

THE CHATBOT EFFECT

**AN EXPLORATORY STUDY INVESTIGATING HOW STUDENTS INTERPRET
AND ADOPT CHATBOTS IN HIGHER EDUCATION**

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Abstract

Chatbots have emerged as a promising technology in various contexts, including education. The year 2022 brought chatbots into the mainstream when OpenAI released the chatbot ChatGPT, which students have rapidly adopted. The increasing presence of open-domain, freemium chatbots has sparked interest and debate around its potential impact on education. Given the limited research available in this field, this thesis takes an exploratory approach to investigate students' interpretations and adoption of chatbots in education. Against the backdrop of the growing reliance on chatbots, this thesis aims to reduce the ambiguity surrounding students' chatbot usage. A qualitative cross-sectional case study explores 13 business students' perspectives using semi-structured interviews. The collected data is analyzed through the lens of Technological Frames of Reference (TFR). The findings uncover three domains students rely on when approaching the chatbot; *areas of use*, *perceived outcomes*, and *societal trends and adaptation*. The study also provides insights into situations where time constraints lead students to reprioritize the outcomes they associate with using the chatbot. This thesis contributes essential insights for educational managers and policymakers when addressing the diffusion of chatbots in education.

Keywords

Artificial Intelligence (AI), Technological Frames of Reference (TFR), Chatbot, Higher Education, Students

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Definitions

Term	Definition
Artificial Intelligence	A field of technology capable of performing cognitive tasks similar to the human mind, such as gathering data, analyzing it to find patterns, making predictions, and continuously improving its own decision rules (Frankenfield, 2023).
AI Chatbot	AI chatbots are interactive virtual agents designed to simulate verbal interactions with humans and can be found in the field of natural language processing. The most recent chatbots are contextually aware and continue to learn as they are exposed to more and more human language (Ciechanowski et al., 2019).
ChatGPT	An AI chatbot developed by Open AI, with capabilities such as answering questions, writing creative essays, conducting research, and producing code. After being released to the public in November 2022, it became one of the fastest-growing software products in history (Hu, 2023).
OpenAI	An artificial intelligence company that conducts research with the stated goal of promoting and developing ‘friendly AI’ in a way that benefits society as a whole (OpenAI, n.d.).
Technological Frames	The subset of members’ organizational frames that concern the assumptions, expectations, and knowledge they use to understand a technology in an organization (Orlikowski & Gash, 1994).
Technological Frames of Reference	The concept of technological frames of reference is about understanding individuals’ sense-making processes in the interaction with technology, how it contributes to the underlying frames, and how they shape the following actions toward the technology (Orlikowski & Gash, 1994).
Stockholm School of Economics	One of Europe’s leading business schools, located in Stockholm, Sweden. It offers education in business and economics at the Bachelor, Master, and PhD levels. It also offers MBA and Executive Education programs (Stockholm School of Economics, n.d.).
SULF - Sweden’s University Teachers and Researchers	Union and professional organization for university teachers, researchers, and doctoral students (SULF, n.d.).

Table 1. Definitions

Abbreviations

Term	Abbreviation
Artificial Intelligence	AI
Higher Education Institutions	HEIs
Stockholm School of Economics	SSE
Sveriges Universitetslärare och Forskare (Sweden's University Teachers and Researchers)	SULF
Technological Frames of Reference	TFR
Technology Acceptance Model	TAM
Unified Theory of Acceptance and Use of Technology	UTAUT

Table 2. Abbreviations

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1. Introduction

1.1. Background

In a world where technology intertwines increasingly with our daily lives, interest in Artificial Intelligence (AI) is skyrocketing. In November 2022, AI was brought into the mainstream when OpenAI released ChatGPT, a freemium AI chatbot (Frankenfield, 2023). Over one million people signed up to try it in just five days, and it quickly went viral on social media (Roose, 2022). In January 2023, it reached 100 million monthly users, making it the fastest-growing consumer application in history (Hu, 2023). AI chatbots, now referred to as chatbots, are interactive virtual agents designed to simulate verbal interactions with humans (Ciechanowski et al., 2019).

Several researchers have noted that chatbots will likely significantly affect the education sector (Hwang & Chang, 2021; Mhlanga, 2023; Rudolph et al., 2023). Students are one of the most prominent groups of adopters of chatbots like ChatGPT due to their ability to generate texts indistinguishable from texts written by humans (Rudolph et al., 2023). Chatbots' presence in education has raised discussions on their potential effects, including how they will impact students' learning experiences (Mhlanga, 2023) and how they might create difficulties in detecting plagiarism (Fazackerley, 2023). Lars Strannegård, principal at the Stockholm School of Economics (SSE), expressed a need to question the very purpose of education in his opinion paper addressing the rise of ChatGPT in the educational sector. He argued that rather than fighting against the chatbot, universities should be places where algorithms become friends, not enemies (Strannegård, 2023). While there are both enthusiasts and strong opponents to chatbots' increasing presence in education, little is known about students' perceptions of chatbots in their studies.

From a managerial standpoint, making informed decisions regarding adapting to and potentially implementing rapidly emerging technologies is critical. Such decisions must be grounded in relevant knowledge to ensure effective and appropriate actions (Slack & Brandon-Jones, 2021). Educational institutions are no different from other businesses and organizations, as they, too, must be responsive to changes in societal trends and organizational members' behavior. With technological development showing no signs of

slowing, educational leaders must acknowledge students' interpretations and adoption of emerging technologies. The growing use of chatbots in education thus calls for exploratory research within this field. This study aims to investigate chatbot interpretation and adoption by students in an educational setting using the lens of Technological Frames of Reference (TFR).

1.2. Prior Research and Research Gap

As suggested by Winkler and Söllner (2018), chatbots are at the very beginning of entering education, pointing towards scarce research within this field. While some researchers have highlighted potential drawbacks of chatbots in education, such as the risk of biases and cheating (Rudolph et al., 2023), others have suggested that chatbots have the potential to enhance learning outcomes by increasing engagement and improving self-efficacy (Nazari et al., 2021; Yildiz Durak, 2023). Previous research has studied chatbots designed explicitly for educational purposes, such as language learning (Fryer et al., 2017; Kohnke, 2022). However, Li and colleagues (2022) state that educational institutions must acknowledge informal technologies to engage in the digital environment. To the authors' knowledge, informally adopted chatbots have not been researched in education. Moreover, research on technology adoption generally applies one of two perspectives; positivism or interpretivism. The positivist perspective assumes that technology acceptance is based on a logical decision-making process (Davis, 1989). Contrarily, an interpretive approach focuses on the studied actors' interpretations of the world and how these influence and shape technology adoption (Orlikowski & Gash, 1994). A few studies exist on students' chatbot adoption, albeit solely based on a positivistic approach (Almahri et al., 2020; Malik et al., 2021). Therefore, the authors of this thesis have identified an intriguing research gap concerning how students interpret and adopt informal technology, specifically chatbots, in a higher educational context.

1.3. Purpose and Research Question

The divergent and scarce findings on the effects of chatbots in education introduce ambiguity into the already idle educational sector, where institutional policies and regulations can hinder universities' adaptation to technological advancements (Gregory & Lodge, 2015). The thesis' authors argue that students' perceptions of chatbots may point toward crucial considerations when managing and designing for learning in an AI world

since it impacts how and when students adopt chatbots. Given the rapid advancement of AI and the presumed widespread propensity to accept chatbots voluntarily, studying the processes underlying students' adoption may help academics and managers understand chatbots' role in education. Research on this topic could help identify potential concerns and challenges, understand drivers of optimism or skepticism, and classify critical constructs that shape specific interpretations of chatbots. To uncover students' interpretations and adoption of chatbots, the research question of this thesis is:

“How do students interpret and adopt an AI chatbot in an educational setting?”

The authors hope that the insights gained from answering the research question can provide a starting point for educational managers and policymakers seeking to address the diffusion of new AI technologies, particularly in the face of external pressure from a widespread chatbot.

