Linnæus University
Sweden

Master's thesis

Possibilities of Artificial Intelligence in Education

An Assessment of the role of AI chatbots as a communication medium in higher education

Author: Marta Slepankova
Supervisor: Nuci Krenare
Examiner: Anita Mirijamdotter
*Course Code:*5IK50E, 30 credits
Subject: Information Systems

Abstract Artificial intelligence has grown in importance in many application areas. However, the application in the education sector is in an embryonic state, where a variety of trials has been conducted. The purpose of this master's thesis is to investigate the factors that influence the acceptability of AI chatbots by university students in higher education which might point subsequently to the lack of usage. The study also suggests the most appropriate communication areas of AI chatbot application in higher education suggested by students. For this study, the unified theory of Acceptance and Use of technology 2 (UTAUT2) has been compiled with the qualitative data gathered from semi-structured interviews and questionnaire surveys. The study participants are university students from various countries (Sweden, Norway, Finland, Czech Republic). The findings showed three primary constructs: Performance expectancy (PE), Effort expectancy (EE), and a newly proposed construct, Nonjudgmental expectancy (NE), to significantly predict intention to use AI chatbot technology without education intentionality. Students suggested using AI chatbots for recap of course material, study material recommendation, and exam and requirements information. Furthermore, this study provides a rationale behind AI chatbot acceptability based on students' generation characteristics. The results can guide universities to incorporate innovative solutions into their organization.

Keywords AI chatbot; conversational agent; Technology acceptability factors; Technology Acceptance; UTAUT2, behavioral intention

Contents

1. Introduction

Education and educational institutions have undergone many changes in the last years, mainly due to new technologies. The rapid evolution of internet technology has changed and is constantly changing the ways of teaching and learning. Thus, new technologies transform how teachers and educators interact with students, setting new teaching methods and altering the traditional classrooms' look. Organizations depend heavily on Information Communication Technologies (ICT) for the efficient completion of everyday tasks. Among these new technologies, Artificial Intelligence (AI) is gaining popularity. It is becoming prevalent in our lives with solutions such as AI chatbots.

Although the use of Artificial Intelligence is constantly expanding and enabling many processes, AI chatbots, also known as conversational agents, are still regularly underused, existing in the shadow of more frequently used rule-based chatbots. AI chatbots use Machine learning (ML) and Natural language processing (NLP) techniques that enable them to mimic human conversation through messaging platforms (Schuetzler, Grimes and Giboney, 2020).

Most typically, AI chatbots have been implemented into organizations to provide efficient user inquiries, like responding to users' questions on 24/7 availability. It has been confirmed that this solution can increase productivity, automate repetitive tasks, and lower the cost of customer service support by handling multiple users in multiple languages simultaneously (Adamopoulou and Moussiades, 2020). Artificial intelligence has grown in importance in many application areas; however, the application in the education sector is in an embryonic state. A variety of trials has been conducted. Some applications are available for commercial use, but the technology is not yet widely used (Jaakkola, et al., 2020). Emerging artificial intelligence technology is driving human education to a transition. These changes mean an alteration from a traditional tutor-centered education system to a learner-centered, characterized by personalized learning (Sandu and Gide, 2019). Therefore, the application of chatbots in education is regarded as a possible essential assistant since they can provide considerable help in learning processes (Molnár and Szüts, 2018). From this perspective, chatbots can initiate communication based on the user's environment, the user's location, or clickstreams and provide more personalized learning (Hien, et al., 2018). The pressure on higher education institutions increases, while teacher's support for each student is reduced considerably, resulting in ineffective learning and a high dropout rate (Hien, et al., 2018). At the same time, the high dropout rates and delayed completion of studies are significant issues in higher education worldwide (Baranyi, Nagy and Molontay, 2020).

The recent development of communication technology has accelerated the communication process and enabled instant communication between people. Increased number of students reflects to increased student-university communication (communication initiated by student towards university staff). This research will first explore the studies addressing AI chatbots and investigate how university students perceive them by pointing to factors of the acceptability of AI chatbots in higher education and elaborate on what students-university communication topic could be AI chatbots applied from students point of view.

1.1 Research Setting

Communication between students and the university is an important educational activity, especially in online education. The term communication can vary in some cases; however, researchers see the importance of communication between students and teachers. It might

highly influence the students' success (Bajracharya, 2015; Krahe, Escamilla-Fajardo and López-Carril, 2021). However, the increased number of students makes adequate guidance difficult for teachers; thus, the positive interaction between teacher and student is lowered (Dimitriadis, 2020). It has been proven that chatbots can: a) repeat the course lessons, b) gather feedback for a course to improve learning and teaching, c) answer frequently asked questions about a specific subject, or d) support administrative tasks (Hien, et al., 2018).

Even though there is a possible solution to support the communication, the universities still lack AI chatbots to be incorporated. Moreover, even though academics have researched the application of artificial intelligence to education (AIEd) for more than 30 years, its adoption in education lags behind other fields such as the applied sciences or finance. In this matter, more than a decade ago, the researchers Rubin, Chen and Thorimbert (2010) suggested that it is both timely and conceivable to consider adopting AI chatbots for informational, educational, and assistive tasks which were considered trivial and repetitive. The article has been purposely chosen to benchmark people's perception of AI chatbots in research 10 years apart. Same as master's thesis, also not reflects the age nor gender, educational attainment, or socioeconomic background. In the paper, researchers pointed to the importance of user preparedness and acceptance. In addition, researchers advised that many information professionals believed that AI chatbots might threaten the future of face-to-face service or considered AI chatbots as a marketing gimmick. Most importantly, the study suggested an explicit requirement in user awareness and familiarity with the systems for AI chatbots to overcome the mentioned negative categorization.

Could it be that consumers still cannot imagine accepting AI chatbots into their day-to-day lives? Could this be the reason for the lack of AI chatbots in the education field? Or the current opinion differs from research done by Rubin, Chen and Thorimbert (2010) and AI chatbots are now an acceptable awaited solution to provide such a service? The thesis utilizes the Unified Theory of Acceptance and Use of Technology 2 (UTAUT2) model to find the predictors of AI chatbots acceptability. However, there is a need to differentiate two terms: acceptability and acceptance. Acceptability refers to perception technologies before use, whereas acceptance refers to the perception of products after use. In other words, acceptability relies on personal expectations that the product can provide one day, and the opinion is formed before its actual use (Martin, Cojean and Ragot, 2020).

1.1.2 Related work

Regarding the acceptance, research of AI acceptance of AI chatbots in the United Kingdom by Almahri, Bell and Merhi (2020) has been identified as the first study to investigate university students' motivation for AI chatbots using UTAUT2. The results indicated that Performance Expectancy, Effort Expectancy, and Habit are the main predictors of student intention to use AI chatbots. The researchers pointed to factors that block and facilitate the acceptance of this technology. Researchers conducted a quantitative survey-based approach to collect data from 431 students at Brunel University London. However, the study's outcome could not be generalized, as the data came only from one particular university department. As future work, the researchers proposed applying the UTAUT2 model across different countries and possibly improving the prediction model by expanding it with other constructs. These particular future research suggestions by Almahri, Bell and Merhi (2020) have led the author of the thesis to focus on data collection from university students from different countries and search for additional UTAUT2 constructs. Furthermore, to make the research more unique, the focus has been placed on acceptability instead of acceptance.

Regarding other AI chatbot experiments in education, Rossi and Carletti (2011) explored the possibilities to make online tuition sustainable and effective by evaluating an open-source system containing a chatbot. This system supported university teachers' work by implementing a knowledge base rather than pedagogical aspects specific to subject-specific. The AI chatbot retrieved information already coded in the courses or originated in student activity logs, thus answering the student's most common questions. Furthermore, the study showed that 42% of all questions posted on university forums could be delegated to a software agent having access to the course and students tracking data. The authors further suggested exploring the chatbot to all university users through an internal messaging system enabling synchronous, on-demand, first-level help desk service.

Also, Fonte, et al., (2016) presented an AI chatbot able to address students' questions regarding their exams, questions about a course, and recommend study materials. The purpose of the chatbot was to provide a friendly interface and support student's needs. The proposed solution enabled students to ask questions (text or speech) about their study content. The answer would be provided from the knowledge base stored in the repository. The application was based on AI Markup language (AIML) and acted as intermediation between the students and server platform, where the repository was located.

Research by Rieke (2018) focused on verifying and analyzing the relationship between AI chatbot characteristics and the motivation of Portuguese millennials to use them. The results showed that millennials seem to regard almost all of the indicated characteristics as indifferent. One reason for this could be that the target group had limited knowledge of AI chatbots and their preparation. They did not seem to value personality, emotions, or avatar characteristics in this technology. Still, they valued features such as speed and accessibility.

1.2 Purpose Statement and Research Questions

This research seeks to understand the factors of acceptability of AI chatbots, which might subsequently explain to lack of AI chatbots (without education intentionality) implementation in higher education in contrast to student-university communication increase. The research is focused on seeking the factors influencing the consumer's acceptability and pointing to communication topics suitable for AI chatbots to handle from students’ point of view.

The research questions comprise three elements: a conceptual element, an IT element, and an empirical element. Accordingly, this research aims to explore the following questions:

RQ1: What are the factors of the acceptability of AI chatbots by students in higher education?

RQ2: What types of communication areas can be assisted by AI chatbots to support student-university communication from student perspective?

1.3 Topic Justification

Artificial intelligence is in the epicenter of the Information systems (IS) discipline as it stands today as one of the most promising emerging technologies (Ågerfalk, 2020). However, there is little research within the IS field, particularly in senior scholar's basket of journals (basket of 8). Based on those mentioned above, this study focuses on the IS theory of Unified theory of acceptance and use of technology information (UTAUT2) and elaborates on AI chatbots application in the educational setting as a medium in student-university communication. The research is based on future work suggestions by Almahri, Bell and Merhi (2020). The

researchers proposed applying the UTAUT2 model across different countries and possibly improving the prediction model by expanding it with other constructs. Furthermore, to make the research more unique, the focus has been placed on acceptability instead of acceptance.

As the research focuses on acceptability factors (regardless of participant's gender or study background). It suggests what student-university communication topics AI chatbots can assist with. It is the primary social concern of this thesis. However, the characteristics of the student's generations characteristics will be taken into consideration.

This thesis positions the research within Informatics research field with body of research within human-computer interaction (HCI).

1.4 Scope and Limitations

AI chatbot application research is becoming popular also in the educational field. Numerous papers have been written, however not many within senior scholars' basket of journals. A single paper has not been found concerning the acceptability of AI chatbots in higher education using UTATU2.

To better illustrate the research to the reader Creswell (2014) suggests designing a literature map where links are made between concepts by drawing arrows. It is a visual picture of chosen publications that illustrates how the thesis will extend or replicates the literature; thus, the map visualizes the thesis within the larger body of research. The thesis literature map visualizes the thesis in contrast to related work research (see Appendix A.: Literature map).

This master thesis study collects data through interviews and questionnaires surveys from university students to understand and gain valuable insight into how students in higher education perceive AI chatbots. Moreover, to the best knowledge, there is no research identified that has focused on the acceptability of AI chatbots relying on UTAUT2, thus predicting the intention of university students to use AI chatbots. The data will be compiled with the UTAUT2 in a context (AI chatbots), consumers (university students), in a new cultural setting (Sweden, Norway, Finland, Czech Republic). On top of that, the research focus on discovering a new UTAUT2 construct of the predictive model while explaining the student's acceptability intentions based on the age moderator. The mentioned above makes the research unique.

1.5 Thesis Organization

Section 1: As shown in Figure 1, the introduction part introduces the reader to the topic, background information, followed by the purpose statement and definition of research questions, related work, topic justification, and study limitations.

Section 2: This part is the literature review section covering the search, brief history of chatbots, current use of AI technology in the educational sector, and technical description of basic chatbot design. It describes AI chatbots application in education, focusing on AI chatbots as a communication medium. Further, it touches on the known challenges in AI chatbot (conversational agents) adoption and characterizations of the university students' generations. The gaps in the reviewed literature and theoretical framework is mentioned as well.

Section 3: After the literature review, the thesis moves into a research design section, describing the philosophical tradition and methodological approach. Further explains how data will be gathered and analyzed. The reliability and validity part specifies how the data could prove to be valid and trustworthy. This part ends with ethical considerations describing how this research addressed ethics and secured ethical considerations.

Section 4: The empirical findings part covers the interview and questionnaire survey analysis outcome.

Section 5: In the discussion part, the research questions (described in the introduction part) are discussed based on collected data and findings from the literature review. These parts lead up to the conclusion.

Section 6: The conclusion part points out the study's conclusion, contribution, and future research in this area.

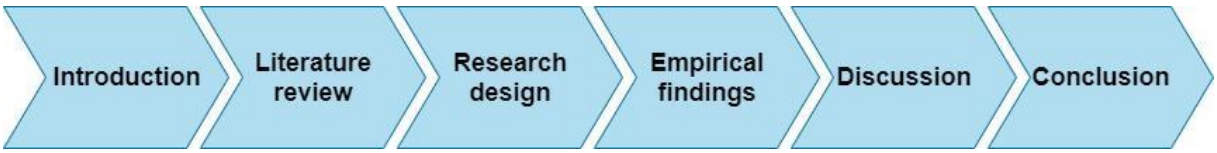

Figure 1. Thesis structure

2. Review of the Literature

This part of the thesis includes the literature review, the gaps identified from selected literature, and the theoretical framework adopted to conduct the research. According to Creswell (2014), there are several goals of the literature review; for instance, it points to other studies closely related to this thesis. It also provides a framework for the thesis. Literature reviews focus on integrating or criticizing previous scholarly work or building bridges between related topics. However, most literature review types aim to integrate the literature, organize it into a series of related topics and summarize it. The literature review presents Brief history of chatbots, AI Chatbots in education, the Application of other AI solutions in the education sector, Essential chatbot design concepts, and the Characterizations of university student generations.

2.1 Literature review search strategy

There have been various papers regarding AI technology and AI-based solutions over the last years concerning various fields such as Big data, finance, healthcare, to name a few. Therefore, it should be mentioned that there is no lack of publications in this domain; however, this literature review focuses mainly on the application of AI-chatbots in the education sector to support communication between university and students and human-computer interaction. Therefore, the thesis author followed the review process suggested by Creswell (2017) which contains four steps: identification, screening, eligibility, and inclusion.

To ensure a transparent and complete reporting, the thesis author followed the PRISMA method (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) and visualized the search process by the flow diagram (see Appendix B.: PRISMA flow). The search has been

conducted throughout January and February 2021 in five databases – Scopus, EBSCOhost, IEEExplore, One Search, and Google Scholar. In each of the databases, the key search term has been conducted individually. However, the main focus has been on papers published in senior scholars' baskets of journals.

The thesis researcher followed the recommendation by Creswell (2014) and started by identifying keywords. Final keywords were decided based on identifying a topic, often resulted from preliminary readings of AI-related articles. The initial search has been done by the term "Artificial intelligence", later by a combination of terms "AI" AND "education", additionally by combination "AI" AND "education" AND "chatbot". Further has been the search extended to terms as "bot" OR "tutor" "agent" OR "machine learning" OR "NLP". Thus, the search has been done by combining the search terms with the Boolean operator "AND" and "OR". The literature has also been searched by the source title "information systems". The initial searches have focused purely on predefined journals. However, due to a lack of relevant literature, the research also expanded to other journals. During this phase, short papers, non-computer science-related papers, and duplicates were excluded. Publication whose title or abstract consisted of these terms (Artificial intelligence, education, and chatbot) were preferred, selected, and taken as potential papers for review.

For the comprehensive literature review, the author has chosen only the publications published after 2015. Only newer papers were chosen. By this decision, some publications might have been missed. Also, it is essential to note that the searches for this study were undertaken with criteria specified by mentioned keywords and a general review process of the abstract and the content of the selected articles; however, other keywords could be used. Furthermore, findings were collected only from academic journals and conference papers in scholarly databases; thus, other materials containing more information on this topic might have been excluded. For instance, business promotional materials of existing devices taken from companies' web pages could bring another level of information. However, the belief is that the author provided a comprehensive review by pointing to general information on the work being accomplished in the education sector. Some relevant articles from other databases such as Web of Science may have been missed regarding the database search.

Starting the search with the keywords mentioned above, Scopus showed the most significant number of results with 2,765, followed by EBSCOhost 1,563, IEEExplore 502, Google Scholar 413. However, each of the search combinations of words brought a percentage of the same articles. At this point, it was crucial to eliminate and remove the duplicates. To complement the chosen systematic review method, the author used both the forward and backward search approaches. It is especially beneficial to identify other references by reviewing the citations and references (Wohlin, 2014). Once this step was done, the remaining articles had to be screened by their titles and abstracts. Only relevant articles remained (Liberati, et al., 2009). To ensure that the papers selected for this study were related to the topic chosen, the inclusion and exclusion criteria were defined as eligibility criteria set of predefined characteristics that help decide which articles should be or not be included in the study. It was essential to define the criteria wisely as they could impact the validity of the results. Inclusion criteria are used for further study. The exclusion criteria help withdraw the articles from the study (Salkind, 2010).

