all, AI has affected higher education in multiple ways and both beneficial and challenging effects have been noticed. Students' usage and knowledge on AI is mostly gathered around GenAI solutions e.g. chatbots, which work as personal tutors and tools to help complete academic tasks. Challenges around AI consist of trust issues, ethical questions, privacy issues to name a few.

3 Development of the theoretical framework for the study

3.1 Socio-technical systems theory

In this chapter, the definition of socio-technical systems (STS) and socio-technical systems theory are explored, as well as the history behind these concepts. After that, the current state of STS and its utilization is explained with the conceptualisation of the framework which will be used in this thesis' empirical part.

Socio-technical systems theory has been present as a concept for around 70 years whereas STSs have been prominent as long as mankind has used technologies. Socio-technical system as a term is very descriptive as an STS is a system consisting of technological and social forces, which are embedded in an environment or context. In traditional STS theory a business organisation is often considered as the environment part in which the social (employees) and technical (machinery) aspects are embedded in but in recent literature this part has been opened up for more interpretation in order to expand the usage of STS theory and to further explore the interconnectedness of the technical and the social aspects in different scenarios as many other environments than just the traditional business organisation could benefit from being inspected through the STS theory to reach better results in adoption of technologies. Therefore, the concept of system can be seen as multidimensional and open to interpretation. Badham et al. (2000) defined system with five key characteristics: interdependent parts, adapting to and pursuing of targets in external environments, having internal environment comprising separate but interdependent technical and social subsystems, having equifinality meaning the capability of achieving goals by more than one means, performance relying on the joint optimisation of the social and the technical aspects. By failing to take all these into account a system is may degrade (Baxter & Sommerville, 2011). As previously noted, STSs are inherently embedded in larger environments that influence its functions and processes. One of the key findings of STS scholars regarding these systems has been the concept of open systems (Mumford, 2006; Sony & Naik, 2020) that differentiate from closed systems due to their innate tendency to interact with the surrounding environment (Münch et al., 2022).

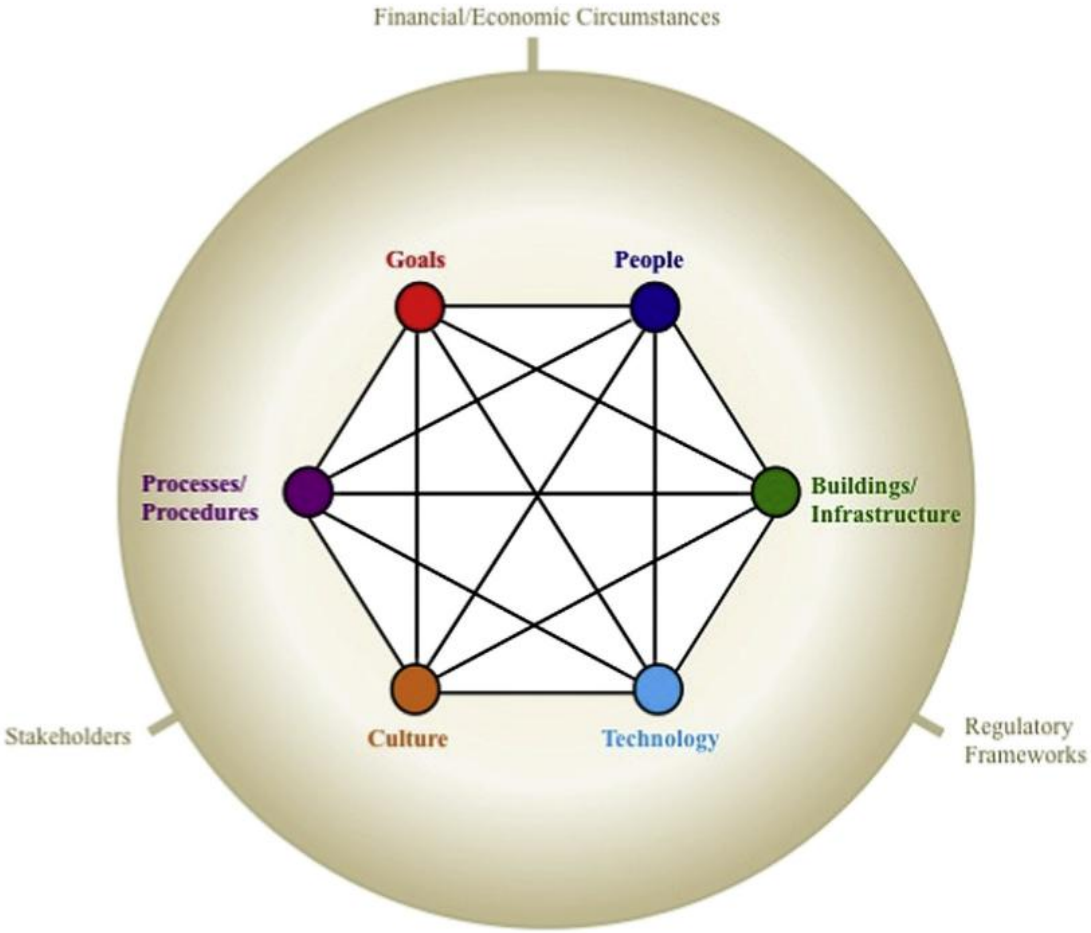
During the last 70 years the concept of STS *theory* has gone through plenty of development and evolving (Davis et al., 2014). The basic idea behind socio-technical systems theory is the joint design and optimisation of systems by considering social and technical aspects as equally important for this optimisation to be achieved (Davis et al., 2014; Baxter & Sommerville, 2011). Socio-technical systems theory was devised first at the UK Tavistock Institute when the

interconnectedness of technological and social aspects of introducing machinery to a coal mine were studied (E. L. Trist & K. W. Bamforth, 1951). The implementation of machinery without regard to the employees and the effect on them was found to cause issues and this spun the need to consider social issues when designing and implementing new technologies. According to Davis et al. (2014) the underlying philosophy of STS theory has not changed dramatically from what it was at first even though STS scholars have continuously tried to develop the theory further (Mumford, 2006). However, they also note that specific principles and applications have been developed as the surrounding world has also changed quite a lot during the last 70 years. Münch et al. (2022) note multiple cases of STS theory being applied in industry 4.0 related studies, which shows the adaptability of the framework to changes.

According to Ghaffari et al. (2019) STS scholars have researched that any kind of information systems are developed on the basis of multifaceted networks of actors (social), technologies (technical), and institutions (environment). They also note that even though the social and technical aspects are very closely intertwined, they are distinct from each other by nature as the technical side's goal is to reach some kind of separately defined target or parameter whereas the social aspect consists of human beings which causes uncertainty. As the overarching idea of STS theory is the optimisation of the system it is also necessary to consider the surrounding environment and its effects on the system embedded in it (Shin, 2006). Whereas the social and technical aspects of the systems are eligible for designated manipulation the surrounding environment is usually not, and the other aspects need to be optimised and aligned to cope with the complexity and dynamism of the environment (Sony & Naik, 2020).

Already in the 1960s Leavitt (1965) proposed a four-dimensional model for STSs which included people, task, structure and technologies as the dimensions. This model has then been further developed and the dimensions extended to six parts including people, culture, technologies, infrastructure, processes, and goals (Challenger & Clegg, 2011). To develop the model even further Davis et al. (2014) proposed the adding of the external environment in which the system is embedded in. Their external environment consists of financial/economic circumstances, stakeholders, and regulatory frameworks. Their visualisation of a socio technical system and the external environment can be seen in figure 1.

Figure 1 Socio-techincal system according to Davis et al. (2014)



The model was developed in order to create a simple but efficient way to analyse a variety of complex work systems. The authors note that the emphasis on different elements vary depending on the case in which the model is applied. However, all of the aspects should be considered respectively.

Davis et al. (2014) also clarify that as some other STS methods are designed to explore risks and to conduct accident analysis their model is not limited to these or any other kind of specific scenarios. This model has then been applied to different cases which gives proof of validity (Sony & Naik, 2020; Münch et al., 2022). According to Münch et al. (2022) the model and STS theory in general offer a comprehensive framework to examine emerging phenomena with interconnected social and technical aspects.

Davis et al. (2014) point out that their paper is not meant to be a guide to be followed in every single case as they focus on offering a flexible tool to be applicable in various scenarios. However, they still provide an overview of the main steps of the process when analysing an STS with their

model. This overview will be further explored in upcoming chapters as it will provide the cornerstones on conducting this research.

3.2 Background on the selection of the framework

As AI has become more relevant and almost a daily-use-tool in recent years, it has also found its way into higher education environments. In this chapter the framework introduced in the last chapter will be applied to evaluate AI's status in higher education environments. As the model is originally created to analyse work organisations as socio-technical systems it needs to be slightly modified to be fit to use in this study. Also, in this chapter the selection of STS theory and the previously mentioned model as the framework of this thesis are explained.

As Bates et al. (2020) argue, having different perspectives is crucial when tackling emerging challenges and opportunities in educational environments. They also emphasise the need to understand both aspects of the phenomenon: the technology of AI and the social settings of teaching and learning, as well as the difference in AI's nature in this particular context. As Bates et al. (2020) point out, what has worked previously in other circumstances does not automatically translate into learning context. On top of this, in higher education context it is not just the technology that needs to be more thoroughly investigated but also the pedagogical, ethical, social, cultural and economic dimensions as well (Zawacki-Richter et al., 2019). However, still in 2023, Bearman et al. reported in their literature review that there was still worryingly little actual scientific discussion on AI in higher education environments. They also emphasise the necessity of research on more complete take on AI than just investigating the usage of a chatbot or some other kind of a tool and to rather explore e.g. how students, teachers, administrators and other groups are affected by AI and what is the relationship in-between the users and the technology. This is in line with the findings of Malik et al. (2023) who note that the balanced AI integration where AI technologies work in collaboration with humans was important for the studied AI tool to be found useful by the interviewed users.

As already mentioned, the aim of this study is to explore AI as a socio-technical system in higher education environment with the main focus on the students' experiences and relationship with AI. Selection of STS theory as the framework of this thesis stems from various notions of AI, as a sub-part of industry 4.0, manifesting itself as a socio-technical system due to its inherent interactivity with humans (Davies et al., 2017; Sony & Naik, 2020; Collins et al., 2021) and the need for further research on AI's socio-technical system traits (Collins et al., 2021). On the other hand, STSs are typically associated with business organisations, such as corporate companies, but according to Davis et al. (2014) the theory and framework could be beneficially applied in different contexts as

well. They claim that STSs thinking could be adapted to various societal challenges of our time as many of these require systemic thinking and are on some level intertwined with technology. To answer their call for extending the conceptualisation of a system in STS context, in this thesis the business school will be considered as the environment with students as the social aspect collaborating with AI as the technical aspect. With all three parts of the socio-technical system defined as such, the framework can be seen appropriate to be applied in this research. As Münch et al. (2022) point out, STS theory has already been applied to industry 4.0 studies which supports the selection of framework in this thesis.

3.3 Application of the STS framework

To explore the systemic nature of AI in business school environment, the STS model proposed by Leavitt (1965) and then further developed by e.g. Davis et al. (2014) is adopted in this thesis. As Davis et al. (2014) argue that their version of the model could be applied to analyse various systemic problems, and that any complex organisational system can be theorised through the model it gives a solid basis to conduct this research. To further back the selection of this framework, it has been successfully applied to research by e.g. Münch et al. (2022) who studied digital servitisation.

The way the previously presented STS framework and model by Davis et al. (2014) will be applied to this thesis is that by semi-structured interviews of Finnish business school students, who have studied during the emergence of AI tools and AI in general in higher education environment, the six dimensions of a STS attempted to define in order to gain clarity and more detailed picture of AI in this particular context. The more specific data collection and analysis methods are presented more thoroughly in the following Methodology chapter.

4 Methodology and Study Design

In this part the methodology selected for the conduction of this research is explained. The empirical part of this thesis is based on semi-structured interviews with the aim to explore AI as a socio-technical system in higher education environment, more specifically in Turku School of Economics' environment, from students' perspective. The methodology chosen for this research is explained and after that also the methods on the data collection and analysis are clarified. The methodological decisions are based on previous literature on the subject followed by a detailed breakdown of the data process from collection to analysing. Finally, the limitations, ethics and validity of this research are discussed briefly.

4.1 Selection of Methodology

This study is conducted as qualitative research and as a case study to be more precise to explore the current situation and possible future visions on the state of AI in Turku School of Economics' environment. The choice of qualitative research was made as it gives the opportunity and tools to explore the subject due to its novelty. Qualitative methods offer the tools to study research areas that are still by a large part left unexplored in the scientific field, and they are recommended and previously successfully implemented in research considering topics that are not easily quantified or require more discussion than mathematics (Eriksson & Kovalainen, 2008). Qualitative methods also enable the researcher to understand people involved in the research with a bigger emphasis on the social and cultural context that quantitatively conducted research which on the other hand gives more numerical and definitive results.