1.4. Primary Focus and Delimitation

This study focuses on how students at SSE interpret and adopt a chatbot in an educational context. The rationale for investigating higher education students is based on two primary reasons. First, students are an intriguing target group since they are considered early adopters of chatbots and likely to have some prior experience with them (Rudolph et al., 2023). Second, students are crucial stakeholders in education, and their perceptions will likely impact how chatbots unfold within the learning environment. Furthermore, because SSE is a business school, the study is limited to business students. The curriculum of students pursuing different programs is deemed too diverse to conclude all students' interpretations and adoptions as they encounter various educational tasks. Lastly, ChatGPT is the chatbot investigated in this thesis to which students were expected to refer. It is currently available free of charge and remains the most widely known and adopted chatbot, which was confirmed during the interviews. In addition, the authors attended a SULF seminar titled “How does ChatGPT affect the workload of the university sector?” in which 300 participants, mainly university faculty, participated. Thus, ChatGPT is, to date, the most relevant chatbot in the university sector, contributing to the selection.

2. Literature Review

The nascent nature of chatbots in education, especially from a management viewpoint, implies scarce literature in the field. Consequently, the authors include more recent studies and articles to highlight current knowledge that tangents with the aim of this thesis. Despite some literature being more immature regarding peer reviews and citations, the authors deem it relevant to include them to provide readers with contemporary ideas. Firstly, literature on technology development and how it affects organizations, specifically higher educational institutions (HEIs), is presented to provide a starting point for how existing literature has addressed this topic. Secondly, literature on AI and chatbots in education and how it impacts students is presented. Lastly, the literature review introduces previous research on technology and chatbot adoption before transcending to the theoretical framework and a more interpretive stance on technology adoption.

2.1. Technology Development and Higher Education Institutions

Technological advancements are increasing the competitive landscape, which forces businesses and organizations to adapt (Slack & Brandon-Jones, 2021). HEIs are no different, as their purpose is to educate students for the future (Carvalho et al., 2022; Iivari et al., 2020). HEIs are higher learning institutions, such as universities, aiming to provide students with relevant capabilities for the future. HEIs can be analyzed through organizational theory, where the educational system functions as the organizational field that shapes the social expectations around them (Benner et al., 2022). One standard view is that the academic system is characterized by inertia, where its stability, universal standards, and strength of old ideas contribute to its robustness (Jónasson, 2016). While students are expected to graduate with attributes like creativity and agility, HEIs tend to be reluctant to use external and potentially disruptive technologies (Flavin, 2016). Li et al. (2022) argue that this standardized technology approach might fail to prepare students for life beyond studying. With the modern era's ambiguity and complexity, external pressure for change shows no signs of diminishing. Most recently, the global COVID-19 pandemic forced educational institutions to engage in digital transformation by adopting online tutoring (Iivari et al., 2020). With the increased technological advancements of AI and chatbots, education again stands before a shift.

2.2. AI and Chatbots in Higher Education Institutions

Literature on AI's impact on HEIs delve into the potential benefits and drawbacks of such technologies' impact on students' learning and disruption of education management. AI technologies in HEIs range from tools specifically designed for learning (Kohnke, 2022) to open-domain, publicly accessible solutions not purposely designed for education (Huang et al., 2020). Regarding the latter, HEIs have not carried out any formal implementation; instead, students have adopted them independently. One such tool is Grammarly, which helps students improve their writing (Kim et al., 2022). The emergence of informal technologies suggests a shift for teachers and faculty to recognize the potential of an overall digital learning environment to prepare students for complex and evolving contexts beyond their studies (Li et al., 2022). Furthermore, Li and colleagues state that the absence of instructions on using various technologies creates confusion among teachers and students.

Chatbots are a current disruptive AI technology with the potential to revolutionize education. They have the potential to create individual learning experiences by taking on roles as learning partners and mentors for students, thereby improving their learning interests (Winkler & Söllner, 2018; Wu & Yu, 2023). Furthermore, Yildiz Durak (2023) found that chatbot usage satisfaction enhanced students' overall course satisfaction. Students' chatbot usage satisfaction also improved their engagement and encouraged active participation in learning, suggesting that increasing satisfaction can turn chatbots into a supportive tool for educational outcomes (Yildiz Durak, 2023). Related to this but from another field, Gkinko and Elbanna (2022) investigated employee chatbot usage satisfaction and found that it is positively related to positive emotions. Although negative emotions from imperfect answers can hinder adoption, positive emotions like pleasure and convenience may counterbalance frustrations and even encourage continued chatbot use (Gkinko & Elbanna, 2022). Furthermore, chatbots can increase students' efficiency as AI facilitates students' ability to collect information and knowledge rapidly (Hernandez-de-Menendez et al., 2019; Okonkwo & Ade-Ibijola, 2021). However, notable is that there may be a trade-off between increased engagement and effectiveness, leading to inefficiencies in learning (Rapp et al., 2021). Moreover, Rudolph and colleagues (2023) have raised concerns about cheating following chatbots' presence in education.

2.3. Technology Adoption

2.3.1. Technology Acceptance Model and the Unified Theory of Acceptance and Use of Technology

When studying chatbot adoption, a majority of researchers have used the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT) (Gatzioufa & Saprikis, 2022). TAM posits that two factors affect technology adoption; *perceived usefulness* and *perceived ease of use*. Perceived usefulness concerns a person's belief that a particular system could enhance their job performance, and perceived ease of use concerns their belief that using a particular system would be free of effort (Davis, 1989).

Following Davis, other researchers developed TAM to include other variables. Venkatesh et al. (2003) created the UTAUT and found four primary constructs correlating with behavioral intention and use behavior. Two of them resemble TAM's variables, whereas *social influence* and *facilitating conditions* emerged as new constructs. Social influence explains how an individual believes others view them when using technology. Facilitating conditions concerns an individual's belief that the environment supports their usage by providing necessary resources, knowledge, and guidance (Venkatesh et al., 2023).

2.3.2. Chatbot Adoption

Research on chatbot adoption has been conducted in varying fields, where studies, primarily using TAM and UTAUT, have concluded that perceived usefulness, performance expectancy, trust, and attitude are key factors influencing adoption intention (Gatzioufa & Saprikis, 2022). Furthermore, factors such as effort expectancy, perceived ease of use, social influence, perceived enjoyment, and habit have been confirmed in various studies (Gatzioufa & Saprikis, 2022). Moreover, research investigating what motivates people to adopt chatbots found productivity as a distinct factor, which concerns its ability to efficiently provide help and information (Brandtzaeg & Følstad, 2017). They also found entertainment, curiosity about novel technology, and social and relational factors as motivational factors.

As stated, chatbot adoption in HEIs is a new research topic. A few positivist studies exist (Almahri et al., 2020; Malik et al., 2021); however, these studies fail to consider users' interpretations and sensemaking of a technology. Thus, to analyze the underlying

assumptions, knowledge, and expectations of students in HEIs when facing a new chatbot, the authors have chosen TFR as a theoretical lens, which will be further detailed below.

3. Theoretical Framework

This thesis builds on the theory of TFR, which stems from the idea of individual and shared frames. The theoretical section includes an overview of the concept of frames to provide the reader with an understanding of the ideas and assumptions that underpins the framework applied in the analysis of the empirics. The study aims to develop the framework to fit the specific context of students in an educational setting using an interpretative abductive method with semi-structured interviews.

3.1. Individual and Shared Frames

Social cognitive studies build on the notion that individual actions are based on an individual's interpretations of the world, which shapes specific social realities and provides meaning to them (Berger L & Luckmann, 1967; Smircich & Stubbart, 1985). By introducing the concept of frames, Goffman (1974) explains how frames shape individuals' perceptions of reality. Individuals make sense of situations through their frames, enabling them to organize their experiences. Thus, an individual has subjective involvement in their definition of a situation (Azad & Faraj, 2011; Goffman, 1974). Frames can be applied to how organizational members interpret and give meaning to their surroundings, organization, and work tasks (Orlikowski & Gash, 1994). Thus, frames influence peoples' perceptions and understandings of organizational phenomena, which shape their actions within the organization (Orlikowski & Gash, 1994).

While individual members of a specific group have their own interpretations and frames, fundamental beliefs are often shared among members (Orlikowski & Gash, 1994). The literature recognizes that group participation significantly impacts the knowledge systems, understandings, and norms that members are exposed to, leading to similar interests and perspectives within communities (Dougherty, 1992; Gregory, 1983; Van Maanen & Schein, 1979).

Individual frames and the sharing of frames lay the foundation for Orlikowski and Gash's (1994) concept of TFR, which will be used as the theoretical lens.

