The impact of artificial intelligence amongst higher education students

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Abstract

This thesis is about how artificial intelligence is impacting students in universities and universities of applied sciences. Artificial intelligence has developed a lot in the past years, each day loads of new tools and software are released. It has been taken into use also among teachers and students and can offer great advantages in education. The idea of the topic came from articles and Tik Tok videos on students using ChatGPT.

The aim of the theoretical framework was to find out how the use of artificial intelligence can benefit students, and what tools can be used for educational purposes. Also, what possible risks and ethical issues exist. The theoretical framework first describes artificial intelligence in general, after which it focuses on artificial intelligence in education. Different artificial intelligence tools and their usage are introduced. Also, the advantages and disadvantages of using them in education are included.

A mixed method research was applied to the research, and a survey was chosen as the method to collect primary data, after considering the possible risks of the method. By conducting a survey, the aim was to find out how students perceive using artificial intelligence in their learning experience, and whether it has affected their learning outcomes. Also, whether the students think that the use of artificial intelligence can affect the future available professions in their study field.

The research showed that the most used artificial intelligence tool for studies is ChatGPT. The students learning experiences with artificial intelligence are rather positive. And the learning outcomes with artificial intelligence are mostly positive or neutral, but some do think artificial intelligence affects their skills and outcomes. Most students think artificial intelligence can replace a part of the future jobs in their field or affect them to a certain extent. While hospitality students think their future jobs cannot be replaced, information technology students think the opposite.

Key words
Artificial intelligence, education, computer science, machine learning, natural language processing
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1 Introduction

Artificial intelligence (AI) has grown to be something that’s a part of our daily lives, often in ways we don’t even realize it. It makes our lives easier and solves problems we face. Everything from self-driving cars, smart home devices, medical diagnosis to even news anchors created by AI. Before most of us knew what artificial intelligence is, we were introduced to the concept in various movies, in the form of artificial intelligence robots. And for some the intelligence can be hard to grasp.

AI is also becoming more and more common in education, with different tools students and teachers can use for their advantage. AI is reforming the methods students use for studying. Different study fields can benefit from AI tools in different ways. These tools can save time, function as a tutor, help dyslexic students, assist to write code, and it can even adjust to the student’s learning style. This thesis covers also what possible disadvantages and risks there are of AI in education, including ethical considerations.

1.1 Research questions and objectives

This thesis aims to answer the following research questions and their sub-questions:

− How can artificial intelligence be applied in education to benefit the students?
  o What tools can be used for educational purposes?
  o What are the benefits of using these tools?
  o What are the ways artificial intelligence can be used in specific study fields?
− How do students perceive the use of artificial intelligence in their learning experience?
  o What is their attitude towards usage of artificial intelligence in studies?
  o How do they compare their learning experience with vs without AI?
− Does the use of artificial intelligence in studies impact the students’ learning outcomes, and is there a chance of it affecting future career prospects?
  o In what way does AI impact the learning outcomes (positive/negative)?
  o Do they consider that the use of AI can affect their future career prospects?

The objective of the thesis is to be more aware of artificial intelligence in education and how it is affecting education as it is a part of our daily lives now. The objective of the survey is to get current data on students’ experience and opinions, as artificial intelligence has become more common amongst students for educational purposes since the release of the natural language processing tool ChatGPT. The concepts have been explained in the theoretical framework.
1.2 Benefits of the thesis

The thesis is beneficial for anybody interested in the use of artificial intelligence in education, also for people interested in artificial intelligence in general. For instance, students, teachers, or anyone interested to learn more about the topic. The thesis outcome is meant for learning about artificial intelligence, how it is being used in education, and looking at how it impacts students’ overall learning outcomes and experience. The thesis can also be utilized by the reader to get new ideas and find out about new tools they could apply and benefit from in studies, or for any other purpose.

1.3 The structure of the thesis

The thesis structure consists of 6 chapters, which are explained below.

![Thesis structure diagram](image)

Figure 1. Thesis structure

The first chapter is an introduction to the thesis, where the research questions, objectives, and benefits of the thesis are introduced. Also, the structure of the thesis is explained. The second and third chapters are the theoretical framework of the thesis. Chapter 2 is about artificial intelligence in general, history behind it, how AI works, the different types of AI, and its classification. Whereas chapter 3 focuses on artificial intelligence in education. The advantages and disadvantages of using AI in education are discussed, the most useful tools are introduced, and ethics of AI in education are included. Chapter 4 describes the research process by introducing existing research methods and discussing which methods have been chosen for this thesis. It also covers how data has been collected and analysed. And research reliability, validity, and ethics are presented. Chapter 5 includes survey results and its analysis. Lastly, chapter 6 includes a conclusion about the research and self-assessment. Chapter 6 is followed by sources and appendix. (Figure 1.)
2 Artificial Intelligence

2.1 What is artificial intelligence?

Firstly, to be able to even talk about this topic, we need to understand what artificial intelligence (AI) is. The word intelligence can be defined by the following activities: being able to learn new information, being able to manipulate information in different ways, understand and validate the manipulated information, see relationships between data, considering meanings, and being able to differ facts from beliefs. This is done by creating algorithms and providing data for a computer. (Mueller & Massaron 2018, 8-12.) Based on this definition, artificial intelligence could be explained as intelligence that is reached in an artificial way, something that does not exist naturally, but is created as a copy of something that already exists, in this case the human intelligence.

In the Encyclopedia Britannica artificial intelligence is described as the capability of a computer or a computer-controlled robot to do things that normally require human intelligence and judgement, things that previously could have been done only by humans. Since it learns from previous mistakes, AI can reduce human error. It can also make decisions that are unbiased, whereas a human might be influenced by something in their decision. (Copeland 17 April 2023.)

2.2 History of artificial intelligence

The beginning of artificial intelligence dates to 1950, when the technology behind it was invented by Alan Turing, a computer pioneer, who had already previously talked about the concept of an intelligent machine. In year 1950 Alan Turing did a test known as the Turing Test, to see whether a computer can think like a human. This test includes a computer, human interrogator, and a human respondent. The interrogator asks any type of questions to the computer and the respondent, and based on the answers must then guess which is the computer. The human respondent must try to help the interrogator make a right guess, but the computer is allowed to answer in any way it is capable to not be identified. (Copeland 17 April 2023.)

In 1955 the three researchers Allen Newell, Cliff Shaw, and Herbert A. Simon, designed Logic Theorist. Logic Theorist is a computer program with the purpose to mimic human problem-solving skills. Many people consider this the first program done within artificial intelligence. However, it is not until 1956 when the word ‘artificial intelligence’ was coined by John McCarthy during the DSR-PAI conference at Dartmouth College campus, where a bunch of top researchers participated. This event is what started the active research on AI as a field, although they were not able to completely agree on standard methods for it. During the following decades artificial intelligence developed, e.g., ELIZA was invented by Joseph Weizenbaum, a chatbot that was able to hold a conversation
with humans. During 1970s expert systems appeared, this term is not being used anymore, but the expert systems still exist, for instance a grammar check which is based on rules. Expert systems were made to make decisions in a way of a human expert, through either a rule based, frame based, or logic-based process. In the 1990s to 2000s AI really flourished and hit its goals. A remarkable event happened in 1997 when the chess champion Gary Kasparov lost a chess game to a computer program, called IBM Deep Blue. (Anyoha 28 August 2017; Mueller & Massaron 2018, 16.)

