

# Unravelling AI-Anxiety:

Exploring Perceptions and Adoption Dynamics among Students in  
Educational Settings



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Master Thesis

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## Preface

With this Master Thesis my Master in Business Administration offered by the Radboud University Nijmegen with a specialisation on Innovation and Entrepreneurship slowly comes to an end. It has been a demanding process accompanied with both successes and setbacks to write this thesis and getting closer to a Master's degree.

I would like to thank my supervisor, Paolo Franco, for his great advice and assistance. With his guidance I came to the topic of AI adoption, which formed the topic of AI-anxiety in students. During the last few months he provided me with knowledgeable direction, continuous encouragement, and perceptive criticism, which have been essential to the development of this thesis. With his guidance I was able to discuss and ask questions whenever needed and he delivered a critical view that encouraged me to raise my bar for academic achievement.

Furthermore, I have to thank my fellow students and friends. It has been possible to remain motivated and to be focussed because of the discussions, support from each other and to share our experiences. The conversations and support during these months have been essential to get the best outcome during this process. Last but not the least, I want to thank all the participants who partook in my research. Them giving their time and opening up about their experiences and opinions on the topic helped immensely in contributing to the success of this research.

Several months of dedication and hard work have resulted in this master's thesis outcome. I hope that the results gained from this study contribute to the existing body of knowledge and stimulate more research into this relatively new emerging topic. I am proud to present this thesis and have had a great time researching this area.

Therefore, this master's thesis is the outcome of effort that spans several months of hard work and commitment. I trust that the current study contributes to the already existing literature and encourages more research into this relatively unexplored area. I truly enjoyed researching this area which gives me the pleasure to present this thesis and end this thesis trajectory.

Thank you for taking the time to read and reflect on my thesis!

Mika Herold,

Nijmegen, June 2024

## Abstract

The integration of artificial intelligence (AI) in educational settings has brought forth the concerns among students on the phenomenon called AI-anxiety. The aim of this thesis is to uncover the **roots, causes, implications and coping mechanisms of AI-anxiety**. This research employs both interviews and netnography in a qualitative approach in an effort to establish how socio-cultural factors shape students' perceptions and adoption of AI technologies.

The findings suggest that **anxiety in relation to AI is highly likely to be shaped by cultural practices, peer pressure, and institutional frameworks**. This means that students experience AI-anxiety because it raises concerns about academic dishonesty, data privacy and the loss of traditional education. The research divides students' reactions into **three categories: full adoption, partial adoption, and full resistance**, each influenced by individual beliefs and socio-cultural contexts.

This research also discusses the existing adoption theories including the TAM and UTAUT to highlight the need for a more comprehensive framework that considers socio-cultural factors. By drawing on the socio-cultural perspective of the study, a detailed understanding of AI-anxiety is provided. The results provide useful information for educators, policymakers, and technological developers to foster a positive environment for AI implementation in education..

The research offers practical recommendations on creating clear AI policies, developing ethical AI tools for combatting AI-anxiety, and encouraging responsible AI use in educational environments. This research builds upon current theoretical knowledge of technology adoption by including socio-cultural viewpoints, showcasing how societal norms, cultural meanings, and institutional structures impact students' views on AI.

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## Introduction

The past few years have shown how students are both excited and unsettled by the introduction of artificial intelligence (AI) technologies. This study seeks to understand the sources of these anxieties, the outcomes, and coping mechanisms. Some students, as shown by this research, are concerned about AI applications in their assignments provoking academic dishonesty accusations, while others worry about how AI algorithms would infringe on their privacy. Additionally, some students worry that AI might replace traditional learning methods, and the effort they put into gaining and learning their skills and knowledge will be lost.

Johnson and Verdicchio (2017) discuss the growing fears and misunderstandings about AI, emphasising that these fears stem from misconceptions about AI technology. They identify three main factors contributing to 'AI-anxiety': an exclusive focus on AI programs neglecting human involvement, confusion about computational versus human autonomy, and inaccurate understanding of technological development. Despite the advantages of AI in education, such as automated grading systems, AI tutoring, and smart classrooms (Chen et al., 2020; Timms, 2016), significant concerns about psychological stress and apprehension remain. This thesis argues that understanding the complex interplay between technological progress and student fears is essential for addressing AI-anxiety in education.

Recognizing these fears requires a deeper exploration of the socio-cultural contexts in which AI is adopted. Leeuwis and Aarts (2020) also provide a new approach to the adoption and diffusion of innovations that goes beyond individual anxiety. Their view represents a multi-dimensional lens of social, cultural and institutional factors that are in the adoption process. Their lens of social and institutional factors show that technology adoption is affected by larger social structures. For instance, in the case of student AI-anxiety, this approach brings to light how societal norms, cultural meanings, and institutional structures affect students' perceptions and reactions towards AI technology. Therefore, this thesis has integrated such perspectives as well and emphasised the socio-cultural aspect of AI-anxiety. It points to the complex interrelationships between social norms, cultural meanings, and institutional structures shaping people's feelings and perception towards AI technology.

This research explores AI-anxiety among students, focusing on social and cultural aspects. By incorporating this socio-cultural perspective, it aims to provide a thorough explanation by examining the interplay between societal influences and students' experiences. Additionally, it offers management implications for addressing students' AI anxieties in educational settings, considering the underlying socio-cultural factors.

## Research Question

As a result of the AI integration in different parts of the modern world, including education, this study is aimed at highlighting the complicated relationship between technological breakthroughs and human fears. In essence, the research question is aimed at identifying the social cultural factors that drive the acceptance of AI technology by people even though they experience anxiety, and how these factors influence their behaviour. Through an exploration into the motivations underlying AI adoption and diffusion, the study aims to identify the subtle factors that encourage students to navigate their anxiety and embrace technological change. Additionally, the study intends to investigate the effects of AI adoption in the context of anxiety, highlighting the need of comprehending the intricate relationships between human fears and technical advancement. This has resulted in the following research questions:

1. *"How do socio-cultural factors influence students' decisions to adopt and use artificial intelligence (AI) technologies despite experiencing anxiety?"*
2. *"What impact do these socio-cultural factors have on students' behaviour and coping strategies in relation to AI technology adoption?"*

These questions are formulated to provide a focused investigation into the reasons why AI is taken up in the face of anxiety, the behavioural and coping implications that come along with these socio-cultural influences. This study provides answers to these questions and contributes to a deeper understanding of how the complex relationships between social and cultural phenomena, AI adoption, anxiety, behaviour and coping strategies are manifested in educational environments and beyond.