3.2. Technological Frames of Reference (TFR)

With social cognition and frames as a basis, Olikowski and Gash (1994) believed a term was missing to constitute organizational members' frames concerning technology in organizations. They argue that by understanding an individual's assumptions, expectations, and knowledge about a technology's function, context, relevance, and role, one can investigate technological development, use, and change in an organization. They believe "an understanding of people's interpretations of a technology is critical to understanding their interaction with it" (Orlikowski & Gash, 1994, p. 175). Particularly, it is about understanding individuals' sense-making processes in the interaction with technology, how it contributes to the underlying frames, and how they shape the following actions toward the technology. They founded the term *technological frames*, which they define in the following manner:

"We use the term technological frame to identify that subset of members' organizational frames that concern the assumptions, expectations, and knowledge they use to understand technology in organizations. This includes not only the nature and role of the technology itself, but the specific conditions, applications, and consequences of that technology in particular contexts." (Orlikowski & Gash, 1994, p.178).

Similar to shared frames in social cognitive theory, the authors explain that individuals within related social groups are inclined to develop shared technological frames, which will guide how people interact with, interpret, and use the technology (Orlikowski & Gash, 1994). Therefore, organizational members with similar education, background, and technology experience tend to share technological frames, while frames can differ significantly between groups (Young et al., 2016). The authors define *congruence* in technological frames as the alignment of key elements, which refers to similarities in structure and content. On the contrary, *incongruence* occurs when there are important differences in expectations, assumptions, or knowledge about the technology (Orlikowski & Gash, 1994). They argue that when incongruent technological frames are apparent among key organizational stakeholders, there is a risk that organizations will encounter difficulties and conflicts around the development, implementation, and use of the technology. Therefore, it is desired that shared technological frames become established among stakeholders, as it will facilitate the adoption of technology within the organization (Orlikowski & Gash, 1994).

Individuals' interactions shape and are shaped by the emerging collective technological frame (Kaplan & Tripsas, 2008). When frames are shared among key stakeholders of an organization, such as in negotiations and social interactions, an individual's personal frames affect others' frames (Davidson, 2006; Lin & Silva, 2005; Orlikowski & Gash, 1994). Understanding how these dynamics and other people's technological frames impact the use and adoption of technology is essential for understanding individual interpretations and adoption of technology (Kaplan & Tripsas, 2008).

In Orlikowski and Gash's (1994) empirical study, they define three frame domains relevant to their data: *nature of technology*, *technology in use*, and *technology strategy*. The authors emphasize that frames are time- and context-specific, implying that they are not automatically generalizable across organizations. However, the initial domains and findings provide guidelines and illustrate how the concept of technological frames of reference can be applied.

Domain	Definition
<i>Nature of Technology</i>	"People's images of the technology and their understanding of its capabilities and functionality."
<i>Technology in Use</i>	"People's understanding of how the technology will be used on a day-to-day basis, and the likely or actual conditions and consequences associated with such use."
<i>Technology Strategy</i>	"People's views of why their organization acquired and implemented the technology. It includes their understanding of the motivation or vision behind the adoption decision, and its likely value to the organization."

Table 3. Original technological frames domains by Orlikowski and Gash (1994, p. 183)

Orlikowski and Gash (1994) emphasize that the three domains are interrelated and overlap, and cannot be viewed as separate. The domains were coded to identify the core themes that covered the most data, which could explain the respondents' technological frames (Orlikowski & Gash, 1994).

3.3. Discussion of the Theory

While TFR has been used when analyzing technology adoption in organizations, it has mostly been concerned with technology implementation and change processes. Since the case

university has not deliberately implemented the chatbot under investigation, ChatGPT, it is not a strategic implementation by the organization. However, even if the university has not adopted and implemented the technology, students have done so rapidly. Thus, ChatGPT can be seen as an informal technology potentially disrupting education. When explaining the framework, Orlikowski and Gash state:

“We propose a conceptual framework for examining the interpretations that people develop around technology, which should be useful for researchers studying the role of technology in organizations, as well as for practitioners managing the implementation of technological change.” (Orlikowski & Gash, 1994, p.175)

The authors of this thesis believe that the widespread adoption of chatbots in HEIs demonstrates a potential technological shift within education, which makes TFR suitable for this study. Furthermore, since there is uncertainty surrounding chatbots’ impact on the university sector, understanding users’ interpretations of the technology can provide guidelines for how universities should respond.

Further areas of discussion are the limitations of TFR. Firstly, Davidson (2006) argues that the original framework fails to consider the elements from which individuals’ and groups’ frames originate. Studying frames outside of the organization may be beneficial in understanding where they come from and how they can be influenced (Davidson, 2006). Since students’ adoption of chatbots has originated from outside the organizational context and not through a formal implementation by the university, the authors of this thesis deem this drawback essential to consider in this study.

Finally, the framework focuses on individuals’ frames at a specific point in time. Thus, it fails to account for how frames change over time or what triggers change (Davidson & Pai, 2004). However, due to the emergent nature of the chatbot and research area, the authors of this study deemed it relevant to conduct an explorative study that captures students’ interpretations at an early stage rather than focusing on changes over time. Since these early interpretations tend to congeal into more established understandings over time, capturing them in the present moment can provide valuable insights into the initial understanding and framing of the technology (Orlikowski & Gash, 1994).

4. Method

4.1. Method of Choice

4.1.1. A Constructivist and Interpretivist Study

This study is based on a constructivist ontological perspective, which views reality as shaped by social actors' interpretations and actions (Bell et al., 2019). This research philosophy was chosen as the authors want to understand the subjective reality of how students experience and interpret a chatbot in education. The constructivist ontology aligns with the theoretical framework, highlighting that actors' technological frames are co-constructed through social interactions (Orlikowski & Gash, 1994). Viewing reality as intersubjectively constructed thus provides an understanding of how students interpret and make sense of an evolving AI technology. Moreover, as the students' attitudes and interactions with the technology are seen as a constant process, this perspective suits the study (Bell et al., 2019).

Furthermore, as the authors strive to gain knowledge about students' understandings and interpretations of new technology, the thesis is based on interpretivism. The interpretive approach allows for investigating the complexities of interviewees' perceptions, attitudes, and interpretations and acknowledges that their subjectivity influences their reality and actions (Saunders et al., 2019). This approach enables an in-depth understanding of students' interpretations of technology in the social construction of education. The authors further acknowledge that the interviewees' answers are mediated through the authors' subjective reality and interpretations (Saunders et al., 2019).

4.1.2. An Abductive and Qualitative Study

This thesis is based on an abductive approach, which implies going back and forth between theory and the collected empirical data (Saunders et al., 2019). Since the domains of the chosen theory are contextual, an abductive approach enables the authors to explore and develop the theory in parallel to data collection. To the authors' knowledge, technology adoption of chatbots is underexplored in an educational setting, particularly from an interpretive perspective. Therefore, an abductive process allows for exploring relevant perspectives based on existing theories and adjusting where necessary (Saunders et al., 2019). Moreover, because this study aims to explore individuals' underlying interpretations of technology, qualitative, semi-structured interviews have been conducted. This allowed the

interviewees to express their thoughts freely and allowed for follow-up questions. Thus, the interviewees could guide the interview to aspects that were relevant to them, which would have been difficult for the authors to foresee if conducting fully structured interviews. Furthermore, semi-structured interviews enabled some degree of comparability and provided helpful guidance in understanding and analyzing the empirics compared to unstructured interviews (Saunders et al., 2019).

4.1.3. A Cross-sectional Case Study

This study follows a cross-sectional research design by observing multiple subjects at a particular time (Saunders et al., 2019). This research design contributes to the study's purpose of exploring students' perspectives by allowing for a comparison of the students and their interpretations. Furthermore, a case study of SSE, a business school in Stockholm, has been adopted. According to Saunders and colleagues (2019), a case study facilitates answering the questions "why", "what", and "how", which is in line with the thesis' aim. Given that members with similar education and background often share technological frames, a case study provides insight into how frames may be shared among students. This can inform strategies for chatbot adoption in similar educational contexts. Although the findings are limited to the case university, the study potentially allows for generalizability to similar universities with comparable curricula.