In the world of qualitative research this thesis is conducted as a case study. Case study as a method is considered appropriate for studies that aim at discovering new dimensions of a particular environment. These environments may be organisations, businesses or other specific circumstances that make the case unique and therefore make the research. According to (Eriksson & Kovalainen, 2008) case studies offer the possibility to showcase some complex issue in an easier to understand and more comprehendible manner. This is one of the main reasons for the selection of conducting the research part of this thesis as case study as STS theory and these systems and their functioning may be quite hard-to-grasp and need more real-life examples to be more understandable also for people who are not well educated in this area.

According to Benbasat et al. (1987) it is necessary to thoroughly think about the selection of the research methods and that is it important to study the topic in its natural setting and if there is an

already existing strong scientific background for the studied topic. Also, it is necessary to decide if the studied setting needs manipulation or controlling. When it comes to this thesis there is scientific literature to be found on different aspects of the topic (STSs, AI, AI in higher education) but the topic itself has been left with less attention and as the topic is inherently connected to the natural setting with the environment being an important part of the STS theory, the selection of case study as the method can be viewed as appropriate.

It is worth noting that the reason this study is conducted as case study and not a multiple case study is mainly due to the number of resources available. As the nature of this study is a master's thesis conducted by a single researcher there it could be seen as unnecessary to make a multiple case study. Also, the setting should not vary too much between different business schools in Finland so the results should be at least on some level generalisable.

4.2 Data collection

Interviews have been established as the main data collection device in qualitative research and semi-structured interviews is a common sub-category of interviews often utilized to explore topics that have not yet been comprehensively studied. They also offer the tools to ensure that the interviews have a similar structure and that same topics are discussed in each interview but still leave enough space for the interviewee to express their own thoughts and experiences. Eriksson & Kovalainen (2008) point out that in these semi-structured interviews it is important to make sure that all the topics to be discussed are actually discussed to keep the answers comparable.

Semi-structured interviews were chosen as the method for data collection in this analysis. By interviewing Finnish business school students in the selected case business school that have studied long enough to experience the change in studying before and after the emergence of GenAI (Openai.com) and mainstream AI applications that, as noted in chapter 2, are the most common AI tools and applications harnessed in the use of students, it is tried to clarify AI's position as an STS in this particular environment. The selection of these interviewees is not completely randomised to ensure that they have the necessary experience required to be able to give comprehensive answers to interviewer's questions during the interview process. However, to achieve at least a minor level of randomisation the interviewees were not specifically chose but an open invitation to volunteer as an interviewee was published in different WhatsApp groups to reach fourth- and fifth-year students. With this method 10 interviewees were contacted and interviews scheduled. All of them were also sent a more formal interview invitation (Appendix 1) with more detailed information. They were

also asked for the permission to record the interviews which they all granted. In the invitation (Appendix 1) the anonymity of the interviewees and the data was also further clarified.

Before the actual interviews two pilot-interviews were held to test the interview questions and to gain clarity on how to structure the conversation in order to achieve more optimal settings for the actual interviews. After the pilots the interview questions were refined slightly to make them easier to approach and the order of the questions was given more thought to achieve more logically structured discussions in the actual interviews. The interview questions were also reviewed by the thesis instructor and also the instructors in the commissioning organisation of Suomen Ekonomit to get other perspectives in order to come up with a rigid and well-reasoned question structure (Appendix 2). The structure of questions visible in Appendix 2 was built on the basis of the socio-technical theory to inspect all aspects of the framework. As the framework by Davis et al. (2014) is quite manyfold it was deemed necessary to include rather many questions on the form (Appendix 2).

After these preparations the interviews were conducted with each interviewee. All discussion were held in Finnish as it was the native language for all of the interviewees and because it was easier for the interviewees to express their thoughts compared to having the discussions in English. The interviews were mostly held remotely via Microsoft Teams due to location differences and scheduling reasons. One of the interviews was held in person but still recorded with Microsoft Teams in order to collect the data. The interviews followed the structure presented in Appendix 2 in order to ensure comprehensive discussions on all necessary topics. However, as the interviews were semi-structured the conversations were let flow freely while still focusing on the subject and making sure that all the topics were covered equally in all interviews.

To collect the actual data from the interviews the interviews were transcribed using Microsoft Teams' built-in transcription. These transcriptions were then further inspected with the recordings to fix false parts of the transcriptions. Other than that, the transcriptions were not modified in order to maintain the interviewees actual thoughts expressed in the interviews.

4.3 Empirical data

The data collected for this thesis was gathered from 10 different interviews. In Table 1 basic information on the interviews and the interviewees is presented. In the rest of this thesis the interviewees will be referred to as i1, i2, i3 etc. As visible in table 1 all of the interviewees match the before mentioned criteria of having studied before and after the emergence of mainstream

GenAI applications. Also, the interviewees vary quite significantly in their major and minor subjects which ensures that the dataset is not one sided as interviewees have interacted with different peers and teachers during their studies. The interviews varied in their duration from 42 minutes up to 1 h 20 minutes. This probably stems from their personal interest on the subject as well as the comprehensiveness of their answers. The interviews were conducted in December 2024 and January 2025 depending on how they were able to be scheduled.

Table 1 Interview specifications

Interviewee ID	Starting year of studies	Major	Minor	Duration of interview
Interviewee 1 (i1)	2020	Marketing	Information systems science	1 h 12 min
Interviewee 2 (i2)	2020	International business management	Political science	1 h 9 min
Interviewee 3 (i3)	2019	Accounting	Sustainable business administration	50 min
Interviewee 4 (i4)	2020	Accounting	Business law	51 min
Interviewee 5 (i5)	2019	Management	Information systems science	1 h 5 min
Interviewee 6 (i6)	2019	International business management	Supply chain management	1 h 20 min
Interviewee 7 (i7)	2020	Supply chain management	Machine engineering	57 min
Interviewee 8 (i8)	2019	Management	Sustainable business administration	42 min
Interviewee 9 (i9)	2020	Management	Accounting and finance	49 min
Interviewee 10 (i10)	2020	Information systems science	Marketing	53 min

4.4 Data analysis

After the collection of the data, it was analysed utilising thematic analysis and the framework presented in chapter 3. Clarke & Braun (2017) define thematic analysis as a method that makes it possible to identify and analyse themes from qualitative data sets. According to them thematic analysis is an accessible and systematic way of coding themes out of qualitative data. The selection of thematic analysis is based on its flexibility and unboundedness to any particular theory. In fact, it is eligible to be adapted in many different theories and therefore in this case thematic analysis was

combined with the framework of the STS theory. This ability to be combined with an existing framework or theory is called theory-driven thematic analysis which is usually done deductively instead of inductively meaning that the data is approached top down (from the perspective of the framework) rather than bottom up (creating the framework from the data) (Braun & Clarke, 2006). However, Braun & Clarke (2006) emphasise the flexibility of thematic analysis and propose that the methods may be modified to accommodate the needs of the particular research. The important thing is to systematically analyse the whole dataset with the same principles (Braun & Clarke, 2006). Keeping this in mind, the data was combining both inductive and theory-driven analysis.

With a theory-driven approach the six dimensions of STS (Davis et al., 2014) were selected as the highest-level aggregate dimensions. Considering the research questions of this thesis it was determined that developing sufficient second-level themes from the data set to define the highest-level dimensions would give clarity on both the main research question and the sub-questions and therefore insight on AI as a socio-technical system in the chosen context of Turku school of economics. After this the rest of the research was conducted inductively to be able to find truly defining themes under each aggregate dimension. To facilitate the idea of external aspects in which the socio technical system is embedded in (Davis et al., 2014) these external aspects were treated as aggregate dimensions next to the six dimensions of STS as well as assessing their effect on the respective dimensions of STS as Davis et al. (2014) argue that the external aspects affect the whole STS.

First step of the data analysis was familiarising with the dataset by reading it through to get an initial idea of the contents. According to Bird (2005) carefully going through transcriptions can be very helpful in getting to know your dataset. The dataset was then again reread in the process of correcting the mistakes in the transcriptions done by Microsoft Teams. After this familiarisation initial codes were identified in NVivo 14 to help navigate the coding process. The same software was used during the whole process of first-order coding. These initial first order codes were then utilised to code the whole dataset. If findings from the transcriptions were identified and they did not fit in any of the initial codes additional codes were created. With the whole dataset coded an additional rereading of the transcriptions was done without any more changes to the first order codes to make sure that the whole dataset was given equal attention with the same codes. After this the first order codes were exported into Microsoft Excel and revisited in order to inductively conduct further analysis and to identify the second-level themes to define the dimensions of STS. The definitive themes were identified for all six dimensions and three external aspects of STS. These will be further explored and explained in chapter 5.

4.5 Validity, limitations and ethics

4.5.1 Validity and trustworthiness

To ensure that the results of a research are valid and trustworthy there are actions that can be made. One of the most used and academically accepted definitions of validity and quality is by Lincoln & Guba (1985) as they categorised validity in four parts: dependability, transferability, credibility, and conformability. Next, these are inspected and the criteria for them to be achieved explained according to Eriksson & Kovalainen's (2008) summary of the four.

Dependability means the responsibility of the researcher to give the reader information on the process. The process should be logical, traceable and documented to be considered as dependable. Transferability concerns the need to be able to show evidence that the research or some part of it is on some level similar to other research or results of research. Eriksson & Kovalainen (2008) also emphasise that this does not mean duplication or replication but that there needs to be some connection to previous results. Credibility means that the data needs to be sufficient to merit the claims made in the research. Also, the level of familiarity on the topic by the author needs to be considered. Finally, conformability refers to the linkage between the data and the results. This should be easy to understand by others than the author.

In this study transferability was achieved as the framework was successfully adapted to the context of business school environment. Also, this study would be able to be conducted similarly in the environment of a different Finnish business school, if wanted to. What increases this study's credibility is the researcher's level of familiarity on the topic as I am a business school student with a status that would have made myself an acceptable interviewee for this study. In other words, I understand the context of this study very well.

4.5.2 Limitations

As is usual, there are some limitations to this thesis as well, which should be considered when making generalisations and backing future studies. Firstly, it is worth noting that the sample group interviewed for this thesis consists of Turku School of Economics students close to graduating and does not fully represent all other students or other educational contexts. Secondly, the literature reviewed for the scientific background of this study is gathered in a specific time frame and therefore represents the knowledge available at that particular time. The same goes with the interviews and the results gotten from those interviews. These two limitations are being tackled

with thoroughly getting familiar with the topic and the theories involved. Thirdly, this thesis may be limited by the fact that the data is collected via interviews, which opens up the possibility for potential bias by the interviewees. This is tried to tackle by carefully selecting the guiding questions for the semi-structured interviews to make sure that the results reflect the participants own thoughts and experiences more than biased opinions. Finally, a limitation to consider is also the possible subjectivity in in the interpretation of the results. As this thesis is done by one person alone there is the possibility for potential subjectivity in the interpretation. This is also tried to tackle by reviewing the interview questions with thesis supervisor and the third-party supervisor from the organisation this thesis is conducted for. The same is done with the results with added review of multiple peer reviewers and this way the possibility of subjectivity and own expectations as well as prejudices should be mitigated.

4.5.3 Ethics

According to Eriksson & Kovalainen (2008) ethics are crucial to consider when doing research as they regulate our society and the way we live. Therefore, to get meaningful and expedient ethics need to be taken into consideration. This thesis aims at conducting an ethical and objective research. For ethicality, actions taken include keeping the interviewees anonymous and providing them with complete confidentiality with their answers. This can be seen also purposeful as fear of answering truthfully, e.g. if the interviewee has experience on using AI against the university rules, might lead to distorted results.

To make the process of data collection and analysis also as transparent as possible, a data management plan (DMP) (Appendix 3) was developed. In the DMP it is thoroughly explained how the data is collected, analysed, kept, and destroyed so that all participants can be sure of their data's storing. For further backing of the ethicality of this thesis, the research ethics guidelines of University of Turku (UTU.fi) have been implemented. These guidelines include reliability, honesty, respect, and accountability.

4.5.4 Use of artificial intelligence in the research process

In this thesis AI was used mainly as a "study buddy" meaning that it helped to clarify e.g. how are master's thesis usually structured and what are usual subchapters. Other main use of AI was generating initial lists of ideas on what kind of thesis would be interesting. For example, I asked ChatGPT to give me list of different information systems science frameworks that could be used in this kind of thesis. Of course, any choices or text were not made fully with AI, but it was more used

to give inspiration and the outputs were double-checked. Mainly ChatGPT was used as a tool for these tasks. The reason for limiting AI use to this was both intentional and unintentional. AI use was limited intentionally to ensure the ethical use of AI and to also make sure that any rules were not broken. However, unintentionally AI use was limited through trial and failure as it was tried to use to help in data analysis and coding process. This was found not to work easily enough to be helpful, so AI was cut off from that process.