Figure 2. AI timeline 2010s (ICBA 2018)

There have been a lot of major achievements during the 2010s. For instance, personal assistant Siri that was released by Apple for their devices, and Tesla that created their autopilot based on AI. (Figure 2.) Nowadays, there are hundreds of new tools based on artificial intelligence released daily, developed to perform different tasks. The most recent huge developments of AI are the chatbots ChatGPT by OpenAI, translator program DeepL, and Bard by Google.

2.3 How does artificial intelligence work?

To understand artificial intelligence on a deeper level, it is important to also understand how it works. AI learns from experience, based on combining huge amounts of data with intelligent, iterative processing algorithms. By the system analyzing the data it then learns from recognized patterns automatically. With every time the system processes data it recognizes its performance and develops to become more intelligent at the task it is developed to perform. AI can be trained very quickly, as it does not need downtime, and can perform millions of tasks at an incredible speed. It is important to understand that AI is a whole field of science, not just a program. (CSU Global 9 August 2021.) However, this explanation of how artificial intelligence works is very general, and we need to go more into the different components of AI to understand how each of them work.
2.4 Artificial intelligence fields

The field of artificial intelligence can be divided into several components: machine learning, deep learning, neural networks, natural language processing, computer vision, and cognitive computing. It is important to understand these components, also called as sub-fields, when implementing AI.

In machine learning the computer learns by receiving data and learning from it automatically to get better at a certain task, which it is often not specially programmed for, so it learns and improves based on experience. During the process the AI looks for patterns in data to find insights and develop for the future. Machine learning is used in for instance image and voice recognition. It can recognize the objects displayed in an image and categorize them. (CSU Global 9 August 2021.)

Deep learning is a type of machine learning; it gets smarter and better by processing data. This component uses neural networks, these are like neurons we have in our brains. By using the neural networks, it tries to function like the human brain; find relations between data, make a guess based on available information, and try to determine which the better result is. A practical example of deep learning are virtual assistants, like Siri or Alexa. (CSU Global 9 August 2021.)

Neural network is also in fact a component of artificial intelligence. This method analyzes data repeatedly to find connections and give meaning to data that is undefined. And as mentioned before the neurons mimic neurons found in the human brain. (CSU Global 9 August 2021.)

Natural language processing is a crucial component in AI that in any way interacts with humans. It’s what allows the computer to identify, analyze and understand spoken and written human language. It is certain that most people use natural language processing in some form daily. Some examples include spelling check, translators, or chatbots. (CSU Global 9 August 2021.)

Computer vision is the ability to recognize and understand data in a visual form, such as an image or a video. It can classify certain objects in an image and categorize them. Self-driving cars use computer vision detect and recognize objects around them. Also, facial recognition is an example of computer vision. (CSU Global 9 August 2021.)

Lastly, cognitive computing technology is designed to mimic the human brain, so a computer can help people perform challenging tasks in a way a human would, it can solve situations where the answer is uncertain. It can be applied in sentiment analysis, where also an actual human brain can in some cases be uncertain of the correct answer. (CSU Global 9 August 2021.)
As shown in the figure 3, we can see how AI has used the component, computer vision, to recognize certain objects in the image, it even classifies the objects into categories, e.g., all persons are marked in green.

2.5 Classification of artificial intelligence

It is possible to differentiate intelligence between strong AI and weak AI. Strong AI is something that exists only in a theoretical form for now, it is something that is capable to solve problems it hasn’t faced before, in a way that humans can. It is a goal of many AI experts to create a computer this intelligent, however, this could come with a potential risk of it being too powerful. As mentioned earlier, this is what we have seen in movies as robots. Weak AI can also be called specialized AI, as it is focused to performed only certain tasks, and has a specific problem it is supposed to solve. Some examples include Siri, autopilot, chatbots, and Netflix recommendations. (Schroer 19 September 2022.)

Artificial intelligence can also be put into four different categories depending on its capabilities: reactive machines, limited memory, theory of mind, and self-aware AI. Reactive machines are the most basic type of AI, they have no memory and perform only the specific tasks they are programmed for. In the same situations the outcome will always be the same. The IBM Deep Blue chess program and Netflix recommendations are examples of reactive machine AI. Limited memory which is the second category was developed based on reactive AI.

Limited memory AI can learn from the data it receives and become smarter the more historical data there is. It is programmed to mimic how the neurons in human brains work. It observes previous situations or things and learns from them, and then combines that with present data which leads to
the actions the AI will take. Self-driving cars observe things around them such as how other cars move, their speed, etc. This is an example of limited memory, and helps the self-driving car adjust based on situation.

While reactive machine and limited memory AI are existing, theory of mind, and self-aware AI are yet to be created. The idea of theory of mind is to build a system that is capable to understand thoughts and emotions, and act based on those emotions when interacting with a human. The goal of theory of mind is to imitate human relationships, and how different things affect one another.

Self-awareness is the most majestic and advanced type of AI, it will most likely not exist in the nearest future, as there is still so much to learn about the function of human brain before that. The idea of self-awareness is that the AI would be aware of itself, express their feelings and needs, and predict other’s feelings or needs. It is not certain that this type of AI will ever be achieved. (Coursera 2023.)
3 Artificial intelligence in education

With artificial intelligence being as big as it is today, it is natural it appears in different fields, even education. It can have huge advantages and it can solve the biggest challenges that exist in education, of course there are also risks with this, these all have been discussed further in the text. There are mixed reactions to using AI in education, some are excited about the opportunities it brings, while some are worried about the possible risks.

University of Helsinki has published instructions on their website where they encourage using artificial intelligence in teaching and studying. In teaching, the course coordinators can themselves decide how artificial intelligence can be used in a course, however, it cannot be used for maturity tests. Teachers are allowed to use AI when creating assignments, but if an assignment is easily solved by AI, it should not affect the course grade much. The instructions also include ways how to deepen the students learning and gives examples of assignments that might not be possible to solve by AI. The teachers also must instruct the students on how to use AI for assignments, for instance a whole text generated by AI cannot be presented as somebody’s own, as that would result in plagiarism. These instructions focus mostly on language models such as ChatGPT, Bard, DeepL, and similar. It is also warned that these language models are not typically able to produce a high-quality text on a very specific topic. (University of Helsinki 2023a; University of Helsinki 2023b.) The university is preparing students and teachers for the future of AI and allowing them to use it to their advantage.

On the internet you can find many examples of universities that support artificial intelligence, such as above-mentioned University of Helsinki. A lot of schools are in fear of fraud and plagiarism, so they have banned ChatGPT, it is allowed only if transparent referencing of using an AI tool is done. Sciences Po, a top university in France, banned ChatGPT and other AI tools in text production without transparent referencing, or unless there is a special course task that is supervised by the educator. Not following these guidelines and not clearly presenting the use of an AI tool in a text can result in expulsion from the university, or even from the whole French higher education. (Sciences Po 2023.) By having a system like Sciences Po, universities can ensure students are not cheating, and are transparent about using AI tools in their assignments. This also teaches the students how to reference properly.