## Theoretical Relevance

This research holds substantial theoretical significance within the realm of technology adoption studies. This study highlights the relationship between technological advancements and human fears by analysing existing adoption theories (Johnson & Verdicchio, 2017; Leeuwis & Aarts, 2020). This research critiques the existing adoption theories, including the Technology Acceptance Model (TAM) by Davis (1989) and the Unified Theory of Acceptance and Use of Technology (UTAUT) by Venkatesh et al. (2003). **It is often the case that such theories neglect socio-cultural aspects that are in fact influential in adoption of technology.** As shown in this research, students' anxieties about AI, such as **Vanessa's fear of academic dishonesty and Sam's concerns about data misuse are examples of how the norms of a society and cultural factors shape the behaviours which are not reflected in the current models.** These socio-cultural dimensions are incorporated in this research to get a more comprehensive understanding of AI adoption. These theories concentrate on the perceived technologies, their ease of use and usefulness, neglecting the socio-cultural factors influencing adoption rates. This study contributes to the existing literature on technology adoption by incorporating a socio-cultural perspective, which places it within the framework of societal norms, cultural meanings, and institutional structures. Specifically, this

research illustrates the impact of these elements on student's adoption of AI and their anxiety levels within socio-cultural dynamics, which falls outside the parameters of existing theories like TAM and UTAUT. This will not just expand the theoretical understanding of AI, but also provide valuable insights for establishing strategies to reduce AI-related anxiety.

## Managerial Relevance

In terms of practical implications, this research is particularly relevant within educational settings. By revealing AI adoption anxiety factors, **educators and university administrators may be able to comprehend students' AI technology-related fear more effectively** (Johnson & Verdicchio, 2017; Leeuwis & Aarts, 2020). Empowered with this knowledge, relevant assistance and learning programs can be created to help alleviate anxiety and improve the emotional well-being of students at the university. Although the results of this research do not directly influence policy, it provides guidance to the academic organisation in educational institutions.

Understanding the socio-cultural elements of AI anxiety is essential for designing effective solutions in educational settings. Educators and university management can provide students with tools to overcome their fears by implementing interventions that directly address the barriers to full implementation of AI technologies in learning environments. By incorporating socio-cultural dimensions into educational strategies, this research helps create a more inclusive and supportive learning space for students.

Furthermore, this research holds significant **implications for innovators and entrepreneurs** in the AI sector. By understanding the factors contributing to AI-anxiety, developers can design AI tools that address these concerns, thereby facilitating smoother adoption. Key recommendations include developing user-friendly interfaces that minimise complexity and enhance perceived ease of use (Davis, 1989), and incorporating robust feedback mechanisms to support users and alleviate anxiety (Venkatesh & Bala, 2008). Additionally, emphasising **transparency in AI operations and ensuring ethical design can help build trust and security among users** (Shin, 2020). These strategies not only improve user experience but also foster a supportive environment for AI integration, ultimately driving innovation and market success.

Moreover, ethical design principles are critical. Innovators should prioritise transparency in AI operations to ensure users understand how AI functions and how their information is utilised (Shin, 2020). This transparency can alleviate fears related to privacy and control, fostering a sense of security among users. Entrepreneurs can also develop features that allow for customization and control, enabling users to adjust AI tools to their comfort levels and needs.

This research first discusses relevant literature to the adoption of AI and AI anxiety. The interviews (Arsel, 2017) and the netnographic analysis are used as data sources, which focuses on the



description of AI-anxiety among students. The research conducted an in-depth examination of the meaning of AI-anxiety, identifying at-risk students, and ultimately achieving the goal of mitigating AI-anxiety and improving the overall well-being of students in the educational environment.

## Literature review

In this chapter, AI anxiety is explained in detail and further investigated in terms of its theoretical background and main concepts. Building on the existing knowledge, the crucial concepts underlying the AI anxiety problem area are developed, which consequently, results in propositions that reflect the identified issue.

### Adoption Theories

The adoption theories comprise different theories that examine how emerging technology factors impact acceptance and adoption. Adoption refers to how individuals start incorporating technology into their everyday routines, according to Rogers (2003). This refers to how much someone **believes a program is helpful and can therefore be utilised** (Davis, 1989). The TAM by Davis (1989) and the UTAUT by Venkatesh et al. (2003) are the main models used to study the adoption of technological innovation since they consider people's attitudes and intentions to use them.

#### Technology Acceptance Model

Davis (1989) designed the TAM to explain and predict users' readiness to embrace technology based on its perceived views of usefulness and ease of use. The TAM states that perceived **usefulness** refers to how much someone thinks using technology enhances their work performance or boosts productivity (Venkatesh & Davis, 2000; Marangunić & Granić, 2015). For example, a student may see AI advancements as a benefit to the learning journey by enhancing comprehension, customising the experience, or boosting academic success. The TAM's second component is the **perceived ease of use**, which is related to users' confidence that using technology is simple and straightforward (Davis, 1989 and Marangunić & Granić, 2015).

Studies show that users' attitudes and behavioural intentions towards new technologies are primarily determined by the usefulness and ease of use of the technologies (Venkatesh & Bala, 2008; Hubert et al., 2019). TAM has also been utilised to clarify users' feelings of anxiety or discomfort regarding the process of adopting technology (Venkatesh & Bala, 2008). **The model suggests that reducing perceived complexity and enhancing perceived benefits can alleviate user anxiety, making technology adoption smoother.** However, TAM does not fully address broader anxieties such as job displacement and technological reliability (Meuter et al., 2003). These issues are especially important in the field of AI, where worries about being substituted by smart systems and uncertainty regarding the openness and management of AI procedures are widespread.

Additional studies conducted by Venkatesh and Bala (2008) extend the TAM to incorporate anxiety as a crucial element impacting the adoption of technology. They suggest that it is essential to grasp users' emotional reactions, like anxiety, in order to forecast their willingness to adopt novel

technologies. Anxiety can prevent users from adopting technology by creating mental obstacles that they need to overcome. This is particularly important in academic environments where students may be concerned that AI impacts not just their learning methods but also their job opportunities in the future.

### **Unified Theory of Acceptance and Use of Technology**

The TAM and other multiple adoption models serve as the foundation for Venkatesh et al. 's (2003) UTAUT, which offers a thorough explanation of technology adoption behaviours.

**Performance expectancy**, a crucial component of UTAUT, is the extent to which an individual recognizes that employing technology would help them accomplish particular activities or goals. Students, for instance, may want to employ AI to expect better learning outcomes or faster academic progress. **Effort expectancy** is a concept that refers to the ease or difficulty that individuals perceive when they interact with a particular technology. Technologies that are conceived as a walk in the park are most likely to be employed by users. **Social influence** regards the role of social factors like peer decisions or norms in the process of making technology adoption decisions. A positive social influence can be a tool for the adoption of technology and its use. **Facilitating conditions**, however, consist of external factors which play either an enabling or hindrance role in technology adoption, such as infrastructure, support services, or technical assistance (Venkatesh et al, 2003).