5 Results

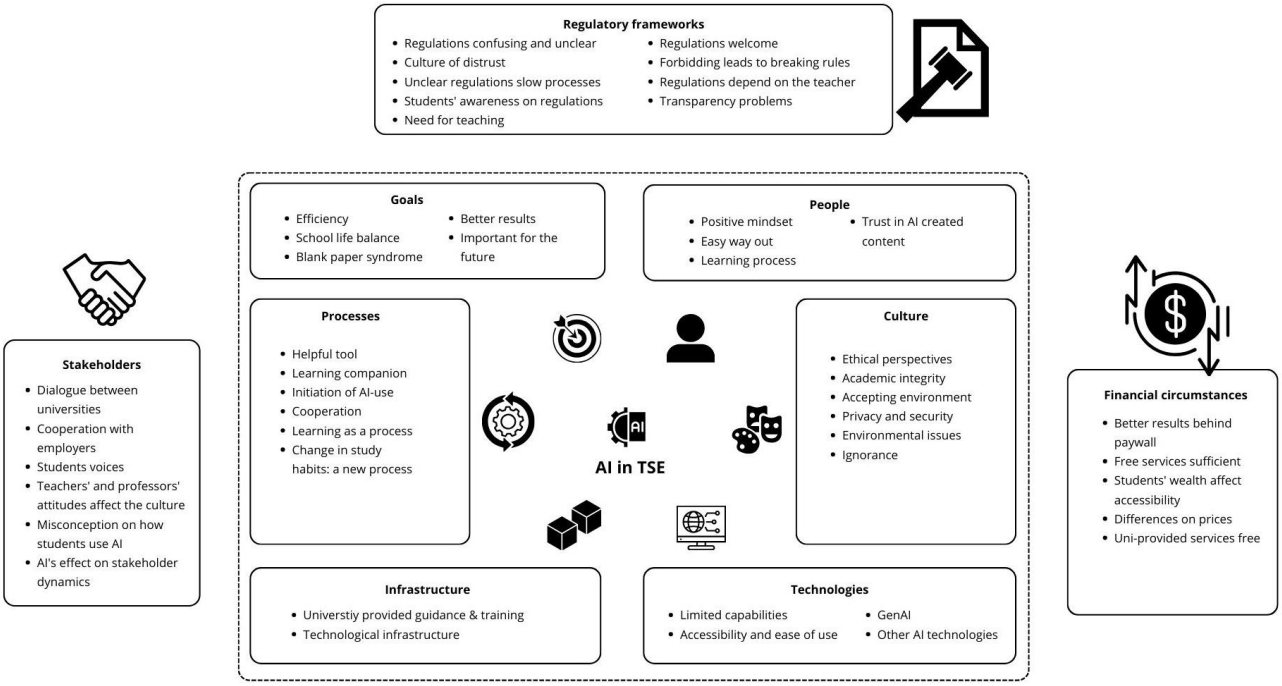
In this chapter the results of the data analysis part will be presented. First, we will take a look at the overall results regarding the whole socio-technical system inspected. After these, results more precisely regarding all of the six dimensions of the socio-technical system and the external aspects affecting the system will be presented one-by-one with references to the interviews conducted in the empirical part of this thesis.

5.1 General results

In this section the general results regarding the empirical part of the thesis will be presented. From the empirical data gathered in the interviews defining themes for each STS dimension and the external aspects that affect the system were identified. The socio-technical system investigated in this research is available visualised in the appendices 4 and 5 with the themes explaining the state of the system in the case context.

In appendices 4 and 5 the first order codes gathered from the interview data that further explain the 2nd level themes are presented in order to keep the research transparent and also to visualise the empirical part of the thesis. As there were 10 interviews conducted and therefore quite a lot of data gathered leading to various codes per theme, only a few per theme are presented in the visualisations in appendices 4 and 5, in order to keep the pictures more readable as visualising all of them would have not been rational. However, the themes are fully explained in the following sections. Figure 2 presents the whole inspected socio-technical system with the defining themes under each dimension. This visualisation is made to simplify otherwise quite large and complex framework and the adaptation of it into this specific context.

Figure 2 AI as a socio-technical system in Turku School of Economics



In the following section when the results are explored more thoroughly the interview references have been translated into English for the purposes of this thesis' understandability. This has been done while still keeping the statements made similar in their meaning and as similar as possible in the feeling as well. There are also some explanations included in the references made in brackets.

5.2 Goals

5.2.1 Efficiency

One of the main goals in AI use according to multiple interviewees was to streamline work. By automating some of the previously manually completed tasks workload can be reduced. Interviewees 5 and 9 describe this as follows:

"With those tools that completely remove or significantly reduce the manual work the aim is to make my life easier" (i9)

"Speed and efficiency in a way to get me there quicker or something or make my life easier that's the main reason for using it." (i5)

Efficiency seems to also stem from the possibility to take it a bit easier when deadlines are pushing, and workload is heavy.

"But I feel like with AI tools especially when you're in a very severe hurry and the deadline is pushing you can just be like I don't have the energy to even think about this, so I'll just shove it through AI" (i6)

Using AI to understand complex terms and concepts also makes studying more efficient as students do not need to spend so much time finding the explanations or connecting the dots in e.g. google on their own as they can just ask for the explanation and examples and receive a tailored answer.

"The best use in my opinion is when I want to understand some concept, let's say we're talking about it in school, and I don't have a clue about it and then I can ask AI to clarify the concept" (i10)

5.2.2 School life balance

One of the main goals in AI use is to obtain and maintain school-life balance. Sometimes it may even feel like a must to use AI in order to get everything done especially during the busiest periods of time. By easing tasks with AI automation and new tools less stress and exhaustion is endured.

"It (using AI tools) reduces stress and helps with extra exhaustion" i1

AI tools also ease dealing with big workloads and when the students face the challenges of taking care of their wellbeing taking shortcuts with AI use is a tempting and also efficient option. In the case of also having a job as well as the studies to balance with free time, automating processes with AI is even more important.

"It (using AI tools) depends on if I have any energy left in me or do I want to be in this case just comfort-seeking and leave this project with less attention" (i1)

"The reason (for use of AI tools), at least a part of it, is the need to find balance when juggling with work, school and leisure time." (i2)

5.2.3 Blank paper syndrome

One of the most mentioned and important reasons for AI use and things that it is used for was overcoming the blank paper syndrome. Utilising AI to get started in different projects has helped interviewees to be more efficient as getting started when one does not clearly know what needs to be done is reportedly really overwhelming.

"For me AI tools are the best way to avoid the blank paper syndrome" (i8)

"It's (the use of AI tools) mostly about situations with the blank paper problem or if I am doubting if the work that I have done for a project makes any sense or if I need some new ideas." (i9)

The way AI tools such as Chat GPT help this problem is by generating a sort of starting point for the project at hand in the form of a mind map or an essay structure or other kinds of output.

> "What you get is sort of a basis for your own project or a good starting point and that is what I am aiming for (with AI use)" (i1)

> "If I cannot get started with for example an essay so what I will do is that I will ask for Chat GPT to give some input." (i10)

5.2.4 Better results

Another goal named by the interviewees when considering the use of AI tools was to be able to produce better end product in projects. It could be done by sparring to get more perspectives or ideas with AI or editing text or other content with AI tools to make it higher in quality.

> "Of course, if you are a studying the main goal is to learn but at the same time also to get good quality text done in projects. So also, to ensure that the quality of my work is good" (i2)

> "So, in that sense the efficiency comes from the fact that in the same amount of time you can get through much more options and ideas" (i8)

An option for better quality results would also be to get same level of end product as one would be able to get without AI tools but to get it done faster by utilising AI tools. At least some kind of AI tool involvement was noted as beneficial considering the end product.

> "Yes, and often you notice that at least using AI a little bit in some way you get better quality results." (i5)

5.2.5 Important for the future

One of the main goals in getting to know AI and utilising it in school is the capabilities it is seen to give in the future work life. Multiple interviewees listed AI as an important work life skill and also a one that might affect finding a job and competing with others on the job market. By being able to use AI already in school one gets a head start compared to ones that do not handle these tools.

> "Definitely in the future its (AI) role will grow because, as we need to at least at some point accept, it will be a part of how we work and if you don't accept it, you might get ran over by it." (i3)

AI tools are believed to streamline the future work life as it has streamlined schoolwork as well. Especially in the field of business where almost all of today's work is done with computers AI is regarded as a skill that needs to be handled. However, it is also important to be able to handle it correctly and responsibly.

> "I think that it will be a rather significant skill required in the future work life that you know how to utilise generative AI as it anyways is a way to streamline the daily tasks of an information worker when used correctly and fairly." (i7)

For the students one work related goal in AI usage that was pointed out multiple times in the interviews was that it can also help in job search. By automating some of the processes in job search the whole project becomes more tolerable. On the other hand, it is also noted that too much automation can be harmful as the application letters may drop in quality. Therefore, sparring with AI tools was found to be helpful according to the interviewees.

> "If I am working on a job application letter, I might put it in there (AI tool) and ask if there are any improvements to be done or something unclear" (i3)

> "A big part of how I utilise it (AI) is with job applications" (i1)

5.3 People

5.3.1 Positive mindset

Students' attitudes towards AI tools were reported as positive or neutral. Majority of the interviewees found AI useful and capable of easing their workload while acknowledging the still existing limitations. Another perspective that was risen multiple times was a neutral attitude towards AI tools and their capabilities. While positive and neutral attitudes were the most prominent also a level of scepticism was expressed.

> "I do find them (AI tools) quite good as a support for studying and I would describe my opinion as positive." (i2)

> "In principle I approach them (AI tools) without any specific opinion like I cannot say that my opinion would be positive or negative so it's quite neutral." (i3)

5.3.2 Easy way out

Another description for AI tool was an easy way out. With AI tools students are able to get boring or unimportant projects done or at least eased the workload with AI. They note that this has not been such an option in their studies before the mainstream rise of AI tools. However, they also point out that taking advantage of this new easier way of completing tasks might affect learning in a negative way.

> "When you have experienced what it is like to study without the help of AI tools, maybe the threshold to use AI tools can be sometimes higher as you feel like it is the easy out to use these tools" (i1)

> “If you want to take the easy way it is possible now (due to AI tools) whereas before it was not so much an option.” (i4)

One of the negative effects noted by the interviewees was the decline of capability and skills that one should learn in university before stepping into work life. By using AI tools to complete all schoolwork those skills are not seen to be acquired which the interviewees report to manifest in a drive and motivation to still use own brain to think and to learn.

> ”Anyways, you want to get something out of your degree and if you use AI to do everything for you it might blow up on your face in work life and that is why I have tried to use them (AI tools) in studying just as a support for my own writing to make sure I still learn what I am supposed to learn.” (i2)

5.3.3 Learning process

An important point risen on how interviewees perceive AI tools is that they are approached as a continuous learning process. Multiple interviewees emphasised that it is crucially important to know how to use these new tools to get good results that support learning. As a reason affecting this the novelty and continuous evolving of these tools were mentioned. However, some notes of AI tools being so easy to use that much learning is not necessary were risen.

> “You need to know how to use them (AI tools) to benefit from using them.” (i3)

> “They (AI tools) are tools that can be used but also require knowledge on how to use them” (i2)

> “You need to understand what you are doing with the AI tools or what the AI does so that you can make your processes more efficient” (i2)

As well as the continuous evolving of AI the changing rules and regulations also demand the students to keep on learning to not fall behind.

> It is a process (learning to use AI tools) that keeps evolving and will not finish as new AI tools emerge, and the regulations change as well.” (i2)

In the interviews it was also pointed out that the main way to find information and educate oneself on AI tools is to do it by themselves. Using Google or other search engines to find out how utilise these tools was mentioned as a source of information. The reason for this was named to be the lack of information from university.

> “It is basically trial and error so to learn you need to just google stuff.” (i10)

The learning method to increase knowhow and capabilities on AI tool usage was mainly by trial and error. By testing how tools like Chat GPT work and then reiterating results it was said to be possible to learn to use these tools.

> "Yes, especially if I ask something (from AI) and I get a response I look at the response and think what I would want improved and, on that basis, ask again with the modifications on the prompt to generate a better more accurate answer that takes into consideration my changes. So, I would call it (the learning process) trial and error". (i4)

5.3.4 Trust in AI created content

When considering their trust in AI created content, and trust in AI as a whole, multiple interviewees emphasised keeping a certain level of critique when handling AI generated, or AI edited projects. AI tools were described as helpful and even reliable but not without critical thinking.

> "It is maybe reliable, but you cannot regard the results without critically thinking their accuracy." (i1)

> "It is a big help, but I would not blindly trust its accuracy." (i5)

The reason for the necessity of critical thinking was mainly noted to be the accuracy and quality of AI generated products. Some of the interviewees reported even sources being created by AI tools. Using critical thinking with AI tools was said to manifest as double checking the results and editing them afterwards.