3.1 Artificial intelligence tools in education and their usage

In this chapter some artificial intelligence tools that can be used in education will be presented. There are plenty of tools students can benefit from in their studies but might not even know about.
Firstly, a tool that has been created by 3AMK-universities for their students, Careerbot. 3AMK is a collaboration between three universities of applied sciences in Finland: Haaga-Helia, Laurea, and Metropolia. Careerbot is a trained AI language model that is developed to help students build their skill profiles, search jobs, find courses to develop and improve skills, and find topics for their research or thesis. By using the skills profile feature students can create profiles that are based on their current skills, reskilling, and skills they want to have in the future. The current skill profile can be built for instance by using a current CV or the studied courses at 3AMK. Using the current skill profile students can then look for job ads on the platform. They can also detect what skills they are missing from their dream job and recognize what skills they need to develop. It is then possible to search amongst 3AMK course offering to find a course that teaches the missing skill. To find topics for thesis and research, Careerbot allows a keyword search and shows trends of these keywords. (3AMK s.a.) Careerbot is a useful tool that can enhance the student career and study planning.

ChatGPT is a natural language processing tool developed by OpenAI, officially released in November 2022. The tool works like a chatbot and generates text based on user input. It has been designed to give intelligent responses to anything the user writes or asks. Just two months after launching the tool hit 100 million users. At times the tool can reach maximum capacity of users, so you might have to wait to get to use it. While ChatGPT is a free tool, they have also developed a paid subscription of 20 dollars per month. This subscription allows a user to use the tool even when user capacity is reached and offers faster response speed. (Halaweh 2023,1.)

This technology has the potential to revolutionize various activities in educational settings, such as searching for information, answering specific questions, enquiring about any topic; engaging in open conversations and discussions; writing and editing reports and essays; generating software codes; providing tutoring by explaining codes; providing samples of data for databases and analysis; and solving mathematical calculations and statistical analysis, as well as translating texts to other languages. (Halaweh 2023,1.)

ChatGPT clearly offers loads of ways to use it for educational purposes. Bing AI chat is a similar tool that can also be used for the same purposes in education. Another tool is the Google Bard; however, it is yet to be released in some countries, including Finland.

Course Hero’s developed QuillBot paraphrasing tool uses AI to enhance writing in multiple ways. It is a free tool, although it also has a paid subscription with more features available. The tool offers to reword your written text in any way you like. It can improve the language and grammar, rewrite the text to be more formal or simple, it can also make the text creative, and make it either longer or shorter. QuillBot improves the vocabulary, tone, fluency, and style used. It can also adapt to different English dialects. It allows the user to find synonyms for any word, while also offering plagiarism check, translator, and citation functions. (QuillBot 2023.) QuillBot can be used to produce texts of
high quality. It is quite like the AI-powered Grammarly tool which is more commonly used. Both tools can offer great advantage to the students, and can also teach them new synonyms, grammar, and ways to rephrase their sentences.

Speechify is an example of an AI-powered text-to-speech tool. It is accessible and can benefit for instance students with dyslexia, or vision impairment. It is also a great tool to use for students that learn better by listening to an audio, this improves the learning experience and outcomes. When learning a new language, a text-to-speech tool can be beneficial to hear the pronunciation of words. Another way to use it is to let the tool proofread your text out loud, by re-reading the text you have written it is easy to miss things, but by hearing it out loud there are higher chances of noticing if e.g., the flow of the text is bad. Using this tool allows multitasking, as you can listen to study material at the same time as going on a walk or taking notes. (Weitzman 27 June 2022.)

Speech-to-text is the opposite of text-to-speech, a tool offered by for example Speechnotes, Google, or Apple with its built-in dictation in all their devices that works like speech-to-text. These tools recognize the audio and transcript it into a text version. Speech-to-text can be used to transcript a lecture, this is especially beneficial for students that have hearing problems, non-native speakers who do not understand everything being said, or who have a hard time taking notes. When conducting an interview for research or thesis, students can use speech-to-text to transcribe the interview, which can save them tons of time by not having to transcribe manually. Additionally, the function can be used to create subtitles for videos, assess pronunciation skills when learning a new language, and produce text for essays or reports. (Doty 29 July 2022.)

A tool that especially students studying programming can benefit from is GitHub Copilot. It is available for free by signing up as a student or a teacher. GitHub Copilot is an AI pair programmer, it can auto-complete comments and code based on what the user already has written. The user can also write what they want to program, and the tool will suggest a code. It can recognize the error messages that appear, give in-depth explanations to the user, and suggest how to fix bugs. (Dohmke 22 March 2023.)

Graphic design students can benefit from using AI image generator tools. Image generators can create a beautiful image based on a text description the user provides. There’s a huge number of tools to choose from, e.g., Picsart’s image generator, or DALL·E 2 by OpenAI.

Synthesia is a video generator tool that can create professional videos based on the text-to-video function, with no video editing skills required from the user. It can create videos in 120 languages,
with over 125 different avatars to choose from, also allowing the ability to clone your own voice. (Synthesia 2023.) Synthesia is just one of the various video generator tools on the internet. These tools can be used for instance for course assignments, and presentations. The tool can also be used by teachers to generate course material.

Additionally, the DeepL AI translator, that can translate text in 31 languages with high-quality results. DeepL can also translate whole PDF, Word, and PowerPoint files. The tool can either be used online on their website or by downloading to any device. By using the free version of the tool there are limitations on how much you can translate monthly, there are also several subscription types to choose from. DeepL has released a beta version of DeepL Write, which functions as a grammar, punctuation, and rephrasing tool. (DeepL s.a.) DeepL can be used as an alternative to Google Translate.

Furthermore, Google announced the release of their new large language model PaLM 2 in May 2023. PaLM 2 is advanced in multilingualism, reasoning, and coding. It is being used in various tools, such as Google Bard to expand its language capabilities, and coding. Med-PaLM 2, a tool that gives medical insights, is now also using the language model. (Ghahramani 10 May 2023.) PaLM 2 advancements make Google Bard a valuable tool to use for students who are learning to code. Healthcare students can have a benefit from using the Med-PaLM 2 tool to get answers to different medical questions.

There are other tools students can benefit from in their learning experience, such as different AI productivity or organizing tools, and music generators.

3.2 Advantages vs disadvantages of artificial intelligence in education

The use of artificial intelligence in education can have some definite advantages by changing the way students learn and teachers teach. It is undeniable that it also has its disadvantages and risks that come with it. The author has used ChatGPT language model to find out the most common advantages and disadvantages of artificial intelligence in education.

There are many potential advantages of using artificial intelligence (AI) in education, including:

1. Personalized learning: AI systems can be used to create personalized learning experiences for students. For example, an AI system might be able to analyze a student’s performance on assignments and tests to identify areas where they are struggling and provide targeted feedback and support.

2. Improved efficiency: AI systems can help teachers and administrators be more efficient by automating routine tasks such as grading, scheduling, and data analysis. This can free up
teachers' time to focus on more important tasks, such as lesson planning and working with students.