Due to the relevance, only publications after the year 2015 were included as the technology is developing fast, and older described solutions might have become obsolete. Hence, including only the resources from recent years contributes to the internal validity of thesis research.

Inclusion criteria were (1) studies focusing on Artificial intelligence chatbots suitable for student-university communication; (2) studies addressing services for university-related communication purposes; (3) studies targeting chatbots/tutoring systems; (4) studies with the full text is written in English and (5) studies published between 2015 and 2021.

The exclusion criteria were 1) the paper describes an Artificial intelligence-based solution not applicable for university-student communication 2) papers as book chapters, a magazine or letters, short papers 3) source of the paper focused outside of the information systems field or pedagogy field.

As a next step, the texts of eligible publications were read to ascertain and confirm the relevance of the articles to the subject focus. Then, the author made notes from each publication into the shared document. As a result, each paper has been synthesized based on the following: the title of the paper, author name, source, research purpose, research objective, concept/theory used, data collection method, type, key findings, contribution to knowledge, and limitations. Finally, the selected articles were analyzed to identify themes and gaps.

2.2 Brief history of chatbots

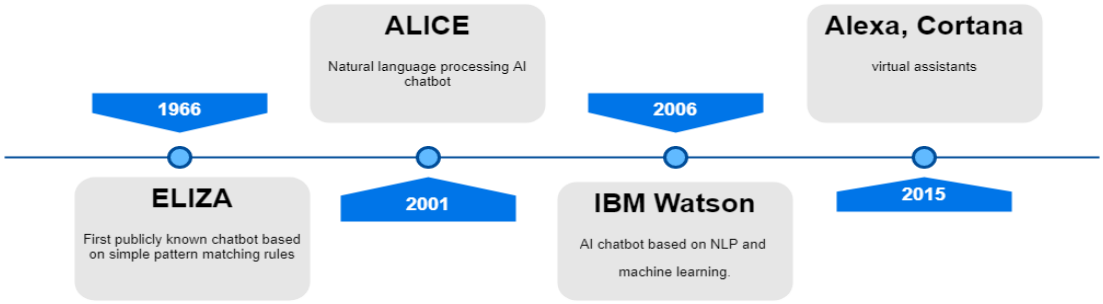

Figure 2. The evolution of chatbots

As shown in Figure 2, everything started with the first publicly known chatbot called ELIZA, introduced by the Massachusetts Institute of Technology (MIT) in 1966. In contrast to modern AI chatbots, ELIZA was based on simple pattern matching rules. These types of chatbots are referred to as rule-based chatbots. Once a particular keyword is identified in the text, the chatbot provides a predefined response. The primary purpose of the ELIZA chatbot was to act as a psychotherapist (Mekni, Baani, and Sulieman, 2020; Adamopoulou and Moussiades, 2020). Based on template-based responses, the chatbot was able to imitate the conversational style of a non-directional psychotherapist. As a result, users thought that ELIZA was an actual person and not a machine. Another example of a well-known chatbot is ALICE (Artificial Linguistic Internet Computer Entity), released in 2001, as a natural language processing chatbot. This chatbot was also built on a rule-based approach, which aims to discover significant parts of the text, code them, and script language to create conversation scenarios.

Over the following years, the efforts in chatbot design aim to re-engineer or improve this methodology. For example, in 2006, IBM released Watson, AI chatbot based on natural language processing and machine learning. In the last decade, developers have deepened computer interaction based on Artificial intelligence technologies and Natural language processing (NLP). However, both types of chatbots are still frequently used, and therefore distinction needs to be made between the AI chatbots (conversational agents) and the rule-based chatbots. AI chatbots use algorithms to learn and understand unstructured information and learn from the interaction with the users and the outcomes. Thus, the users co-produce and influence

AI chatbots while communicating with them (Shumanov and Lester, 2021). Recent developments include virtual personal assistants like Apple Siri in 2010, Microsoft Cortana, or Amazon Alexa in 2015 (Mekni, Baani, and Sulieman, 2020; Adamopoulou and Moussiades, 2020).

Further, Microsoft's XiaoIce was designed to answer questions and be a virtual companion to users (Shum, He and Li, 2018). The improvement of text-to-speech and speech-to-text communication has made AI chatbots more convenient, resulting in the popularity of chatbots as assistants worldwide. AI chatbots allow users to access data and services and exchange information by imitating a human conversation (Jansen et al., 2020). Nowadays, AI chatbots are used in various public and private institutions for services and tasks such as checking the user's calendar, making appointments, reading, writing, and sending emails (Dale, 2016). Different parameters can classify today's chatbots (see Figure 3).

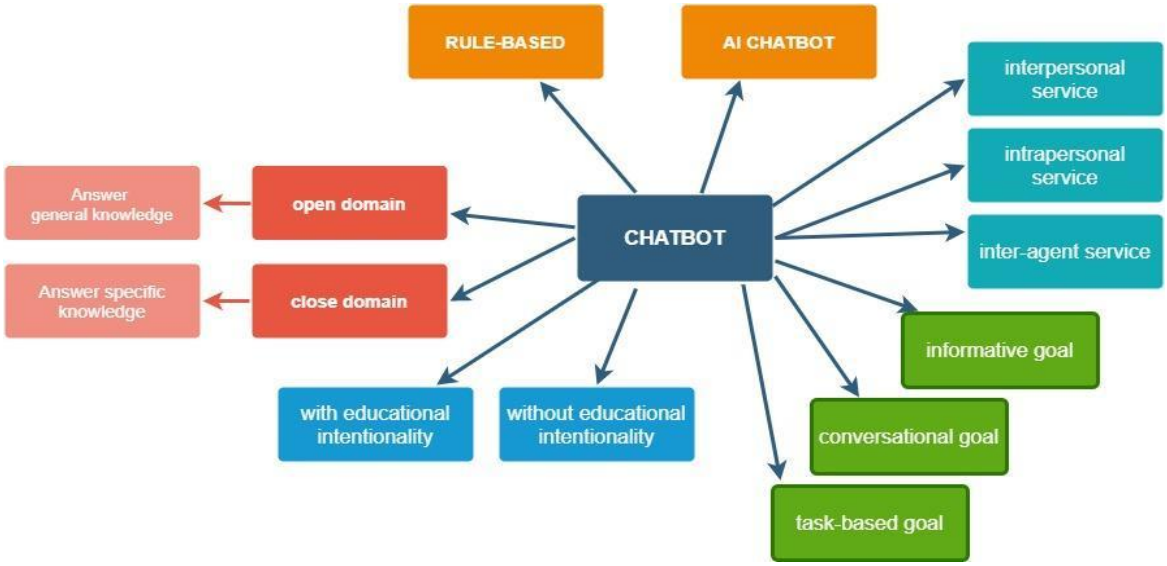

Figure 3. Categories of chatbots by Sandu and Gide (2019)

Following Figure 3, AI chatbots based on the assessed knowledge can be divided into chatbots with open domains to address general topics and respond appropriately to general questions and chatbots with closed domains to address specific knowledge. Their service can further classify chatbots into those that offer interpersonal, intrapersonal, and inter-agent services. Another classification is the chatbot's goal: informative, conversational, and task-based (Sandu and Gide, 2019). Finally, another classification divides AI chatbots into a) with educational intentionality and b) without educational intentionality (outside of teaching). Chatbots without educational intentionality support students by performing educational and informational tasks but do not teach students courses. The latter once is under the focus of this thesis.

2.3 AI Chatbots in the education sector

Although the term AI chatbot or conversational agent represents a wide variety of systems with various capabilities and purposes, most researchers refer to a chat application supported by artificial intelligence in a human-machine dialog (Mekni, Baani and Sulieman, 2020; Dimitriadis, 2020). They enable users to access data and services and exchange information by

simulating human conversation (Janssen, et al., 2020). Their functional ability can vary from simple questions to complex conversations (Molnár and Szüts, 2018).

Researchers addressed the AI chatbots as they believe that this technology can increase and enhance teachers' capabilities and students' abilities (Ashfaque, et al., 2020; Lee, et al., 2020). Some also noted that the AI chatbots have a general potential to help students, teachers, and education staff by providing helpful information (Khin and Soe, 2020; Mekni, Baani, and Sulieman, 2020; Molnár and Szüts, 2018). Furthermore, the researchers were trying to solve the increased workload of the teaching staff (Lee, et al., 2020) and support college students who recurrently navigate challenging tasks (Mekni, Baani, and Sulieman, 2020).

The use of AI chatbots has been recently implemented in universities to improve existing services or introduce new ones (Quiroga, Daradoumis and Puig, 2020). AI chatbots are applied in the educational sector with or without education intentionality. Chatbots with education intentionality are examples of AI-led solutions and supplement the teacher in fostering teaching. Chatbots without education intentionality are AI-supported solutions and are used in administrative tasks such as student guidance and assistance and handling FAQs (Frequently Asked Questions) (Sandu and Gide, 2019; Ranoliya, et al., 2017). Further, the researchers point to personalization as an outcome of the AI chatbot adaptation. For example, they can assist students separately by providing answers according to different student profiles and adjusting to their needs (Lee, et al., 2020). However, some researchers advise further research as the addition of ontology technology can help to improve a chatbot's performance and architecture by giving basic concepts and relationships to capture and train relevant domain knowledge (Hien, et al., 2018).

Further, AI chatbots can be equipped with voice recognition and text-to-speech capability so that individuals will interact more successfully with them (Santoso et al., 2018). Furthermore, AI chatbots can sense a users' feelings during interactions and target the response based on it. In consequence, it provides a more pleasant service experience (Yang and Evans, 2019).

Although the suggested outcome of AI chatbot adaptation varies, the researchers often mention the cost-saving aspect as the individual support to students is costly. In consequence, the use of chatbots can not only improve an institution's services but also reduce labor costs (Hien, et al., 2018; Choque-Díaz, Armas-Aguirre and Shiguihara-Juárez, 2018; Yang and Evans, 2019). According to Yang and Evans (2019), the university bureaucracy workload could be reduced if AI chatbots could automatically fill in users' request forms.

2.3.1 AI chatbot in education sector used as a communication medium

Many studies have provided a wide range of practical implications to support student-university communication. Researchers Ranoliya, et al., (2017) addressed the time consumption perspective in services provided by a human to a human. The growing number of student questions increases the waiting time for the response and, consequently, results in poor client satisfaction. As a solution, the researchers propose AI chatbots as a communication medium due to their time effectiveness. Such an interaction between the students and the chatbot consists of the following elements: initiation, response, and feedback (Fleming, et al., 2018).

The selected papers provide helpful insight into what is currently possible to delegate to software. The analysis tried to capture the simultaneous use as a communication medium mentioned in selected literature (see Figure 4). In other words, Figure 4 depicts communication areas mentioned in research papers where AI chatbots are used as a communication medium.

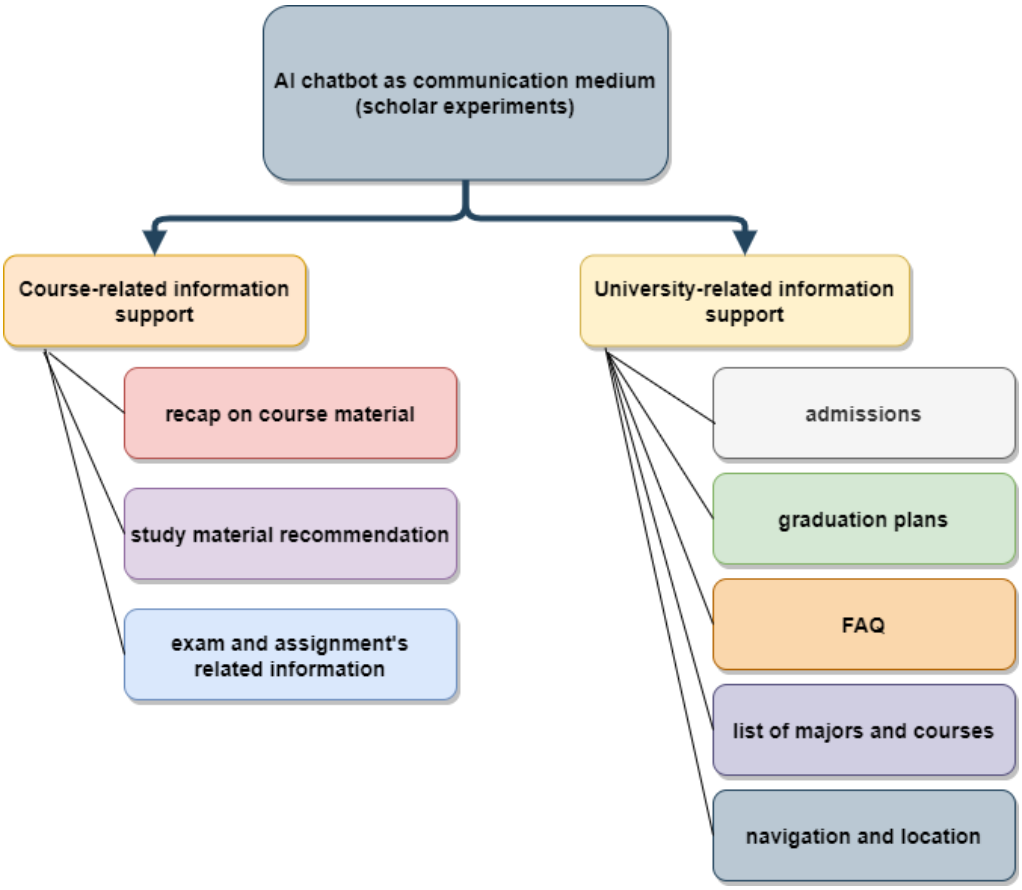

Figure 4. Area of application of AI chatbots as a communication medium mentioned in research papers

Most of the AI chatbot prototypes were concerning course-related information support. Solutions could assist students and provide a quick recap on course materials on multiple common social platforms like Telegram or Facebook messenger. At the same time, it could function as an online tutor reducing teachers' workload effectively (Lee, et al., 2020). In addition, it can assist and help teachers identify a set of at-risk indicators among students, such as consistently late assignments or lack of login activity (Mekni, Baani and Sulieman, 2020). Another application was university-related information support, where AI chatbots represent an alternative to an information desk (Stachowicz-Stanusch and Amann, 2018). For example, experiments pointed to the possibility of students approaching the chatbot with inquiries regarding building their graduation plans, learning about majors, and retrieving information about scheduling (Mekni, Baani and Sulieman, 2020), as well as information about the university location (Khin and Soe, 2020). In addition, the system can act as an intelligent assistant and improve university services (Touimi, et al., 2020; Choque-Díaz, Armas-Aguirre and Shiguihara-Juárez, 2018) as well as reduce labor costs and create new innovative services (Hien, et al., 2018; Mekni, Baani and Sulieman, 2020). Furthermore, the AI chatbot can extract the information from the university knowledge base and respond to the students and applicants about admission services (Santoso, et al., 2018). Similarly, a question answering chatbot can also support academic admissions by using a data set of conversations and help with admission services (Chandra and Suyanto, 2019).

2.3.2 Challenges in AI chatbot adoption to the education sector

Despite the many opportunities that the application of chatbots can bring in education, some challenges need to be addressed as they can have a negative impact on individuals and society as a whole. This technological revolution will dramatically change higher education worldwide. Therefore, a more humanistic perspective for this kind of education needs to be considered before any actual changes (Popenici and Kerr, 2017).

Privacy and ethical issues are major topics that require more attention and to be discussed further. Regarding that, AI systems demand vast amounts of data and information derived from students and university staff that is confidential; this can cause serious privacy issues (Kengam, 2020; Benbya, Davenport and Pachidi, 2020). Further, another challenge concerns the *development of chatbots* that depend on their users to enhance the communication process. Insults, intimate questions, vulgar words, and other inappropriate topics can have a negative impact on the chatbot's communication development (Stachowicz-Stanusch and Amann, 2018). For this reason, chatbots should be aligned with an institution's policies and regulations regarding data privacy and security (Yang and Evans, 2019). The results show that there are always questions that AI chatbots cannot answer as it is impossible to predicate all potential scenarios for interaction.

Nevertheless, to change and update chatbots' responses, it is necessary to have AI knowledge and technical skills that the teaching and support staff often do not have (Yang and Evans, 2019). In addition to that, education institutions will have to equip with appropriate infrastructure while ensuring the safety and credibility of AI-based systems. Additionally, the *cost of installing, maintaining, and repairing* AI is considerably expensive, and only well-funded educational organizations might be able to equip such high technology (Kengam, 2020). Another factor is a fear of *job loss* that faculty members, librarians, or administrative staff might experience. Moreover, in the future, AI applications in education might increase due to addiction to non-human technology, limiting all personal interactions and personal connections. Thus, *AI addiction* can hurt the learners instead of helping them (Kengam, 2020).