> "The accuracy is not always what you would want as they (AI tools) are not always able to give you the answer you are looking for and you might need to consider the results yourself as well and also, you cannot always completely trust it (AI)". (i5)

> "I have noticed that even though you would have access to the paid premium version (of the AI tool) it might just make up references. For example, if you give it a text and ask it (the AI tool) to search academic references for it you might get references as a response but when you double check them you might notice that they do not exist at all." (i6)

5.4 Processes

5.4.1 Helpful tool

Process-wise interviewees had experienced various uses for AI tools. Mainly it was said to be used as a helpful tool in different processes. The processes where AI tools were said to be utilised were e.g. generating content like text or pictures, editing said content, translating texts as well as brainstorming ideas and transcribing recordings to text-form. As AI was said to be used as a tool

there it was pointed out that mainly the hard work and laborious tasks were outsourced to AI while the actual brainwork was still done by the interviewees.

> "They (AI tools) are supporting tools. The output that they give you is never a complete result." (i1)

> "I use them (AI tools) as a support for my own work but still do the writing or the thinking myself." (i2)

> "I use them (AI tools) as a sparring partner." (i4)

5.4.2 Learning companion

Another way of AI tools affecting processes was reported to be using AI tools such as Chat GPT or Copilot as a learning companion. As such it has generated a new process of using these AI tools as a study buddy that does not tire and is available around the clock whereas humanoid friends would have other interests and e.g. the requirement to rest at some point.

> "I treat the AI tools basically as it would be a member in a group project as in, I discuss with it for example how should the essay be structured." (i10)

This method was noted to be felt helpful in actual learning as by discussing matters with AI tools one would get multiple perspectives and explanations if needed that a fellow student could not perhaps provide.

> "I use AI tools as support for my learning." (i2)

One of the ways AI tools were told to be used as a learning companion was to make them act as a language teacher. Language studies were pointed out to be a simple enough task that revolves around certain laws such as grammar and vocabulary that AI tools at least seemingly is able to handle well enough. AI tools were reported to be used to study and teach languages multiple times. For example, giving further info on homework questions' answers and explaining grammar rules were identified as ways of harnessing AI tools to language learning processes.

> "I have used it (AI tools) to study languages. For example, if I have had a Spanish course with homework but for some reason the grammar rules or the explanations for the correct homework answers have not been available then it has been possible for me to upload the homework to the AI tool and it has then given me the explanations on why the homework answers are what they are." (i7)

5.4.3 Initiation of AI use

The process of getting familiar with AI tools and starting to use it in schoolwork was reported by multiple interviewees to have happened quite quickly after the emergence of mainstream AI tools like the launch of Chat GPT 3 in the end of 2023. Even though the initial knowledge of the existence of these tools reached the interviewees quite quickly, taking these tools to usage has reportedly taken a bit longer as some of the interviewees said they were a bit critical of the tools and their privacy e.g. Besides internet, word of mouth was noted as one of the ways the interviewees had received information on AI tools. Word of mouth was reported to be distributed and received in school with student friends.

> "My friends had used them (AI tools), and I had seen people using it so I tried as well" (i1)

> "It is discussed quite openly. And I think it is beneficial to do so as that way friends can share good tools with each other and give each other tips on how to use those tools" (i2)

> "I think I heard about Chat GPT the first time from one of my student friends" (i5)

Another way of the interviewees getting information on new AI tools was through social media. By following content creators in the fields of information technology and business videos promoting these tools were encountered. Also, by keeping up to speed with professional magazines more info could be gathered.

> "Sometimes in Instagram I see some content, and I also follow this kind of content, on how to use AI tools to make studying more efficient and then they show different tools that could be useful which has led me to try them as well. Also, some magazines write about these thigs, for example Kauppalehti has had some articles regarding AI tools which also has led me to try them out." (i2)

Many of the interviewees reported Chat GPT to be the default AI tool in various processes as it is the most common and usually the first that comes across. Multiple interviewees also reasoned that Chat GPT's position as the go-to AI tool could be due to it being the first that they had learnt to use and that is has enough capabilities to be used in most processes.

> "Of course, Chat GPT might be the default as it has been so viral. Or it is a little bit like that everyone knows about it. And the other tools I have found through my friends recommending them." (i2)

What also popped up in the interviews was that the lack of information on using AI tools from the university had slowed the process of adapting these new tools. As it was not known if it is allowed

or not and what is the correct way to utilise AI tools some of the interviewees felt better not to take them in to use at all.

> "At first, I did not really know what was allowed (to do with AI tools) and what was not and how it (AI tool) can even be used and therefore I did not really use it. Or on my own I did use it a lot but with my studies I did not as I was too afraid of doing so and it felt somehow forbidden." (i5)

5.4.4 Cooperation

The use of AI tools in group work processes was reported to have multiple reasons. Dividing tasks and unifying the end product were mentioned as ways that AI tools are used in group setting. By dividing the task at hand with an AI tool it was felt fair and equal to everyone in the group. This also makes the process faster. Another use pointed out was that after everyone in the group are ready with their part of the project the whole text etc. could be run through an AI tool to unify the structures and this way improve the end product.

> "One of my favourite things to do (with AI tools) is to give it a group project description and ask how to divide this within group members and who would be best at which part. This makes it so much easier when one can ask, and it doesn't take time to think about who would be good at what and how to make the tasks equal so that everyone has as much to do as the next person". (i10)

> "If you write in there that we have this and this kind of tasks and things X, Y, and Z needs to be done and there are this many of us, it can of course help in dividing the tasks. It might also feel fairer for everyone that the dividing of tasks is done by some anonymous AI compared to a member of the group doing it." (i3)

> AI can also help with generating ideas to come up with a unanimous vision for the group project because, well, group projects are in my opinion especially more fruitful if the instructions are clear for everyone, and they have been developed with the group together. And, with delegating the tasks and finally making the project feel like it has been written by one person and coherent the AI tools can be helpful." (i1)

In the group work processes the usage of AI tools were noted to be similar to as in individual projects. No reports of AI tools dedicated to group work were reported and in group work processes the use of AI tools were told mainly focus on the individual parts of the group project.

> "Maybe not (Does group use differ from individual use), I use it in similar way as in my own projects." (i4)

> "I use it mostly in the same way always in either individual or group projects." (i5)

> "Definitely yes, the same way I use it in my personal projects. The sparring and that kind of using and, for example, proof reading of some texts or making these kinds of

> little checks is all. I do not really see it affecting the group work dynamics. Or at least I don't want to believe that it would have affected them." (i8)

Changes in the social aspects of group work were also pointed out. Multiple accounts of not approving all work done with AI tools were given. It was also noted that if a member or members of the group clearly have conducted all of their work on the group project with AI tools it is frowned upon. However, if the group work is known to be graded completely based on the part one has written it is not such a problem.

> "What comes to mind is mostly the fact that if everyone else does their part of a group project and give it effort and then there is someone who is lazy and does everything with AI, it makes you think is this fair for everyone." (i10)

> "If you notice that someone has done everything with AI and it reflects on the results, it frustrates you because at least in my opinion you can still see it and it makes the whole group look bad." (i2)

Regarding group work processes also the still existing appreciation for social interaction was also noted. It was said that AI tools should not replace human interaction completely as it will be important skill to interact with other people in the future even though other processes would be replaced or changed by AI tools.

> "I don't think there are any issues as long as it (AI use) doesn't affect or reduce human interaction." (i8)

> "I would not want to see like genuine teamwork vanishing because I really do appreciate it so much that I would not want to see AI like replacing it leading into a scenario in which your new teammates are some sort of AI assistants." (i7)

5.4.5 Learning as a process

Learning as a process itself has also changed with the AI tools coming to play. Notions on being more able to focus on the important parts of the contents studied were made. Also, it was pointed out that with automating some of the not-so-important processes in learning with AI larger entities of information could be handled which was felt to improve learning.

> "It (AI tools) helps you to focus your work much better and that way frees your potential also in the sense of making it possible for you to work smarter. It also reduces some of the heavy lifting off some tasks." (i1)

> "I think it has improved my learning in a way of making some phenomenon or some cause-and-effect chain more understandable by discussing those with it (AI tools) which improves the learning." (i2)

> Another thing I do is sort of summarising especially summarising academic articles and well why not other articles as well to understand them quicker. First to see what their about and the if it is relevant for my purpose. If I just search for articles this way I get at least the main points." (i5)

What was noted to also enhance the learning process is that by using AI tools to be more efficient which allows the course material to be studied faster and therefore some of the course materials that were previously had to be left unread as there was no time to go through everything.

> "Before AI tools some of the course materials might have been left without attention because some other thing has taken too much of the course hours. And if I haven't felt like reading everything completely AI tools have been helpful." (i5)

It was also noted that learning processes might be affected negatively if AI tools are used in everything. By acknowledging this and taking care that AI tools are not replacing thinking by oneself.

> "For example, producing grammar-wise correct text is sometimes a little more difficult as if you haven't needed to rely on your own skills in a long time it might get more difficult in time." (i1)

> "Maybe regarding learning, it is also reality that if you do everything with AI you don't actually benefit from that." (i2)

Worries about the level of knowhow after graduation were also expressed in the case of the learning process being affected too much negatively. The worry was that the necessary skills for work life would not be acquired during studies if every process of learning would be outsourced to AI tools. This was also noted to be affected by the rules of AI use and the problems with checking if AI has been used in projects where it is not allowed.

> "If there is no system like for example Turnitin, where you need to upload your project, you might easily get away with it. And this of course raises the questions on the level of graduates in the future if it is so easy to just copy paste everything." (i6)

> "Of course, it is very easy these days and when you once learn how to use it (AI tool) and realise that with Chat GPT you can easily get most stuff done, it is in my opinion everybody's own responsibility to take care of their own learning. So, in a nutshell it is completely your own fault if you end up as a Chat GPT graduate." (i3)

5.4.6 Change in study habits: a new process

As well as the actual learning, changes in studying processes were reported by the interviewees. Scheduling of school project has changed as studying takes less time with AI tools automating some of the tasks and quickening the others. However, other studying processes were not found to be

necessarily affected too much as many of the interviewees described AI-usage as more of a completely new studying process rather than replacing or affecting old ones.

> "It (use of AI tools) has not replaced any specific parts of processes but more like created new processes next to the existing ones" (i3)

> "I don't feel like I would have replaced necessarily so many processes with AI but rather it has brought new things that I can do." (i4)

However, one old study processes that AI tools have reportedly changed according to the interviewees is that Google usage and googling for information has more or less transferred to Chat GPT and other GenAI software. Rather than looking for information through different web pages AI tools are used to find more information in less time.

> "Often I have AI onboard, maybe not in the smallest of tasks, but always when I need to for example start writing something I immediately start brainstorming and thinking with AI whereas before I would have initiated the project by going to Google and search for a million things from there." (i10)

5.5 Technology

5.5.1 Limited capabilities

Technology-wise various limitations were mentioned during the interviews. These limitations were named to affect the usability and number of use scenarios of AI tools in schoolwork. One of the main limitations of AI tools used by the interviewees was that the output might be quite low in quality. This is a reason e.g. not to use AI tools to directly write text to projects but more to be used as a first iteration of text which needs to be checked and modified. Another example of low-quality output was experienced when going through the sources provided by Chat GPT as they were identified as made up and not actual scientific sources of information. This limitation was experienced even with the premium version of the particular software.

> "I don't want to generate text straight from AI tools because I know it is still quite bad in quality." (i2)

> "But you can still notice that they (AI tools) make a lot of errors like they generate text or speech, but you have to check everything yourself." (i2)

> "Often the first output is quite bad and then I tell it (AI tool) to make it better and then it gives a little bit different answer and then often if it gives various for example structure for an essay, I will combine them and, on that basis, make my own. So, I don't directly take anything as given because I still feel like I can make a better one myself so basically, I take help from them but do the thinking on my own." (i4)

"With Chat GPT I have noticed that even if you the paid version at your use it still makes up references." (i6)

Usability in different languages was also mentioned as a limitation of the AI tools in use. Especially when used in Finnish problems were encountered with both the tools understanding the input and also providing quality output. This was often solved with communicating in English with the AI tools.

"It (AI tools) is still not good enough with anything you want to do in Finnish that it is better to give the prompts directly in English." (i1)

"Especially if you are thinking their (AI tools) capabilities when used in Finnish, they don't really work so you need to do it in English." (i3)

Lack of critical thinking was also pointed out as a problem with AI tools regarding GenAI tools that create content on request. The lack of critical thinking requires the user to do that part on their own. On top of this the AI tools utilising outdated data was found problematic as it leads to false output. However, this limitation was said to be less problematic nowadays compared to the initial emergence of these tools as they have improved through time.

"They (AI tools) are still no capable of critical thinking." (i1)

"At first, it was that if you did not purchase the subscription for premium access, you had the weaker system to use which had the data only up to a certain date whereas now even with Chat GPT 4o free version you get a certain number of prompts to use with the premium features." (i2)

5.5.2 Accessibility and ease of use

During the interviews the accessibility of AI tools was described multiple times as good and not problematic. One of the reasons for this was noted to be using just a few AI tools so the chance of facing problems would be rather low. Anyways, some of the interviewees had had slight problems with accessing AI tools that were described as less popular.