3. Enhanced student engagement: AI systems can be used to create engaging learning experiences that are tailored to individual students' interests and needs. For example, an AI system might be able to recommend books or videos that a student is likely to find interesting or provide interactive simulations that help bring difficult concepts to life.

4. Greater accessibility: AI systems can help make education more accessible to students with disabilities or other special needs. For example, an AI-powered text-to-speech system can help students with visual impairments to read digital materials, while speech recognition technology can help students with physical disabilities to participate in classroom discussions.

5. Improved outcomes: By providing personalized feedback and support, AI systems have the potential to improve student outcomes. For example, an AI system might be able to identify students who are at risk of falling behind and provide them with extra support to help them catch up.

It is important to note that AI should not replace teachers or human interaction in education, but rather be used as a tool to enhance the learning experience for students and support the work of educators. (OpenAI 2023.)

Personalized learning is a really great feature, it recognizes the area where a student needs support and helps them in different ways. This is something that teachers often do not have time for, so by adapting to each student's needs, the AI supports the teachers, and helps students to learn more efficiently. The next point, improved efficiency, is all about supporting teachers and students. By automating tasks, the teachers can spend more time on e.g., helping students and therefore being able to focus on their learning experience more deeply. AI systems that are created to enhance student engagement based on their interests and needs can be motivating for the students, as they can be learning at the same time, they do something they enjoy, for instance playing a game. Accessibility is a very important feature for students with disabilities or special needs, also for students who are just in need of a different learning method. There are for instance text-to-speech and speech-to-text AI systems that improve the accessibility of education. The last point is connected to the personalized learning, that leads to improved learning outcomes.

Besides these advantages there are a couple more worth mentioning. With the use of artificial intelligence students can receive answers to questions instantly and get help with their tasks, without having to wait for up to a few days for an answer. This is also an advantage to students who are shy to ask questions, or who fear that their question is going to be judged. This makes the study process more efficient and saves both the students' and educators' time. There are even AI tutoring systems that can help students in their learning and give feedback. AI can give instant feedback which can promote learning as the topic is still on their mind. To improve the previously mentioned engagement also augmented and virtual reality can be used, there could be course tasks that are implemented in a virtual reality environment. (Hooper 23 February 2023.) Artificial
intelligence can also make it easier to find different information, summarize long texts, check spelling, check plagiarism, and translate things.

Here are the disadvantages ChatGPT found on artificial intelligence in education:

While there are many potential benefits of using artificial intelligence (AI) in education, there are also some potential disadvantages to consider. Here are a few examples:

1. Bias and discrimination: AI systems can sometimes perpetuate or amplify existing biases and discrimination. For example, if an AI system is trained on data that is biased in some way (e.g., if it is trained on data that reflects gender or racial stereotypes), it may make biased or discriminatory decisions.

2. Overreliance on technology: In some cases, the use of AI in education could lead to an overreliance on technology. This could mean that students are less likely to develop important skills like critical thinking, problem-solving, and collaboration because they are relying on technology to do the work for them.

3. Lack of human interaction: AI systems may not be able to replicate the value of human interaction in education. For example, a student who is struggling with a difficult concept may benefit from having a teacher explain it to them in person, rather than relying on an AI system to provide an explanation.

4. Cost: Implementing AI systems in education can be expensive, and many schools and universities may not have the resources to invest in these technologies. This could lead to a widening gap between schools that can afford to use AI and those that cannot.

5. Privacy and security concerns: AI systems in education may collect sensitive student data, which could be vulnerable to security breaches or misuse. This could lead to privacy violations and other potential harms.

It is important to carefully consider these and other potential disadvantages of AI in education when deciding whether and how to use these technologies in the classroom. (OpenAI 2023.)

Bias and discrimination are a major risk when using artificial intelligence for education, especially when trying to promote equality at schools. For instance, an AI system could wrongfully choose a female student over a male student because of its’ algorithm. Addiction and relying too much on AI technology is a risk that is very likely to happen. By always being able to solve problems instantly with the help of AI, the student is not anymore thinking by themselves, and therefore their problem-solving skills could be affected. Critical thinking and collaboration can also be affected, as the computer can give information for them, then there is no need to collaborate with anyone else. A student can become addicted to artificial intelligence technology and whenever there is an obstacle, they will immediately turn to an AI tool instead of thinking about it. There are a lot of students who learn better from another person explaining it to them, an AI system might not always be able to explain something. The lack of human interaction could also lead to worse communication skills, which are critical in life. AI provides an answer that is straightforward with no need to have a discussion, whereas in a human interaction a student would possibly discuss the topic and ask questions. The disadvantage of cost can affect not just the schools, but also students. Not everyone can
afford to buy a laptop or use an AI tool of cost, this leads to a further gap between students. The last point brought up is privacy and security concerns.

3.3 Ethics of artificial intelligence for educational purposes

Ethics need to be considered when using artificial intelligence in education. The use of AI includes different potential risks with some of them mentioned below.

Privacy is possibly the biggest ethical problem of artificial intelligence. Violations of privacy typically happen when too much personal information is exposed online. Although there are laws and standards in place to protect this personal information, people are still concerned due to the AI-based tech companies that have violated these laws. To deal with these worries, the AI systems ask for permission to access personal information. The issue is that many people give access to their personal information without knowing or realizing how much data they are sharing with the AI system. If an AI system is required to be used by the student in their education, it leaves them with no other choice than to consent the AI system to access their personal information. (Akgun & Greenhow 2022.) Artificial intelligence tools could be required to use for instance as a part of a course, this can become problematic as the student is not given a choice to whether they would want to share their personal information. In this case it can become an issue of everyone not being treated equally, or even a student getting a lower grade due to not doing the required course content.

Surveillance is another ethical problem; it means that the system can track the actions and preferences of the user, and by doing that predict future actions and choices the user is going to make. It can be a good thing to monitor student activities and make sure nothing dangerous is occurring like cyberbullying, but it is affecting the student's privacy. Surveillance of the student online can make them feel unsafe, have a fear of expressing their thoughts, and reduce their participation in activities. The prediction about the user’s future actions and choices is also connected to autonomy issues. This means that the student or teacher has less freedom to make own choices and it can threaten their autonomy. The risk is also that the prediction can carry on with existing bias and prejudices the user has. (Akgun & Greenhow 2022.) The predictive function can affect one’s autonomy in a way that makes the person incapable of making decisions by themselves.

Additionally, bias and discrimination are also a part of the risks. Artificial intelligence systems can contain biases and discrimination in their machine learning models. Gender bias is one of the most recognized issues that can appear when using an AI translator between two languages where one is more gender-specific than the other. It can e.g., translate ‘she is a doctor’ to ‘he is a doctor’ in another language. Also, racial bias is a possible risk. (Akgun & Greenhow 2022.) If the AI system
uses data that has bias or discrimination in it, it can lead to the AI being biased, and making bad choices based on this data.