2.3.3 Other AI solutions in the education sector

Numerous researchers that focus on applying AI into the education sector belong to the interdisciplinary community called The International Artificial Intelligence in Education society (AIED), which combines computer science, education, and psychology. AIED researchers point to several current trends, including intelligent tutor systems, adaptive learning, and smart classrooms (Joshi, et al., 2021; Kengam, 2020). As for the thesis, the research is positions within computer science research field with body of research within Human-computer interaction (HCI).

Further, Zawacki-Richter, et al., (2019) notes the following application areas of AI in higher education:

Profiling and Prediction – At the administration level, many AI applications can function as learner models or profiles in a way that allows prediction concerned students in a) admission decisions and course scheduling by evaluating students' academic performance, b) dropout and retention rate by developing early warning systems to detect the performance of students while still in their first year and c) future academic achievement by modeling academic behavior.

Intelligent Tutoring Systems – (ITS) is concerned with the teaching and learning of the student and include functions as a) teaching course content as mathematics, business statistics, accounting, b) diagnose strengths or gaps in students' knowledge c) counseling on student materials by observing the student's behavior in the course and generating a student's profile, d) facilitate collaboration between learners by supporting online collaborative learning discussions and writing, e) assisting teachers for example with supervision and detection of conflictive cases in collaborative learning.

Assessment and Evaluation – Address the teaching includes a) automated grading a wide-ranging of courses b) evaluation of student understanding, engagement, and academic integrity, as well as c) evaluation of teaching.

Additionally, other researchers propose *Pedagogical Agents* (Joshi, et al., 2021), which are digital or virtual characters aiming at facilitating learning incorporating social, emotional, and motivational aspects of technology while interacting with the students. The agents can have a three-dimensional or two-dimensional shape.

2.4 Essential chatbot design concepts

There are various designing techniques to develop the source of communication between computers and humans. The developers can choose among methods like pattern matching for rule-based chatbots or AI Markup language (AIML) for AI chatbots (Benbya, Davenport and Pachidi, 2020). Human-computer interaction (HCI) is a multidisciplinary field of study. The main focus is on users and their interaction with computers. The interaction can be done on messaging platforms by typing the text or speech dialogue using the voice (Khin and Soe, 2020; Mekni, Baani and Sulieman, 2020; Følstad and Brandtzaeg, 2017; Benbya, Davenport and Pachidi, 2020). According to Adamopoulou and Moussiades (2020), AI chatbot can be considered one of the most elementary examples of intelligent Human-Computer Interaction. Further, HCI focuses on the design and use of information with an explicit goal to improve user experiences, task performance, and the connection of modalities (Khin and Soe, 2020; Ranoliya, et al., 2017). Although the designers have been for years focused on rule-based chatbots and designing graphical user interfaces, recently conversational agents designers focused on natural language user interface and utility to enable chatbots to perform specific tasks (Mekni, Baani and Sulieman, 2020; Følstad and Brandtzaeg, 2017). Based on chatbots' leading functional focus, developers decide on algorithms or platforms to use (Adamopoulou and Moussiades, 2020; Khin and Soe, 2020. According to Adamopoulou and Moussiades (2020), some fundamental concepts are mentioned to better understand AI chatbot technology.

Pattern-matching (also called rule-based approach). This means that the system matches the words from a predefined dictionary. This method has been used in Eliza and ALICE chatbots; however, this approach has many disadvantages. For instance, the responses are relatively predictable and repetitive and have a conversational looping effect due to missing the storage (to store previous responses). Figure 5 depicts the example of the conversation between a rule-based chatbot and an AI chatbot.

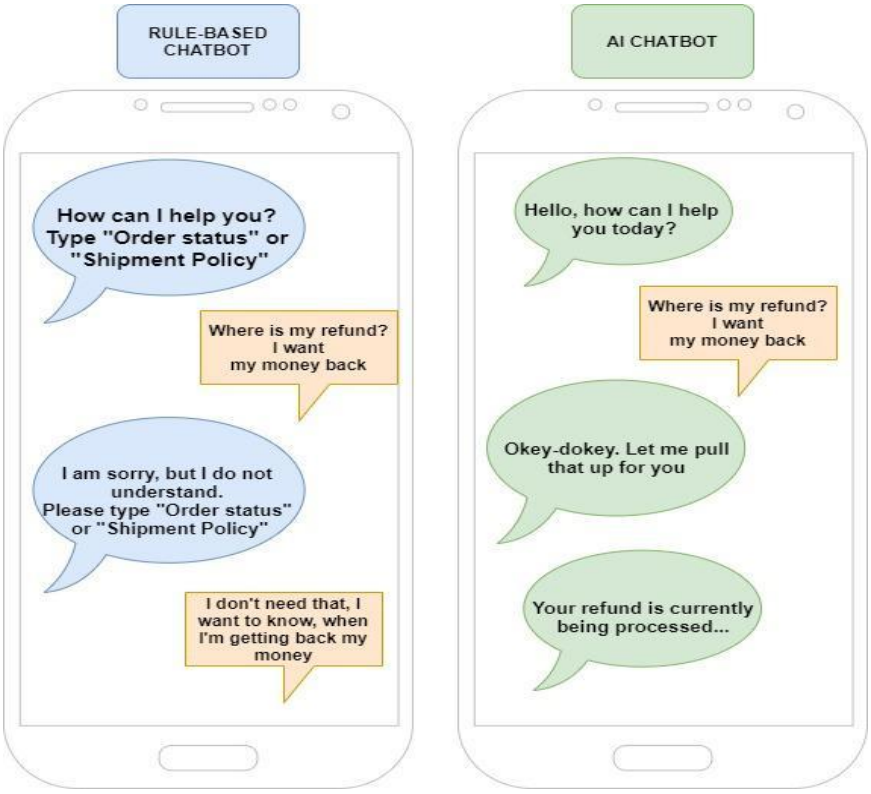

Figure 5. Example of conversation between basic rule-based chatbot and AI chatbot. Inspired by Agrawal (2020)

The main difference visible for the consumer is the understanding of the chatbot. For example, suppose a consumer asks a question that a rule-based chatbot has not been trained to answer. In that case, it is confusing and unable to provide the information. On the contrary, AI chatbots enable users to engage in natural, human-like conversation.

The Artificial Intelligence Markup Language (AIML) tag-based technique is applied to natural language modeling. It is based on basic units of dialogue called "categories". General questions or template-based questions such as greetings can be answered by using AIML. In contrast, AI chatbots use Latent Semantic Analysis (LSA) to discover likenesses between words for more advanced questions. However, every system contains a set of predefined tailored neutral answers when the input is not understood.

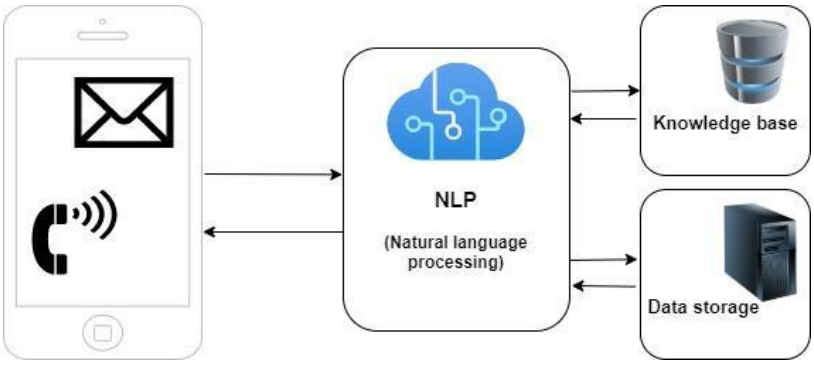

Figure 6. NLP processing of user's input. Inspired by Mallya (2021)

Figure 6 depicts the *Natural Language Processing* (NLP) technology used for AI chatbots. NLP is a field of artificial intelligence that focuses on how computers understand and translate human language. Thus, NLP aims to ensure that complex and highly diverse human language is easy to understand for machines. NLP converts the user's speech or text into structured data; the data are then utilized to give a relevant answer. Many NLP techniques are based on *Machine learning* (ML), which is the computer's ability to learn by training enormous data and improve over time without being explicitly programmed. However, the core technique for the NLP task is *Natural Language Understanding* (NLU). When a user provides input to the AI chatbot, the NLU extracts the context and meanings from natural language. Once specific intent is triggered, the AI chatbot responds by corresponding action.

Another critical component is an *entity*. The entity is a tool for extracting values from the natural language. Once the user requests the chatbot, the system aims to infer the user's intention and the associated information. For instance, a user might type a request "Translate orange," where translate is the intended value and orange are the entity (associated information). Alternatively, as another example, a user might ask, "What is the weather in Sweden?". The user's intent is to obtain information about the current weather forecast; the entity value is the word Sweden. Then, the chatbot proceeds with the execution of the action or asks for additional information or clarification. Machine learning gives AI chatbots the ability to learn from the experience so that AI chatbots can execute the task based on the previous conversation (Adamopoulou and Moussiades, 2020). Additionally, chatbots could be developed by programming languages like Java or Python or be built on cloud-based state-of-the-art platforms such as Google's DialogFlow, IBM Watson, or SAP Conversation, all empowered by machine learning (Adamopoulou and Moussiades, 2020).

2.4.1 Conversational Skill

The rapid growth in the last decade in the development of natural language processing (NLP) s overcome many NLP technical challenges; however, the research in behavioral aspects of communication skills of AI chatbots is still ongoing. Conversational skill is an essential capability for chatbots, to the extent that it might impact consumer perceptions, especially when organizations pass on more significant roles and tasks on chatbots, which subsequently start to act like employees (Schuetzler, Grimes and Giboney, 2020). As developers aim to develop chatbots that are indistinguishable from humans, the last decade has been characterized by significant advancement in the technical capabilities of conversational agents. Besides, the research focused on technical capabilities rather than understanding how the different designs impact the perception. It's crucial to understand when it is more suitable to apply sophisticated AI chatbots and when the system's sophistication may lead to adverse effects, and a relatively simpler rule-based chatbot would be more appropriate. Further, Schuetzler, Grimes and Giboney (2020) also determined that once a chatbot can act more human-like, consumers increase their expectation of the device capabilities and see the chatbot as more engaging than a less skilled one. This led to blurred differentiation between behaviors in human-human and human-computer conversations.

The level of conversational skill consists of many different behaviors. Consumers with high conversational skills often give relevant responses, do not speak too slow or too fast, and exhibit variety in their speech. These skills influence how others see the speaker during an interaction. The same principle is applied to chatbots. The researchers distinguish between *style* and *content* of chatbot conversation skills. *Style* is how the intent is expressed, while *content* is seen as the main intent expressed in a message. The chatbot's predefined set of tailored responses represents content, and response variety represents a style (Schuetzler, Grimes and Giboney, 2020).

According to Schuetzler, Grimes and Giboney (2020), the improvements in conversational skills can positively influence perceptions of AI chatbots, as tailored responses and variety in responses improve engagement and increase the sense of connection between consumers and conversational agents. The authors suggested that organizations aiming to engage with their consumers should incorporate tailored responses for their chatbots.

2.5 Characterizations of the university students' generations

In addition to the AI and chatbot-related information, there may well be critical generational characteristics information. For example, most current university students belong to *Generation Y* (also referred to as the millennials) and *Generation Z* (also referred to as the iGeneration).

According to Linnes and Metcalf (2017) generation Y (born between 1981-1995) is defined as digital natives, and fast communication is an essential aspect of their school and daily lives. When decisions need to be made, this generation heavily relies on peer advice by asking for a recommendation in their network of "friends" and "followers" rather than researching other sources. The millennials generation was the first to experience the Internet's possibilities and witness the development of many types of technology such as mobile phones. Further, this generation prefers online or mobile communication and social media, and their signature product can be described as a tablet and smartphone.

Further, Linnes and Metcalf (2017) advise that the communication process accelerated with the technological developments such as reading the emails moved from computer desktops to smartphones. In practice, students can approach their peers or university staff outside of their consultation hours and dispel their doubts any time over the Internet. However, this led to a situation where students representing the millennial generation often expect an immediate response. Students of this generation approach the teachers with questions about the practical application of the course content. They seek to have a closer relationship and extra personal attention from the teacher than previous generations. According to Schrodt, Whitt and Truman (2007) the student-teacher relationship involves a degree of social influence. Teachers have the power to influence students in many ways. Teachers reward students with extra course credits or other forms of positive feedback. Students are motivated to get a reward, so they aim to meet the teacher's requirements. Students are also aware that teachers have the power to punish in the form of penalties for late papers or unexcused absences.

Generation Z is the generation born after the millennials (born from 1995 to the present). It is the first generation accompanied by technology since birth. This generation is very dependent on IT, fond of innovations with signature products as nano computing and 3D printed products. They demand customer orientation, high priority to customer satisfaction, and a "customer is always right" attitude. Their communication mainly takes place on hand-held devices, and the generation moves the favor from "older "communication platforms such as Facebook and "ancient" forms of communication such as email on immediate social platforms such as Snapchat (Linnes and Metcalf, 2017).

2.6 Gaps in knowledge found in Literature review articles

After summarizing the review assemblies, the thesis researcher, was able to distinguish some gaps in the themes and point out some of the deficiencies. For example, although Artificial

Intelligence is an important subject within the IS field, the researcher believes that research concerning AI chatbots application in higher education communication has not been addressed fully in the senior scholars' basket of journals (basket of 8).

Another deficiency in the reviewed literature is the perceived lack of acceptance metrics. None of the reviewed papers referred to IS research theory, such as the Unified theory of acceptance and use of technology information (UTAUT). Besides, the experiments have been only conducted in one particular country and not in different countries. The studies also do not address the consumer behavioral characteristics based on their generation characteristics. Generally, the papers lack extensive evaluation to support the proposed solutions or justify the proof of concepts.

Furthermore, as the implementation of AI chatbots in the education sector has not been fully realized, there has not been found studies with phenomenological research design used by researchers. There could be a reason, as phenomenology attempts to build the essence from participant's experience (Creswell, 2017) and currently mentioned technology is not being widely accepted and incorporated particularly into the education sphere.

The last gap has been perceived in the lack to mention of ethics or security-related aspects of AI chatbots application in higher education experiments. The researchers often did not address or take into consideration these issues during their experiments. AI chatbot might be an effective communication enabler; however, the innovation brings challenges. This creates a paradoxical situation when benefits are accompanied by unintended consequences such as security risk. However, the authors of studies did not address such issues.

2.7 Theoretical Framework

Technology acceptance is vital for designers; consequently, researchers also address acceptance and acceptability in their research. Both are crucial for the further development of any new technology. Furthermore, when an organization is planning to facilitate their platform to increase, for instance, personnel efficiency or profitability, or cost reduction or to improve marketing, it is important to recognize the consumers' needs and attitude towards the solution in the beginning stage. Therefore, understanding the issues that influence consumers' decision to use technology is helpful to consider already during the development phase. Consequently, it is also important for the successful implementation of such technology. Furthermore, the impact on individual willingness to use the technology plays the technology's features. Therefore, understanding the consumers' perception towards adoption helps facilitate the rise of implementing a new solution (Taherdoost, 2019).

Various studies have been conducted to predict the adaptation and acceptance of technological solutions. Many recent studies have relied mainly on models such as the technology acceptance model (TAM) (Davis, 1989) and the unified theory of acceptance and use of technology (UTAUT). UTAUT has been proposed by Venkatesh, et al., (2003) and consists of eight models (TAM is one of the models included). This theory helps researchers evaluate the probability of success of new technology and understand the factors for its acceptance. According to Venkatesh, et al., (2003) it also points to the mitigation of the impact of skeptics and less prone users to adopt the new technology, for instance, by marketing or training interventions. The model consists of four variables: performance expectancy (PE), effort expectancy (EE), facilitating conditions (FC), and social influence (SI). There is a difference between UTAUT and UTAUT2 introduced by Venkatesh, Thong and Xin (2012). The main focus of UTAUT is organizational context, aiming to predict if the employees will accept and use the technology.

On the other hand, the UTAUT2 has been proposed to understand consumer behavior. Both include the moderators of age, gender, and experience. Also, both predicting models consist of performance and effort expectancy, social influence, and facilitating conditions. On top of that, UTAUT2 contains three additional factors: hedonic motivation (HM), price value (PV), and habit (HA) to explain consumer behavior.

According to researchers Gharrah and Aljaafreh (2021) and Huang and Kao (2015), the seven factors are further described:

Performance expectancy (PE) can be explained as a personal belief on how the technology will support a specific activity or attain a gain in job performance. In other words, the extent to which new technology usage can bring benefits to consumers while performing activities. This construct further consists of four criteria: the perceived usefulness, the job fit, the extrinsic motivation, and the relative advantage. Perceived usefulness means a degree to which people believe that using new technology can improve their job performance. The job fit criterium means the potential of new technology to increase job performance. Extrinsic motivation means realizing if consumers would like to perform an activity linked to a reward or linked to a valued outcome. Finally, relative advantage criterium refers to benefits coming from the new technology adoption compared to the costs. This factor points to advantages that university students would gain by using AI chatbots in the thesis context. Further, the students might expect the AI chatbot's performance to enhance their study performance. Based on this reason, the performance expectancy factor impacts the behavioral intention of university students to use AI chatbots.