Being aware of the importance of UTAUT in the technology adoption studies, it can be a useful tool in the research on AI-anxiety of students. Integrating UTAUT together with the socio-cultural theory helps researchers to investigate how the social and cultural factors come in contact with the students' perception and attitude towards AI technologies. Through this interdisciplinary approach, this research can expand the comprehension of AI anxiety and put forward strategies to tackle it in educational settings (Venkatesh et al, 2003).

### **AI-anxiety**

The AI integration into different areas of life has produced a great deal of interest, but it has also caused concern about its possible influence on people's mental health which is commonly known as AI-anxiety. The studies of Wu & Wen (2021) and Sundar (2020) have broadly brought out the complex ways in which people behave and respond to AI systems, which is why there is a need to focus more on the psychological effects of human and AI interactions. Within the realm of AI-anxiety, numerous underlying factors contribute to this complex phenomenon, including ingrained biases against AI, concerns regarding job displacement, and discomfort arising from the perceived loss of autonomy and control over AI systems (Wu & Wen, 2021; Millet et al., 2023). In addition, the socio-cultural environment that AI functions in plays a significant role in shaping individuals' attitudes and emotional responses towards these technologies (Sohn et al., 2020). To cite an example, Millet et al. (2023) have

pointed out that AI exceeding human abilities may fuel anxiety that further intensifies this emotion, thus showing the vital role of mental determinants in both the adoption and design of AI systems. The understanding and mitigation of AI-anxiety is the key factor in the development of good user experiences and the integration of AI into the society (Sundar, 2020).

Existing AI-anxiety research often focuses on individual psychological dimensions, overlooking the broader socio-cultural context. Therefore, a distinctive gap arises in the comprehension of how social and cultural factors intertwine to make people view AI technologies in a certain way. Neglecting these dimensions may result in an incomplete comprehension of AI-anxiety and its implications for technology adoption. This critique is backed by studies like the ones by Sohn et al. (2020), Millet et al. (2023), and Sundar (2020), which confirm the need of the integration of socio-cultural viewpoints into the study of AI-anxiety for a more complex comprehension of the dynamics of the phenomenon.

### **Critique of adoption theories**

While recognizing the relevance of theoretical frameworks such as TAM (Davis, 1989) and UTAUT (Venkatesh et al., 2003), it is crucial to analyse their treatment of 'technology anxiety' during adoption procedures. Fear or anxiety plays a significant role in decision-making processes related to new technologies. TAM incorporates a form of technology anxiety that is ease of use and perceived usefulness based on the work of Venkatesh and Bala (2008) but other theories do not fully capture all forms of anxieties such as job loss anxieties, anxieties about new technologies, and anxieties of the unknown effects of technology such as Meuter et al. (2003).

TAM has been instrumental in identifying key factors influencing technology adoption, yet it often treats anxiety as a peripheral factor. Meuter et al. (2003) argue that TAM falls short in addressing intricate elements like concerns about job loss, unease with evolving technologies, and doubts about technological advancements. Marangunić and Granić (2015) conducted a thorough review of literature, emphasising the significance of incorporating socio-cultural aspects into TAM for a more comprehensive grasp of technology adoption. They propose that the adoption of technology is not only affected by personal perceptions, but also by socio-cultural influences and contextual factors.

In academic environments, students' anxieties concerning AI adoption can be influenced by their cultural heritage, social norms, and institutional policies (Venkatesh et al., 2003; Hofstede, 1980). By including these wider socio-cultural factors, the TAM model can be improved to more accurately anticipate and address users' technology adoption anxieties (Marangunić & Granić, 2015). This thorough method helps in creating plans to reduce anxiety, making it easier to embrace new technologies such as AI in educational environments. Recognizing these socio-cultural aspects is vital for tackling the

underlying reasons for technology anxiety and creating a conducive atmosphere for technology acceptance (Kaplan & Haenlein, 2010).

This examination points out the constraints of traditional adoption theories in explaining technology anxiety, stressing the importance of incorporating detailed socio-cultural viewpoints. Expanding the range to include various socio-cultural aspects (Leeuwis & Aarts, 2020) is crucial for understanding the AI-anxiety and technology adoption processes. Societal norms, cultural beliefs, and institutional settings play a significant role in shaping attitudes and behaviours when it comes to adopting technology (Hofstede, 1980). For example, societal stories regarding AI in education and institutional backing for technology can significantly impact acceptance (Kaplan & Haenlein, 2010).

Incorporating socio-cultural viewpoints helps in comprehending how social and cultural environments impact decisions about adopting technology (Triandis, 1995). This research aims to improve studies and strengthen strategies by merging these perspectives. Information from interviews about cultural aspects will explain socio-cultural factors behind AI-anxiety and technology adoption. The socio-cultural lens clarifies larger factors influencing attitudes and behaviours towards technology adoption, offering a comprehensive analysis and improved remedial strategies.

### **Towards a Socio-cultural Perspective on Adoption and AI-Anxiety**

Adoption theories such as TAM and UTAUT have faced criticism for their narrow attention to social and cultural elements, frequently neglecting the wider factors that impact technology adoption. These theories focus mostly on how users view technology characteristics, but do not fully examine how socio-cultural factors influence people's attitudes and behaviours towards adopting technology.

**Vygotsky's** (1987) study is essential for examining AI-anxiety from a socio-cultural point of view. He **stressed the importance of culture in shaping mental functions and actions, pointing out how cultural instruments like language and objects influence how a person interacts with the world and views AI technologies**. This point of view implies that individuals' advancement is closely connected to the society and culture in which they reside. This also suggests that AI-anxieties may be linked to students' participation in culturally organised activities within educational settings.

Dewey (1938) also highlighted the importance of social interaction and experiential learning in influencing an individual's views and involvement with technology. **When AI-based educational tools are brought into a classroom, students may feel anxious not just because of the complexity of the technology but also due to their interactions with teachers and fellow students**. If students see their classmates showing anxiety or discomfort with the technology, they might develop similar worries and not want to use the technology (Bandura, 1986; Prensky, 2001).

Moreover, Dewey's belief that learning is a collaborative process influenced by social and cultural factors highlights the significance of taking into account students' social connections and cultural histories in understanding AI-anxiety. For instance, individuals from societies that prioritise group consensus and uniformity might experience increased anxiety regarding AI implementation if they view it as contradicting the customs or values of their society (Hofstede, 1980; Triandis, 1995).