When using an artificial intelligence tool there is also a potential risk of the information not being reliable. For instance, when using ChatGPT we get information from the chatbot, but we do not know what sources have been used, whether the information is reliable and up to date, or whether it includes some type of bias. This could potentially be a big problem if a student or a teacher uses and learns false information. A potential risk occurs also if a teacher uses artificial intelligence to generate course material without performing any type of quality checks. The material could possibly be inaccurate or unethical. The educational institution should have guidelines in place for the teachers on this matter, and perhaps monitor whether the guidelines are being followed.

Another ethical question is how artificial intelligence can affect future jobs in the study field of the students, or the teachers’ jobs. Artificial intelligence can perform a lot of tasks that people are currently doing manually, some of them are performed even better by AI. This brings up the question whether we will rely on and start trusting in AI enough to let it do these jobs.
4 Research process

This chapter explains what research methods have been used and how they support the thesis, the methods are explained and compared to each other. The process of data collection and analysis is described in depth. Lastly, the reliability and validity of the study is presented, and ethical principles are assessed.

4.1 Research method

Data can be divided into two different categories: quantitative data, and qualitative data. Quantitative data consists often of numbers and can be displayed as charts or tables. Questions that have fixed answers such as, yes, or no, can be displayed as quantitative data. The best way to show numbers is typically in a chart. Qualitative data on the contrary cannot be displayed with numbers as it is words of emotions, ideas, etc. (Walliman 2011, 71-73.) The author has used both quantitative and qualitative data, as both data types have been possible to apply to the thesis. Quantitative data was used when analysing some of the data received from the survey. Qualitative data has been used to display the answers to survey questions without a fixed answer, as quantitative data cannot be applied to these answers. In the open-ended questions the respondents were able to express themselves freely, which has given more precise data for the thesis, however, these answers were not possible to show as charts.

A research method not mentioned in the previous source is mixed method research, which is the actual name of the method used in the research. It is a mix of both quantitative and qualitative data. This method can give a bigger picture than using just either one of the methods, as it gives the benefits of both. (George 13 August 2021.)

Primary data is data collected by the researcher themselves. There are four types of primary data, they differ based on the way they are collected: measurement, observation, interrogation, and participation. Measurement is when data is collected in numbers, e.g., weather temperatures, exam results. Observations are collected by observing an event by watching or listening, and can often be observed with a camera, microphone, or similar. Interrogation is data that’s collected by asking people questions about things, or their opinions, this can be done through a survey or an interview. Participation is data collected by participating in an event or doing something, instead of just observing. Primary data can be difficult and time consuming to collect, however, the more primary data available, the more reliable the research is. (Walliman 2011, 70.)

Secondary data is data that is already collected by someone else and exists on the internet, or in
form of a book, newspaper, etc. Using secondary data requires to check the quality of the data, it can be done by reviewing the evidence used in arguments, and the reputation and trustworthiness of the source. It is a good idea to compare different sources to detect any possible bias, different understandings, or mistakes. (Walliman 2011, 71.)

To collect primary data, the author conducted a survey including questions based on the second and third research question. The survey allowed to efficiently collect primary data through measurement and interrogation, as students typically enjoy responding to surveys. As with everything there are risks involved with conducting a survey, these risks were identified and assessed to prevent them from happening.

To collect secondary data the author has used resources on the internet, such as blogs, articles, e-books, and research papers. Also, a physical book has been used.

4.2 Data collection

The method used to collect primary data was through an anonymous survey. The survey was carried out through the survey tool Webropol between 28th of March and 5th of May 2023. Data was collected from the specific target group; students at universities and universities of applied sciences (UAS) in Finland. The survey was sent out to the target group using social media platforms, such as Snapchat, WhatsApp, Instagram, and Facebook. The survey link was also posted in the forum of an AI course in Haaga-Helia. In total the survey reached 111 students, from which 42 responded, and four students started responding but left the survey.

The Webropol survey tool was chosen as it is recommended by the author’s university, and offers a wide variety of functions, that other tools do not have. The survey consisted of six questions, three of the questions were open-ended, qualitative questions, and three were closed-ended, quantitative questions. There was one selection question, two matrix table questions, and three text field questions.

A survey was chosen as the method of collecting data due to how flexible and efficient it is. Walliman (2011, 97) states that surveys allow the respondent to not be influenced by the researcher, and it’s more likely to get true replies to questions. The author also assessed the potential risks of a survey and tried to prevent them.

Cornell (18 April 2023) names some of the following risks when conducting a survey:
- Possibility of survey fraud if the survey is too complicated or confusing.
− Response bias due to fear of being judged or having different opinions.
− Survey fatigue from the survey being too long or including too many open-ended questions.
− Unanswered questions.
− Difficulty to understand the respondent’s sentiments.

Survey fraud was prevented by having questions that are easy to understand for everyone, and don’t require a lot of effort to respond to. To prevent response bias, the survey was conducted anonymously, so every respondent can give an honest answer without a worry. The survey included six uncomplicated questions, of which three were open-ended, this was done to prevent survey fatigue. If the respondent is not interested in a question or just wants to get the survey done, they might skip over questions. Therefore, all six questions were mandatory, and the respondent could not leave them unanswered. To reduce the risk of not being able to understand the respondent’s sentiments, two of the questions were in the form of a matrix table with different statements to better understand how the respondent feels about a specific statement.

Other risks include students not being interested in the topic and therefore not taking part in the survey or having very short answers that do not give a lot of insight.

4.3 Data analysis

For data analysis mainly the survey tool Webropol was used, as it provides great reporting possibilities. For two of the open-ended questions the responses were filtered based on the respondent’s study field, to get more insightful data for answering the research questions. Additionally, the data was exported from Webropol to Microsoft Excel. Excel was used to summarize some of the responses and create a chart that visualizes the data in a more efficient way.

4.4 Research reliability, validity, and ethics

Reliability, validity, and ethics have been considered in the research to evaluate the research quality. The sources used for the theoretical framework have been checked and evaluated to ensure they are valid and reliable. Referencing has been done when using already existing information from a source, that was not ‘common knowledge’. Appropriate research methods and data collection methods have been reviewed against each other and the most suitable methods have been applied.

As stated by Middleton (3 July 2019), "Reliability refers to how consistently a method measures something. If the same result can be consistently achieved by using the same methods under the
same circumstances, the measurement is considered reliable”. The author made sure the survey was reliable by formulating the questions, so they are easy to interpret, and do not require a lot of effort to answer. By letting all the respondents remain anonymous the author ensured the responses are as reliable as possible. If the survey is carried out again using the same questions and target group, it is likely the responses will be similar.

“Validity refers to how accurately a method measures what it is intended to measure. If research has high validity, that means it produces results that correspond to real properties, characteristics, and variations in the physical or social world.” (Middleton 3 July 2019.) To ensure the research has high validity the author created the survey questions by aligning them with the thesis research questions, and making sure that the research questions and their sub-questions get answered. The method of the measurement was carefully chosen by assessing all the possible risks. Also, the survey target group was clearly defined in the beginning of the survey.

Ethical principles have been applied in the research. Bhandari (18 October 2021) mentions the following ethical considerations in research:

− voluntary participation
− informed consent
− anonymity
− confidentiality
− harm potential
− communication of results.