4.2. Data Collection

4.2.1. Sample

The interviewees consisted of 13 university students, one of whom was the pilot study. To reach participants unselectively, the authors posted a message in joint Facebook groups for first-, second-, and third-year students enrolled in the Bachelor program at SSE (see Appendix 1). The interviewees volunteered, or the authors contacted those who liked the posts. In total, the authors got in touch with 20 students. The selection was based on year of enrollment and gender to get a varied and fair representation. The authors initially aimed to narrow the scope by only including bachelor students. However, after the Facebook post, a student recommended a master's student with chatbot knowledge and experience. The authors deemed it interesting to include this person as they wanted a broad spectrum of knowledge and users and did not experience program enrollment to impact the outcome of the data. Thus, the sample was extended to business students at SSE. An overview of the

interviewees is presented in Appendix 2. Although no differences in gender or year of enrollment were identified, the information is presented to increase transferability and transparency.

4.2.2. Interview Process

Some factors were initially identified as attractive to answer the research question based on the chosen theory and literature review. The three TFR domains, *nature of technology*, *technology use*, and *technology strategy*, laid the foundation for the interview guide. The questions were crafted to understand the interviewees' underlying assumptions, expectations, and knowledge of the chatbot (Orlikowski & Gash, 1994). Questions about the future concerning the technology were also included due to the belief that rapid technological development might impact students' frames. The interview guide is presented in Appendix 3, and the four elements underpinning the questions are displayed in Table 4. A pilot interview was conducted before the completion of the interview guide to ensure all questions were formulated correctly and received valuable responses. Minor clarifying changes were made after the pilot interview. Still, because these were minor and the pilot provided interesting data, it was included in the study.

Nature of Technology	Technology in Use	Technology Strategy	Future
Chatbots and how they work	Usage in studies Self-image and consequences Classmates' usage	View of faculty Adoption by university	Development and role in the future

Table 4. The elements underpinning the interview guide

All interviews were conducted in person and ranged in length from 22 to 58 minutes, with a mean and median of 35 minutes (see Appendix 2). The study reached empirical saturation after 13 interviews, based on the occurrence of similar concepts and themes (Saunders et al., 2019). Following this, two remaining interviews were canceled.

4.3. Data Analysis

All interviews were taped and transcribed accordingly by one of the authors. In order to ensure a coherent data analysis, one of the interviews was trial coded by both authors. The results were then compared to confirm that the authors interpreted the transcribed material similarly. Following this, the two authors each coded half of the interviews separately. The empirical data was processed by looking for patterns and extracting first-order codes. Next, second-order codes were identified, from which similar first-order codes were placed at a higher level of abstraction based on repetitions, concepts, similarities, and the framework. Lastly, the literature and theoretical framework were investigated further and adjusted as needed. The analysis combined the theoretical framework and the empirics to produce new final aggregated dimensions to cover as much relevant data as possible.

4.4. Ethical Considerations

Ethical considerations have been acknowledged to increase the study's reliability and equitability. The empirical collection, analysis, and presentation have been carefully considered to protect the interviewees' integrity. As a result, all interviews were anonymized, and no unnecessary data was gathered. The anonymization also aimed to increase the possibility of earnest interview answers. All participants were informed of the study's purpose and the interview's format and conditions and signed a consent form following GDPR before the interviews. Moreover, all interviews were held in Swedish, recorded, and transcribed. The data was kept in its original language until the chosen citations were translated into English. The quotes were translated by their wording but were adjusted when the meaning of it changed. Lastly, following what Saunders and colleagues (2019) characterize as participant validation, all interviewees had the opportunity to read, comment, accept, or neglect the usage of their quotations in the study before publishing.

4.5. Method Criticism

Certain study aspects are subject to criticism. Due to the theoretical framework's nature and the thesis' purpose, the authors deemed it interesting to interview students in the same context. However, the adopted cross-sectional design and case study can threaten the study's transferability and credibility. The study focuses on individuals in a specific organization at

one point in time, which makes the study difficult to transfer to different contexts (Bell et al., 2019). To account for this, the authors have tried to provide as much context-specific information about the case university and the participants as possible, referred to as thick descriptions (Bell et al., 2019). Thus, the institution and relevant information about the interviewees have been disclosed. However, students' interpretations and usage will likely change over time, which makes replication of the study with comparable results unlikely.

Moreover, all interviews were conducted on school premises, the student's natural environment, to increase ecological validity and study credibility (Bell et al., 2019). The authors also demonstrated the chatbot during the interviews to confirm that all respondents referred to the same technology. However, because only 13 interviews were conducted, the empirical objectivity may be questioned.

Furthermore, issues around confirmability can be addressed in terms of sampling. The authors reached out to students through Facebook groups. Although the posts were directed at all students, most respondents were familiar to the authors due to SSE's relatively small size. However, as the individuals came from various constellations, years of enrollment, and specializations, the sample of interviewed individuals was still varied, and the authors do not personally know most of the participants. Moreover, the authors looked for students with experience of ChatGPT. The authors acknowledge that students with a negative attitude toward ChatGPT might be less likely to volunteer for an interview. However, this criterion was deemed necessary to attract appropriate interviewees and receive rich data on their interpretations and adoption of the chatbot.

Moreover, the authors have received peer reviews and supervisor support to increase the study's dependability (Bell et al., 2019). The external feedback and audit have intended to ensure consistency and accuracy of the interpretations and conclusions made by the authors. Lastly, the authors acknowledge the role of their values in the research process. Since the authors were familiar with the chatbot before starting the research, they reflected on the implications of their experiences throughout the study (Bell et al., 2019).

5. Empirics

Interpretations can vary in different contexts and depend on the actors' technological frames, defined as “the core set of assumptions, expectations, and knowledge of technology collectively held by a group or community” (Orlikowski & Gash, 1994, p. 199). The empirics are presented according to two of the framework's original constructs, *nature of technology* and *technology in use* (Orlikowski & Gash, 1994). However, as previously highlighted, frames are context-specific. Thus, the original domains only provide initial guidelines for examining and articulating students' interpretations and adoption of chatbots. Therefore, the domain *technology strategy* is excluded from the empirics as the case university has not deliberately acquired the chatbot (Orlikowski & Gash, 1994). Instead, the third empirical section presents *novel findings* unrelated to the abovementioned dimensions. Figure 5 shows the empirical structure and the underlying themes. The empirical section presents quotations and findings from the interviews that provide a basis for the analysis.

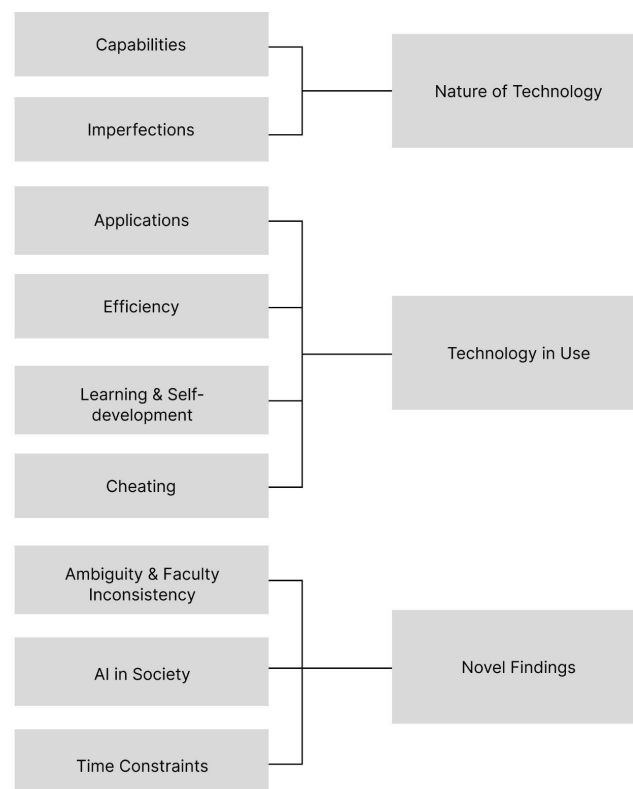


Figure 5. The empirical structure

5.1. Nature of Technology

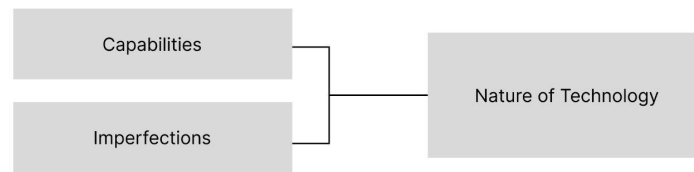


Figure 5.1. Nature of technology

According to Orlikowski and Gash (1994), *nature of technology* refers to the user's understanding of the technology and its capabilities. When asked how the chatbot works, the participants primarily discussed its functions and shortcomings. These were based on their previous interactions with the technology and comparisons with similar technologies.