"I have only had two (AI tools) in use so at least I haven't encountered any problems." (i1)

Accessibility was also pointed out to be affected by the persons own interest on AI and AI tools. Having a work-related reason to delve into AI was mentioned to be another reason for finding the accessibility good. The user interfaces of these tools were also noted to be well-functional with quick response times, and the user experience easy to navigate which affect the feeling of accessibility. Only little bad experiences were shared in the interviews.

> "I feel that as I am already quite interested on these topics, I also find them easily accessible." (i8)

> "I mostly use Chat GPT as it is able do basically anything needed and as well as studying, I use it in content creation and similar tasks quite a lot and I find its response times and functionality to be quite good." (i10)

> "I would describe it (AI tool) as easy to use and the user interface to be usable." (i10)

AI tools were described as easy to use as they were not felt like needing a lot of practicing. This easy to learn and use depiction was told to apply until a certain level of skillset. In other words, it is easy to learn to use AI tools at least on some level but more specific use would need more practise and training. The nature of using GenAI tools iteratively i.e. giving input and then giving new input on the basis of the previous output to get better output was mentioned as a reason for the easy learning.

> "They (AI tools) are easy to lean to use at least on some level. However, the accuracy is not always on a good level, so they are note able to always give you the response you want so you need to spin them a bit." I6

> "The usability is most of the times on a good level at least in a sense that they are easy to learn to use at least on some level." (i5)

> "It (using AI tools) does feel quite easy – especially Chat GPT you just put in a question, and it replies so it is not rocket-science." (i4)

5.5.3 GenAI

GenAI tools were identified as the most common to use among the interviewees. Tools that were mentioned include the following Chat GPT, Scopus AI, Dall-E, Copilot, ChatPDF, SciteAI. Some of the tools such as Dall-E and Scite AI were described to be used in more specific scenarios whereas e.g. Chat GPT and Copilot were told be used as in all sorts of tasks that they could be used for.

> "There are some of these specific tools that I have found like ChatPDF and Scripted that have a specific use in which they are useful but then most of the time it is Chat GPT as a sort of basic tool." (i5)

Chat GPT was described multiple times to possess a status as the default AI tool to be used in studies. As the reason for this being first in the market and its familiarity through friends using it were listed. After University of Turku beginning to provide access to Copilot for students Chat GPT's position was reported to have been affected a little. Some of the interviewees told that they

have more and more transferred their school related AI tool usage to Copilot as university provided it feels safer to use than other options.

> "I guess that there could be better tools for my needs behind the paywall compared to Chat GPT so in a sense it could be more beneficial to use some other tool but somehow it just has gone so that Chat GPT is the one. And of course, as everyone else uses it, it is east to end up using it yourself." (i6)

> "Now that Microsoft has launched Copilot, I have used it more and more compared to Chat GPT because it is more secure." (i7)

> "I use mostly Copilot for studying purposes because we have access to it through university's services and it is at least promised to be more secure. So basically, I use Chat GPT on leisure things with my own Gmail but of course it can be sometimes used in studying purposes as well if it just happens to be open when I need to check something." (i8)

5.5.4 Other AI technologies

As well as GenAI tools interviewees reported on the use of other kinds of AI tools. As these tools are not able to generate content from prompts, they were told to have more specific task related uses. For example, Canva's picture editing tools were told to be used in presentation preparations and DeepL translation tool to edit texts. The level of utilising and the number of tools used varied quite a lot in between interviewees namely depending on their familiarity with their own interest towards AI.

5.6 Infrastructure

5.6.1 University provided guidance & training

Infrastructure in the context of this thesis refers to the physical infrastructure but also the foundational systems and resources that enable the use of such technology within the organisation under inspection, it includes the institutional support and training as well. Regarding guidance and support provided by the university for students to take on AI tools various points were made in the interviews. Mainly the lack of guidance or the guidance being hard to reach were mentioned. Guidance in this case meaning the instructions on how students are actually allowed to use AI in projects and how it should be mentioned in these projects or how it could be beneficially used by the students.

Another aspect of institutional support enabling the use of AI tools that was mentioned multiple times in the interviews was university provided training. To describe the way this was discussed,

the word inconsistent would be appropriate. Some mentions of having got training on AI tools were heard but also points to the opposite and that there has not been any training at all were made. What was also dividing the interviewees was the questions regarding whether training students to use AI tools would be necessary. What tells about the diverse feelings regarding this is the fact that during one interview both sides could have been advocated.

> "Its good that the curriculum adapts to the changes (brought by AI) but maybe I don't really see that with the current state of the tools that most people use they would need that much studying. Maybe more like guidance and overall telling what is possible and what is not would be good and welcome but maybe there is no need to specifically teach the use for now." (i4)

> "It is definitely necessary to teach AI use and there is no need to go all out on forbidding all kinds of use but rather it should be realised that AI is here to stay and of course it is necessary to be able to utilise but also to ensure that the learning process is still on the person themselves." (i4)

Reasons for the requirement of AI tool training varied a bit but mainly the motives for this would be that AI is seen as a tool that will be used in the future as well so it would be important to learn and for the university it would be important to be able to stay on top of the development of these tools. Another reason mentioned was that students might be able to learn to AI tools on their own but to consider ethical factors and to use them in a sustainable manner would need training from university. By learning these skills already during the studies, the interviewees felt that they would also be better applicants in jobs after the studies and that they would not be completely oblivious to the tools that would probably anyway be in use in work life. University environment was also felt safer to learn and make mistakes with AI tools compared to learning in work as mistakes made there might affect the employer and therefore probably have more repercussions.

> "First of all, I think the university should start at least on some level to teach this (use of AI tools) because AI will not go away, and its significance will just grow to be even bigger than it already is. It is growing all the time, and it is sort of a requirement for the future to be able to use it and understand its functioning at least on some level, so I would say it is important." (i5)

> "I think it is important for the university to take this role (of teaching AI) to be able to reduce misuse of these tools and they could be the safe and secure middle part in that deal. Basically, they could make it possible in a sensible and safe way and the educate on the correct use of AI tools and at the same time promote the ethical aspects. So, they could help to make AI use more sustainable." (i8)

As some notes of teachers already taking on AI tool training in their courses were made, the level of this varied a lot depending on the course and the teacher. The teachers and courses that allowed using AI and also provided instructions, training or guidance on that were generally experienced

positively. Completely forbidding use of AI tools had not provided interviewees with good experiences.

> "The approach depends largely on who is the teacher as some of them really support in AI use while just making sure that it is reported in the correct academic manner and the reasoning behind it which encourages to use these tools also in the future. Whereas some other teachers are more on the side of forbidding all kinds of AI tools use in all projects." (i7)

> "AI will be a big part of the future and the processes in the future so it should be taken into consideration in the university as well and rather than forbid, as we have talked about forbidding is not the solution, it should be taught to be used correctly in terms of the academic side of things. I think it would be great if there was a course teaching these subjects and their use in work life." (i5)

> "Yes, I do believe that it is good to have visited these questions about information security of AI and the ethical issues regarding AI during school years because then they won't be completely new to you when you face the same things in work life. In a sense it could give you certain advantages in work life to be familiar with these subjects even before going there." (i9)

> "Well certainly in learning to use these tools (AI) already in school the important thing is that if you have not used them already in school it is significantly more difficult to familiarise yourself with these tools afterwards whereas using them in school gives you the opportunity to learn them and to do that in a safe environment as it is so to speak a safe platform because there is no money on the line or any effects happening to any company's revenue if something goes wrong". (i10)

5.6.2 Technological infrastructure

Regarding the technological infrastructure two points were risen multiple times in the interviews. First of them being the AI tools that university provides access to for students. Interviewees named Scopus AI, UTU Transcribe and Microsoft Copilot in this category. The awareness of these being available for students varied a lot. Some of the interviewees named all three while other knew just about one or two and for some of the interviewees these were completely new. However, among the interviewees who were in the know of the availability of these tools they were found useful. Also, the fact that university provides these for students was important for the interviewees and seen as something that university needs to do also in the future as the usage of AI tools was only seen to increase. Also, being supported by the university, using these was felt safer and less rule breaking than other AI tools.

> "But on the other hand, what I talked about, for example, the university's library and the library services have taken on Scopus AI to provide for students and that kind of applications in which university provides access to could be very beneficial as then students don't need to buy the access themselves." (i4)

> "The university recommending and providing access to certain AI tools is very good because it basically implies that it is allowed to use." (i6)

The other aspects of technological infrastructure that was discussed in the interviews were hardware and software requirements. Both were felt accessible for students. Regarding hardware the interviewees were unanimous on the opinion that they were able to easily run these AI tools on either their laptops or their smartphones. No restrictions were encountered with the hardware requirements. A reason for this was speculated to be that the processes run, and the data used in these processes were light enough to be done with the hardware available. The same results were provided for the questions regarding software as there were no problems encountered with that either. Software was described to be working well if functioning internet access was available.

> "When I use it (AI tool) on my own projects I don't work on any that massive programs or data that there would be any problems, and I do have monitors available. I think that I would not need anything more special than a basic wi-fi connection and a computer so I haven't had any problems where I would have needed more processing power to get through bigger data amounts." (i3)

5.7 Culture

5.7.1 Ethical perspectives

In the interviews multiple ethical perspectives and thoughts on AI were shared providing an idea of the ethical culture regarding AI in the case university. It was noted that teaching these ethical perspectives on AI was felt important and also by the ones who had already experienced these lectures had found it a positive experience. These were at same time felt affecting positively towards critical thinking capabilities.

> "We have some courses on ethics and other stuff in the international business management program and one course was global business ethics a part of which was digital ethics and there we discussed AI tools and their challenges and problems which made me think about algorithm biases and how they affect the output that these tools give. This has taught me to use them and to think about the responses I get when I use them." (i2)

Another ethical question that was brought up in the interviews was that can humans be replaced by AI. This was felt as something that will potentially happen in the future and should therefore affect teaching as there would be need to renew teaching and the subjects taught to keep the skills learnt relevant for the work life waiting in the future.

> "Well, I do basically believe that the development of these things (AI tools and their use) will be that they are going to be used in work life and therefore there is no reason

> to fight the inevitable but rather it is better to adapt and accept that some things that human have previously done will be done by AI in the future. Of course, it is another conversation if it is ethically okay to replace human with a machine, but the capitalistic society will do it if it improves efficiency." (i2)

There was also a sense of unclarity on ethical aspects of AI proposed in the interviews. This was experienced due to the unclear rules on use of AI tools. What was also told to have an effect on this was the low level of knowledge on the privacy matters regarding AI tools which leads to unclarity on what kind of use can be viewed as ethical. For example, not knowing that GenAI tools might distribute provided materials such as academic articles with copyrights to further use had led to these problems.

> "I think it (AI tools) is still considered cheating at least on some level. If we think about the ethics of the AI itself and the security of AI and whatnot, they are not regarded too much but when the ethical aspects of using AI tools are discussed for example to make some project for you it is a different thing." (i3)

> "I was not previously aware of the fact that you might commit a copyright infringement if you upload (to an AI tool) an article and therefore I have done it without a care." (i1)

Ethical perspectives were felt important to know also for the future work life. It was pointed out that it is better to learn these things on the lectures than by the hard way of making errors that might become costly in the future work life.

> "Yes, a lot of practical stuff. I like the possibilities it grants. However, it also makes me worried about the ethical and environmental problems associated with it. Also, the challenges that we do not even know about yet like it might be quite a scary tool in the future." (i8)

> "I do find it useful that I have visited these topics like information security and ethical questions regarding AI. This way they won't be a completely new topic when faced in the future work life." (i9)

5.7.2 Academic integrity

Different forms of academic integrity were named multiple times to be held important by the interviewees. It was said that feeling capable of saying that one has done the project on their own rather than by using AI was found important. Also, the feeling of ownership on projects was noted as a factor that affected interviewees' use of AI tools.

> "Still, it gives a specific kind of feeling of accomplishment when you have been able to complete a project on your own and that is why I don't use it (AI) that much or at least less than before." (i1)

> "For me it is about being able to say that I have done this on my own and if that is something you can do then you haven't used too much AI. Of course, this a very unclear line." (i4)

Worries regarding academic integrity were also expressed as it was felt that for a lot of people academic thinking and integrity might not be as valuable as getting things done easier and faster. Plagiarism was named as one of the biggest challenges caused by AI tools. However, hope was also felt on university's ability to control these problems.

> "But yes, I do still see these plagiarism issues and other stuff as major problems, like you are just able to take text out of nothing." (i8)

> "I would see that regardless as AI evolves, we still want to ensure also in the future that plagiarism is kept at minimum and that students create their own products. These are valuable things in the future as well." (i9)

> "There is a concrete worry about academic integrity and the academic capabilities, and it will only grow in the future as many people are willing to take the easy way and just get their degree." (i10)

On the other hand it was also pointed out in the interviews that even though it has never been this easy to get away with cheating and just getting projects done the easy way, learning is still valued and at least the interviewees were keen on still continuing to learn even if it would mean a little extra work as that is the reason why one goes to university.