To protect the survey respondents the survey was voluntary and anonymous, with no personal information being collected, therefore none of the respondents were possible to identify. Informed consent was achieved by being transparent and clearly communicating to all potential respondents what the survey is about, what it is intended for, and that it is anonymous. No confidentiality or potential harm forms were identified due to the survey being anonymous. The communication of the research results has been transparent and honest. The survey data has not been manipulated or falsified.
5 Results and analysis

This chapter presents the survey (appendix 1) that was carried out and its’ findings. The purpose of each question is explained, and the question results are presented.

5.1 Background of the respondents

The survey started off with a close ended, selection question about the respondents’ background. The question asked was “What field do you study in?”. The aim of the question was to see if there are any connections between the AI tools students use in a specific field, and how they view the future available professions in their field.

![Figure 4. Study field of respondents](image)

Most of the respondents are studying business (33 %) and information technology (29 %). As seen in the figure there were responses from each option that was provided in the question, 7 % of the respondents had a different study field. (Figure 4.) As figure 5 shows, the respondents who chose “Other, what?” are studying communication and media, tourism, and teacher education.

<table>
<thead>
<tr>
<th>Option names</th>
<th>Text</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other, what?</td>
<td>Communication and Media</td>
</tr>
<tr>
<td>Other, what?</td>
<td>Tourism</td>
</tr>
<tr>
<td>Other, what?</td>
<td>Teacher</td>
</tr>
</tbody>
</table>

![Figure 5. Other study fields of respondents](image)
5.2 Previous use of artificial intelligence tools

The next survey question was an open-ended text field where the student could freely write their experience. The question asked was “Do you recall what artificial intelligence tools you have used in your studies, and for what purpose?”.

![Figure 6. Used AI tools](image)

The most used tool amongst all the students is OpenAI’s ChatGPT, 17 of the respondents have used it for various purposes in their studies. Whereas, Bing AI and Google Bard have each been used by two respondents. Other tools include chatbots, grammar check, and tools that help when writing texts, image and video generator, speech-to-text, and text-to-speech. Six of the respondents have never used an artificial intelligence tool in their studies, whereas three cannot remember whether they have used one, and one cannot remember the name of the tool. (Figure 6.)

To better understand whether there is a connection between the study fields and the tools students use, the responses have been analysed further based on the respondent’s study field.

![Figure 7. AI tools used by business students](image)
Four of the business students either have never used or do not remember using an AI tool. Five students have used ChatGPT, other tools used by the respondents include Google AI, Grammarly, Microsoft Azure, and a tool to create chatbots. (Figure 7.)

**Figure 8. AI tools used by information technology students**

Among also information technology students ChatGPT is the most used tool, mentioned by six of the respondents. Two students have used GitHub Copilot, and another two have used Grammarly. Other tools that the respondents have used include Microsoft Azure, Quillbot, Teachable Machine, Microsoft AI, Power BI, Google Bard, Bing chat, chatbot, and an image and caption generator. (Figure 8.)

**Figure 9. AI tools used by hospitality students**

Two hospitality students have created chatbots as a part of their courses. Other tools used are Google speech-to-text, Quillbot, ChatGPT, and chatbots. (Figure 9.)
Two of the health and welfare students have not used any AI tools during their studies. One student has used Speechify, and another has used ChatGPT. (Figure 10.)

Both engineering students have used ChatGPT, the social sciences student has used ChatGPT, Perplexity, and Google Bard. The communication and media student has used Quillbot, and a plagiarism check. The tourism student has used chatbots on different websites, while the teacher student has used Bing AI and ChatGPT to search information. (Figure 11.)

This question was asked to see what tools students have benefited from in their studies, and whether there is a tool that is used by most respondents. The responses are beneficial to find out about any new tools that can be used for educational purposes in a specific study field, and how the students have used these tools. The intention was also to find out how many students do not know whether they have used an AI tool, and how many have not used one. It is possible that students do not know what tools are using artificial intelligence, or how they can use them for their advantage in education.

5.3 Learning experience with artificial intelligence

The third and fourth survey questions are directed to the second research question of the thesis, “How do students perceive the use of artificial intelligence in their learning experience?” With this the author wanted to find out what are the students’ opinions and experiences with using AI in studies.

The third question was in the form of a matrix table and the main question asked was “How do you...
perceive the use of artificial intelligence (AI) in your learning experience? On a scale 1-5 (1 = strongly disagree, 5 = strongly agree)”. The table consisted of five statements that the respondent had to rate on the given scale.

<table>
<thead>
<tr>
<th>Statement</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Average</th>
<th>Median</th>
</tr>
</thead>
<tbody>
<tr>
<td>I have a positive view on using AI in my studies</td>
<td>4.9%</td>
<td>0.0%</td>
<td>19.5%</td>
<td>26.8%</td>
<td>48.8%</td>
<td>4.1</td>
<td>4.0</td>
</tr>
<tr>
<td>I trust that the information provided by AI is correct</td>
<td>4.9%</td>
<td>2.4%</td>
<td>43.9%</td>
<td>26.8%</td>
<td>22.0%</td>
<td>3.6</td>
<td>3.0</td>
</tr>
<tr>
<td>I know what AI tools I can benefit from the most in my studies</td>
<td>12.2%</td>
<td>21.9%</td>
<td>24.4%</td>
<td>29.3%</td>
<td>12.2%</td>
<td>3.1</td>
<td>3.0</td>
</tr>
<tr>
<td>I feel confident about using AI tools in my assignments, essays, etc.</td>
<td>4.9%</td>
<td>9.8%</td>
<td>26.8%</td>
<td>26.8%</td>
<td>31.7%</td>
<td>3.7</td>
<td>4.0</td>
</tr>
<tr>
<td>I am able to study also without using AI tools for assignments, essays, etc.</td>
<td>2.5%</td>
<td>2.4%</td>
<td>19.5%</td>
<td>26.8%</td>
<td>48.8%</td>
<td>4.2</td>
<td>4.0</td>
</tr>
</tbody>
</table>

Figure 12. Statements on use of artificial intelligence in learning experience

Most of the respondents somewhat agreed to the first statement, almost 50% have a positive view on using AI in their studies. However, only 22% fully trust that the information provided by AI is correct, with most respondents being a bit sceptical towards it. The responses of the third statement indicate that most students are not completely aware of what AI tools they can benefit from the most in studies, with the average score given 3.1. A lot of students feel confident about using AI tools in their studies. And 48.8% strongly agree that they can study also without using AI tools. (Figure 12.)

The fourth survey question was an open-ended text field, asking “How do you compare your learning experience with vs without the use of artificial intelligence? (give examples of how you have benefited from using AI)”.

Figure 13. Learning experience with vs without AI
With this question the aim was to find out what are the things that affect the students’ learning experience with AI, and whether it is better than without using AI.

5.4 Learning outcomes with artificial intelligence

The fifth survey question is directed to the first part of the third research question “Does the use of artificial intelligence in studies impact the students’ learning outcomes and is there a chance of it affecting future career prospects?”. With this question the author wants to see whether students recognize their skills being affected from using artificial intelligence, e.g., critical thinking, problem-solving, or remembering what they learn. Also, whether the outcome of using artificial intelligence is effective and of higher quality than without AI. The question was in the form of a matrix table and consisted of six statements, seen below.