Exploring the social and cultural dimensions of AI-anxiety contributes to a more comprehensive grasp of the influences that form students' perspectives and feelings towards AI technologies within their cultural contexts and social relations. This holistic approach goes beyond the perception of technology emphasised in TAM and UTAUT models, acknowledging the intricate interplay between individual experiences, cultural norms, and societal influences in technology adoption behaviours.

### **Consumer Culture Theory**

Consumer Culture Theory (CCT) can provide understanding of AI-anxiety among students in relation to technology adoption and diffusion. CCT centres on the marketing field and explores customer actions, market dynamics, and cultural elements (Arnould & Thompson, 2005). **In the field of AI technology, CCT helps identify socio-cultural factors that can impact how individuals view, think about, and act towards AI technology.**

Johnson and Verdicchio (2017) pointed out that the proliferation of AI technology has caused a rise in AI-anxiety among individuals, largely due to widespread misconceptions about the technology. CCT argues that misconceptions about AI are not innate, but are actually shaped by societal norms, media representation, and the narratives propagated by institutions (Arnould & Thompson, 2005). One fear that students may experience is the fear of losing their job or facing economic instability due to the automation aspect of AI, which can increase their anxiety about AI in education (Chen et al., 2020; Timms, 2016).

Franco (2022) explores the interactions within consumer culture and how consumers introduce fresh methods of innovation and personalization, as well as communication. While Franco doesn't directly talk about generative AI, his main focus is on the importance of grasping consumers' perception, behaviour, and culture in AI usage. This shift in viewpoint suggests that human anxieties arise from various aspects of technology advancement in society, not just its new developments.

CCT enables the examination of AI-related anxiety among students on a broader level, showcasing the link between technological progress and people's concerns. By examining cultural significance, interpersonal connections, and organisational structures that influence students' views on AI adoption, researchers can better comprehend the specific elements that promote or obstruct technology acceptance. Interviews and ethnography are utilised to comprehend the reasons behind AI

anxiety, the specific groups prone to experiencing it, and how to effectively address the anxiety to foster positive learning environments.

### **Understanding Socio-cultural Factors of AI Adoption in Education**

Taking on a socio-cultural viewpoint offers a thorough grasp of AI adoption in educational settings. This method considers various social, cultural, and institutional factors that impact how individuals view and adopt technology (Belk, 2013; Bijker et al., 2012). Collective social dynamics and institutional contexts influence how individuals behave and their attitudes towards adopting technology. In the upcoming paragraphs, various aspects of this socio-cultural conceptual model are highlighted, such as the socio-material, cognitive-affective, and socio-institutional dimensions.

In order to effectively utilise this conceptual model, this study examines particular components across various aspects. **The physical characteristics like the design, functionality, and usability of AI technologies utilised in educational settings can impact how students view and choose to use them.** Research conducted by Kim et al. (2013) has demonstrated that student engagement and acceptance of educational technologies can be greatly impacted by the user interface and ease of use. These factors emphasise the significance of taking into account the practical and physical aspects of AI tools in educational settings.

In the **cognitive-affective dimension**, focus can be placed on students' views, opinions, and feelings towards AI technologies. Understanding students' perceptions of AI's abilities, privacy and control worries, and overall acceptance of AI in educational settings is essential. The examination of literature has shown that establishing attitude and emotion factors is essential for student acceptance of technology (Thompson et al., 1999). Identifying and dealing with these cognitive and emotional factors is essential for promoting favourable attitudes towards AI adoption.

The **social and institutional aspect** includes social and governmental frameworks that impact the acceptance of technology. Cultural norms, educational policies, and institutional practices within schools can shape students' experiences with AI technologies. For instance, societal narratives about the benefits or risks of AI in education, along with institutional support for technology integration, can impact students' acceptance levels. This dimension underscores the role of larger societal and institutional frameworks in shaping individual technology adoption behaviours (Bijker et al., 2012).

In the cultural context of the socio-institutional sphere, prevailing cultural attitudes towards technology and education can influence students' perceptions and anxieties related to AI technologies. For example, Consumer Culture Theory (CCT), as advocated by Belk (2013), emphasises how cultural norms and practices shape individuals' interactions with products and technologies. Societal values emphasising individual autonomy versus collective learning may shape students' attitudes towards AI

adoption in classrooms. Recognizing these cultural influences can help in developing strategies that align with students' values and expectations.

By applying this socio-cultural conceptual model, this research aims to uncover these multifaceted influences on students' AI-anxiety and adoption behaviours. This approach provides a comprehensive understanding beyond individual-level explanations and offers actionable insights for educators, policymakers, and technology developers to address challenges related to AI integration in educational environments.



## Methodology

This chapter outlines the method for studying AI-anxiety in students, covering data collection, data analysis, and ethical considerations. This holistic strategy provides a comprehensive perspective on how social and cultural elements impact the acceptance and spread of AI technologies, as well as their influence on students' actions.

### Research Design

This study employs a qualitative research design that is in line with CCT and socio-cultural assumptions, thus allowing the researcher to gain an understanding of students' experiences and perceptions of AI-anxiety. Quantitative methods are especially useful for identifying and analysing the intricate and context-bound processes through which people think and behave, thus providing rich insights into their relationships with AI (Denzin & Lincoln, 2018). Through the use of qualitative research, this study will be able to capture the details of student anxiety and give a detailed description of the phenomenon.

The research methodology uses CCT qualitative processes which stress participatory observation and the use of multiple data sources to capture the richness of consumer behaviour and cultural contexts (Belk, 1988; Sherry, 1990). The first phase of the research entails a literature review to establish a background of the research topic and to determine areas that have not been covered by previous research (Arnould & Thompson, 2005). It not only contributes to the theoretical foundation but also helps in formulating research questions that are relevant to the existing debates in the field.

Using multiple data sources and the theoretical lens known as “the enabling lens” (Dolbec et al., 2021), the study intends to address the gaps in the literature and develop an emerging perspective that can offer a strong theoretical foundation for the present work. This method enables the understanding of the social and cultural factors that lead individuals to adopt and diffuse AI technologies even if they have anxiety, and how these factors affect their behaviour.

The concept of "enabled theorising" through the enabling lens involves looking at a topic in a novel and informative way, allowing researchers to uncover new dimensions and insights that may not be visible through traditional theoretical approaches. This lens facilitates a deeper understanding of complex phenomena by encouraging the integration of multiple theoretical perspectives and interdisciplinary approaches (Dolbec et al., 2015).