> "If I wanted to some language courses that can be done in Moodle I could probably do so, but I don't want to as I want to learn." (i1)

> "You don't want to get into any trouble with AI use and at least I still want to learn the subjects taught." (i6)

What also was noted to affect the culture around academic integrity was the issues encountered with transparency. It was pointed out that that as it is difficult to the students to know what is allowed and what is not taking the easy way feels less wrong as it can be justified with the obliviousness towards the regulations. Also mentioned was that the lack of clarity on teachers approach to grading projects that have reported on AI use drives students even more to the grey areas of academic integrity as they are not willing to follow the regulations as they cannot be sure of fair and equal grading from the teachers. Therefore, not reporting AI use was described as a norm instead of following the rules. What also was said to affect this was the distrust on the AI-detection software such as Turnitin.

5.7.3 Accepting environment

The cultural environment in Turku School of Economics was described as open and accepting. It was said in the interviews that it feels easy to discuss AI-related businesses with peers, and this was also one of the main ways to find information on new technologies to try out. However, some statements of the culture still avoiding the talk on the misuse of AI tools were also given. When discussed about future the visions were generally optimistic and positive.

> "I do feel like there is an open environment for talking about these things (AI tools and their use) and I think that it is also beneficial." (i2)

The approach to AI was described by the interviews mainly to revolve around the idea of understanding AI's principles to be more important than using the technology. Regardless, when asked about the general culture on this subject the interviewees had the feeling that they were in the minority and that the majority of students felt like the using aspect would more important than the understanding. This was however only their feeling and not a verified fact.

> "In a sense the approach is that understanding the technology (AI) is more important than knowing how to use it." (i4)

5.7.4 Privacy and security

Awareness of privacy and security factors of AI tools on the cultural level was found to be quite low. Few interviewees pointed these out and the ones who did were raising the point of the lack of knowledge on this area. Also, the lack of knowledge on this behalf was told to hinder the use of AI tools as the user could not be certain of whether the used software is secure or not.

> "If you think about the ethics of AI and the security of it and whatnot, these things are not so widely regarded." (i3)

> "During my bachelor's degree I still stressed a lot about getting caught (using AI) and in a sense maybe I was also sceptic about the information security of such new tools (AI tools). However, after seeing many other people using it, I was encouraged enough to do so as well." (i4)

What was also pointed out culture-wise in the discussion on privacy and security was that as majority seems to disregard these the ones who do not still have to shut their eyes to these problems to stay able to compete with others as they would probably fall behind in the case of completely letting go of AI tools.

5.7.5 Environmental issues

Worries about environmental issues were expressed in the interviews. The specifically named worries were energy consumption and water consumption that are required to keep the servers of some AI tools running. This was felt crucial to be taken into consideration when thinking about using AI tools and also to be included in the teaching of these subjects.

> "Of course, I am worried about all these news about Google and others buying some nuclear plants to able to generate the required energy (to run AI)." (i6)

> "Well yes about all the basics like energy consumption and water consumption at the sites where the big computers are running all the time so not my own laptop. So, these are basically the environmental issues." (i8)

5.7.6 Ignorance

When discussed about the culture of AI use in Turku School of Economics, multiple notions on ignorant attitude towards AI tools and their functions were made. Of course, these are just the interviewees perceptions but still worth reporting as the matter is important. The general culture was described as ignorant meaning that AI generated content is used as it is without giving any thought to its factuality or the effect that this would have on one's learning. The interviewees raising this point all felt this quite alarming.

> "A sort of ignorant and like taking for granted sense of attitude (towards AI use). And yes, I must say that I have noticed quite a lot of use that if not absurd but still ignorant use." (i8)

One reason given for this kind of attitude was named to be not knowing how AI tools actually works and where the outputs of GenAI come. Without giving this any thought, it of course is easy to take the content as given. Also not caring if scientific sources searched with AI tools would turn out to be so called predator journals, meaning not peer reviewed and academically approved, was pointed out as harmful behaviour for the academic culture.

> "How are the tools coded and how does like algorithm biases appear like who even is responsible when the tools and the algorithms are so complex and maybe it is not even understood how the output is formed and if it contains untrue data." (i2)

> "Now that all these problems regarding research emerge. Like there are so many misuses for example if there are some journals are normally academically proven and peer reviewed and then there are some unofficial ones that accept and publish whatever papers done completely by AI and then is just send to these distributors someone might find the article and read it as true and then problems occur." (i8)

5.8 External aspects of the environment the system is embedded in

5.8.1 Regulatory frameworks

Regarding regulations and regulatory frameworks affecting the different dimensions of AI tool usage various points were made in the interviews. Mainly the regulations and rules being not in the know of the interviewees and also being hard to find were pointed out. On the other hand, a few accounts of the regulations being accessible were also stated. What were commonly shared with the opinions of the interviewees was that following the regulations religiously creates a completely new workload which was not seen reasonable. Also, a common theme among the interviewees was that they were open for the regulations to be around and pro regulations as they were seen necessary to keep academic integrity intact and also to make processes more transparent and fairer for all parts.

> "It is surprisingly hard to know what is allowed like for example, what I am allowed to put in Chat GPT because there are not that many clarifications making it very easy to interpret. To my best understanding, what you put in Chat GPT should be under Creative Commons license but is that same as for example open access? Anyways, I don't think that there are enough instructions on what is allowed and what is forbidden to do." (i1)

> "At least for me personally it is quite unclear how it is allowed to use AI tools. And like if I report it, where is the line on how much AI use is okay to report and when is it too much in quantity and so on. And I don't even know if my understanding of these rules is correct. I would describe them as a line drawn in water so very unclear." (i5)

Problems stemming from this unclarity and lack of knowledge regarding the regulations were also identified. With the rules of AI-usage being too unclear using it has been felt cheating even though it would have been used correctly. A tabu-like feeling was expressed towards AI due to this problem. Also, interviewees raised the point that with the lack of clarity on the rules and the fear of getting caught the students are even less likely to report their use of AI in school projects to avoid reporting it incorrectly and it therefore affecting their grades. What was also noted to affect this was the unclarity on whether AI use, even when correctly reported, affects grades or not.

Another problem pointed out regarding the regulations was that they were felt even more confusing and unclear due to different teachers having different approaches to the AI-usage. The problem with this was that a student would follow the instructions they would have gained first and if after that different teacher would have stricter rules, they would not be seen reasonable. This goes the other way as well. If a prior teacher had more strict rules the student would feel like cheating with using AI tools on course with a teacher who allowed more AI use. Also noted in the interviews was that

completely forbidding AI use was not felt reasonable and would lead to breaking these rules as getting away with it was described as very easy.

> "Maybe the lack of trust (a problem with the regulations). Like if I don't really know precisely how it is allowed to use AI tools and let's say I do use them I would rather try to not get caught. Or like for me it is about the fact that I cannot be sure of how the person evaluating my project sees this and how it affects my grade. So, I have followed this rule of never admit anything before you have to so maybe that's my mindset on this. That as long as it is not clear what is allowed and what is not it is better to not admit anything." (i5)

> "In my opinion one concrete example on how the university could help this problem would be for them to provide concrete examples of how AI use should be reported in different scenarios. At least I haven't bumped into anything like that at all. Like clear basic examples on how to properly report it. It of course may exist but at least I haven't seen it which in that case tells about communication. Maybe it could help reduce the tabu and stigma around admitting AI use." (i6)

Many accounts of the regulations needing clarification were heard in the interviews. Firstly, clear rules and the information on the rules being easy to access would make students' lives easier as they would not need to worry about breaking the rules or spending time trying to unravel what is allowed and what is not. Second, it was noted that unclarity in the rules might lead to distrust and lack of transparency which would hurt the settings between students and personnel. The point was also raised that the unclarity of regulations hinders the students' ability to learn AI tools in use as the unclarity and fear of breaking the rules would outweigh the curiosity and will to learn new things. The same factor would also deny the possibility of asking help from teachers due to the feeling of cheating and of course one would not want to tell on themselves to the teachers.

> "It would be good to have some sort of guidelines or instructions presented on some kind of course or something." (i8)

> "Of course, it is very subjective as well, like I don't know about how others have used it (AI tool) and on what kind of tasks and how do they report it or do they even report it and therefore I struggle with deciding on should report even the smallest of things like brainstorming with AI or am I admitting AI use at that point for no actual reason and does it affect something. And that kind of creates this problem with transparency of these things." (i4)

> "Clearer regulations would in a sense be better like they don't have to be any stricter but at least clearer." (i4)

> "It is very challenging at least I would like to think that the responsibility is in the end on the researcher and the writer of the project but it isn't necessarily always enough like I don't know if there are any concrete rules in intranet but at least I haven't found it and if there is no such thing maybe it could be beneficial to have some sort of clear regulations to follow." (i4)

What was also discussed in the interviews were the interviewees own awareness on regulations. The accuracy of their awareness varied quite a lot as there were interviewees with better perception of the AI regulations but also interviewees with basically no knowledge of these regulations. None of the interviewees could exactly tell what the regulations say about AI use at the moment. However, a few interviewees had a quite good understanding of these rules but this they told to be due to their job or personal interest on the matter and not due to the communication from the university. What also stood out was the fact that all of the interviewees were quite unsure of their own perception of the regulations even though they would have had it quite close to the truth. On top of that, a repeating theme through the interviews was the lack of knowledge on where exactly one would be able to find the information on the regulations.

> "In my opinion the healthiest approach towards AI use would be to have complete freedom to use it as long as you are honest and transparent on how you have used it" (i1)

> "First of all, the regulations could almost be customised for each faculty separately as there are significant differences on the subjects studied. For example, studying medicine or law basically are based on plagiarising or repeating the previous texts as the laws are as they are whereas in business, we need to create more own perspectives and texts. So, faculties having their own regulations could be beneficial." (i3)

> "In a way I know that yes, they (regulations on AI use) are on some level explained like that you need to report AI when used and how you use it but maybe at least for me it is still unclear like how it is allowed to be used. And like even if I report it what even is the correct way to use it and how much is still okay and therefore, I feel like the regulations are like not very airtight like I don't know where the lines on how much AI are can be used." (i5)

As one solution to not maybe clear all these problems but at least help the situation, teaching the correct ways to use AI tools in school projects was proposed many times in the interviews. By including this into some mandatory course every student would get the same information and go through it at least once in their academic journey. It was also noted that it would probably be most beneficial to introduce this in some of the first courses in the degree. However, this would need the clarification on the regulations to be done beforehand. Also advocated for was more communication from the university's side regarding these regulations and where to find them.

> "From an ethical perspective, not informing students soon enough (on the rules of AI use) is a problem. Like on some basic courses it would be good to introduce AI use and the guidelines on its correct use as early as possible." (i3)

5.8.2 Financial circumstances

When talked about financial aspects of AI tools and their use in studies the nature of their business model popped up multiple times. Almost all of the AI tools used by the interviewees had also a free version to use and a paid version. However, there were a few exceptions as e.g. UTUtranscribe is completely free to use for all students at the university of Turku. For the ones with the options to either use free version or to pay for more features it was noted that the paid versions were seen better than the free ones. However, the free versions were described as still very comprehensive for study use. Also worth mentioning is that some of the tools, like Chat GPT, was said to have the option to use even the premium features for a limited number of times per a certain period of time for free which increased popularity of the free versions compared to the paid premium ones. It was also mentioned that sometimes to get something done quickly if e.g. the deadline is approaching the premium subscriptions were felt necessary to get the project done in time.

> "My friend got the premium paid version of Chat GPT and told me it is way better than the free version." (i1)

> "Well once during a time of extreme despair with one essay I bought the subscription to ChatPDF to get through it and then cancelled it afterwards." (i9)

With the free services being described as enough for study use it was also felt like AI tools are financially accessible for students. This being said, it was also noted that different AI tools have different pricings and some of them were felt quite expensive which made them feel less attracting. On the other hand, by using more than one tool it was said to be possible to use AI tools in more scenarios without having to pay for them.

> "Personally, I have always managed with the free services and haven't faced any major problems with them." (i1)

> "Notebook LM has been free to use for now and Google's Text-to-Speech has also been free to use when you use it through your Google account." (i2)

As the university of Turku have recently provided students with a few different AI tools, the need for paying for premium tools on their own had been reduced even more. Especially the introduction of Copilot for free for students had impacted a few interviewees to start using that tool more and reduce the use of Chat GPT which had previously been the default option.

> "I don't really know if the Copilot provided by the university is some premium version or not, probably at least not the most expensive, but still even though Chat GPT is nowadays able to search the internet for source material and references but only in the paid version and therefore I have basically only used Copilot which is also able search

> for that stuff. So, I don't know if it is a premium paid version or not but at least I don't have to pay anything for it myself. And of course, Chat GPT allows a few prompts per day for free in the 4.o version so sometimes I also use that." (i8)

Having the university provide AI tools for students was also felt necessary as these tools was described to be anyways part of the future so it would be appropriate for the university to stay on top of these new technologies as well. Also, providing these tools was seen important as it would make students more equal among each other. The premium features of some AI tools being quite expensive not all students could probably afford them giving the students with more wealth an advantage which was described as an ethical issue.