Effort Expectancy (EE) can be described as the extent of the effort of a person who used the system. This construct consists of three criteria: complexity, the perceived ease of use, and ease of use. The complexity criterium means if the technology is easy or difficult to use and understand. The perceived ease of use refers to consumers believing that the technology will be free of effort. Finally, the ease of use criterium means the likeness if the consumers see the technology as easy or difficult to use. In the thesis context, these factors point to, for instance, the degree of ease exerted by university students using AI chatbots.

Social influence (SI) can be explained as the importance of others' opinions to use the technology. Further, this construct consists of the image, the subjective norm, and the social factor. The image shows what consumers think the technology will enhance an individual's status in a social organization. A subjective norm is a social pressure to behave in a certain way. It is the consumer's internalization from the social system's subjective culture. For instance, the thesis context would be the importance of what friends of university students think about A chatbots and if they accept and support using AI chatbots.

Facilitating conditions (FC) can be explained as a user's confidence in the organization and technical infrastructure to be able to support the technology. In the thesis context, it would be the ability of the universities to provide and facilitate sufficient infrastructure and resources such as internet connection.

Hedonic Motivation (HM) can be explained as the comfort, stimulation, or pleasure a person feels when using the technology. In other words, it is a motivation based on consumer satisfaction. In the thesis context, this would, for instance, mean that university students are having fun using AI chatbots.

The habit (HA) factor can be explained as routine when a person performs the task automatically as a custom. This construct consists of three criteria: reflex behavior, past behavior, and individual experience. The reflex behavior means consumers' daily life customs. The past behavior refers to consumer behavior in the past. Finally, the individual experience refers to consumers' routines linked to using technology. For instance, in the thesis context, university students' habits affect their intentions to use AI chatbots.

The price value (PV) factor indicates the tradeoffs between the benefits and monetary costs of using the technology. However, this factor has been removed from the model. It is not relevant as it is assumed that any university would provide such service for students free of charge. Furthermore, the factors lead to a state when the consumer has made his mind and has formulated a conscious decision to use or not use the technology in the future. This stage is called behavioral intention. The six mentioned constructs are the predictors of behavioral intention in this study. The thesis author decided to apply this IS theory. It has been recently used in the research of AI Tools adaptation by Venkatesh (2021) and in pedagogical research (Almaiah, Alamri and Al-Rahmi, 2019) addressing new technology acceptance in higher education. Further, the thesis author decided to rely on the UTAUT2 version used in quantitative research by Almahri, Bell and Merhi (2020) where researchers excluded the price value factor. The authors also did not address any moderators in their study (age, gender, experience); however, they suggested that the future work should focus on modifications of the prediction model by including other

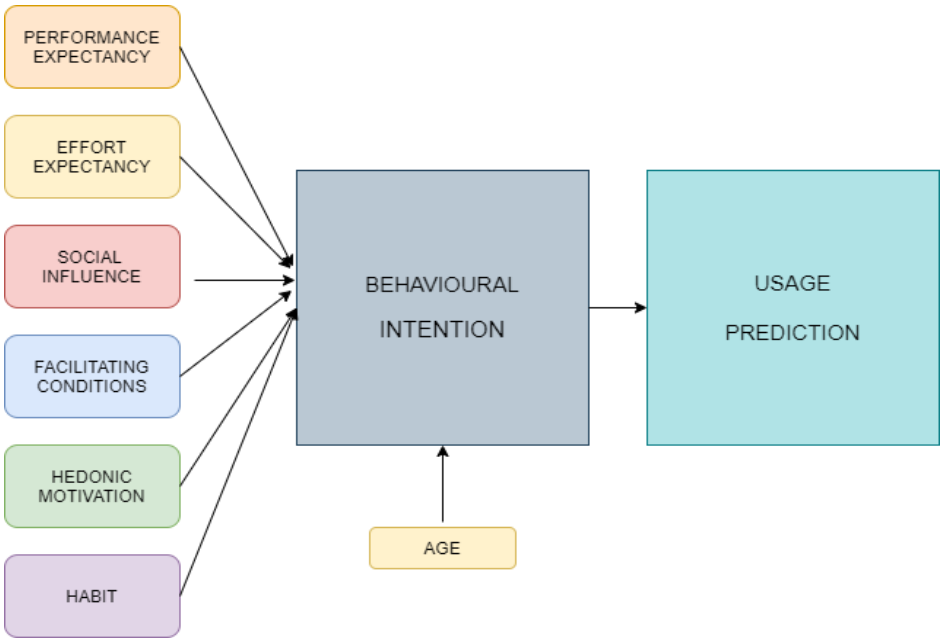

Figure 7. UTAUT2 model by Almahri, Bell and Merhi (2020) enriched by age moderator

constructors such as security, trust, and system quality. Consequently, this study would use the same prediction model but consider one of the moderators (age) and look for the other constructs that might improve the current model (see Figure 7).

3. Methodology

This chapter focuses on the research methodology adopted to answer the research questions. The chosen methodological tradition is based on the recommendations mainly by Creswell (2018) and elaborates on the research methodologies. This part is divided into the following subsections: firstly, there are presented the methodological traditions and explained the philosophical idea (or else the worldview) that this study would adopt; secondly, there is the methodological approach where the research approach will be discussed, and last, the research design, data collection, and analysis methods that will be used to conduct this research.

3.1 Methodological Tradition

The meaning of philosophical ideas, or else what is often called worldviews (or ontologies and epistemologies), has to do with the general philosophical orientation that the researcher brings to the research study about the world and the nature of the research. Respective paradigms supplement worldviews can be described as an intellectual framework embodying a tradition of scientific research. It helps to explain why the researcher chose a particular research approach in the study. Worldviews are developed in individuals according to their discipline orientation or another subject area, past research experiences, research communities, etc. (Creswell and Creswell, 2018). *Ontology* is a concept that aims to answer the questions "what exists in reality?". It is built on a belief that there is only one single reality, this reality is constantly changing and that multiple realities exist. It is seen as the reality perceived by the researcher.

On the contrary, *epistemology* aims to answer questions "how do we know?" and "how can we acquire knowledge?". It builds on assumptions that knowledge is measurable and that reality needs to be interpreted and examined in the best way possible with the right tools. Researchers following epistemology are trying to find the knowledge from reality (Creswell, 2014).

Four worldviews are broadly discussed in the literature: postpositivism, constructivism, transformative, and pragmatism. *Postpositivism* holds a deterministic philosophy and regards that the reality is objective and develops numeric observation measures, setting it as a more suitable for a quantitative approach. *Constructivism* or else *social constructivism* considers the reality of being subjective. Individuals develop meanings of their experiences, and it is more appropriate for a qualitative approach. *Transformative* regards that the research has to be closely tied with politics, and the research contains a plan of action to change the lives of the participants that the researcher studies. *Pragmatism* holds the belief that truth is what works at the time and reality is in constant change (Creswell, 2014).

This study adopts the constructivist worldview as the aim is to explore and capture the various meanings of students in higher education institutions. The goal is to capture the individuals' views and meanings of people in a setting. Hence, the researcher collects a diversity of views from as many participants as possible (as the meanings of people can vary). In the constructivist worldview, the researcher intends to interpret and make sense of the meanings of others about the world. Further, according to Creswell (2014), constructivism or social constructivism is an approach to qualitative research. Researchers applying this perspective believe that individuals want to understand the world where they live and work. These individuals develop subjective views - meaning directed toward particular objects or things. Accordingly, researchers rely heavily on the participant's views by asking them open-ended questions. This approach can be justified as the most suitable for this study because it is based on literature review and qualitative interviews and surveys. As literature review analysis points to various findings of

other researchers and interviews and questionnaire survey seeks to understand the topic from the viewpoint of consumers.

3.2 Methodological Approach

There are three research approaches: quantitative, qualitative, and mixed methods (Creswell and Creswell, 2018). The *quantitative* approach tests objective theories by studying the relationship among measurable variables where the collected data can be analyzed using statistical procedures. Researchers who conduct quantitative approach test theories deductively, looking for alternative explanations, limiting bias, and generalizing the findings. The literature in such studies justifies the research problem and suggests possible questions or hypotheses. Quantitative studies include variables and hypotheses. A variable can be described as a measurable characteristic or attribute of an individual that varies among the people under study. Hypotheses are predictions about what the results will show. A theory is placed into the study in the form of an argument, a discussion, a figure, or a rationale. The theory then tries to explain the phenomena that occur in the world; the researchers often test theories as an explanation to answer research questions. The final report has a rigid structure (Creswell and Creswell, 2018).

The *qualitative* approach aims to understand the meaning of individuals or groups of people of a problem while the research process includes questions and procedures. Thus, non-numerical data are collected in the participants' environment, and their analysis is done inductively, building from particular to general themes. One of the suggested methods for data collection in this approach is qualitative unstructured interviews. Creswell and Creswell (2018) suggest that the questions are generally open-ended, few in number, and intended to elicit opinions from the participants. Researchers conducting qualitative research are looking at research that follows an inductive style. Their main focus is on the individual meaning and rendering the complexity of a situation. However, the literature review helps to justify the research problem does not constrain the views of participants. The Review is usually in a separate section of the thesis. The use of theories in qualitative research varies. For instance, some researchers place the theory as a lens at the beginning of the study, and some generate the theory as a final outcome of the study. The theory is in the qualitative study generally referred to as patterns, naturalistic generalizations, or theoretical lens. The final report has a flexible structure (Creswell and Creswell, 2018).

Last, the *mixed methods* approach involves collecting quantitative and qualitative data; later, these forms of data can be integrated into a study. A qualitative approach is appropriate when a concept or a phenomenon needs to be explored and understood because little research has been done. There is a belief that a combination of both approaches provides a more comprehensive understanding than either approach alone (Creswell, 2014). This approach can include deductive theory testing quantitatively or inductive qualitative theory, or pattern emerge. Researchers can, in this approach, decide to use either a qualitative or a quantitative approach to the literature review.

This study follows a qualitative research approach as the purpose is to record, understand and interpret the meanings, experiences, and opinions of the individuals involving the collection of non-numerical data. Additionally, Myers and Avison (2002) note that it is designed to help researchers understand the people and the social and cultural context. The approach has been chosen based on Creswell (2014) suggestion to choose this approach if the topic is new and the subject has never been addressed before with a particular sample or group of people. When existing theories do not apply to the particular sample or group under study. This

recommendation suits this study's characteristics. The qualitative approach is also particularly useful when the researcher does not know the necessary variables to examine.

3.2.1 Research Design

Researchers not only select research methods to conduct the study (qualitative, quantitative, or mixed methods), they also must decide on a type of study within these three approaches. Following the section of the methodological approach is the section of the research design (or else strategy of inquiry). The research design has to do with the structure of the research project, the plan, or the framework for carrying out an investigation focused on a research question (Schwartz-Shea and Yanow, 2013). For example, the design associated with quantitative research includes experimental designs such as true experimental or nonexperimental designs, such as surveys. If researchers adopt a qualitative approach Creswell (2017) further recommends among the possibilities of design such as narrative, phenomenology, ethnography, case study, and grounded theory.

To present briefly, in *narrative research,* the researcher tries to analyze and understand stories provided by individuals. Here, the researcher focuses on one or more individuals and gathers data by collecting their stories. Then, the researcher reports the experiences of these individuals that are ordered accordingly chronologically. Often, in the end, a narrative is presented with are combined views from the participants and researcher. *Phenomenological research* involves describing the meaning of several individuals of their lived experiences about a concept or a phenomenon. The researchers in a phenomenological study focus on describing what all participants have in common as they experience a phenomenon. This type of research aims to reduce the meaning of the individual experiences about a phenomenon to a description that provides an understanding of the actual phenomenon like, for example, insomnia, something that Creswell (2007) calls the description of the universal essence. In the *grounded theory*, the researcher moves beyond description and derives a general, abstract theory of a process, action, or interaction based on the participants' views. All the participants in this study should have experienced this process, and the development of a theory can help provide a framework for further research. Additionally, *ethnography* is a design where the researcher studies shared patterns of behaviors, language, and actions of a cultural group in its natural setting for an extended time period. Last, a *case study* analyzes in-depth a case, an activity, or a process of one or more individuals. The researchers, therefore, collect detailed information by using a variety of data collection procedures for a sustained period of time (Creswell, 2007; Creswell and Creswell, 2018).

The thesis researcher decided to collect data from various sources to explore activities with a detailed description of settings. The most suitable is to follow the case study design.

3.2.2 Case study

Creswell (2007) notes that researchers in case studies explore a case through detailed data collection, including multiple sources of information such as observations, interviews, audio-visual materials, documents, reports, and questionnaires. The case is seen as a real-life, contemporary bounded system, and the researchers explore the case through multiple detailed sources of data collection. One of the characteristics of a case study is the unit of analysis and not the topic of investigation. For example, they are analyzing the experiences of a specific group (Merriam, 2002). Further, Merriam (2002) provides an example to understand how the unit of analysis characterizes a case study. The example involves a study of women's experiences in welfare-to-work training programs. Although it can be a qualitative study, this

study does not necessarily mean that it should be a case study. To explain, the unit of analysis is the women's experiences, and there could be an indefinite number of women selected for this study. However, for that to be a case study, one particular program (bounded system) has to be selected. A bounded system is typically unique, experimental, and it is the unit of analysis. For instance, a case study could also be conducted by recording the experiences of a single woman.

In this thesis, the case study records the experiences of university students (who might already have used chatbots in different circumstances); now focused on their thoughts on the potential use of AI chatbots in particular bounded systems of higher education institutions. This study, therefore, examine the application of AI chatbots in general but in a specific setting.

3.3.3 Types of case studies

There are different types of case studies mentioned in the literature. For example, according to Yin (2009) a case study aims to answer "how," "why," and "what" questions to explore a phenomenon. The author further distinguishes between three types:

a) *Explanatory* - is used when the researcher seeks to answer a question that aims to explain the presumed causal links in real-life interventions that are too complex for the survey or experimental strategies. This type of case study seeks to answer "How" and "Why" questions
b) *Exploratory* - is used to explore situations in which there is no single set of outcomes. This type aims to answer "How" and "What" questions.
c) *Descriptive* - is used to describe a phenomenon and the real-life context that it occurred.

Further, Stake (2006) makes the following distinction among case studies:

a) *Intrinsic* - a case study is characterized as intestacy when the researcher has an intrinsic or else enduring interest for the case itself that is not necessarily a means of learning about general problems.
b) *Instrumental* - is when the purpose of the case study is to go beyond the case, meaning that there is a need to understand the case to understand a bigger research question at hand. The goal of this case study is to understand something more by understanding it.
c) *Collective* - or else called multiple cases. Each of them is useful for the learning experience. The researcher selects multiple cases to illustrate an issue

This study follows an exploratory case study (students' thoughts on the potential use of AI chatbots in particular bounded systems of higher education institutions). It explores the acceptability of AI chatbots in higher education as a communication medium to inquiries addressed to the university by students. Additionally, the thesis researcher regarded that there is not a single set of outcomes. To further justify the chosen type, a detailed description of the situation is established by recording the meanings and opinions of the relevant stakeholders. The study seeks to answer the questions: "How" can AI chatbot technology be used in the higher educational setting (usage area) and "What" are the factor behind the acceptability. Therefore, the thesis researcher considers the study exploratory.

3.2.4 Participants' Selection Criteria

Bounded systems in this thesis refer to cases being bound by time and place. The phenomenon of the study is the acceptability of AI chatbots by university students (consumers). Real-life contemporary bounded system (university student acceptability AI chatbots). The researcher purposely decided to explore university students' perceptions from different countries to obtain

in-depth data, not limited to a particular country. Before selecting the population, the thesis researcher considered several aspects. For instance, the chosen population must be aligned with a chosen social problem. The researched chosen social problem is the lack of incorporated AI chatbots into educational settings. The purpose is to understand how university students view AI chatbots (if their beliefs vary from the previous research). Therefore, the thesis population includes the students interviewed or approached to answer the open-ended self-administered questions in the online survey tool MonkeySurvey. Thus, the selected sample of the population has knowledge regarding the phenomenon which is being researched.

A population can be described as a set of cases from which a sample is created. Due to time and resource limitations, the researcher of this thesis cannot analyze the entire population. The number of cases has been reduced and narrowed down to a specific group - university students (Taherdoost, 2016). The thesis researcher considered the main aspects to justify the choice of university students as this study's population. Firstly, university students' inclusion is relevant as they are seen as consumers (target users). Thus, their view on this technology is essential for the success of the implementation. Secondly, one of the research questions elaborates on student-university communication.

The population location (Sweden, Norway, Finland, Czech Republic) has been predetermined based on the researcher's personal network pool. All participants come from predefined countries, are enrolled in a university, and are between 20-32 years old (Generation Y or Generation Z). The age of participants is one of the moderators of the acceptability study. In addition, the researcher delineated that the selected participants must be enrolled in a bachelor or master's study program (not in doctoral or a single standing course).