<table>
<thead>
<tr>
<th>Statement</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Average</th>
<th>Median</th>
</tr>
</thead>
<tbody>
<tr>
<td>Artificial intelligence helps me learn and study things more effectively</td>
<td>9.7%</td>
<td>7.3%</td>
<td>17.1%</td>
<td>17.1%</td>
<td>48.8%</td>
<td>3.9</td>
<td>4.0</td>
</tr>
<tr>
<td>The results from learning with the help of AI are of the same or higher quality than without AI</td>
<td>9.8%</td>
<td>7.3%</td>
<td>19.5%</td>
<td>14.6%</td>
<td>48.8%</td>
<td>3.9</td>
<td>4.0</td>
</tr>
<tr>
<td>Artificial intelligence is not affecting my ability to preserve and remember things I learn</td>
<td>9.8%</td>
<td>4.9%</td>
<td>31.7%</td>
<td>34.1%</td>
<td>19.5%</td>
<td>3.5</td>
<td>4.0</td>
</tr>
<tr>
<td>I am equally motivated to educate myself both with and without the use of AI</td>
<td>7.3%</td>
<td>9.8%</td>
<td>24.4%</td>
<td>31.7%</td>
<td>26.8%</td>
<td>3.6</td>
<td>4.0</td>
</tr>
<tr>
<td>I am not worried about AI affecting my learning outcomes</td>
<td>12.2%</td>
<td>7.3%</td>
<td>29.3%</td>
<td>31.7%</td>
<td>19.5%</td>
<td>3.4</td>
<td>4.0</td>
</tr>
<tr>
<td>AI does not affect my analytical, problem-solving, or research skills</td>
<td>12.2%</td>
<td>12.2%</td>
<td>29.3%</td>
<td>26.8%</td>
<td>19.5%</td>
<td>3.3</td>
<td>3.0</td>
</tr>
</tbody>
</table>
Thoughts about future of artificial intelligence in the respondents’ field

The last question in the survey answers the second part of the third research question. The survey question was “Do you think the use of artificial intelligence can affect the available professions in your field in the future? How?”. This question was an open-ended text field. Responses have been analysed by study field.

Figure 16. Business student views on the impact of AI in future professions in the field

Majority of the business students think that AI can affect available future professions in their field in some way. Some say that AI can replace professions, while others say it can replace only a part of the professions which don’t require customer interactions or other actions by humans. Two of the respondents said that AI cannot affect the available professions. (Figure 16.)

Figure 17. Information technology student views on the impact of AI in future professions in the field
As figure 17 shows, the information technology students think that AI can affect future available professions to an extent by being able to perform certain tasks, or even replace some of the professions.

<table>
<thead>
<tr>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>i think it can't fully replace an actual person working in hospitality field. Maybe it could replace some jobs that is required to do on computer.</td>
</tr>
<tr>
<td>Not really</td>
</tr>
<tr>
<td>I feel like it cannot affect the jobs</td>
</tr>
<tr>
<td>It can affect the available professions in hospitality customer service, or some work that is possible to be performed by a computer or robot</td>
</tr>
<tr>
<td>Yes it can automate some of the tasks done at jobs</td>
</tr>
</tbody>
</table>

**Figure 18.** Hospitality student views on the impact of AI in future professions in the field

Four of the hospitality students think that AI can affect or replace some of the tasks that are done at a job, while two students think that it most likely cannot affect the available hospitality professions in the future (figure 18).

<table>
<thead>
<tr>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>As a nurse, I’m not worried about being replaced. In health industry you need people to work with other people, AI doesn’t have the human judgement to handle patients.</td>
</tr>
<tr>
<td>not really, in my field there will always be people needed</td>
</tr>
<tr>
<td>Possibly but that is still in the future</td>
</tr>
<tr>
<td>I think it can improve efficiency in healthcare but could not affect available jobs</td>
</tr>
</tbody>
</table>

**Figure 19.** Health and welfare student views on the impact of AI in future professions in the field

Three respondents think that AI cannot affect the available professions in the health and welfare field, while one respondent thinks it can possibly have an effect in the future. One respondent mentions that AI could improve the efficiency of healthcare. (Figure 19.)

<table>
<thead>
<tr>
<th>Study field</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering</td>
<td>No, AI tools can not replace engineers (at the moment at least)</td>
</tr>
<tr>
<td>Engineering</td>
<td>Artificial intelligence could affect a lot of tasks that are done by humans within the IT industry in the future</td>
</tr>
<tr>
<td>Social sciences</td>
<td>In my opinion it will definitely impact available professions in my field, pushing humans to adapt and surpass the technology</td>
</tr>
<tr>
<td>Communication and media</td>
<td>I don’t think so, because there’s still things like making advertisements that can be done by humans to make it more understandable, I think</td>
</tr>
<tr>
<td>Tourism</td>
<td>Yes, it can. AI has wide usage in tourism and travel industry</td>
</tr>
<tr>
<td>Teacher</td>
<td>I am not sure</td>
</tr>
</tbody>
</table>

**Figure 20.** Other student views on the impact of AI in future professions in the field

One of the engineering students thinks AI cannot replace engineer jobs for now, while the other one says it can affect a lot of the job tasks. The social sciences student thinks it can affect the available professions, while the communications and media student doesn’t think it can. The tourism student thinks AI influences the tourism industry, and the teacher student is not sure. (Figure 20.)
There's a lot of talk about the possibility of artificial intelligence replacing many jobs in the future, the author wanted to know what the students’ take is on this, and whether they think the available jobs could be affected in their field.
6 Discussion

This chapter includes a conclusion of the whole thesis, suggestions for further research on the topic, and self-assessment of the thesis process.

6.1 Summary of results

There were differences in the number of respondents from each study field. More than half of the respondents were studying either business or information technology. When asked what AI tools the students have used for educational purposes, ChatGPT was the tool used by most students across the included study fields, also different grammar tools and chatbots were used a lot across different study fields. There was a tool that has been used in a certain study field for a specific purpose, GitHub Copilot has been used by information technology students for coding.

It can be concluded from the third question that the students seem rather positive about their learning experience with using artificial intelligence tools. However, most students do not fully rely on the information provided by AI being correct. Only 12% of the students completely agree that they know what AI tools they can benefit from in studies, this means that a lot of students might not know what tools could be beneficial for them. The author suggests that useful AI tools should be introduced to the students by the school. The fourth question shows that the learning experience with vs without AI is positive in most cases, it makes the studies more efficient, and makes it easier to solve the problems the students face. However, some students do not see a difference, or have not used any AI tools.

According to the results, nearly half of the respondents completely agree that artificial intelligence helps them learn and study things more effectively, others either somewhat agree or disagree. The results are quite similar also for the statement whether the outcome of learning with AI has the same or higher quality than without AI. Based on these results the use of artificial intelligence has been a beneficial experience for most.