> "So, there are a lot of ethical issues in the AI tools themselves but also in their accessibility like if their prices are raised at some point making them very expensive no all students will be able to afford them, which can be a ethical question of a higher level, but will it be okay to set students in unequal positions according to their wealth. Of course, just the abilities to use these tools already differentiates students with each other when some are more technically capable than others which leads to the less capable ones needing to do more manual work. So, in that sense it (AI) makes students unequal." (i2)

5.8.3 Stakeholders

When stakeholder aspects were discussed in the interviews, it was often tied to what sort of goals the organisation could have regarding AI use. It was noted that university should be preparing students for work life and also promote academic values such as integrity and curiosity for knowledge. Therefore, the discussions on stakeholders often revolved around which stakeholders could be able to give valuable insight or input to AI use and the university's guidance, training and regulations on the matter.

> "And maybe that university's mission is to enhance students' skills on critical thinking and that sort of skills like prepare students for the future. And I think this will just be more important in the future when AI use increases and people are streamlining their work and therefore nourishing this kind of ability think will be even more important and I think that will be the role of universities in the future as well." (i7)

One set of stakeholders mentioned in the interviews was other universities in Finland as having similar regulations and approaches towards AI tools and their use would give all students more equal opportunities to learn and utilise these new tools on their academic journey. This would also be beneficial for the universities on keeping their degrees on the same level of appreciation as each other.

> "I think it could be beneficial if universities discussed these things (AI regulations) with each other so that the rules would be similar for all students and therefore the opportunities and also the quality of degrees similar." (i4)

The most commonly mentioned stakeholders were employers and companies. Cooperation with employers or companies was felt important as they would be able to give the input on what actually is necessary to know in work life and what do they appreciate in candidates when hiring. One option for this set of stakeholders to be included in the processes that was mentioned in the interviews was implementing more company set projects and cases in coursework.

> "Discussions with companies regarding skills needed in the work life would be beneficial and, in these conversations, also discussing AI related matters. At least I like to think that as TSE and companies in the Turku region already do a lot of collaboratives on different courses, they could also discuss the need of AI skills and how and what should be taught." (i2)

> "Turku school of economics already does a lot of cooperation with different companies so they could also think together is that aligned with the way it (AI) is used and taught here and that could be beneficial stakeholder activity." (i2)

> "Of course, there could be some sort of like cooperation with employers as they are the ones who have the need for graduates that handle these (AI tool) skills in the future." (i9)

What was also pointed out as an insightful group of stakeholders was students. It was mentioned multiple times that as students are the ones obeying to the rules, they should be also allowed to express their opinions in the decision-making process regarding these rules. Students were also seen as more in the know of the newest AI-trends due to their need to learn these tools on their own compared. It was also noted that in various cases the interviewees had faced situations where students had been more capable of using AI tools and helping others with questions regarding AI tools than teachers. However, also a few statements questioning the students' capability on taking part in this kind of conversation were heard.

> "I am not entirely sure if that is needed. Certainly, when the guidelines or regulations have been prepared it would be important to give it to the students to evaluate not maybe substance-wise but more the aspects of understandability and if there is something completely missing that they would see appropriate to include. In my opinion this could make it clearer and more probable for people to follow the guidelines if they would include the students' perspectives as well." (i4)

> "But I feel like what I have personally noticed is that previously I have, like I said earlier, we students are the ones riding the AI wave and therefore we are probably more up to date with our knowledge than people in work life." (i6)

> "Yes definitely, because many students have invested a lot of their time in it (learning about AI) and therefore knows a lot more than some professors or teachers so a dialogue between the two would be a possibility to make it (rules on AI use) make sense for everybody." (i8)

Another perspective on the stakeholders' effect on the system in this case is the teachers' and professors' attitudes towards AI. Reports on both teachers being pro and against AI tools were stated in the interviews. It was noted many times that the opinion of these stakeholders affected the way the interviewees had been able to use and utilise AI tools in their school projects. It was also proposed that the diverse set of attitudes might be due to the misconception of how students use AI tools. Multiple interviewees raised the point of teachers having negative prejudice towards AI tools and that the attitude was automatically assuming that students misuse these tools if they are allowed to use them at all when in fact the use would be more editing and brainstorming related than content creation.

> "It depends a lot on the teacher what the approach is, like some teachers actually support using it (AI tools) and just emphasises the importance of reporting what you have done with it and your own reasoning behind it which embraces students to use these tools whereas other teachers are more on the side of forbidding all kinds of AI use." (i7)

> "Maybe the teachers bring on more the feeling of not fully understanding why and how students use AI tools, and this creates these unnecessary limitations and, well attitude problems is a harsh statement but let's say, attitudes and these negative attitudes mainly coming from the teachers' side affect the students that want to or decide to use AI tools. That's like the essence of it." (i1)

From stakeholder perspective also worth mentioning is the effect that the dynamics between stakeholders have on AI use. Some changes after the introduction of AI tools were described by the interviewees but also statements on the dynamics not necessarily changing were heard. However, what can be seen as insightful was the effect of these dynamics to the attitudes towards AI use. The interviewees that had had positive experiences with teachers promoting AI tools described that as beneficial whereas the ones having had negative experiences found that discouraging for future AI use.

> "I feel like if someone asks on some course if there is some kind of guidelines or instructions available for how it is okay to use AI, the teacher just casually replies that there is this link and through it you can find the information on the matter. So at least I haven't really noticed any schism there so just basically teachers just accept the guidelines and according to it emphasise like very clearly that it (AI use) needs to be reported if it is being used." (i9)

(Especially the dynamics between students and teachers have changed (due to the AI tools).” (i1)

“Regarding the teachers I haven’t noticed any changes (in social dynamics due to AI use).” (i2)

“Certain teachers have maybe become a little paranoid or doubting towards students on whether they have used AI or not assuming that it would have been used more often than it actually is.” (i3)

6 Conclusions and discussion

6.1 Conclusions

As artificial intelligence and different tools utilising it have gained more publicity in the recent years with GenAI tools, like Chat GPT and Copilot, leading the line these tools have found their way into university studies as well. The aim of this thesis was to develop a better understanding of how AI appears in business school students' lives within the case of Turku School of Economics. A socio-technical theory framework was selected as the perspective of the research. To guide towards this purpose the main research question (RQ1) was stated. Also, three sub-questions (SQ1-3) were stated to further clarify the purpose of this research. All research questions:

- Main research question (RQ1): How do business school students perceive AI as a socio-technical system in the context of business school studies?
    - Sub-question 1 (SQ1): How is artificial intelligence utilized in studying, and how do students perceive its impact on their studies?
    - Sub-question 2 (SQ2): What social aspects are related to business students' experience of AI?
    - Sub-question 3 (SQ3) Are there any significant challenges in the alignment of the social and the technical sides of this socio-technical system, and if so, how could these be addressed in the future?

First, a look into prior research on AI, AI in higher education environment and socio-technical systems was conducted. As a result, the selection of STS theory as the framework, was justified due to the framework previously being successfully implemented in research and due to the need for further experimenting with the framework in different context expressed in the literature (Davis et al. 2014). Regarding AI use in higher education environment, it was noted that the use and knowledge regarding AI has mostly revolved around GenAI technologies.

After the look into the previous literature the methodology of this thesis was introduced. As the method a theory-driven thematic analysis was selected due to its compatibility with the existing framework and flexibility in analysis (Braun & Clarke, 2006). The analysed data was gathered with semi-structured interviews from 10 interviews with students meeting the specifications from Turku School of Economics.

Following the methodology chapter the results of the empirical study were presented. The main findings are as follows. For the six dimensions and the three external factors affecting the socio-technical system, defining themes were able to be identified in the specific case context of this thesis. Therefore, it can be said that AI appears as a socio-technical system in this context. This also means that a description of how business school students perceive AI as a socio-technical system in the context of business school studies can be identified from the results of this thesis being at the same time an answer to RQ1. So, to answer RQ1: business school students perceive AI as something that has already changed and will continue to affect their studies in all dimensions of a socio-technical system while also acknowledging that those effects are also linked with factors of the external environment. The more precise description of the system was visualised in figure 2 (chapter 5: Results) with the framework adapted from Davis et al. (2014) proposed framework. As presented in figure 2 defining themes for all six dimensions of the socio-technical system and its external aspects were able to be identified. The number of themes identified per STS dimension or external aspect varies and therefore it is worth noting that different aspects of the system have different level of effect on the perception of AI in this context. These themes were further explored in chapter 5 “Results”. After answering RQ1 the sub-questions are answered next.

To answer SQ1 regarding the utilisation of AI and students’ perception of its effect on studies the results of the empirical part of this thesis imply that mainly GenAI technologies are used but also tools utilising other AI technologies, but these are used in more specific scenarios whereas the GenAI tools are used more broadly. The students perceived the effect of using AI tools as rather small and rather than changing previous processes the AI tools have created a whole new process next to the previously existing ones. Main usages of AI tools are streamlining processes and using the tools as study buddies to help studying.

SQ2 considered the social aspects. To answer this question in brief, social aspects were found in different dimensions of the system. One of the main methods of getting information on new AI tools and learning to use them was word of mouth through social connections. AI tools were not found to affect social dynamics other than some changes in dynamics between students and teachers. However, an appreciation of socialising is still apparent when discussing the change in processes.

Challenges in the alignment of the social and technical aspects of the system were identified and therefore an answer to SQ3 was also found. The main challenge found was being technically able to use AI tools but lacking knowledge on the regulations on how to use them within the rules. This

was found to lead to multiple problems such as not caring about the rules, students being too scared to use AI tools and therefore not learning to use them and the unclarity of regulations creating transparency concerns. To solve these problems in the future suggestions for clarifying the regulations were given such as e.g. teaching the proper use of AI tools and improving the guidance given by the university on the matter.

6.2 Discussion and contributions

As AI tools and especially GenAI tools are getting more and more popular in everyday use the timing of this thesis can be seen as very appropriate. The findings of this research are however quite hard to reflect on any previous research as no such combination of the STS framework by Davis et al. (2014) a case study exploring AI use in higher education context could be found. This in mind, I will reflect the findings to the literature already discussed in chapters 2 and 3.

When it comes to how AI is presented in this research and its specific context it is largely aligned with the previous literature. As AI's potential for higher education has been seen as quite significant it has also been stated that higher education environments take more time to adopt new technologies than other environments. According to the results of this research benefits can be seen on both individual student level and the level of the whole institution. Students are able to streamline their projects and therefore more focus on the important things whereas for the institution the benefits could include students in the future graduating faster. However, as mentioned it might take time for higher education environments to adapt to new technologies and this also reflects especially on the regulatory frameworks aspect of the external forces affecting the studied STS in this thesis as the regulations were found to be unclear and the information regarding them hard to find which can be seen as slow adaptation. However, the interviewees had experienced the adaptation as rather quick which would imply that either other environments adapt even slower or that this part of the previous literature needs revisiting.

Regarding the framework used this thesis also answers to the call for new implementations of the framework by Davis et al. (2014). It was proven to be usable in this context by providing framework around which depict the state of AI in the case context. On the other hand, the Davis et al. (2014) suggest also researching the relationships between the different dimensions of the socio-technical system which was not done in this case. The decision to leave this out was purposely done as the framework already paints a very detailed picture of the state of the system at hand. However, it is one of the main recommendations for future studies to revisit this topic to address this question as well. Also, as the data of this research was purposely gathered from students that had

experienced studying both before and after the AI tools becoming mainstream, could it be seen as quite beneficial to conduct similar research with younger students who have begun their studies later and therefore have been able to use AI tools throughout their studies. Also, by recreating this kind of research in different environments like other Finnish business schools more data on the accuracy of this study could be gathered and also more generalisable conclusions could be done.

6.3 Limitations

As is in most cases this thesis has its own limitations. First, the research was conducted by only one researcher which of course makes the thesis prone to subjectivity. Even though my status as a business school student is also a credibility increasing factor, it also takes the possibility of subjectivity even further as both the interviewer and the interviewees represent the same group. However, as was stated in the methodology chapter the possible actions to avoid this have been taken. Second, the research describes AI as a socio-technical system only in the case context as there is no such research to compare it with the accuracy of the results may have been affected by some local bias or other unexpected factor. Also, what might be limiting the research is the fact that the framework used have not been implemented in such case before and therefore no previous studies were found that would have given guidance on how to conduct this thesis in an already proven way.