In the context of this study, the enabling lens helps to illuminate the intricate interplay between socio-cultural factors and AI-anxiety among students. By thinking through the enabling lens, the research can explore how societal norms, cultural values, and institutional structures influence students' perceptions and behaviours towards AI technology. This approach allows for a more comprehensive

analysis that goes beyond the limitations of conventional adoption theories, which often focus narrowly on individual perceptions of technology attributes such as usefulness and ease of use (Venkatesh et al., 2003; Davis, 1989).

Enabling theorising helps to close the gap in research by offering a comprehensive perspective on AI-related anxiety that incorporates personal experiences and wider socio-cultural settings (Arnould & Thompson, 2005). This new viewpoint is essential for creating successful plans to tackle the psychological and social aspects of technology adoption, which helps create a more encouraging atmosphere for incorporating AI in educational environments (Venkatesh & Bala, 2008; Kaplan & Haenlein, 2010).

A diagram is generated to visually depict the theoretical framework developed through enabled theorising, offering a concise overview of the theory and direction for continued interpretation and analysis. This structure aids in illustrating the complex relationships and interactions between various socio-cultural factors and AI-anxiety. Afterwards, the data collection processes align with the chosen theoretical lens and research focus (Otnes & McGrath, 2001). Qualitative interviews and netnographic analysis are employed to gain nuanced insights into the complex phenomenon of AI technology adoption and student anxiety at a micro level. These methods allow for in-depth exploration of participants' perspectives and experiences related to AI-anxiety within educational settings.

## **Data collection**

The research employs semi-structured interviews (Arsel, 2017) and netnographic analysis (Kozinets, 2002) allowing for a comprehensive understanding of AI-anxiety among students from both personal narratives and digital interactions.

### **Interviews**

To investigate the participants' subjective experiences and perceptions of AI-anxiety, semi-structured face-to-face interviews were conducted. This approach enables the investigation of particular subjects while being open to new perspectives as they arose (Arsel, 2017; Brinkmann, 2014). Using the CCT lens, the interviews delved into the emotional and psychological aspects of AI-anxiety, providing detailed insights into how students perceive and interact with AI tools in educational settings (Arnould & Thompson, 2005). Every interview spanned around 45 minutes, creating a casual and relaxed environment that promoted open and candid conversation.

Two initial test interviews were conducted to confirm the significance of AI-anxiety among students and refine the research questions for more nuanced data collection. This early insight not only provided confidence that forthcoming data collection efforts would effectively address the research questions but also allowed for the refinement and adjustment of these questions to better capture the

nuances of AI-anxiety. This iterative process aligns with an inductive qualitative approach prioritising adaptability (Corbin & Strauss, 2015).

The sampling process began with **convenience sampling**, selecting individuals known to have experience with AI technologies. Convenience sampling is a method of non-probability or non-random sampling where members of the target population that meet certain practical criteria or the willingness to participate are included for the purpose of the study (Dörnyei, 2007). Specifically targeting individuals familiar with AI ensured that the discussions delved deeply into the phenomenon of AI-anxiety among students.

After convenience sampling, **purposeful sampling** was used to capture participants from diverse social and educational backgrounds, crucial for understanding the impact of socio-economic status and educational history on AI-anxiety (Creswell & Creswell, 2017). Students from different socio-economic backgrounds may have varying degrees of technology access and resources, which can influence their perspectives and worries about AI. Similarly, students' confidence and proficiency in utilising AI technologies can be influenced by their educational levels, leading to different levels of anxiety. The research aims to gain a thorough understanding of AI-anxiety and its socio-cultural dimensions in different environments by involving a variety of participants.

Table 1 shows insights into demographic details with relevance to this study. The first interviewees were chosen by convenience sampling and later on by purposeful sampling. The recruitments were that they needed to be students who had prior experiences with AI as mentioned before. To maintain the privacy of the participants, each one was given a pseudonym.

	<b>Gender</b>	<b>Age</b>	<b>Education level</b>	<b>Education subject</b>	<b>Pseudonym</b>
1	Woman	20	University	Health Sciences	Francesca
2	Woman	22	Higher education	Business Administration	Catherine
3	Man	25	University	Business Administration	Sam
4	Man	24	University	Business Administration	Matthew
5	Man	18	Higher Education	Sport and communication	Carlos
6	Woman	20	Higher Education	Business Economics	Vanessa

Table 1: Demographic details interviewees

### **Netnographic Research**

Netnographic research involves the analysis of specific online forums, social media platforms, educational blogs, and virtual learning environments using a netnographic approach (Kozinets, 2002).

This method combines established techniques of **digital ethnography and online community research**, providing a methodological base for the collection and analysis of qualitative data from digital spaces (Kozinets, 2010; Markham, 2012). By utilising these methods, researchers can obtain critical knowledge on the effect of AI technologies in educational settings on students' experiences and views.

The netnographic approach allows researchers to immerse themselves in digital spaces where discussions about AI-anxiety occur, gaining nuanced insights into students' perceptions and experiences. This holistic approach allows researchers to gather a broad range of viewpoints on AI-anxiety among students, providing a comprehensive understanding of the social and cultural effects of AI technologies on individuals adopting and diffusing AI technologies with anxiety. **The immersion period takes place over a period of one month, which is sufficient for a thorough analysis of the digital spaces where students exchange ideas about AI technology adoption and its influence on academic life.** Fieldnotes are meticulously recorded to capture key insights, themes, and patterns observed during the netnographic research. Saved posts, screenshots, and detailed descriptions of interactions are compiled to support the analysis and interpretation of findings in the subsequent stages of the research. These artefacts play a significant role in making the students' experiences with AI-anxiety more understandable and relevant within the wider research framework.

In this study, the netnographic analysis is conducted on targeted platforms like university-related subreddits (e.g., r/college on Reddit), which are the most common platforms where students post their academic experiences, challenges, and anxieties related to technology adoption in education. This is demonstrated, for instance, by the fact that the r/college subreddit has seen the emergence of topics related to AI-generated content, and many students have shared their worries about the effect of automatic feedback on their academic papers.

## **Data analysis**

In this research, the approach to data analysis is comprehensive and based on the combination of multiple sources including interviews and netnographic analysis (Myers, 2020). As a result, there are difficulties in perceiving emotions on the internet, and the interview questions are meant to reveal the emotional aspects of the perspectives in their online and offline life. The people participating in the survey should have a sound psychological state to present real opinions regarding AI anxiety.

The coding techniques such as open, axial, and thematic coding are included in the data analysis process. Open coding implies the initial grouping of data into concepts or themes without the predetermined categories, and it gives a chance to see new ideas and patterns (Charmaz, 2006). Axial coding helps in revealing relationships between categories and subcategories, and therefore, allows a profound comprehension of the underlying phenomena (Strauss & Corbin, 1998). Thematic coding, instead, includes the systematic identification and analysis of the recurring themes or patterns within the

data, which provides a framework for interpretation (Braun & Clarke, 2006). Utilising these coding methodologies makes the data analysis process more rigorous and profound in uncovering the complexities of AI-anxiety among students.