Their gender, university program, and socioeconomic status vary; however, this supports the choice of the sample as students in real life are not heterogeneous. In other words, this sample is representative of the population.

To meet the participant's criteria (university students), the qualitative sampling could not be done randomly. However, one of the sampling techniques called snowball recommended by Creswell (2013) has been used to identify the participants. Besides the social media groups, the researcher asked people in her network to help them to identify others who fit these criteria and decided to conduct interviews with 3 participants and approach the rest of the 17 participants with the questionnaire survey until data saturation occurs. However, the researcher has not been engaged prior with the interview participants and, as the questionnaire survey is done anonymously, is not aware of any relationship to the population.

The researcher does not purposely distinguish between gender (meaning that this study does not seek to understand if particular gender has higher acceptability of AI chatbots than others). Instead, the researcher seeks to reveal the readiness to accept this technology to reveal the mood among university students to use AI chatbots in general, not to point who should be in the pilot group and act as an early bird to implement the solution.

Generally, with more diversity between the participants, more cases are needed for data saturation than in a more homogeneous sample (Taherdoost, 2016). There could also be other factors that might distinguish participants into a more heterogeneous sample. For example, the differences between private or public university students, digital readiness or strategy of each university or country, different funding possibilities of each university to maintain digital technology. Besides, some countries might be more digital-oriented than others. Therefore, the thesis researcher decided to consider the chosen participants as a homogenous sample, even

though more diversity could be found if looked for. As the As the thesis follows qualitative research, which is not generalized to the wider population (does not imply a large number of participants) the researcher believes that such collected information (gender, demographics, and background) might lead to wrongly understanding assumptions only because of limited examples. Hence, due to the limited number of participants, this study has not covered the UTAUT2 moderators of gender and experience. The researcher did not want to influence the research based on personal bias and assumptions from information based only on a few examples. Roberts (2020) points out that a qualitative researcher might disseminate findings based on personal bias and prejudice if proper preparation is skipped. The researchers that approach the research as if they know the answer to the research question might be tempted to guide the participants to provide only responses that support their predetermined ideas and beliefs.

3.3 Methods/Techniques for Data Collection

This section highlights the methods used to collect the data for this thesis research. As the thesis researcher explores a phenomenon, the primary type of data collected is the participants' responses. However, as the case study has been chosen, the data should be triangulated, meaning to be collected from other sources to completely understand the phenomenon. The thesis researcher also incorporated field notes from the interviews into data collection, as some of the notes provided additional information that later helped put the interview responses into context. A case study employs multiple methods for data collection of one or more people (Myers and Avison, 2002). In this study, two methods are used for data collection: a primary suggested by Merriam (2002) semi-structured interviews with open-ended questions and second surveys with open-ended questions (Saris and Gallhofer, 2014).

According to Alshenqeeti (2014) qualitative research provides detailed descriptions of individuals, events, and natural settings. The interview is generally thought of as a key factor in research design and communication with people as one of the most effective methods for exploring constructs. Data gathered during an interview can extend the scope of understanding investigated phenomena. It is a rather naturalistic than structured data collection tool. Further describes three types of interviews: structured, unstructured, and semi-structured. The critical feature of structured interviewing is a set of predetermined direct close-ended questions that require an immediate response. For instance, the ‘yes’ or ‘no’ type of response. Unstructured interviewing is characterized by flexibility and freedom in terms of organization and implementation and is offered to both interviewers as well as to interviewees.

This thesis uses semi-structured interviews as this type is considered the most appropriate in a case study, according to Hancock and Algozzine (2017). Researchers can ask predetermined but flexible questions followed by further unstructured questions, allowing them to express their perspectives openly. Data collection through interviews is a standard method in case study research as interviewing individuals or groups allows the researcher to obtain rich and personalized information. Therefore, the researchers tend to use open-ended questions so that interwebs can share their views (Creswell and Creswell, 2018). Also, researchers follow the guidelines by Hancock and Algozzine (2017) to perform a successful interview. These authors suggest that a researcher firstly identifies key participants whose knowledge and opinion provide helpful insight. Secondly, the researcher should formulate an interview guide/protocol with open-ended questions to ask the interviewees. Thirdly, the researcher needs to consider the setting where the interviews is conducted. Fourthly, a researcher must record the session to

prevent the loss of valuable information. Fifthly, the researcher must consider the legal and ethical requirements that concern the involved people.

The thesis participants are university students from multiple locations (Sweden, Norway, Finland, Czech Republic). These countries have been purposely selected, as the researcher has her personal network pool in these countries. Regarding the settings, due to the ongoing COVID-19 pandemic, the interviews have been, as suggested by Merriam (2002) held online. Additionally, the participants have been asked if they consent to record the interview. The recording allowed the researcher to analyze the interviews and ensure that no data was lost. Further, the thesis researcher considered ethical requirements.

Another qualitative research method is a survey with open-ended questions (Saris and Gallhofer, 2014). Surveys are a usual method in quantitative studies that aim primarily to describe numerical distributions of variables. However, a qualitative survey aims to determine the diversity of some topics of interest within a given population (Jansen, 2010). That kind of survey can be performed in the context of critical theory or constructivist projects. When it comes to case studies, a qualitative survey can be addressed in the analysis as a multiple case study (Jansen, 2010).

The participants have been engaged on social media (Facebook) university student groups or engaged via messaging platform (Messenger) from the researcher's personal network pool. Further, other participants were addressed based on the participants' recommendation based on the snowball technique recommended by Creswell (2013). The primary data collection was completed through a survey and interviews held in March 2021, and participation was voluntary. A reward of any type has not been provided. However, participants were informed about the aim of the thesis before the data collection. In addition, the information about the possibility of withdrawing (right to step out of the interview/survey and not participate further) has been provided. In general, questionnaire survey participation required complete 10 open-ended questions that inquired about the participants' perception of AI chatbot's potential usage in higher education (see Appendix C.: Survey questions). The participants have been later referred to as respondents (R1-R17). As per the MonkeySurvey site, the average response time of each participant was 10 minutes. On the contrary, interview participation has been held over online conference calls (Zoom), recorded, and the average time spent answering the open-ended interview questions was circa 45 minutes.

3.3.1 Interview process

Roberts (2020) advises that the most important aspect of the interview is to keep in mind that the purpose is not to get the informant to answer the questions but to listen to participants to acquire the meanings associated with these experiences. Researchers should have an attitude to see the participant as an expert on their experiences, and only a participant possesses the needed knowledge to answer the research questions.

The three interviews took place on 26th March 2021 over an online conference call (Zoom). Each took approximately 45 minutes to conduct. As the researcher proceeded with semi-structured interviews, a set of 20 questions was prepared before the meeting (see Appendix D.: Interview question). However, some questions deviated from the list and have been asked spontaneously to clarify the answers. During the call, the list of the questions has been used to reference what needs to be addressed and to keep the interview structured but not framed to limit the focus. Roberts (2020) suggests developing a list of main questions to break the topic into components. The thesis researcher divided the interview list into 6 parts, 5 consisting of

main questions and 1 part with screening questions. Also, probs have been incorporated into the interview, however not written down, but kept in mind to use during the interview meeting. For example, the thesis researcher used probes like “Go on,” and “That is interesting, could you tell me more,” or “Could you go back and tell me about... “ Probs, as described by Roberts (2020) support the researcher in keeping the interviewee engaged, summarizing the topic, managing the flow efficiently, and checking for understanding.

The initial "meeting greetings" conversation has not been recorded. Instead, the recording started once the initial conversation ended and moved to the interview questions. The initial phase made participants feel more comfortable and more open to answering the questions. The recording ended with the last answer; however, the interview continued for a while longer as the thesis researcher thanked each participant for their contribution. In notes, the participants have not been referred by their name but by a personal identifier assigned to each person (P1, P2, P3); their field of study and location have been written down. Next, the researcher used the otter.ai solution to transcribe the voice interviews into the text automatically. Following transcription, the researcher engaged the interview participants with a transcript as an email attachment. This process step is called member checking and aims to review the transcribed interview to double-check and support the accuracy of captured information. The feedback for the member checking did not point to any changes in the text.

3.3.2 Informed consent

Informed consent can be described as a process of providing clear and truthful information about the research to participants. According to Creswell (2014) informed consent form acknowledges human rights and protects participant’s data. It contains a standard set of elements such as a guarantee of confidentiality, identification of the researcher, assurance that the participant can withdraw at any time, and provisioning of contact details if questions arise. Furthermore, the participants can decide not to participate if they disagree with the instructions for consent provided by the researcher. Also, no participant can be forced into signing the consent (Halse and Honey, 2005).

Regarding questionnaire survey participants: informed consent was sent within the messaging tool (Messenger) requesting participation. Once the potential candidate expressed interest in being part of the study, the text was sent to participants (see Appendix E.: Consent form template). Three of the participants have volunteered for an interview, and the consent has been again mentioned at the beginning of the call. In addition, all of the interview participants expressed their permissions to be contacted for additional information and for member checking. All participants have also been advised that the data are stored in an encrypted share drive used only by the thesis researcher for 5 years based on Peng (2017) recommendation for computer science studies.

3.4 Methods/Techniques for Data Analysis

This section deals with the chosen method for data analysis and the justification of this particular model. According to Creswell (2014) data analysis is an ongoing process, and it consists of participant information analysis. Creswell (2014) further recommends that qualitative research adopting a constructivist worldview proceed with inductively data analysis, building from particular to general themes. This study uses two types of analysis – thematic and content analysis. The general thematic analysis includes the organization of data, initial reading through the transcript text, coding the data, and formed description. It is a systematic technique recommended by Braun and Clarke (2006) for identifying, analyzing, organizing qualitative

data sets and further describing them. The method is relatively flexible. It is not tied to a particular epistemological or theoretical perspective. Furthermore, it is agnostic, as it can be used in inductive (data-driven) and deductive (theory-driven) analysis as well as to capture semantic(explicit) or latent (underlying) meaning. In semantic analysis, the researchers focus purely on what participants said or what information was provided. On the contrary, latent analysis seeks to go beyond what has been said to examine underlying ideas and assumptions.

The analysis is conducted within a constructionist framework focusing on latent themes rather than semantic, as the study aims to seek the motivation of acceptability of the AI chatbots by university students (consumers). On the other hand, an analysis focusing on semantic themes does not seek to focus on motivation but seeks to theorize the socio-cultural contexts. Further, latent theme analysis tends to be more constructionist. In more detail, in the inductive content analysis, the researcher is looking for patterns, and therefore it is also called data-driven analysis (Graneheim, Lindgren and Lundman, 2017). Data are strongly linked to the data themselves. Researchers are coding the data without trying to fit it into a pre-existing frame; thus, the process is not driven by the researcher's analytic preconceptions (Braun and Clarke, 2006).

In contrast, in the deductive analysis known as concept-driven, the researchers test existing theories about a phenomenon under study against the collected data (Graneheim, Lindgren and Lundman, 2017). Thus, an analysis is driven by the researchers' theoretical or analytic interest; however, the outcome has a less detailed description of the overall data (Braun and Clarke, 2006). Clarke and Braun (2013) further advised not to use the main interview questions as the themes, hence only summarizing and organizing the dataset instead of truly analyzing it.

Once the member checking was completed, the thesis researcher decided to use the qualitative data analysis software (NVivo) to facilitate coding and sorting data sets from questionnaire surveys and interview transcripts into the initial results themes. The software is based on Natural language processing (NLP), combining the researcher's several rounds of coding to determine categories of themes (Bazeley and Jackson, 2013). In this study, a qualitative approach was employed using online interviews and questionnaire surveys. The thematic analysis has been performed in NVivo by attaching codes to data units while analyzing the files. The content analysis has been performed manually by the thesis researcher. The collected data has been analyzed, focusing on latent themes.

As the NVivo tool was not used before, the thesis researcher decided to perform an additional manual content analysis to analyze the text. Even though the procedure has been more time-consuming, the researcher aimed to cross-check the outcome of the manual analysis with the software support analysis to avoid any missing themes. The content analysis helped to analyze large amounts of data collected from interviews and survey answers quantitatively. The aim was to attain a summarized and broad description of a phenomenon. First, the researcher extracted words into content-related categories to build up a conceptual system, as suggested by Elo and Kyngäs (2008). Then, the data has been organized into specific units of words.

Further, the transcripts have been read over to narrow down the major themes that emerge. As a next step, the text has been coded into categories concerning the research questions. The researcher of this thesis was looking for similarities or differences in the collected data, which were then described in categories to point to theoretical understanding. Once the final categories of themes had been determined, the researcher conducted the relational application to the UTAUT2 model.

3.5 Reliability, Validity or similar

Qualitative research validity refers to determining the accuracy of the findings from the researcher's viewpoint, the participants, and the readers of the research. Various terms can define validity as trustworthiness, authenticity, and credibility (Creswell, 2014). To ensure the validity of the study, the researcher applied different strategies and procedures. Creswell (2014) recommends the use of multiple strategies to increase the accuracy of the results. The frequently used strategies are eight. The first strategy is the triangulation of different data sources. The second strategy adds to the study's validity to establish themes based on several data sources or perspectives from participants. For instance, the researcher can use member checking by taking the final reports or the themes back to the participants and ascertain if the participants feel that the themes are accurate. The third strategy describes the findings abundantly and in detail to be realistic, and the readers are transferred to the setting. The fourth strategy explains the bias brought in the study and reflects on how their interpretation was influenced by various factors like the researcher's background, gender, and culture. The fifth strategy refers to differences in real-life opinions of people. Opinions vary, for instance, due to different perspectives. Therefore, it is advantageous to present information that contradicts the perspective of the themes, making the report more valid. The sixth strategy advises spending a long time in the field so that the researcher is able to develop a deep understanding of the studied phenomenon to be able to communicate in detail the existing situation and the people. The seventh strategy aims to find/use/locate a person who to review and ask questions about the study to include another person's interpretation. Last, and the eighth strategy advices to use an external editor to review the entire project meaning to use/utilize a person who is not familiar with the study and thus provide a more objective assessment of the project (Creswell, 2014). However the thesis researcher did not followed all the suggested strategies, for instance triangulation has not been adopted for this thesis nor spending a long time in the field.

Reliability in qualitative research shows that the researcher's approach is consistent among other researchers and projects. For example, Creswell (2014) mentions two known researchers on how they established the reliability of their studies. The first known researcher who suggested that researchers in a qualitative study should document the procedures of their case study was Yin (2009). He suggested that researchers should describe as many steps of the process as possible and establish a detailed case study protocol so that others can follow the procedures. The other known researcher is Gibbs (2007). He proposed to eliminate transcript mistakes by constantly comparing the data with the codes. Also, the researcher can find another person who can cross-check their codes.

The background of the researcher and position might affect what they chose to investigate. It could influence the angle of investigation, the methods selected for this purpose, the findings considered most appropriate, and the conclusions (Malterud, 2001). In addition, a researcher often has certain opinions about what it is all about. Therefore, different researchers can have different interpretations and representations depending on each one's perspective and position of a studied situation (Malterud, 2001).

Furthermore, the validity and reliability of this study can be supported by correctly using scientific methods. For instance, the data collection, analysis, and interpretation are made in line with scientific methodologies. Moreover, the guidance and feedback from the course examiners, the supervisor, and peer validation, help the thesis researcher contribute to valid and reliable characteristics. For example, the literature review could be validated through cross-checking the papers listed in the reference list. Further, the thematic analysis has been done manually as well as by software support to obtain accurate and dependable results. Regarding

the validity of the interview, the researcher has followed interview recommendations for the novice by Roberts (2020). For instance, the researcher crafted the interview questions with support from the supervisor and prepared a protocol as a guide. Later on, the analysis reflected on the effectiveness of the interview questions. Further, some steps of the Interview Protocol Refinement Framework (IPR) by Castillo-Montoya (2016) have been followed to ensure that the open-ended questions align with the research question and that the questions can simulate the real conversation, however, focused on the study objective.

As a limitation, only qualitative methods were followed due to the chosen methodology approach. The qualitative interview also has some limitations, as it provides indirect information, filtered by the participants' view. Further, researchers' presence might bias responses. Also, not every participant has articulation and perceptive skills (Creswell, 2014). On the other hand, expanding the methods to qualitative observation might bring firsthand experience with participants. One of the critical limitations was time, resource, and sample size, and it might influence the results of this thesis. An extended time frame, additional researchers, and more participants in the study might add additional perspectives and allow the researcher to cover additional UTAUT2 moderators.

3.5.1 Saturation

According to Fusch and Ness (2015), saturation can enhance the validity of the qualitative study. The study population consisted of 20 participants; 3 of them participated in the interview, and the rest in the questionnaire survey. Creswell (2014) explains saturation as a state when the researcher stops the data collection as the themes emerge and further data gathering no longer brings new insights. Furthermore, saturation is reached when there is enough data to replicate the study (Fusch and Ness, 2015). Data saturation occurred during content analysis at participant n.16, with the emergence of common themes concluding. The thesis researcher could not determine any new information, coding or a new theme from the rest of the participants. However, the additional 4 participants from the questionnaire survey enhanced the data-rich responses obtained, especially to confirm the confirmation of subthemes rather than single standing primary themes.