5.1.1. Capabilities

During the interviews, the participants expressed differing views of the chatbot's capabilities. These views stemmed from their understanding of the technology behind the chatbot.

“My perception is that it [the chatbot] has the entire internet within it, which means that it can access any information that is written on the internet, simply put.” - Harper

“In really simple terms, it is based on an extremely good auto-complete function. So the model knows what kind of text should follow. So it can predict what an actual human would have written after a given sentence.” - Ben

The participants mentioned capabilities regarding summarizing, improving texts, and providing information or explanations efficiently. Besides drawing on their previous usage of the chatbot when explaining its functionalities, several respondents related it to other known technologies to make sense of the chatbot.

“It helps to formulate it concretely, concisely, and to get what you want to say in a few words so that it is very clear.” - Finn

“It is fast, specific, and can answer questions directly. Because it is an AI, it can give you an exact answer to your question, instead of Google, which only gives you search results where you have to scroll through everything.” - Maya

“[It is] kind of like Grammarly - on steroids.” - Chris

Regarding other capabilities, the respondents had varying degrees of understanding and sometimes even contradicting ones. For example, Grace and Finn had different understandings of the originality of the chatbot’s work.

“It can only draw conclusions from what is already available online. It’s not like it comes up with something of its own.” - Grace

“[...] it doesn’t only match against previous databases and experiences, it’s more like it adapts and generates, and still creates fairly original works. It’s not just a search engine that matches a hit, and then you get one, but it generates something new.” - Finn

5.1.2. Imperfections

In contrast to its capabilities, several participants believed that the chatbot has imperfections, which influenced their interpretations of its capabilities and limitations. They expressed unsatisfactory results from previous experiences with the chatbot. For example, many participants had experienced the chatbot giving wrong answers.

“It has happened several times that I have thought to myself “no, now it is completely wrong” and then you shut it down and do it yourself. Then you get quite disappointed with it, or whatever you call it. You need to be really careful. Because it is an AI - it’s good, but I believe it has certain limitations.” - Jack

They also questioned its trustworthiness and thought the outdated data set was a limitation.

“I would never use it as the only source or ask it to do a job for me. Because you do not trust [it]... I mean first of all, it’s the database. It’s like from two years ago, so you can’t really ask about news.” - Grace

Anki noticed a lack of sensitivity, and Liam believed it is less useful for tasks that include emotions or personal answers, as it required more effort from him as a user.

“It lacks empathy, emotions, and reflections on moral dilemmas. It is a big part of it, being completely oblivious.” - Anki

“I don’t think it explains emotions very well, or if you write personally. It becomes very objective. [...] It takes a lot more input from you to get a personal answer, but of course, you can make it write anything. But it’s much less effective to get the answer you want than if you ask an objective question where you don’t want any emotional angle to the answer.” - Liam

5.2. Technology in Use

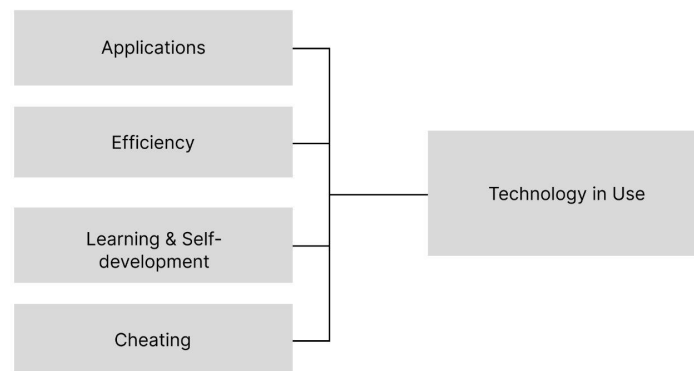


Figure 5.2. Technology in use

Technology in use focuses on technology usage and its consequences (Orlikowski & Gash, 1994). The participants were asked to share their perceptions of the potential uses of the chatbot and its implications for them. Four second-order themes were found based on the participants’ answers.

5.2.1. Applications

When discussing chatbot usage, most students referred to it as a helpful tool that can be applied in various parts of a process. However, the participants try to use it to complement their work rather than replace their inputs in the process.

“I use it as a tool. I try not to use it as “the easy way out”. [...] So rather for inspiration or to help me fine-tune things.” - Isabella

“The ideal would be to use it as a tool. In the same way that Google is a search engine and Wikipedia is good for learning things, everyone feels a little bad if you copy all the content

from a Wikipedia article. That's kind of how I feel about ChatGPT. It's great for understanding things and finding arguments, but maybe you should take them as elements and objects and then develop them yourself." - Emily

Several students referred to it as a private tutor or a friend that can provide feedback.

"Yes, it really became my own personal teacher. It was like having a teacher sitting next to me who could explain the connection between things." - Harper

"For example, I wrote an essay in the fall that I wanted feedback on, but none of my friends wanted to read it, so I turned to this tool. Then you could get feedback based on the parameters you chose. For example, I want to cut down on this part, do you have any suggestions?" - Liam

5.2.2. Learning and Self-development

When asked how their usage made them feel about themselves, several participants expressed their values of developing one's self and their knowledge base. However, their chatbot usage sometimes conflicted with these values.

"I feel some sort of obligation, specifically related to my studies, that the reason for why I'm here is for learning. Even if I think "this assignment is completely useless, it would be so much easier to let a robot do it", I think to myself that I'm here voluntarily, and I will probably develop some skill by doing it myself, even if it's just a tiny bit." - Kevin

"It is a balancing act between your own conscience about the importance of learning, and one's time, how much energy you can put into learning." - Anki

When reflecting on whether or not they learn more when using the chatbot, students had discerning views.

"You always want to learn more and better. ChatGPT helps me get a first glance at a subject and a good mapping of an area. [...] At the same time, it frees up time from what I consider to be shitty tasks in school, for me to spend time on more valuable things and learn instead." - Chris

“You probably learn less, really. Like, if there’s something you’re supposed to learn and you only receive that information compressed... Then you learn exactly what you are asked, the relevant things, but you miss quite a lot along the way.” - Grace

5.2.3. Efficiency

Most participants brought up factors related to efficiency as a reason for using the chatbot. Students assumed the chatbot could cut time spent on an assignment and speed up their study process.

“The reason [for why I use it] is to learn faster and streamline my personal output process in school. To save time.” - Chris

“For example, if I need guidance in Excel or when coding, I’ve previously used Google. That’s the same material that I’ve understood the chatbot uses, only that it [the chatbot] is better at teaching what material is relevant or not. It used to take me several hours to skim through [...]. It was so much more time-consuming.” - David

5.2.4. Cheating

Many participants addressed the topic of cheating, often concerning their moral compass.

“I wouldn’t use it to produce an entire text, where I have to put my name on it, as if I was the author, I wouldn’t do that. Because I’m probably very conscientious. I always think you should be honest, gentlemanly, a decent, honest person, so I find it quite difficult to imagine myself doing something that could be classified as cheating.” - Kevin

“Morally, it feels a bit like taking a shortcut, and like what you’re doing is not entirely honest. Let’s say you just ask ChatGPT to write a text on this topic, enter an article, and “boom”. I would consider that cheating.” - Liam

A majority also referred to a discussed case where a student got caught cheating at another university.

“I know there’s one person who was caught for it [cheating], I don’t know exactly what that person had done, but I think it was in Uppsala that someone had copied the text straight off.”

- David

“There was an article about someone who had submitted an assignment in Uppsala that they had written with ChatGPT. I wouldn’t use it like that.” - Finn

5.3. Novel Findings

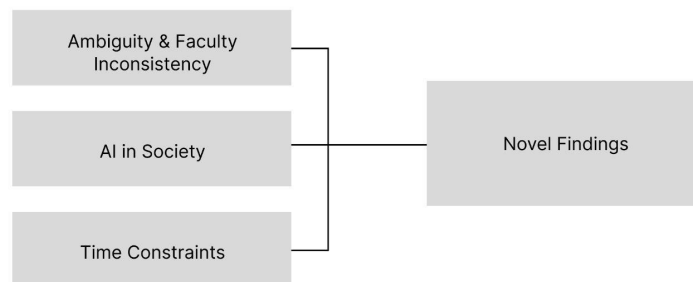


Figure 5.3. Novel findings

Apart from the domains presented above, three additional second-order codes were extracted from the interviews. These shaped the interviewees’ understanding of the technology and offered valuable extensions to the framework for understanding the interpretive grounds for students’ actions around technology.