## **Research Quality**

This research ensures the credibility and strength of results, aligning with interpretive qualitative research standards, particularly in the CCT field. Essential reliability aspects include credibility, transferability, dependability, and confirmability (Denzin & Lincoln, 2018).

Establishing the accuracy and authenticity of qualitative findings relies heavily on credibility (Lincoln & Guba, 1985). Methods like triangulation, member checking, and prolonged engagement were utilised to improve credibility in the study (Creswell & Miller, 2000). Triangulation included gathering information from various sources such as interviews and netnographic analysis to confirm research results. For instance, interviews were supplemented by netnographic analysis to confirm the data. Participant validation was ensured through member checking of initial findings, while spending a lot of time in internet forums interacting with members was helpful in developing a deep understanding and building trust.

**Transferability** evaluates how well study findings can be applied to different situations (Guba & Lincoln, 1989). While qualitative studies typically concentrate on particular instances, this research offered in-depth portrayals of educational environments, cultural backgrounds, and AI technology to assist readers in assessing how the results may apply to their own circumstances (Stake, 1995). Detailed descriptions of the schooling settings, diverse backgrounds of people, and specific artificial intelligence resources discussed were provided to help readers understand how the findings could apply to their particular circumstances.

**Dependability** means that qualitative results remain stable both over time and in different situations (Maxwell & Miller, 2008). A record of data collection and analysis processes, such as interview transcripts and coding decisions, was kept to ensure that the study could be replicated (Creswell & Creswell, 2017). This involves maintaining thorough documentation of interview transcripts, coding procedures, and conclusions reached during data analysis.

**Confirmability** guarantees the impartiality of qualitative analyses, reducing researcher influence (Finlay, 2002). Reflexivity was implemented by acknowledging and addressing personal biases throughout data collection and analysis (Tufford & Newman, 2012; Sandberg, 2005). A personal reflection journal was maintained to record reflections and possible biases, improving the study's objectivity in interpreting results.

The clear research process enhanced the credibility of the study. Emphasis was placed on reducing bias, choosing suitable methods, and following qualitative research guidelines. Peer review and member checking added even more credibility to the research (Patton, 2002; Lincoln & Guba, 1985). Data triangulation involved the integration of various data sources, methods, or researchers to validate findings (Creswell & Plano Clark, 2017). Reflexivity during the procedure aided in decreasing arbitrariness and misunderstandings (Finlay, 2002).

## **Research ethics**

Ethical considerations have been of prime importance with the primary consideration being given to informed consent, confidentiality and anonymity provisions, obeying the ethical guidelines and regulations (Bryman, 2016). The description of the study's limits also shares the same objectives of the reader so that they will be able to interpret the findings (Creswell & Creswell, 2017).

Within the scope of this thesis, safeguarding privacy emerges as a nuanced concern, as cited remarks have the potential to trace back to individuals, potentially exposing online content creators and posters to vulnerabilities. **Despite the public nature of the content they produce, individuals perceive the online realm as private (Markham, 2012). In response, by following Markham's (2012) approach of anonymizing quotes from social media users, the study prioritises safeguarding privacy.** This ethical consideration allows for the capture and analysis of online interactions within the public domain without explicit consent, while also sidestepping any infringement of privacy laws. Consequently, names undergo anonymization, and quotes are subtly adjusted to protect the anonymity of the posters while retaining the essence of their expressions. Additionally, the identities of interviewees within this dissertation are anonymized to uphold their privacy. Each interviewee is referred to in the findings via pseudonym. Appendix II and III contain the plain language statement and the verbal consent form used in this research.

## Findings

This chapter dives into students' multifaceted attitudes and experiences towards AI in education, based on the findings from both qualitative interviews and Reddit online discussions. By analysing the individual experiences, socio-cultural influences, coping mechanisms, and changes in perceptions, this chapter seeks to give a full picture of students' interactions with AI in educational settings. As part of the data analysis process, a supplementary quotes table was created to categorise participant responses and Reddit comments according to key themes and sub-themes (Appendix I). This table provides a structured way to present qualitative data and supports the findings presented in this thesis.

### Socio-Cultural Coping Framework for AI Adoption in Education

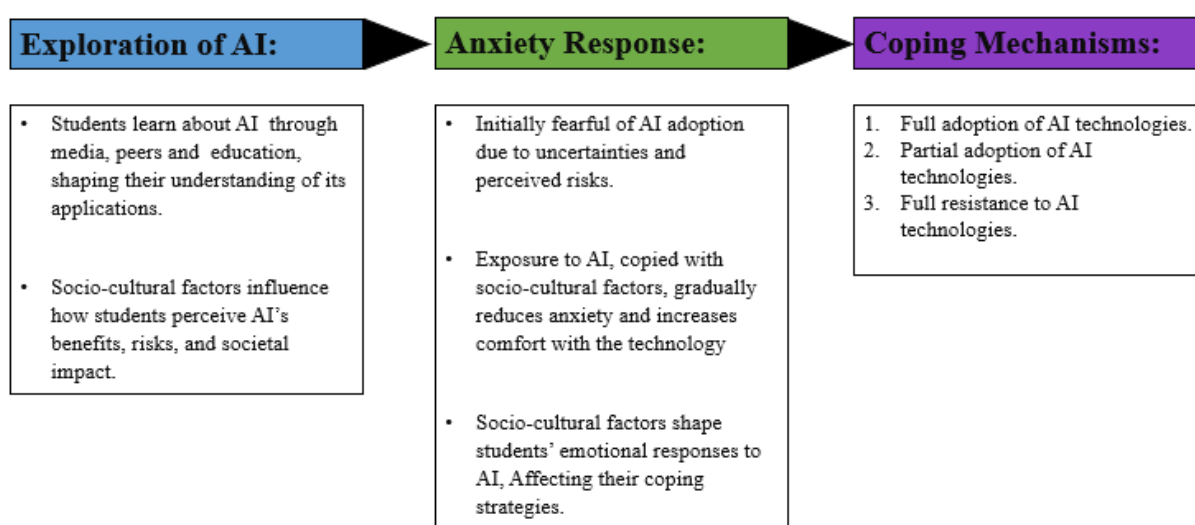


Figure 1: Theoretical framework

### Theoretical Framework

A theoretical framework emerges as students navigate AI in educational contexts, outlining key phases: Exploration of AI, Anxiety Response, and Coping Mechanisms. Each stage reflects students' attitudes and experiences influenced by individual and socio-cultural factors. This framework aids educators, policymakers, and researchers in understanding AI integration's complexities, which will be illustrated through data in this chapter.