3.6 Ethical Considerations

Research ethics concerns the value, standards, and institutional arrangements that regulate a scientific study. During the conduction of research, certain moral principles need to be followed while the research is conducted. These include the relations between the researcher and other people, as well as the environment and society in a broader sense. An essential part of research ethics is how the people who participate as subjects in research should be treated (The Norwegian National Committee for Research Ethics in Science and Technology, 2016).

Furthermore, the author of this thesis anticipated the ethical issues which arise during studies. Creswell further (2014) points out that ethical questions are evident in areas such as personal privacy, authenticity, and credibility of the thesis. The researcher also worked in cross-cultural contexts. Regarding the literature review, the Harvard referencing system has been followed. The author's information captured in the literature was not manipulated and was expressed as accurately as possible.

Additionally, the researcher needs to protect participants of the study by not causing any harm to research subjects, promote integrity, avoid any misconduct, and remain responsible towards

society. The author of this thesis also followed Creswell (2014) suggestions of ethical issues and how to address them. For instance, at the beginning of the study, the author identified a research problem that benefits participants. Creswell (2014) further advises treating participants equally, reporting multiple perspectives, communicating clearly, and reporting honestly. In more detail, the researcher followed all the legal and ethical requirements in this research that involved people (Hancock and Algozzine, 2017). The participants have not been deceived and have been protected from any form of mental, physical, or emotional injury. Their data and their privacy have been protected so that no names will be exposed in the future. Therefore, the information obtained from interviews and surveys is anonymous and confidential. Additionally, the participants were informed about the purpose of the study, and they provided their consent in the participation of this research as voluntarily. Last, the interwebs have the right to withdraw and end the interview at any time (Hancock and Algozzine, 2017).

4. Empirical Findings

This chapter presents the findings coming from the analyzed qualitative data. Through this process, certain themes were identified by interpretation, as the researcher drew meaning from the findings. Creswell (2014) suggests that such findings can be in the form of a lesson learned, personal experience, or information in contrast to information obtained in the reviewed literature.

4.1 General findings

To ensure that the participants have the necessary experience in student-university communication, two screening questions were asked at the beginning of the interview and questionnaire survey. The general findings from the interview and questionnaire survey data showed that the university students are in frequent contact with the university staff – teachers and admission office employees. The students are mainly approaching their teachers regarding two areas. The first topic type involves questions about assignment submission dates, deadlines of projects, and dates of exams. The second type consists of course-related questions about requirements. These two areas can be explained as “when” it needs to be delivered and “what” needs to be delivered to pass the course. These two areas are the most crucial for the student to go through the university education, but they can be read in many ways. Firstly, it indicates that the students are serious about their studies, and that is why they are approaching the university staff to make sure they do not fall behind in their studies. Nevertheless, it can be a consequence of insufficient information provided by the university. On the other hand, it can be caused by the student's fruitless search for information; however, none of the participants suggested it. The students also frequently communicate with the Admission office. The questions mainly address the credit policy (needed amount of credits to continue), and the course retakes policy.

The presented data is coming from three interviews and the replies of 17 questionnaire surveys. Respondents of the interviews are shown in Table 1. Because the survey tool does not automatically gather the data about the participants, information such as gender or field of study has been noted only from the interview participants.

Table 1. Respondents of the interviews

Nr.	Participants of interview	Field of study (Major)	Gender	Country
1	P1	Nursing	F	Czech
2	P2	Marketing and Finance	F	Finland
3	P3	Computer science	M	Norway

The first screening question was: "*How often are you engaging with teachers/university staff/university library per month (email, forum, chat, face-to-face, etc.)?".* The results from the screening question suggest that every participant is engaged in some kind of student-university communication at least two to ten times per month. The second screening question was: "*With what questions/topics are you mostly addressing teachers/ the university office/ university library*?". As shown in Table 2, the results from the screening question suggest that students approach their university with the seven most common types of topics, mainly with questions about the dates of exams, followed by course and assignment requirements types of questions and questions concerning the Admission office. As shown in Table 2, students do not engage a university with one type of topic only; they engage university employees with several topics based on a situation. For instance, a student can contact a university with recommended literature questions and consultation questions within a month.

Table 2. Most common topic engagement

Engagement topic	Number of participants (out of 20) engaging a university with this topic
Deadlines and dates of exams/retakes	16
Requirements (course, assignment)	14
Recommended literature, availability of books	6
Thesis supervision, consultation	7
Student funding, interlibrary loans	4
Admission office (credits, course retakes)	10
Other	3

4.2 Findings from the themes

Firstly the researcher has analyzed the data with software NVivo support. This pointed to three primary themes: Fast support, Limited capabilities, and Lack of concerns. Then, the researcher did the second analysis without software support and provided additional two primary themes (No judgment and Simplicity kills). It might be caused by personal preferences or a lack of familiarity with the software; however, the researcher believes that the second analysis indicated the additional themes. Finally, coding resulted in five primary themes, three subthemes, and 13 codes (see Table 3 and Appendix F.: Themes, subthemes, and codes). The selected responses have been incorporated from different questions; however, they address the same theme. Meaning, the responses are not coming from one particular question, but the codes have been mentioned multiple times throughout the interview and questionnaire survey.

Table 3. Identified themes, subthemes and codes

Theme	Subtheme	Code
NO JUDGEMENT	IDEAL STATE	ANONYMITY
	FEELINGS	BOTHERING OTHERS
		SHYNESS
	ACTION REDUCTION	NO POLITENESS NEEDED
		NO CONSEQUENCES
FAST SUPPORT		FAST
		INSTANT
		TIME SAVER
		AVAILABILITY
SIMPLICITY KILLS		POOR QUALITY
		RULE-BASED EXPERIENCE
LIMITED CAPABILITIES		MISSING TRUST
		FUTURE ONLY
LACK OF CONCERNS		

Theme n.1: *No judgment*. The researcher specifically asked about the negative aspects of communication with humans, what feelings are associated with the communication, and the reply. In total, 20 participants provided 39 related responses which could be linked to this theme. Some of the participants of the interview (P1-P3) and respondents of the questionnaire survey (R1-R17) advised that they have negative feelings associated with the communication to the university employees and the awaiting the reply. Some participants mentioned feelings such as shyness regarding approaching the teacher in front of other students and would prefer to ask their questions anonymously. In contrast, others mentioned that they are worried about how the teacher will perceive their questions.

These findings regarding behavioral and psychological aspects of students' communication, especially the negative ones, might be mitigated by the adoption of AI chatbots. By providing a stress-free solution for particular student-university communication topics.

In more detail, this theme is divided into 3 subthemes. The first subtheme (*Ideal state*) is based on responses advising that students prefer to keep identities secret for various reasons. The second subtheme (*Feelings*) is based on what students feel while engaging the university staff. The subtheme links to different feelings during the communication, not on the reason for the communication. There are two very different codes under this subtheme. For example, some students are experiencing a negative feeling of guilt of allocation of other time. While for some, it is a relief as they see the engagement as a workaround to their shyness to ask out loud. It can be argued that one of the feelings does not exclude the other; however, one prevails, as none of the participants mentioned them together.

P3: "*Sometimes, when I do not follow the course closely, I feel other students will think of me poorly, so I rather ask the teacher separately as you cannot ask in the forum anonymously."*
R10: "*I got the feeling that I am delaying someone from their work by my question."*

The third subtheme (*Action reduction*) is based on students' responses suggesting that some parts of the communication could be removed and eliminated. For example, students feel obligated to be more polite while communicating with a university staff than others. The

behavior could be described as walking on eggshells, in contrast with the communication to the AI chatbot, allowing students to go to the point without any decorum or exaggerated courtesy.

P1: "*I try to be as nice as possible in emails, very formal, and very polite. I am trying to title them properly, using please and thank you. Maybe it's something in our post-communist culture that teachers are above students, and they have the power to punish you. I don't know; I just feel this way. Anyway, in the past, teachers had the power to expel you and make sure you were not able to get to university, not for your grades but political attitude, the cultural feeling might still be there."*
R1:" *With technology, there is no need to be super polite or shy."*

Some of the participants mentioned that they felt nervous and nauseous waiting for a reply. As the latent analysis seeks beyond the responses to examine assumptions, the researcher got the impression that university students fear being judged while seeking attention in parallel. Figuratively speaking, the researcher got the impression that the students wanted to be served with the information. Besides, the respondent should not have any right to opinionate or show an attitude towards the asker.

P1: "*Sometimes teachers' answers are quite short, and you can say "cold". Stating a fact. The worst is when they don't understand what I'm trying to say, as the original info is in 2 emails prior, or when they do not read the email thoroughly and answer me to something different. Sometimes I feel like a child, wanting to reply "thanks for this advice, but I'm not 15 anymore, I could have figured this by myself. I'm asking for more management decisions, not advice to a kid". But I have also come across a great response, so it's more about the personality of a teacher."*
P3: "*Yes, you might say sometimes I could feel from the answer that I have disturbed them in the middle of the joke or cup of coffee."*
P3: "*Sometimes, when I do not follow the course closely, I feel other students will think of me poorly, so I rather ask the teacher separately as you cannot ask in the forum anonymously."*
P1: "*Stressed and nervous. Sometimes I even think – was I too pushy? What if the teacher will remember my name and get me harder exam questions. Maybe it's silly. Also, I'm thinking – maybe it went to spam and they will not answer at all."*

Theme n.2: *Fast support*. The responses indicate the perceived benefits of using AI chatbots (without the educational intention) in communication and information provisioning. The researcher specifically asked about the opportunities that technology might bring to students and important AI chatbot features. In total, 33 related responses have been linked to this theme. Most of the participants in the interview (P1-P3) and respondents of the questionnaire survey (R1-R17) highlighted the speed of the response and the 24/7 availability. The researcher got the impression that university students are intensely annoyed by waiting for answers, and it is not associated with any positive feelings. The researcher assumes that, in general, waiting and pending the reply is seen as a very unpleasant aspect of communication. The students do not demonstrate any patience, thus could not keep a positive attitude during the waiting. Said exaggeratedly, the waiting itself is viewed as a personal crime towards them. The assumption is that this attitude might have been associated with the age of the population sample (20-33 years old), thus belonging to millennial and iGeneration culture.

P1: "*The biggest benefit is to get an instant response."*
P2: "*Fast response."*

P3: "*Time-saving."*
R1: "*Workaround to get a fast, instant answer. No need to stress over the weekend or days to wait for the teacher to answer."*
R2: *"Get the answers quickly."*
R3: *"Get basic information fast and easy."*
R5: *"I would choose AI chatbot due to its 24/7 availability. In case of complex questions when I need detailed answers, I would contact a person."*
R15: "*Being able to answer questions about university procedures so I don't have to read long documentation*."
R17: "*Quick search for specific information."*

Theme n.3: *Simplicity kills*. The researcher specifically asked about the previous experience with AI chatbots and the results of the experience. In total, 29 related responses have been linked to this theme. The researcher got the impression that participants do not distinguish between AI chatbots and rule-based chatbots. The participants mainly mentioned poor language understanding and characteristics, leading the thesis researcher to assume that they have more rule-based chatbot experiences than AI chatbot experiences, which confuses them. As the latent analysis seeks to go beyond what has been said by participant, the researcher has the underlying understanding that simple solutions do not provide an acceptable level of satisfaction.

R2: "*Sometimes useless. I had to change my question to point the chatbot in the right direction."*
R5: "*One time I got the info I needed quickly, another time chatbot misunderstood my question."*
R6: "*I have used this in my bank info. It helps but for the very basic things."*
R8: "*Negative. I was not provided the information I was looking for and no other types of sources of information were available."*
R9: "*I used chatbots on some e-shop websites. Mostly annoying and not very useful."*
R15: *"I would not communicate with current AI because it can only answer some questions."*

Theme n.4: *Limited capabilities*. These responses represent the participants' perceived abilities of AI chatbots. In total, 12 related responses have been linked to this theme. The researcher specifically asked participants about the possible challenges of the usage of AI at a university. The participants mainly mentioned the lack of capabilities of this technology, lack of university resources, and the prognosis that the technology might get better in the future. However, given the assumption (substitution of AI chatbots to rule-based chatbots) from the theme n.3, and participant's lack of belief in the capabilities of AI chatbot technology might be explained by their experience with the simpler types of chatbots.

R2: "*In the future, once technology develops, the chatbots will understand better."*
R6: "*Al chatbots can help until one point, you can use the word you want, and it can provide info. However, the info is not always enough for the word you are searching for. Chatbot technology can does not know all the words."*
P3: "*If the chatbot would make mistakes or don't have answers even to general things, that would only mean that the knowledge has not been put into the system. There must be someone – some person- to upload the data continuously. Many times, there are no resources for that at my school."*

Theme n.5*: Lack of concerns*. The researcher specifically asked if the participants had any concerns regarding AI chatbots (privacy, security, technology is too complicated, non-human, etc.). Only a handful of participants had suggested some concerns. The responses show that

they lack concerns such as privacy and security. Only handful of participants and respondents (4 people out of 20) mentioned any worry or slightest concern about security/privacy or non-human communication. It would be hard to believe that the current students have never heard of security or privacy issues. Thus, the rationale behind it could be that the consumers blindly believe in system protection. Alternatively, they might not have experienced any privacy/security breach that harms them or does not see such data (provided by AI chatbot without educational intentionality) as sensitive and do not prioritize its protection.

R1: "*No.*"
R5: *"No."*
R8: "*No.*"
R10: "*Yes, any departure from face-to-face action raises concerns and risks."*
R16: "*No*."
P1: "*Not really, it's the same with the email*."
P2: "*Maybe a bit. Did not think about it."*
P3: "*There could be privacy and security issues, but as it will be, I assume under login (course info), so it would be encrypted."*

5. Discussion

This part is dedicated to discussing the findings from the systematic literature review and the findings from the qualitative data gathered from the interview and questionnaire survey in relation to the UTAUT2 model. As the researcher followed the case study, themes were analyzed for multiple cases; these themes were further compiled with UTAUT2 constructs to identify findings to answer the thesis research questions. Once the primary themes were compared to the constructs, the researcher indicated that three of the primary themes correspond with UTAUT2. However, one primary theme points to a new construct of the predictive model, and one primary theme does not hold any significance at this moment regarding the acceptability of AI chatbots without educational intentionality (see Figure 9).

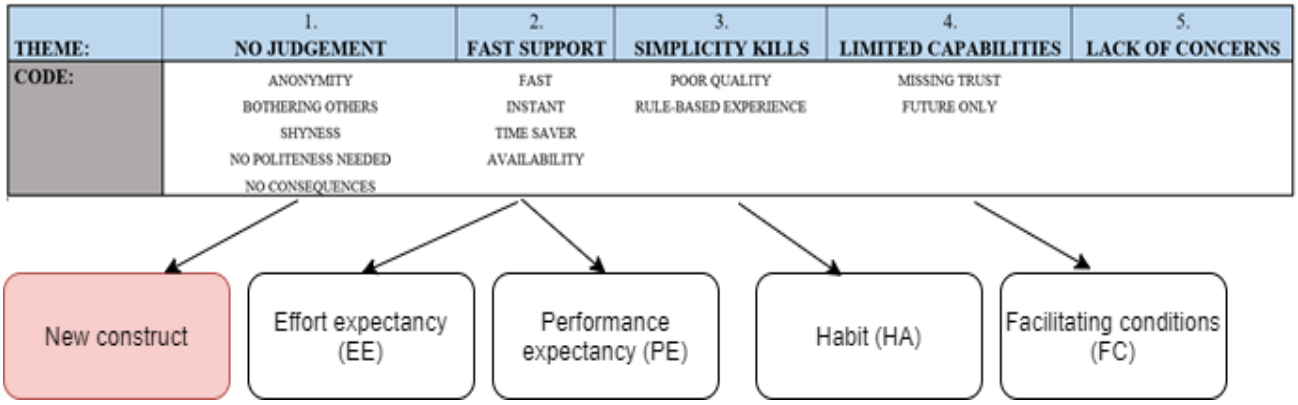

Figure 9. Identified themes and codes compiled with UTAUT2

The first theme (*No judgment*) is not associated with the UTAUT2 model. However, as most of the responses have been associated with this theme, the researcher believes it is a new construct of the predictive model called Nonjudgmental expectancy (NE). It can be defined as the degree to which an individual perceives that using a system will deprive him or her of personal judgment and prejudice. The degree to which university students perceive using AI chatbots as

an unbiased communication medium makes them not worry about any judgments or biases raised by university staff. AI chatbots can enable students to retrieve information without the additional worry of offending anyone or being offended by others. Furthermore, the construct is potentially education sector-specific, possibly due to the hierarchical structure of the educational system and cultural view of teachers as an authority. These findings align with research done by Schrodt, Whitt and Truman (2007) suggesting that teachers have rewarding and punishing power on students (see chapter 2.5 Characterizations of the university students' generations).