5.3.1. Ambiguity and Faculty Inconsistency

Several participants mentioned the uncertainty surrounding the perspectives of the faculty and noticed a lack of discussion around the technology with teachers and friends.

“I don’t know where the limit is because I don’t know what the teachers think, what my friends think, I don’t know what anyone really thinks.” - Grace

“I know that [name] has reached out and asked our Chief Learning Officer at school, “What is going on? Do we need to communicate to the students about academic misconduct and how ChatGPT can impact it, or what effect it might have?” but as far as I’m concerned, she hasn’t received any response.” - Isabella

The participants surfaced that they perceived a sense of inconclusiveness regarding the technology. Several interviewees referred to an article about ChatGPT written by the school's principal, which is the only formal statement made by the faculty to date.

“At SSE I feel like there’s a gray zone regarding AI and ChatGPT. I don’t feel like we have addressed the issue, and that’s kind of scary. It’s clear to everyone that you cannot copy anything from Wikipedia, but we haven’t even addressed this tool. [The principal] has just made a post on LinkedIn where he talks about how exciting it could be.” - Emily

“I read an opinion piece written by him [the principal], quite early on, a few months ago. He talked about how it doesn’t have to be negative with this robot. We can instead focus on becoming more human and good. But that doesn’t really lead anywhere. It’s quite high-flying, empty words. It doesn’t focus on the real problem.” - Kevin

5.3.2. AI in Society

A common perception among the participants was that chatbots are a technology of the future that will be used inevitably in various industries going forward. They expressed an increased exposure to the technology in different contexts and believed that education should follow the development.

“If we are entering the workforce, this is a tool that will exist and that will have a significant impact on society eventually. Therefore, it’s strange to have attended an institution that aims to be academically outstanding if they were to block us out from that world.” - Isabella

“I definitely think that it [chatbots] will be implemented and used a lot more, now that the seed has sort of been planted. [...] Now it’s like technology is way ahead, and the universities are kind of old-school.” - Jack

5.3.3. Time Constraints

The respondents also addressed how time constraints can interfere with how they use the chatbot. Students may have an opinion about the best way to use the chatbot, but saving time may cause them to reconsider their priorities and put their values aside.

“It’s like having a bag of candy in front of you. ChatGPT makes it very easy to get quick facts,

but you feel that you miss a lot of other things, so it's not really the best way. [...] You eat the candy because it's good and you get a sugar rush - you save time and it's easy - but it's bad in the long run. It's like a shortcut." - Anki

"But then I think most people take shortcuts. There's this temptation at eight o'clock on a Friday. I think most people find it difficult to resist this temptation. [...] It's hard to motivate yourself not to use it when you're sitting in the dark writing." - Liam

6. Analysis

The empirics were presented in the structure of Orlikowski and Gash's (1994) domains to provide the reader with a systematic presentation of the findings. This structure resulted in novel findings unrelated to the initial domains, highlighting the framework's contextual nature. In line with Orlikowski and Gash's (1994) methodology, the analysis presents three new aggregated domains that account for the most prominent themes shaping students' technological frames. These were identified through an interplay between the data and the theory. In the following section, the authors present the three new domains: *areas of use*, *perceived outcomes*, and *societal trends & adaptation*, which constitute students' technological frames. Figure 6 below illustrates the new domains and the underlying second-order themes. However, although presented separately, the domains are interrelated and overlap.



Figure 6. The domain content of students' technological frames

6.1. Areas of Use

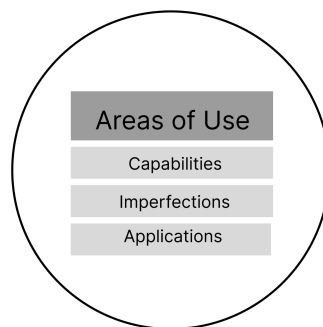


Figure 6.1. Areas of Use (Karlberg & Hansson, 2023)

The empirical data demonstrates how students' interpretations of what the chatbot can and cannot do influence their perceptions of how and when they can use it. The first domain identified as *areas of use* captures students' view of the chatbot's capabilities, imperfections, and applications. While similarities exist between this domain and Orlikowski and Gash's (1994) *nature of technology*, *areas of use* includes the students' perception of the chatbot's applicability. The authors found it relevant to reconstruct the original domain to consider students' usage since their perceptions of its capabilities and imperfection influence and is influenced by its application areas. Thus, the three constructs are interrelated and shape students' image of the technology's areas of use.

Areas of use mainly stem from students' prior experience with the chatbot. Thus, in line with Orlikowski and Gash (1994), their chatbot interaction shapes the students' assumptions, knowledge, and expectations through experienced functionalities, drawbacks, and applications. However, the empirics demonstrate some differences in domain content between students. Technological frames are, albeit individually held, a social phenomenon (Orlikowski & Gash, 1994). Thus, people from the same social group, like students at SSE, are expected to have similar perceptions of technology. Still, discrepancies regarding its perceived areas of use were identified, which can be seen as incongruence (Orlikowski & Gash, 1994). Since students have informally adopted the chatbot, they have unequal prerequisites when understanding its areas of use. However, understandings are expected to be distributed through interactions and negotiations between actors and create shared frames (Davidson, 2006; Lin & Silva, 2005; Orlikowski & Gash, 1994). Some expressed uncertainty regarding what other students think, indicating that the conversation and knowledge sharing around the chatbot and its capabilities, imperfections, and applications have been limited, causing incongruences in this domain.

6.2. Perceived Outcomes

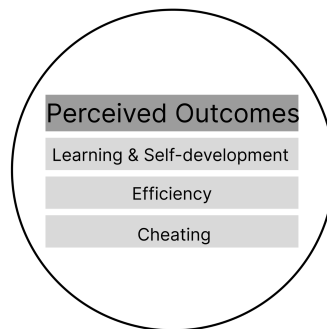


Figure 6.2. Perceived Outcomes (Karlberg & Hansson, 2023)

The second domain is *perceived outcomes*. This domain captures students' interpretations of outcomes related to learning and self-development, efficiency, and cheating. This domain is comparable to Orlikowski and Gash's (1994) domain *technology in use*, which encompass both perceptions of how to use technology and the consequences of such use. However, this new domain emphasizes students' perceived implications of using the chatbot and excludes interpretations of how to use it. Since its implications appeared crucial in the participants' answers, the authors decided to reconstruct the domain to focus entirely on outcomes.

All students express an obligation and willingness to learn. However, they interpret the relationship between efficiency and learning differently. Some believe the chatbot steepens their learning curve and that learning and efficiency correlate. They use the chatbot to receive information efficiently and to perform 'unnecessary work'. Contrastingly, some students express a trade-off between learning and efficiency. These students learn by going through a process. Thus, they either prioritize learning or efficiency, which impacts how and if they use the chatbot. At first glance, the students' differing perspectives make this domain appear incongruous (Orlikowski & Gash, 1994). However, all students agree that learning and efficiency are essential outcomes; the difference is how they believe they achieve them. Thus, the students have similar perceptions of the desired outcomes, but their learning styles distinguish their interpretations of how the chatbot impacts these outcomes.

Another perception is that chatbot usage could imply cheating, which impacts students' interpretations and adoption. Most students define cheating as copy-and-pasting the chatbot, but they also express uncertainty regarding where the line for cheating goes. Most participants mention the student at Uppsala University, reflecting this ambiguity. This

cheating incident has likely resulted in discussions among students, which can be considered social interactions that shape their technological frames (Davidson, 2006; Lin & Silva, 2005; Orlikowski & Gash, 1994).

6.2.1. Time Constraints Leading to a Reprioritization of Outcomes

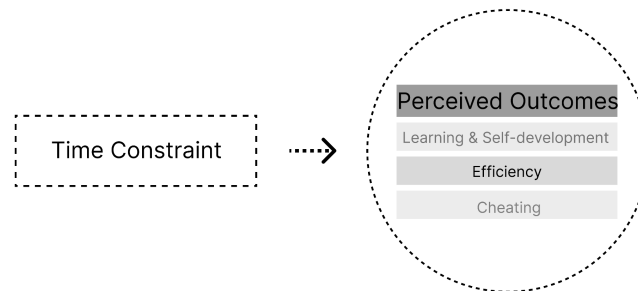


Figure 6.2.1. Perceived Outcomes During Time Constraints (Karlberg & Hansson, 2023)

The empirics reveal how time seems to impact which outcome the student prioritizes. Initially, most students confidently expressed using the chatbot to enhance their learning while distinguishing between its usage and any potential plagiarism. However, in time-constrained situations, students put their values aside to prioritize efficiency, even at the expense of learning or the risk of cheating. Several students use the word “shortcut” to explain how the chatbot enables them to get around the hard work required for learning and development. A temporal aspect thus impacts students’ interpretations and chatbot usage. Without time constraints, students prioritize their morale and learning process and use it as a “valuable tool.” However, when students perceive time is short, they filter other outcomes in favor of efficiency. Therefore, they push their boundaries by using it less as a learning complement and more as a substitute for getting the job done.