When asked about whether artificial intelligence is affecting the students’ ability to preserve and remember the things they learn, and if it affects their analytical, problem-solving, or research skills, about 20% fully agreed that it does not affect their ability or skills. Most respondents somewhat agreed or did neither agree nor disagree. There were also students that completely agreed that their skills are affected. Artificial intelligence is not significantly affecting the skills of the students at the time, but this could become a bigger potential problem in the future, when the AI tools have been used for a longer time, as the results were not all positive.
The views on whether AI can affect future available professions in the student’s study field were divided; some think professions can be replaced by AI, others think AI can affect the professions to a certain extent, and some think AI cannot affect the professions. Especially information technology students think that AI can possibly affect or replace the available professions in the field. Whereas, for instance hospitality, and health and welfare students think that AI cannot affect the available professions, only possibly make the job more efficient.

6.2 Conclusion

The objectives of the thesis were to be more aware of the use of artificial intelligence in education and how it is affecting education. The objective of the survey was to get current data on students’ experience and opinions of using artificial intelligence in studies. These objectives have been achieved through the theoretical framework and empirical part of the thesis.

Also, the following research questions have been successfully answered:
− How can artificial intelligence be applied in education to benefit the students?
− How do students perceive the use of artificial intelligence in their learning experience?
− Does the use of artificial intelligence in studies impact the students’ learning outcomes, and is there a chance of it affecting future career prospects?

To answer the first research question, the author introduced different AI tools that can be used in education, either by all students, or students in a specific study field. The benefits of these tools were included. The students need to be aware of the right tools to use in their studies, which will lead to the most beneficial outcome for the students.

The second research question results show that most students have a positive attitude towards the use of artificial intelligence in their studies. However, many students do not know what tools they can benefit from in studies. Most students do not fully rely on the information generated by AI, this is good as students might perform quality and fact checks on the content, which reduces the risk of them learning incorrect information. Students that have used AI for studies mostly feel that it is a better experience for them than when not using it. It makes them more productive, improves the outcome of studies, and makes it easier to find information.

As for the third research question, AI impacts the students learning outcomes positively as it helps them learn and study things more effectively, and the results are of the same or higher quality compared to when not using AI. However, there are students that are somewhat worried that AI could
affect their learning outcomes, and think it is affecting their skills, and motivation. There is a chance of artificial intelligence affecting future career prospects, more in some fields, than others. Or at least partly affect by automating different tasks at a job.

6.3 Further research and development

For further research the topic could be more specific and impact of artificial intelligence in certain study fields could be researched, such as artificial intelligence in medicine. The different artificial intelligence components could be studied further one by one, to see how each of them can be applied in education, etc.

The ways artificial intelligence could positively impact student collaboration, and interaction, or other specific skills, can be researched. Also, the teacher and parent views and attitude towards the use of artificial intelligence in education could be studied.

The survey results can be considered by staff of educational institutions to understand better the learning experience and outcome of artificial intelligence tools and improve it. Also, to investigate what AI tools are being used by students, and what tools could be used as a part of different courses or introduced to the students as beneficial learning tools.

6.4 Self-assessment of the thesis process

The thesis process started at the end of March 2023 by submitting a topic proposal, however, the actual thesis writing started only in the middle of April and was finished a month later. After submitting the initial topic proposal, the author had to wait to be assigned a thesis advisor, in the meantime a project plan was created. When the thesis topic was approved the author had a meeting with the advisor, whereafter the thesis writing was begun.

The author faced several difficulties during the thesis process. First difficulty faced was the decision of a thesis topic, the author was struggling to find a good, and topical topic, and come up with supportive research questions. The topic idea came from articles and Tik Tok videos the author saw about ChatGPT being used to do school assignments.

The biggest difficulty was the limited amount of time. It took a couple of weeks to get a thesis advisor which slightly impacted the initially planned thesis schedule. The author worked a full-time job during most of the weeks in the thesis process, which left barely any free time for the author to relax or keep up with personal life. However, the author created a detailed schedule of the thesis process, and followed it strictly, which was done successfully by including some type of rewards each
time a milestone was reached. Also, the thesis advisor was flexible and helped the author to schedule and complete the thesis in time.

A difficulty faced during the empirical part of the thesis was the struggle to get responses to the survey, mostly due to the limited time. The author posted the survey everywhere they could think of and sent it to all their friends and acquaintances who corresponded to the research target group. Also, the thesis advisor posted the survey for the students of an AI course. The survey received 42 responses which turned out to be enough, however, if the author would carry out a similar survey again, they would put more effort in getting even more survey responses and focus on getting as many respondents from each study field as possible.

The thesis writing itself was successful and the author was able to find good sources and follow the guidelines well. The thesis seminar presentation and peer review were also successful and gave the author new ideas on what can be included in the thesis.

During the thesis process the author had to work a lot on their self-discipline as they usually procrastinate things, which was not possible during the limited time for the thesis. Keeping up with the self-discipline was very tough, but towards the end it got easier, and made the author learn some new things about themselves, like their willpower, and what study methods work best. The author learned more about artificial intelligence in general, such as how it works and its’ history. The author also learned about a couple of new tools they can benefit from at their job.
Sources


Appendices

Appendix 1. Survey questions

The impact of artificial intelligence amongst students in higher education

Mandatory questions are marked with a star (*)

Dear respondent,

This survey is a part of my thesis on the impact artificial intelligence has on education. The selected target group for this survey is students at universities and universities of applied sciences (UAS) in Finland. The aim is to analyze how students have used artificial intelligence in their studies, with a focus on how they perceive the use of artificial intelligence in their learning experience, and how it impacts their learning outcomes.

All the responses gathered in this survey are anonymous.

Respectfully,
Amanda Nilson

1. What field do you study in? *

- Business
- Information technology
- Engineering
- Social sciences
- Health and welfare
- Hospitality
- Other, what?

2. Do you recall what artificial intelligence tools you have used in your studies, and for what purpose? *
3. How do you perceive the use of artificial intelligence (AI) in your learning experience?
On a scale 1-5 (1 = strongly disagree, 5 = strongly agree) *

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<th>2</th>
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<tbody>
<tr>
<td>I have a positive view on using AI in my studies</td>
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<td>I trust that the information provided by AI is correct</td>
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<td>I know what AI tools I can benefit from the most in my studies</td>
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<td>I feel confident about using AI tools in my assignments, essays, etc.</td>
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<tr>
<td>I am able to study also without using AI tools for assignments, essays, etc.</td>
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4. How do you compare your learning experience with vs without the use of artificial intelligence? (give examples of how you have benefited from using AI) *

5. Does artificial intelligence impact your learning outcomes?
On a scale 1-5 (1 = strongly disagree, 5 = strongly agree) *

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<tr>
<td>Artificial intelligence helps me learn and study things more effectively</td>
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<td>The results from learning with the help of AI are of the same or higher quality than without AI</td>
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<td>Artificial intelligence is not affecting my ability to preserve and remember things I learn</td>
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<td>I am equally motivated to educate myself both with and without the use of AI</td>
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<td>I am not worried about AI affecting my learning outcomes</td>
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<tr>
<td>AI does not affect my analytical, problem-solving, or research skills</td>
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6. Do you think that the use of artificial intelligence can affect the available professions in your field in the future? How? *