Furthermore, machine learning allows the AI chatbot to learn from data sets and experience and make opinions. Therefore, the data must be interpreted carefully before applying machine learning, and the outcomes must be evaluated (Stachowicz-Stanusch and Amann, 2018). To ensure that, the algorithm does not use information about the person for harm. Therefore, it could be argued that this new "Nonjudgmental expectancy" construct is very much suitable for AI technology research.

Integrating Nonjudgmental expectancy into UTAUT2 will complement the theory 's focus on an individual's psychological and emotional attitude of being judged, that/and is? not addressed in the model. It is proposed that Nonjudgmental expectancy directly affects technology use and/or weakens or limits the strength of the relationship between behavioral intention and technology use. The proposed Nonjudgmental expectancy construct consists of two prerequisites: organizational and technology. Technology prerequisite refers to technology being free of prejudice and biases. The organization prerequisite is defined as how using innovative technology or product within an organization mitigates social prejudice.

The second theme (*Fast support*) is associated with Performance expectancy and Effort expectancy constructs. Performance expectancy is the student's belief in how AI chatbots will support them in gathering the needed information. Effort expectancy can be explained as a level of difficulty operating the AI chatbots. The third theme (*Simplicity kills*) has been associated with the Habit construct, particularly with one of the criteriums: individual experience. The responses expressed the perceived quality of service and prior chatbot experience outside the education field. The fourth theme (*Limited capabilities*) is associated with Facilitating conditions: explained as confidence in AI chatbot functional capabilities. The fifth theme (*Lack of concerns*) has not been associated with any UTAUT2 construct (see Figure 10). Due to minimal responses associated with this theme, it is not seen as a vital behavior influencer.
Furthermore, the thesis author mentioned the general lack of security and privacy concerns in the literature review gap. Thus, can be assumed that the general lack of concerns is among scholarly researchers as well as the consumers. However, this might differ in situations outside of this study, such as AI chatbots handling students' medical information. But for AI chatbots without educational intentionality, the students do not seem to have security or privacy concerns to influence the acceptability strongly.

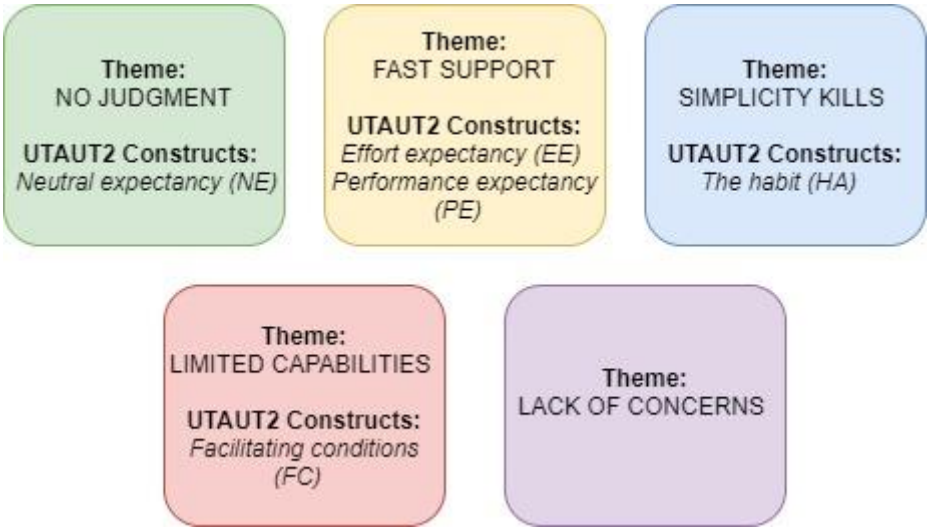

Figure 10. Identified themes compiled with UTAUT2 constructs during data analysis to identify findings

In contrast to the quantitative research of Acceptance of AI chatbots by Almahri, Bell and Merhi (2020), this thesis suggests different results (see chapter 1.4 Scope and Limitations). These authors focused on university students at a particular university department in the United Kingdom and students who experienced working with the AI chatbot in educational settings during the experiment. The results indicated that Performance expectancy, Effort expectancy, and Habit are the main predictors of the student's AI chatbot acceptance. This qualitative thesis suggests that Performance expectancy, Effort expectancy, and a newly proposed construct called Nonjudgmental expectancy are the main predictors of intention to use AI chatbots. Unlike the study by Almahri, Bell and Merhi (2020) this thesis has been applied to multicultural settings on students who have not been exposed to AI chatbots in education settings before. The results show that the judgment-free solution and the speed of the solution's response and availability are the priority regarding acceptability for the consumers.

Nevertheless, it can be assumed that once the AI chatbots are more implemented, the use of AI chatbots will become a custom and a routine activity. Furthermore, this behavior is associated with the UTAUT2 constructs called Habit (HA). Thus, this particular factor might have a more significant effect on student's intentions to use AI chatbots in the future.

The findings are further grouped with the research questions from the first section. The research questions aim to explore the acceptability factors of university students to use AI chatbots in higher education and to further point to areas and situations where AI chatbots can act as a medium in student-university communication.

RQ1: What are the factors of the acceptability of AI chatbots by students in higher education?

This research question is related to the factors which can influence university students' intentions to use AI chatbots. Factors are associated with these constructs: Nonjudgmental expectancy (NE), Performance expectancy (PE) and Effort expectancy (EE), Habit (HA), and Facilitating condition (FC) constructs. Explicitly with emerged theme n.1 (No judgment), n. 2 (Fast support), theme n.3 (Simplicity kills), and theme n.4 (Limited capabilities).

University students favor AI chatbots mainly due to their ability to provide information fast and their 24/7 availability; however, the usage of AI chatbots has been noted as dependent on the situation. The students are generally looking for fast information provisioning. This assumption is supported by Linnes and Metcalf (2017) claiming that this generation often expects an immediate response (see chapter 2.5 Characterizations of the university students' generations). Further, students also mentioned and described feelings to be offended when the reply was not considered "warm". Linnes and Metcalf (2017) explain this behavior as the students of this generation seek closer personal attention from the teacher than previous generations. In general, students are not aiming to bypass the human-to-human conversation; however, it would have to be provided at the same speed as computer-human conversation.

Regarding the Performance expectancy, students believe that AI chatbots can support specific activities (students asking for informational, educational, and assistive tasks) but only related to general, simple, and practical issues. Some of the participants mentioned that they would instead engage a human in case of a more personal or sensitive topic. It might not be surprising, considering the characteristics of millennials and iGeneration, which is pending a fast information provisioning and personal relationship with the teacher (Linnes and Metcalf, 2017). Perceived usefulness, one of the PE criterium, has not been highlighted by students. It is a degree of improvement of performance while using the new technology. Participants did not identify that AI chatbots would immediately improve their study performance and grades; however, they have described that it will indirectly support their studies if they get the needed information quicker. It can be argued that PE is one of the main predictors; however, the consumers do not see a direct link between the usage and higher performance. However, the reviewed literature speaks more optimistically, as researchers strongly believe that AI chatbots can increase and enhance teachers' capabilities and students' abilities (Ashfaque, et al., 2020; Lee, et al., 2020).

Regarding the Effort expectancy, participants addressed the complexity criterium, which elaborates on how the technology is easy or difficult to use. The participants found it easy to use AI chatbots but frustrating not to get the needed answer when requested or not being understood. It has been noted that aspects of inconvenience, frustration, and plain annoyance are associated with the outcome of the engagement.

Besides the mentioned constructs, the acceptability factors include the new UTAUT2 construct called Nonjudgmental expectancy (NE). Especially in situations when the students feel shy to ask or do not want to approach the teacher directly for various reasons. Also, the student mentioned that there is no need for titles, politeness, or courtesy when speaking to non-human, which eases the conversation for them. Most importantly, there is no consequential judgment of others or punishment or stigma due to the question. Thus, if a student perceives that the use of AI chatbots for communication with the university will contribute meaningfully to their emotional and social well-being, they may be favorably disposed to use it. However, to truly achieve this state, the AI chatbots system has to be unbiased.

Furthermore, exploring how the university students perceived AI chatbots showed that a strong understanding of Artificial intelligence technology is missing. Regarding the individual experience factor linked to using the technology, most participants described a more rule-based chatbot experience and did not distinguish between any types of chatbot in general. Students pointed mainly to poor language understanding and not being able to spot any self-improvement over time. As AI chatbots are based on machine learning techniques enabling them to learn and improve their performance (Adamopoulou and Moussiades, 2020), this leads to the assumption

that university students apply one opinion on any type of chatbots. As a result, the consumers might simply overlook the current improvements in the conversational skills of AI chatbots (Schuetzler, Grimes and Giboney, 2020).

As perceived by university students, the Facilitating conditions are mainly associated with the missing knowledge base information that prevents AI chatbots from answering more specific questions. Facilitating conditions express the user's confidence in technology and the organization using it. However, based on the data, the participants do not believe in AI chatbot capabilities to deal with the more complicated issue. Their opinion is that the technology is currently very limited. However, some of them have noted that technology development is moving forward, and AI chatbots will have more extensive capabilities in the future. The opinion regarding the capabilities seems to be still present among the consumers since the research done by Rubin, Chen and Thorimbert (2010). It can be argued that even though the researchers recommended consumers get familiar with the AI chatbots, the accomplishment did not come true. It is depressing that no activities to change consumers' minds have led to a positive view of this technology. It means that even though this thesis has been conducted differently than the study by Rubin, Chen and Thorimbert (2010) and two decades later, there is still a similarity in how AI chatbots are perceived (see chapter 1.1 Introduction and Research Setting).

Surprisingly, none of the participants mentioned any possible Social influence (SI), for instance, a friend's opinion, which would lead to the higher acceptability of AI chatbots. Even though, according to Linnes and Metcalf (2017) the representatives of iGeneration heavily rely on other people's opinions, none of the participants mentioned it as an acceptability factor.

Based on the analysis, some factors significantly affect behavioral intention to use AI chatbot technology. The captured factors that affect university students' intention to use AI chatbots are Performance expectancy (PE), Effort expectancy (EE), Nonjudgmental expectancy (NE), Habit (HA), and facilitating condition (FC). The interpretation of the study findings indicates that there are positive and negative factors that influence the university students' intention to use AI chatbots without educational intentionality. The factors which positively influence the AI chatbot acceptability are Performance expectancy (PE), Effort expectancy (EE), and Nonjudgmental expectancy (NE): providing an unbiased, easy-to-use, fast, and highly available solution for a simple educational, informative, and assistance task. The factors negatively influencing acceptability in this study are Habit (HA), focusing on a previous negative experience, and Facilitating condition (FC), primarily pointing to missing confidence that the technical infrastructure exists to support such a system. The student's acceptability intentions could be explained by the age moderator, as in many cases, their beliefs and ideas can link to characteristics of their generation.

RQ2: What application area should universities address by AI chatbots to efficiently assist in student-university communication?

Reviewed scholarly papers pointed to numerous tasks which can be delegated to software (see Figure 4). These experiments confirm and support student's beliefs (gathered during the interview and questionnaire survey) about the performance expectation of AI chatbots to provide simple and general informational, educational, and assistive tasks. The AI chatbot area of application mentioned in the literature review has been compared with the data about the most common student-university communication topics. Some of the communication topics correlate with scholarly experiments. Figure 11 depicts the feasible and possible application of AI chatbot, thus suggesting areas that could be outsourced from the university staff. The figure

combines Figure 4 (Area of application of AI chatbots as communication medium) and Table 1 (Most common student topic engagement).

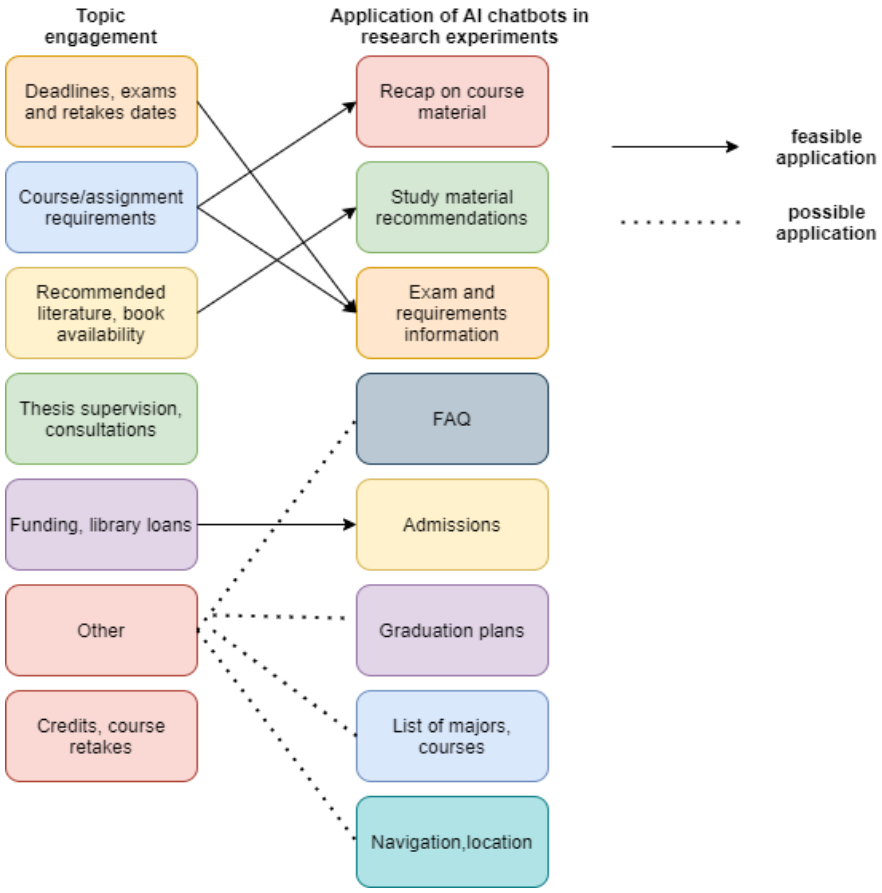

Figure 11. Suggested application of AI chatbots as a communication medium at a university

The feasible application is addressed by scholarly experiments in the literature review and suggested by study participants as the most addressed communication topic with a university. The possible application has been addressed only by scholars but is not mentioned by participants of this study. The tasks which might be seen as feasible to hand over to AT chatbots to assist in the student-university communication are: - recap on the course material, study material recommendation, exam and requirements information, and admission information. In addition, the possible application extends the communication topic scope to providing FAQ, graduation plans, courses, and navigation/location information. These findings are supported by Linnes and Metcalf (2017) on how communication technology is viewed by iGeneration. Students intend customer-orientated solutions and prefer to move from “older“ communication platforms to immediate social platforms (see chapter 2.5 Characterizations of the university students' generations).

However, it is suggested to start applying the AI chatbot with the feasible topic’s application of student-university communication, which scholars have already addressed experimentally. The findings also show that student satisfaction is linked to more advanced types of chatbots. Per the research done by Schuetzler, Grimes and Giboney (2020) with the increasing capabilities of the devices, the consumers' expectations rise. The authors suggested that today's research tries to understand the design impact perception (see chapter 2.4.1 Conversational Skill). Following suggestions by Schuetzler, Grimes and Giboney (2020), this thesis might help to understand when it is more suitable to apply more sophisticated AI chatbots than the relatively

simpler rule-based chatbot. So, suppose a university is deciding between rule-based chatbot and AI chatbot implementation. In that case, the more advanced technology is more appropriate to satisfy the consumers.

Furthermore, university students expect advanced functions and precise service, simply based on the characteristics of their generations. Thus, they do not lower their demands to a basic solution at their university when they are approached by high definition, high resolution, high availability, and multiple functions of Smart products in their spare time. Thus, applying a rule-based chatbot or not suggested communication topic applications might lead to negative consumer satisfaction, detach the usage, and defer the adoption of AI chatbots.

6. Conclusion

This chapter contains the final remarks of the thesis and includes the overall findings of the research. The chapter is divided into three parts. Firstly, a summary of the research problem and the research questions are mentioned, followed by the method of the data collection and the data analysis. The findings are stated in relation to previously mentioned studies. The second part points to the contribution that research makes to the current body of research, and the third part suggests future research.

6.1 Conclusions

Adaptation of AI technology is growing globally in many areas; however, the application in the educational field is still in its infancy. The recent development of communication technology has accelerated the communication process and enabled instant communication between people. Thus, student-university communication also increased. There have been many experiments regarding AI chatbot's adaptation into higher education; however, the acceptability of such a solution in multiple locations has not been addressed. This thesis aimed to fill this gap.

The research focused on factors of acceptability of AI chatbots without education intentionality which might explain the lack of the implementation of this AI solution in higher education. UTAUT2 theory have been chosen for the research to understand the intention of university students to use AI chatbots as a communication medium between them and a university. As a second scope the study points to areas where AI chatbots might assist the communication, seen from the student’s point of view.