6.3. Societal Trends and Adaptation

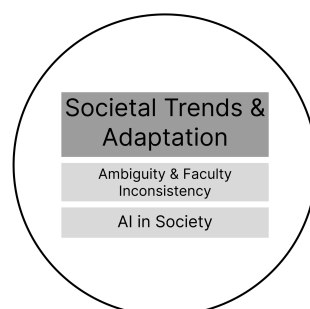


Figure 6.3. Societal Trends and Adaptation (Karlberg & Hansson, 2023)

Societal trends and adaptation is the third and final domain, which explains how students interpret and use the chatbot based on the context of their institution and society. It emphasizes the importance of the organizations' ability to adapt and effectively communicate their stance and highlights the external environments' impact on students' technological frames.

SSE students have rapidly adopted the chatbot, but the school has not implemented nor communicated any adaptations. The empirics show that the faculty's silence creates significant uncertainty for the students, who question how their usage will be met. This uncertainty can be attributed to students not knowing their professors' frames (Orlikowski & Gash, 1994). The students feel uncertain whether their values align with the faculty's, creating ambiguity regarding their interpretation and adoption. This uncertainty is due to the absence of dialogue between the two stakeholders, as frames are shared through negotiations and social interactions (Davidson, 2006; Lin & Silva, 2005; Orlikowski & Gash, 1994).

Moreover, an opinion paper by the principal has contributed to students' perceptions of ambiguity. The paper is the only statement on ChatGPT by SSE so far, and it did not address adaptation in practice according to students' perceptions. Thus, this single and abstract statement has contributed to scattered cues of the faculty's opinions. The university's failure to address the chatbot cohesively can be compared to a lack of strategy from the organization, contrary to the domain *technology strategy* (Orlikowski & Gash, 1994).

Furthermore, university adaptation is repeatedly contrasted with AI development in society. The students believe AI will be present in their future work lives and society. While attempting to understand the adaptation of their institution, they contrast it with the rapidly adopting society, expressing a dissonance between the adaptations. Thus, the students' frames are shaped by their belief that they should adapt to societal trends. Therefore, the external environment influences students' interpretations, which aligns with what Davidson (2006) highlights as a shortcoming of the original framework. The students' technology adoption arose outside the organizational borders when it was widely adopted throughout society in November 2022. As a result, the students appear to have formed frames outside the organizational boundaries, showing that societal and cultural factors have influenced the students' frames (Davidson, 2006).

7. Discussion

7.1. Answer to the Research Question

The authors have studied how students interpret and adopt a chatbot through an exploratory case study collecting qualitative data from 13 interviews. The empirical data has been analyzed by applying the framework TFR. The authors have created Figure 7 below to illustrate and summarize the findings that help answer the thesis' research question:

“How do students interpret and adopt an AI chatbot in an educational setting?”

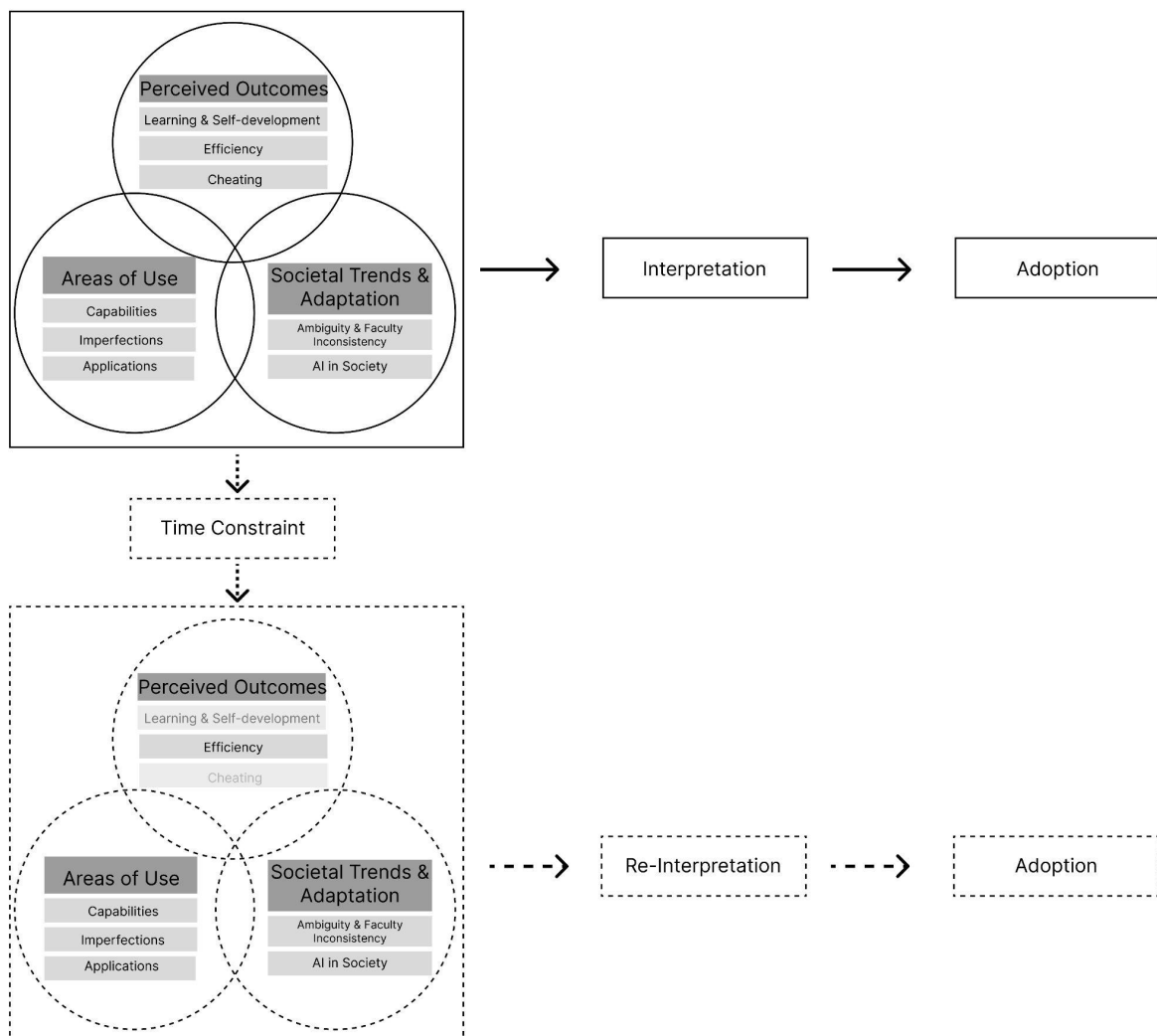


Figure 7. Students' technological frames (Karlberg & Hansson, 2023)

Figure 7 illustrates how the introduced domains interact to form students' technological frames. The three domains, *areas of use*, *perceived outcomes*, and *societal trends & adaptation*, represent the assumptions, expectations, and knowledge that significantly impact students' interpretations and adoption of a chatbot in education. While presented as separate domains, they are illustrated as overlapping to show how they interdependently and simultaneously impact students' frames.

The figure also includes an alternative framing process that impacts students' interpretations and adoption during time constraints. The perceived time frame changes the nature of the domain *perceived outcomes* by influencing students to filter out certain factors related to perceived outcomes. When students are short of time, they perceive efficiency as the most valuable outcome, leading to behavioral changes. Rather than adopting the chatbot as a tool to learn and mitigate the risk of plagiarism, students adopt the chatbot to enhance efficiency. This is not per se in line with their original values, and thus it is often expressed as a trade-off or a balancing act between one's conscience and efficiency. Figure 7 illustrates how time constraints make cheating, learning, and self-development less apparent in students' frames, resulting in a re-interpretation of the chatbot and the following adoption. The authors believe that demonstrating this alternative process partially reduces the static nature of TFR and sheds light on the internal conflict many students face when under time pressure.