**Exploration of AI:** This is the stage where students start exploring AI technologies through various channels like media, peer interactions, and educational institutions. Via these channels, students are building their understanding of the possible applications and implications of AI. Thus, socio-cultural factors like cultural norms and institutional frameworks play a crucial role in how students perceive AI and where they learn about the positive and negative impacts of AI on society.

**Anxiety Response:** At first, students may have the feeling of anxiety about AI since they are accompanied by fear due to the uncertainty and the risk which they envision. On the other hand, the use of AI, combined with the socio-cultural factors, triggers a dynamic feedback loop. Gradually, the level of anxiety is reduced by students when they acclimate to AI technologies, which brings a feeling of comfort and familiarity. Socio-cultural factors are still the central ones, they are the ones that have the greatest impact on the emotional response of students to AI, and they are the ones which influence the immediate coping strategies.

**Coping Mechanisms:** While students are experiencing the changing relationship with AI, various coping mechanisms are revealed. Some students opt for full adoption of AI technologies, embracing them wholeheartedly and demonstrating high levels of comfort and acceptance. Others are of the opinion that they can adopt AI technology partially while being cautious and keeping scepticism as well. For some students, it is the opposite where they display total resistance to AI, constantly battling with stress and fear of participating. These coping strategies are the product of a complex interaction of personal beliefs, social norms, and institutional support, and so they demonstrate the multifaceted nature of the AI-related anxiety in educational settings.

## **Exploration of AI**

As students embarked on the journey of integrating AI into education, their encounters illuminated a spectrum of attitudes and strategies amid underlying concerns. This phase is heavily influenced by socio-cultural factors, including norms, meanings, and institutional contexts that shape students' initial engagement with AI.

Catherina's initial nonchalant approach, *"Everyone else was doing it, so I thought, why not give it a try?"* reflects a common sentiment observed on r/StudyInTheNetherlands, where users often downplay anxieties regarding AI's impact on education. This attitude highlights the role of peer norms and social influences in shaping students' willingness to experiment with AI technologies.

Vanessa highlighted the sway of peer dynamics, noting, *"Especially now that I've started with HBO, I realise that you have to type quite a few things. And because it was very popular in my class, I actually started trying it too."* This underscores the significant role peer influence plays in shaping attitudes toward AI adoption, suggesting that students often follow their peers' lead in embracing new technologies.

Sam's nuanced perspective further illustrates this trend: *"If a lot of people use something, you tend to gravitate towards it. But on the other hand, I also think it's used by so many students that it's also just very valuable to keep using."* This sentiment resonates with discussions on r/StudyInTheNetherlands, where users weigh the practical benefits of AI against ethical considerations, reflecting a broader contemplation within the student community.



These examples show how socio-cultural factors, such as peer influence and institutional norms, play a crucial role in shaping students' initial interactions with AI. The exploration phase is not merely about individual curiosity but is deeply embedded in the social and cultural fabric of the educational environment.

Concurrently, discussions on the subreddit highlighted diverse strategies for managing AI-related concerns. One user suggested, *"Always cross-check AI-generated content with reliable sources to ensure accuracy and credibility."* This advice points to a proactive approach to AI usage, emphasising the need for vigilance and verification. Another user emphasised the importance of transparency, advocating for clear guidelines and ethical standards in educational settings, which reflects a call for responsible AI integration.

Overall, the exploration of AI in education unfolds as a multifaceted phase, influenced by individual experiences, peer dynamics, and broader societal discussions. While some students embrace AI integration with ease, others navigate apprehensions through critical evaluation and strategic coping mechanisms. This highlights the complex interplay between technology and education, revealing the diverse ways in which students interact with and adapt to AI in their academic lives.

## **Anxiety Response**

As students delved deeper into their interactions with AI, various responses emerged, reflecting a range of attitudes and coping mechanisms in the face of anxiety. This phase showcases shifts in perspective due to witnessing AI misuse, strategies to manage anxiety through cautious usage, and broader discussions on AI's impact on education.

Carlos experienced a shift in perspective after witnessing the consequences of AI misuse firsthand. He recounted a group project where a member had used AI without the group's knowledge, resulting in detection and project reevaluation. Reflecting on this incident, he remarked, *"Later this school year, a group was indeed caught with AI, and from that moment on, I became a bit more careful with it."* This narrative underscores the sobering reality of AI-related fears, triggered by tangible consequences within the educational environment.

Conversations on r/StudyInTheNetherlands mirrored these sentiments, with users discussing strategies to manage AI-related anxiety. Some advocated for transparency in AI usage, while others emphasised the importance of critically evaluating AI-generated content. One user commented, *"I always cross-check AI-generated content with reliable sources to ensure accuracy and credibility."*

Some Reddit users in r/StudyInTheNetherlands express concerns about the potential negative impacts of AI on their education, such as loss of control over their learning process or fear of being penalised for using AI tools. This anxiety is fuelled by uncertainties surrounding AI's reliability, validity,

and the consequences of its usage in educational settings. As seen in quote 9 in Appendix I: Supplementary Quotes Table, a user expressed concerns about the validity of AI-generated content and the potential penalties for using it in their coursework.

Users in r/AskTechnology express a range of emotions and attitudes towards AI in education, including uneasiness, scepticism, and reliance. Some users recount negative experiences with AI tools, describing them as unhelpful and “*only causing headache*”. Some recognize the AI's shortcomings in context interpretation but still find it helpful for some tasks like summarization and debugging. The mixed reactions of students to AI technologies in education point to the uncertainties and apprehensions students experience when using AI technologies for learning purposes. Among these concerns are AI's reliability, effectiveness, and potential adverse effects on their learning.

In the r/University subreddit, individuals share concerns and fears about the use of AI in learning. Some have concerns that the development of AI may have negative consequences on learning, such as dependency and inability to learn without AI assistance. One user shared, “*The use of AI for learning purposes is risky. Once you use it it becomes addictive. You won't be able to learn without it. It robs people of their confidence to learn without incorporating the usage of AI.*” Others see the power of AI in research and learning but warn against its abuse, especially in plagiarism and academic dishonesty. These anxieties are driven by the ambiguities regarding AI's impact on learning procedures, the possibility of its misuse, and the ethical issues that arise from its implementation in education.

Overall, the anxiety reaction of students shows a complex interaction of personal experiences, social pressure, and institutional norms. While some students remain unperturbed by AI's potential consequences, others navigate anxiety through vigilance and strategic coping mechanisms, underscoring the complex dynamics surrounding AI integration in education.