The qualitative data has been gathered through semi-structured interviews and questionnaire surveys. Data has been analyzed into the themes and compiled with the Unified Theory of Acceptance and Use of Technology 2 (UTAUT2) model constructs. The research questions aimed to determine the factors of AI chatbot's acceptability in higher education and what communication topic areas are most suitable to handed over to AI chatbots. The thesis findings have been compared to the study of Rubin, Chen and Thorimbert (2010), confirming the long-term opinion among the consumers. The behavior predictors has been also compared to the behavior predictors suggested by Almahri, Bell and Merhi (2020).

As a result: Nonjudgmental expectancy, Performance expectancy, and Effort expectancy have been concluded as the main predictors of acceptability. These constructs can positively influence the AI chatbot acceptability by providing an easy-to-use, unbiased, 24/7 available solution for simple educational, informative, and assistance tasks. Further, fast information

provisioning positively impacts students' inner well-being by eliminating negative feelings associated with waiting. This thesis also suggests that a new construct, Nonjudgmental expectancy (NE), be incorporated into the UTAUT2 predictive model. Nonjudgmental expectancy (NE) can positively influence students' inner well-being by eliminating negative feelings associated with communication, such as being judged or offended by provided unbiased service. Besides UTAUT2 construct is also well suited for AI technology, considering machine learning characteristics. The study further points to particular communication topic areas that are convenient to delegate to software.

Students suggested that most possible application of AI chatbots are in in communication areas concerning recap of course material, study material recommendation and exam and requirements information.

6.2 Contribution

This thesis aims to contribute to the stock of knowledge in IS literature, focusing on the adaptation of AI chatbots in higher education by recording the qualitative meanings of people who did not use them yet, thus adding new perspectives. The master's thesis also brings a unique view on acceptability factors concerning student generation characteristics. The most significant contribution is suggesting a new UTAUT2 construct suitable for education sector research and AI research.

This master's thesis can then be used as a base for the framework for AI chatbot application in higher education, part of the digital strategy proposal of some universities or policymakers, or as an inspiration for proof of concept to justify if the concept has practical potential. For instance, the study could be used when an educational institution decides to implement rule-based or AI-based chatbots, alternatively, whether the AI designers would like to address specific consumers' intent, such as not being judged.

6.3 Future Research

Predominantly, future research should involve a larger population sample to gain a more extensive range of perspectives and experiences. With a larger sample, the researcher could examine the ideal target group for the pilot adaptation of AI chatbots in educational settings and perform research if the gender or educational background might influence the perception. Furthermore, the new suggested construct could be exanimated in other fields to expand the value of the construct. For instance, to fields with similar characteristics as an educational sector or applied in research of other solutions using AI. Furthermore, researchers need to investigate the demand for the non-prejudiced and unbiased capability of the solution.

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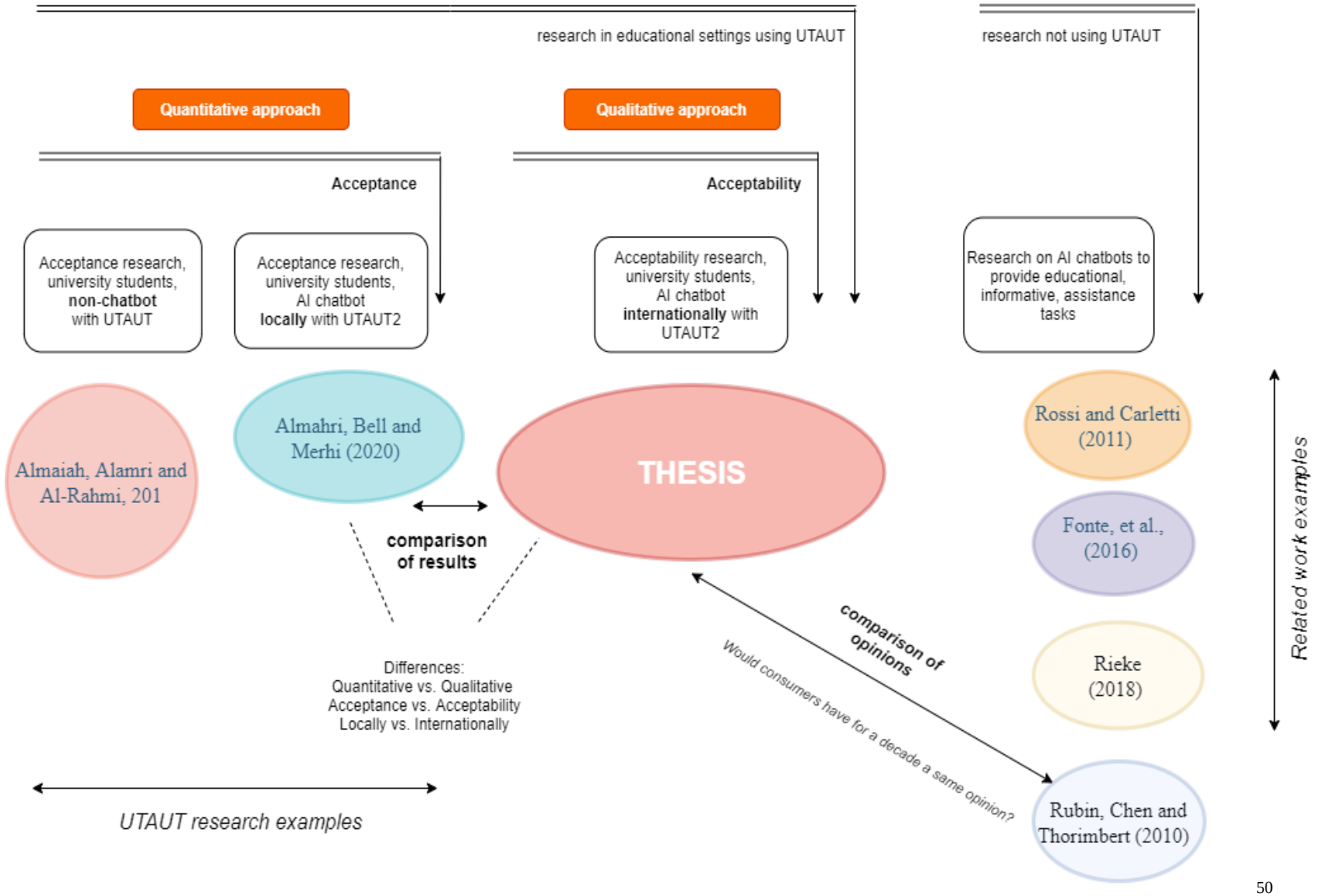
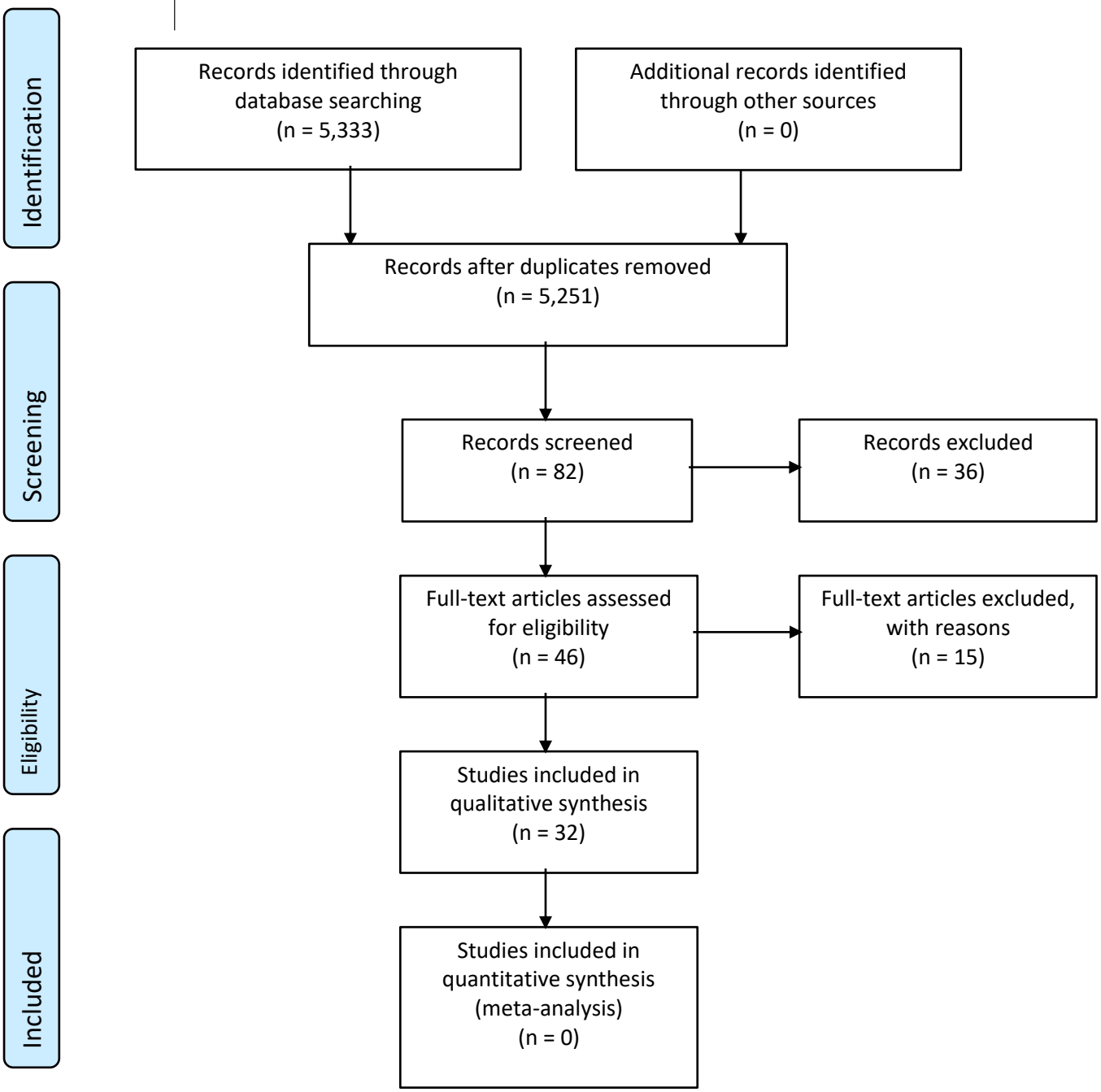
Acknowledgment

The author would like to thank the fellow student, Olga Terzi, for her contribution and comments on an earlier version of this pape

Appendix A.: Literature map



Appendix B.: PRISMA flow



Appendix C.: Survey questions

SCREENING QUESTIONS - COMMUNICATION WITH UNIVERSITY

1. How often are you engaging teachers or university per month (email, forum, etc.)
2. With what questions are you mostly addressing teachers/ the university office/ university library?

MAIN QUESTIONS

3.What were the main reasons you would choose AI chatbots for communication with a university? Are there reasons you would not choose it?
4. What do you think might be AI chatbot the biggest challenge and the biggest benefit in usage at a university?
5.What would be your expectations of an AI chatbot at your university? What is the most important feature for you?
6. Do you have any concerns regarding AI chatbots? (privacy, security, too complicated, not same as human, etc.)
7. If you ever used chatbot outside of the education field, how would you describe your experience with it? How do you remember it? How did you experience it?
8. Do you think chatbots can be capable of providing you an info service? Or what kind of service would be acceptable for you to receive from a chatbot?
9. What would make you use an AI chatbot at the university again and again? (that you will use it instead of email, regularly) Can a recommendation of an influencer, friend, peer made you use it?
10. Could you describe in as much detail as possible the state of the communication with your university? What do you think of current channels, speed of reply, accuracy?

Appendix D.: Interview questions

SCREENING QUESTION - COMMUNICATION WITH UNIVERSITY

1. How often are you engaging teachers or university per month (email, forum, etc.)
2. With what questions are you mostly addressing teachers/ the university office/ university library?

FEELINGS DURING THE COMMUNICATION:

3. Could you describe in as much detail as possible the state of the communication with your university? What do you think of current channels, speed of reply, accuracy? Walk me through it.
4. Have you ever come across a not pleasant teacher/university staff response? How was your emotional reaction?
5. Did ever happen that the teacher/university staff did not reply to your question or you have to wait more than 5 business days? What happened first, next, and later?
6. I want to understand the situation from your point of view. Are you sometimes shy to ask questions out loud in class or ask the teacher? *(or not at all)*
7. Do you ever feel like you bothering the respondent with your question?
8. I want to understand the meaning of your experience. How do you feel when you have to wait for the answer?

FEELINGS WHEN SPEAKING TO A NOT-HUMAN MACHINE

9. Do you mind speaking with a machine? Do you find it confusing or you don't mind at all? What do you feel about it?
10. What would you prefer, what is more, pleasant for you, to use a chatbot with a face (avatar) or classic chat?

OPINIONS ABOUT CHATBOT USAGE IN GENERAL

11.What is your opinion about chatbots? Do you find them helpful? Could you describe it in as much detail as possible?
12. If you ever used chatbot outside of the education field, how would you describe your experience with it? How do you remember it? How did you experience it?
13. Do you think chatbots can be capable of providing you a service (info)? And what kind of service would be acceptable for you to receive from chatbot (outside the basic course and university info)?

OPINIONS ABOUT CHATBOT USAGE AT UNI:

14. What were the main reasons you would choose AI chatbots for communication with a university?
15. Are there reasons you would not choose AI chatbots for communication with a university?
16. Do you have any security or privacy concerns? (*Or non before I have asked this*)
17. Do you think that AI chatbots could be used (have the needed capability) to act as a communication medium to answer your inquiries between you and the university admissions department, library, or your teachers?

18. What would make you use an AI chatbot at the university again and again? (that you will use instead of email, regularly) Can a recommendation of an influencer, friend, peer made you use it?
19. Would you prefer AI chatbots to be used in kiosks at the university or on a web interface on a university website or both?

EXPECTATIONS - AI CHATBOT FUNCTIONS:
20. What is the most important feature of the AI chatbot for you? Walk me through your expectations.

Appendix E.: Consent form template

Consent form for taking part in Assessment of the role of AI chatbots as communication assistants in higher education

The purpose of this research is to seek the motivation behind the intention to use AI chatbots without education intentionality in universities and to suggest the ways that this technology can assist in student-university communication.

By signing this consent form, you approve that your personal data is processed within the frame of the thesis described above. You can withdraw your consent at any time by contacting one of the contact persons below. In that case, your personal data will not be saved or processed any longer.
The personal data that will be collected from you is the gender/background of the study. Your personal data will be processed in March-April 2021 and after this, the data will be archived for 5 years.

You always have the right to request information about what has been registered about you and to comment on the processing of the data that has been collected by contacting one of the contact persons below or the higher education institution's personal data ombudsman on dataskyddsombud@lnu.se. Complaints that cannot be solved in dialogue with Linnaeus University can be sent to the Swedish Authority for Privacy Protection.

……
Signature

Ostrava, 26th March 2021
City and date

Marta Slepankova
Name in block letters

Contact information:
Student's name:
Student's email address:
Supervisor's name:
Supervisor's email address

Appendix F.: Themes, subthemes, codes

Theme	Subtheme	Code	Example of the responce	Number of related responces
NO JUDGEMENT	IDEAL STATE	ANONYMITY	*R11: Anonymity*	6
	FEELINGS	BOTHERING OTHERS	*R10: I got the feeling that I am delaying someone from their work by my question.*	12
		SHYNESS	*P3: I feel other students will think of me poorly, so I rather ask the teacher separately as you cannot ask in the forum anonymously.*	10
	ACTION REDUCTION	NO POLITENESS NEEDED	*R1: With technology, there is no need to be super polite or shy.*	6
		NO CONSEQUENCES	*P1: I try to be as nice as possible in emails, very formal, and very polite.*	5
FAST SUPPORT		FAST	*P2: Fast response.*	14
		INSTANT	*R1: Workaround to get a fast, instant answer.*	7
		TIME SAVER	*R17: Quick search for specific information*	6
		AVAILABILITY	*R5: I would choose AI chatbot due to its 24/7 availability. In case of complex questions when I need detailed answers, I would contact a person.*	6
SIMPLICITY KILLS		POOR QUALITY	R8: *Negative. I was not provided the information I was looking for and no other types of sources of information were available.*	13
		RULE-BASED EXPERIENCE	R6: *I have used this in my bank info. It helps but for the very basic things.*	16
LIMITED CAPABILITIES		MISSING TRUST	R6: *Al chatbots can help until one point, you can use the word you want, and it can provide info. However, the info is not always enough for the word you are searching for.*	9
		FUTURE ONLY	R2: *In the future once technology develops, the chatbots will understand better.*	3
LACK OF CONCERNS			R10: *Yes, any departure from face-to-face action raises concerns and risks.*	4

Linnæus University
Sweden

Linnæus University
Sweden

Faculty of Technology
SE-391 82 Kalmar | SE-351 95 Växjö
Phone +46 (0)772-28 80 00
teknik@lnu.se
Lnu.se/fakulteten-for-teknik