7.2. Contributions and Implications

The study provides insights to research on informal technologies in education and highlights the importance for faculty to recognize the digital environment (Li et al., 2022). Similar to what Li and colleagues suggest, this study demonstrates how faculty's silence and ambiguity create anxiety among students regarding cheating. This anxiety seems to reduce dialogue around chatbots, resulting in differences in students' toolboxes to understand and adopt chatbots. Universities' adaptation and addressing of emerging technologies are thus critical factors impacting students' interpretations and adoption, which can be compared to what Venkatesh and colleagues (2003) described as *facilitating conditions*.

Moreover, consistent with Winkler and Söllner (2018), the findings indicate that students appreciate the chatbot's ability to generate individual learning experiences by acting as a learning partner. However, as brought forward by Rapp and colleagues (2021), students may

need to prioritize certain outcomes when adopting chatbots. This study contributes with a conditional factor affecting the suggested trade-off between engagement and effectiveness by identifying a filtering process during time constraints. This finding extends the notion that frames are context-specific and provides a more nuanced understanding of how students act upon this trade-off.

Lastly, this thesis elaborates on the domains of technological frames (Orlikowski & Gash, 1994). Understanding students' frames contributes to knowledge about their perceptions of a specific chatbot technology, namely ChatGPT, in an educational context. An initial understanding of students' interpretations and adoption provides educational managers and policymakers with necessary information when addressing the diffusion of an informal and disruptive chatbot. The study reveals that although faculty may be uncertain about how to address an emergent technology, adaptation through open and transparent communication is preferred over ambiguity or silence. Arranging dialogues between students and faculty could help reach a shared understanding of the chatbot and enable a strategy going forward. Moreover, education about the chatbot would further give students equal ground of knowledge when interacting with it.

7.3. Limitations of the Study

Although this study has revealed interesting findings, some limitations can be raised. Firstly, the thesis takes a constructivist and interpretive approach, making the empirical data subject to the authors' understanding and interpretation. Consequently, it can affect the fairness of the presented material. Secondly, the theoretical framework considers point-in-time snapshots of actors' interpretations and actions related to technology. This implies that the findings might change together with contextual or situational factors. For example, if SSE takes action to address the chatbot or the technology is modified, the domain content may change. Thirdly, the study has looked only at students' frames, although other crucial actors exist in the educational context. Moreover, the sample of 13 interviewees limits the number of possible nuances between individuals. Finally, although the suggested domains provide some understanding of students' interpretations and adoption of chatbots, they cannot be considered exhaustive. They were the most prominent themes resulting from the empirical data analysis, but the authors acknowledge that other factors may influence students' frames.

7.4. Suggested Future Research

The authors propose that future research should broaden the understanding of the interpretative nature of human actions around chatbots. While the students' interpretations provide a critical starting point, further research should investigate other stakeholders' technological frames, like those held by professors. Such research may provide valuable insights into whether and where incongruences exist between key actors' frames in an educational context. Early identification of these incongruences may reduce the likelihood of unintended misunderstandings around the technology. Furthermore, future research should delve deeper into the conditional factor related to time constraints and how it impacts students depending on their learning styles. Finally, the authors recommend that future studies take a critical stance in examining students' chatbot interpretations. The study found that complex dynamics are at play when students interpret the chatbot. A critical perspective could allow for investigating the underlying beliefs, power dynamics, and implications of students' chatbot interpretations.

8. Conclusion

This study has attempted to reduce the ambiguity surrounding the emergence of a nascent technology, the AI chatbot ChatGPT, in an educational context. The thesis offers insights into how a chatbot is interpreted and adopted by understanding students' technological frames. The study reveals that students appreciate the chatbot for its efficiency, while there are concerns about its impact on their personal growth and learning. Many students notice a trade-off between achieving specific outcomes efficiently and learning and developing themselves. Moreover, students fear that their interactions with the chatbot might have negative consequences regarding academic ethics. Although students generally prioritize learning and avoid unethical chatbot usage to develop essential abilities for the future, the study provides insights into situations where time constraints lead students to prioritize efficiency over learning. Students also notice a lack of guidelines on how to benefit from the chatbot and express a desire to keep up with societal trends. These findings provide important aspects for educational managers and policymakers to consider when attempting to address the presence of chatbots in education. Moreover, the findings give chatbot users and students valuable insights about their use and offer a chance to reflect upon how it impacts them.

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Appendices

Appendix 1. Facebook Post to Reach Students at SSE

The post was written in English and posted in Sharing is Caring 2020, 2021, and 2022 (Facebook groups for SSE students).

Hello!

Me and my partner Pauline are currently writing our Bachelor's Thesis about ChatGPT's impact on the university sector.

If you have used ChatGPT in an educational context, we would love to conduct a short (approximately 30 minutes) interview with you. Your answers will be completely anonymous.

Please contact one of us on Messenger if you can meet with us physically on campus during next week. Coffee will be provided :)

We would really appreciate your inputs!

Best,

Lova & Pauline

Appendix 2. Information About the Interviewees and the Interviews

No.	Code Name	Gender	Year of Enrollment	Time	Date	Place of Interview
Pilot	Anki	Female	3rd year BSc	41:00 min	2023-03-05	SSE
1	Ben	Male	1st year MSc	57:51 min	2023-03-06	SSE
2	Chris	Male	3rd year BSc	49:26 min	2023-03-06	SSE
3	David	Male	3rd year BSc	22:01 min	2023-03-07	SSE
4	Emily	Female	2nd year BSc	35:43 min	2023-03-07	SSE
5	Finn	Male	1st year BSc	37:31 min	2023-03-07	SSE
6	Grace	Female	1st year BSc	32:21 min	2023-03-07	SSE
7	Harper	Female	2nd year BSc	34:18 min	2023-03-07	SSE
8	Isabella	Female	2nd year BSc	28:46 min	2023-03-07	SSE
9	Jack	Male	2nd year BSc	42:26 min	2023-03-08	SSE
10	Kevin	Male	3rd year BSc	37:05 min	2023-03-08	SSE
11	Liam	Male	2nd year BSc	45:36 min	2023-03-08	SSE
12	Maya	Female	2nd year BSc	33:35 min	2023-03-08	SSE
Minimum				22:01		
Maximum				57:51		
Mean				35:56		
Median				35:43		

Appendix 3. Interview Guide

The interview guide was constructed in English but translated to Swedish for the interviews to increase the flow and communication with the interviewees.

Introduction

1. Please tell us a little about yourself. What year are you in, and what are your specializations (if applicable)?
2. What gender do you identify with?

Nature of Technology

1. What is the first thing that comes to mind when I say “AI chatbot”?
2. Have you ever used a chatbot?
 - a. If yes, which ones?
3. In your understanding, how do chatbots work?

Showing ChatGPT for the interviewee, making sure we are discussing the same thing.

Technology in Use

1. Have you used ChatGPT in your studies?
 - a. If yes, how have you used it?
 - b. If yes, why do you use it?
 - c. If not, why do you not use it?
2. How useful do you find ChatGPT?
 - a. Are there any areas of use that you would not use it for?
3. How easy do you find ChatGTP?
 - a. Do you see any limitations with it?
4. Does your self-image change when you use ChatGPT?
5. How do you view your own role as a student when you use ChatGPT?
6. Do you associate your use of ChatGPT with any consequences in your studies?
7. How widely adopted is this technology by your classmates?
 - a. What do you think about this adoption?
8. To your knowledge, do students use ChatGPT in different ways than you?
 - a. If an example is given: Do you see any consequences of this?

Technology Strategy

1. What do you think is the professors' and faculty's view on ChatGPT?
2. How do you believe they [professors and faculty] will adapt to it in the future?

Future

1. How do you believe chatbots will develop in the future?
2. Do you see any risks if universities include chatbots in education?
3. Do you see any risks if universities do not include chatbots in education?
4. Will you use chatbots or ChatGPT in the future?
 - a. Why/Why not?
5. Do you think AI chatbots can replace humans today?
 - a. Why/Why not?
6. Do you think AI chatbots can replace humans in the future?
 - a. Why/Why not?

Other

1. Is there anything you feel we have not covered that you would like to add about ChatGPT in education?