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Appendices

Appendix 1 Interview invitation

Hyvä lukija,

Sinut on kutsuttu osallistumaan haastatteluun, josta kerättyä data käytetään Pro Gradu-tutkielmani empiiriseen osuuteen. Tutkielmani tarkastelee tekoälyä sosio-teknisenä järjestelmänä Turun kauppakorkeakoulun ympäristössä. Tutkimuksen tavoitteena on tarkastella tekoälyn nykytilaa opiskelijoiden näkökulmasta, heidän kokemuksiensa perusteella. Haastattelu kestää noin 60 minuuttia, jotta kaikki tarvittavat aiheet ehditään käsitellä. Osallistuminen ei vaadi aiempaa tietämystä tai valmistautumista. Tutkielma toteutetaan toimeksiantona Suomen Ekonomit ry:lle.

Haastatteluista kerätty data käsitellään luottamuksellisesti, eikä sitä tai siitä tehtyjä päätelmiä voida jälkikäteen yhdistää osallistujaan. Lisäksi tutkimuksessa noudatetaan Turun yliopiston eettisiä ohjeita. Kerätty data on osallistujan halutessa tämän saatavilla, ja kaikki data tuhotaan tutkielman valmistumisen jälkeen, jolloin sen säilyttämiselle ei ole enää tarvetta.

Haastatteluun osallistuminen edellyttää hyväksyntääsi näille ehdoille sekä suostumuksesi siihen, että haastattelu nauhoitetaan ja litteroidaan aineiston keräämistä varten. Voit antaa hyväksyntäsi vastaamalla tähän viestiin.

Ystävällisin terveisin,

Lauri Kemppainen

Appendix 2 interview form

Haastattelulomake puolistrukturoituihin haastatteluihin

Arvioitu kesto: ~1 tunti

1 Johdanto ja suostumus

1.1 Johdanto:

1.1.1 Lyhyt selitys haastattelun ja tutkimuksen tarkoituksesta.

1.1.2 Painota tietojen luottamuksellisuutta ja anonymiteettiä.

1.2 Suostumus:

1.2.1 Suostumus kysytty haastattelukutsun yhteydessä.

1.2.2 Varmista lupa haastattelun tallentamiseen.

2 Taustatiedot

2.1 Voitko kertoa hieman itsestäsi (esim. opiskeluvuosi, pääaine ja kokemukset tekoälytyökalujen käytöstä opiskelussa)?

2.2 Millainen yleinen mielipiteesi/kokemuksesi on tekoälystä opiskelun työkaluna?

3 Kysymykset

3.1 . Teknologia

3.1.1 Mitä tekoälytyökaluja käytät?

3.1.2 Milloin olet ottanut tekoälytyökalut käyttöön?

3.1.3 Miten koet näiden työkalujen tekniset ominaisuudet (esim. käytettävyys, tarkkuus)?

3.1.4 Miten päätät, mitä tekoälytyökaluja käytät eri tehtävissä?

3.2 Infrastruktuuri

3.2.1 Miten riittävästi koet nykyisen teknologisen infrastruktuurin (esim. Wi-Fi, laitteet, ohjelmistojen saatavuus) tukevan tekoälytyökalujen tehokasta käyttöä opiskelussa?

3.2.2 Oletko kohdannut rajoituksia liittyen pääsyyn, yhteensopivuuteen tai institutionaaliseen tukeen tekoälytyökaluille?

3.2.3 Minkälaisena näet yliopiston roolin teknologisen puolen tukemisessa tekoälytyökalujen käyttöön liittyen?

3.3 Prosessit:

3.3.1 Mihin yleensä käytät tekoälytyökaluja opiskeluun liittyen (esim. kirjoittaminen, tutkimus, analyysi)?

3.3.2 Oletko havainnut muutoksia tavoissasi suorittaa tai hallita tehtäviä tekoälyn käyttöönoton jälkeen, jos kyllä voitko kuvailla, millaisia?

3.3.3 Miten koet tekoälytyökalujen vaikuttaneen henkilökohtaisiin opiskelutottumuksiisi?

3.3.4 Miten koet tekoälytyökalujen vaikuttaneen henkilökohtaisiin taitoihisi (Kriittinen ajattelu, luovuus, kommunikaatio, esiintymistaidot)

3.4 Tavoitteet

3.4.1 Mitä tavoittelet tekoälytyökaluja käyttäessäsi (esim. tehokkuuden parantaminen, ymmärryksen syventäminen, työmäärän vähentäminen)?

3.4.2 Miten koet tekoälytyökalujen vaikuttavan substanssiosaamisesi kehitykseen? (ajankäyttö, tehokkuus)

3.4.3 Miten koet tekoälytyökalujen vaikuttavan valmistumiseesi (positiivisia tai negatiivisia vaikutuksia, aikataulu, osaaminen valmistuttua)?

3.5 Ihmiset

3.5.1 Millaisena näet tekoälyn roolin yhteistyössä, kuten ryhmätöissä tai keskusteluissaryhmissä?

3.5.2 Miten koet tekoälytyökalujen vaikuttavan omaan toimintaasi ryhmätyötilanteissa?

3.5.3 Oletko havainnut tekoälyn käytön vaikuttaneen opiskelijoiden keskinäisiin ja/tai opiskelijoiden ja opettajien välisiin dynamiikkoihin?

3.6 Kulttuuri

3.6.1 Kuinka kuvailisit yleistä asennetta tekoälyn käyttöä kohtaan opinnoissa Turun kauppakorkeakoulussa?

3.6.2 Koetko tässä ympäristössä vallitsevan normeja tai eettisiä näkökulmia liittyen tekoälyn käyttöön?
3.6.3 Koetko painetta käyttää tai olla käyttämättä tekoälytyökaluja tietyissä tilanteissa?

3.7 Regulatiivinen viitekehys:
3.7.1 Oletko tietoinen mistään institutionaalisista säännöistä tai ohjeista tekoälytyökalujen käytöstä opiskelussa?
3.7.2 Mitä mieltä olet olemassa olevista säännöistä tai niiden puutteesta?

3.8 Taloudelliset tekijät:
3.8.1 Ovatko tekoälytyökalut mielestäsi taloudellisesti saavutettavissa opiskelijoille?
3.8.2 Oletko kohdannut tilanteita, joissa kustannukset ovat vaikuttaneet tekoälytyökalujen valintaan?

3.9 Sidosryhmät:
3.9.1 Millaisessa roolissa mielestäsi yliopiston ja opettajien tulisi olla tekoälyn käytön ohjaamisessa?
3.9.2 Onko muita sidosryhmiä, joiden kokisit olevan tärkeää vaikuttaa tekoälyn käytön ohjaamiseen?
3.9.3 Miten näiden ryhmien mielestäsi tulisi vaikuttaa tekoälyn käyttöön opiskelussa?

3.10 Muut kysymykset:
3.10.1 Miten näet tekoälyn roolin korkeakoulutuksessa kehittyvän seuraavan 5–10 vuoden aikana? (Positiivisia, negatiivisia vai molempia vaikutuksia)
3.10.2 Miten näet tekoälyn lisääntyneen käytön eettisestä näkökulmasta ajateltuna? (akateeminen integriteetti, plagiointi)
3.10.3 Onko jotain muuta, mitä haluaisit jakaa kokemuksistasi tekoälyn käytössä opiskelussa?

Appendix 3 data management plan

Research data management plan

1. Research data

Research data type	Contains personal details/information*	I will gather/produce the data myself	Someone else has gathered/produced the data	Other notes
Data type 1: *Interviews*		x		
Data type 2: *Prior literature*			x	

* Personal details/information are all information based on which a person can be identified directly or indirectly, for example by connecting a specific piece of data to another, which makes identification

possible. For more information about what data is considered personal go to the Office of the Finnish Data Protection Ombudsman's website

2. Processing personal data in research

I will prepare a Data Protection Notice** and give it to the research participants before collecting data ☐

The controller** for the personal details is the student themself ☐ the university ☐

My data does not contain any personal data ☒

** More information at the university's intranet page, Data Protection Guideline for Thesis Research

3. Permissions and rights related to the use of data

3.1. Self-collected data

Necessary permissions and how they are acquired
Data type 1: Interviewees agreed to participate in research beforehand and double checked at the beginning of the interviews.

3.2 Data collected by someone else

Data type 2: No permissions required. Necessary citations made.

4. Storing the data during the research process

In the university's network drive ☐

In the university-provided Seafile Cloud Service ☐

Other location, please specify: On my personal computer ☒

5. Documenting the data and metadata

5.1 Data documentation

To document the data, I will use:

A field/research journal ☐

A separate document where I will record the main points of the data, such as changes made, phases of analysis, and significance of variables ☒

A readme file linked to the data that describes the main points of the data ☐

Other, please specify: ☐

5.2 Data arrangement and integrity

I will keep the original data files separate from the data I am using in the research process, so that I can always revert back to the original, if need be. ☒

Version control: I will plan before starting the research how I will name the different data versions, and I will adhere to the plan consistently. ☒

I recognise the life span of the data from the beginning of the research and am already prepared for situations, where the data can alter unnoticed, for example while recording, transcribing, downloading, or in data conversions from one file format to another, etc. ☒

5.3 Metadata

I will save my data into an archive or a repository that will take care of the metadata for me. ☐

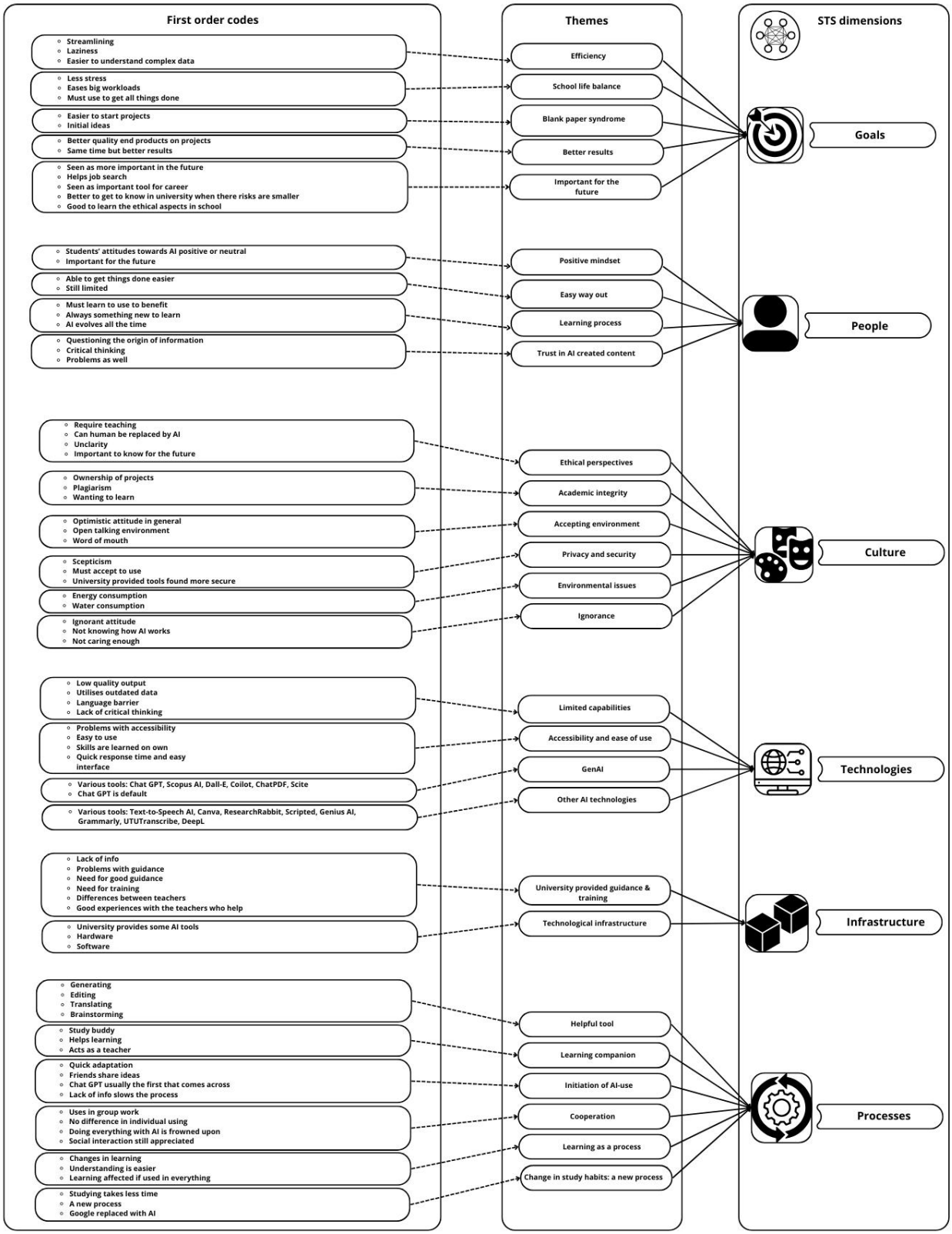
I will have to create the metadata myself, because the archive/repository where I am uploading the data requires it. ☐

I will not store my data into a public archive/repository, and therefore I will not need to create any metadata. ☒

6. Data after completing the research

I will destroy all data immediately after completion, because: The most important pieces of data have been summarised in the findings of the thesis.

Appendix 4 Socio-technical systems dimensions results



Appendix 5 External aspects results