## **Coping Mechanisms**

Among the participants interviewed, distinct coping mechanisms emerged in response to the integration of AI into educational settings. These coping strategies varied in their degree of acceptance and resistance towards AI technology, influenced significantly by their anxiety levels.

### **Full adoption**

Among the participants, it was observed that a significant proportion demonstrated a full adoption of AI technologies. For instance, Vanessa and Matthew both embraced AI's potential to enhance learning experiences, fully integrating AI tools into their study habits, thereby alleviating some of their initial anxiety. Vanessa expressed enthusiasm for the efficiency gains facilitated by AI. When asked how using AI in her daily routine affected her educational experience she stated:

*“I think positively, because you spend less time researching the information you get, you do have more time to find more information about a topic. So you actually have a broader knowledge on a particular topic.”*

This sentiment reflects a proactive embrace of AI as a valuable learning tool. Similarly, Matthew integrated AI tools seamlessly into his study routine, leveraging them to optimise their academic performance. When asked if his personal beliefs would withhold him in any way from using AI, he called himself, *“a real gadget freak”* that would exploit AI in an instant. Later on saying he uses it in his everyday routine but still is a bit cautious about the meticulousness of AI. Reflecting on this perspective, a discussion under r/StudyInTheNetherlands shows a user that has adopted AI completely. The user mentioned that he used AI for almost everything as, *“It has probably saved me over 100 hours of pointless grunt work already”*.

### **Partial adoption**

Conversely, a subset of participants exhibited a partial adoption of AI technologies, maintaining a more cautious approach while acknowledging the benefits they offer. Francesca, Catherine, and Sam exemplified this stance, acknowledging the utility of AI in streamlining academic tasks while remaining mindful of its limitations. Carlos also falls under this category, as he expressed a nuanced approach to AI integration mentioning, *“I’m just careful with it. Because I know what the dangers are.”*, supplementing their learning with at first hand a traditional way and later on supported by AI-driven methods. He later on remarked, *“If I get stuck somewhere and notice that I can’t figure it out myself, it’s very easy to start using AI.”* This perspective highlights a balanced approach to AI usage, where students selectively incorporate AI tools while preserving traditional learning practices. Francesca uses AI in the same manner but gave time pressure as a significant reason to adopt it more, which is shown in quote 14 in Appendix I: Supplementary Quotes Table.

Similarly, Vanessa navigated her anxiety by adopting a cautious approach towards AI usage. She shared, *“I sometimes use such a generator to see what percentage of AI is in your report. And if that’s below 40%, I’m often satisfied.”* This strategy highlights an attempt to mitigate anxiety through self-regulation and monitoring of AI integration in academic work. By selectively incorporating AI tools while maintaining control over the final output, Vanessa exemplifies a balanced approach to AI adoption, reflecting a partial but cautious acceptance of AI technology.

Additionally, users involved in discussions on r/AskTechnology, r/StudyInTheNetherlands, r/University, r/Education and r/Futurology reflected similar perspectives, with users sharing their experiences of partially adopting AI technologies in education. An user mentioned, *“It’s a great tool to get some ideas/arguments/theory about essentially any topic.”* While later on emphasising that AI can not be trusted to get everything right and should not be used in such a fraudulent manner. Many other users state that they partially use it, *“i only use it for grammar and spelling checks, and also get some*

*inspiration from ideas i hadn't thought of.*” But most of these users later on mention that they do not completely adopt it because they are scared of using it in fraudulent ways, or not learning the skills they are supposed to learn. A user on r/GPT3 highlights the benefits of using AI as a learning aid, leveraging it as a tutor for real-time questions and for paper editing guidance. They emphasise the importance of understanding AI's limitations and using it responsibly as a supplementary tool rather than a replacement for human learning and critical thinking skills. As seen in quote 15 in Appendix I: Supplementary Quotes Table, this approach reflects a proactive coping strategy wherein individuals embrace AI's potential while actively mitigating anxieties through informed usage and critical evaluation.

### **Full resistance**

In addition to these coping mechanisms observed among the interviewed participants, there exists a cohort of individuals who vehemently resist the integration of AI technologies into educational settings. This stance was reflected in comments from Reddit users, who adamantly rejected the use of AI tools in academic contexts. Their coping mechanism involves maintaining a steadfast adherence to traditional learning methods and a staunch refusal to incorporate AI into their study routines.

Reddit comments echoed similar sentiments of resistance towards AI integration in education, with some users expressing concerns about the reliance on AI tools potentially diminishing critical thinking skills and devaluing the educational process. One user on r/University expressed scepticism: *"The use of AI for learning purposes is risky. Once you use it it becomes addictive."* The user resisted the use of AI because they think intellectual and behavioural skills suffer under it. While a user from r/StudyInTheNetherlands, advocates for maintaining traditional learning methods and views AI as a shortcut that undermines the integrity of their educational experience, as seen in quote 18 in Appendix I: Supplementary Quotes Table.

A different user was showing his concerns of people not, *"using AI for schoolwork are NOT using it as a tool but are using it as a replacement"*. With eventually showing his concerns that people lose the right skills they need for their jobs.

*"We're going to have people in the workforce in 5 years that did their entire education with AI and none of them actually know what they're doing."*

While other users show full resistance against AI because the technology is not advanced enough and, *"serves no help when it comes to completing work for my econometrics major."* A user on the subreddit r/AskTechnology showed resistance after using it briefly because, *"It never helped even a little bit, only caused me a headache."*

These comments express a tone of apprehensiveness and concern regarding the implementation of AI in education, overprotecting traditional pedagogical methods, and nurturing students' analytical skills. When relating these findings to the socio-cultural conceptual model, it is clear that students'

socio-cultural environment including norms, meanings and institutional support for AI significantly influence their attitudes, anxiety levels, and coping strategies towards AI adoption. This comprehensive lens provides a deeper understanding of how students navigate the complexities of AI integration in their educational environments.

## Discussion and limitations

### **Contribution to adoption theories**

The interviews and online discussions clarify AI adoption in educational environments, aligning with TAM (Davis, 1989; Venkatesh & Davis, 2000; Marangunić & Granić, 2015) and UTAUT (Venkatesh et al., 2003). The research shows that perceived usefulness and ease of use influence students' attitudes toward AI. For instance, like Vanessa, the majority of the students have said that AI has increased their efficiency and also their reach of information which is in line with perceived usefulness in the TAM model.

The UTAUT model highlights the role of social influence in technology adoption, encompassing peer influence, social factors, and cultural norms. As evidenced by discussions on Reddit, peer influence and social norms significantly impact AI adoption among students. For instance, Catherina and Sam reported using AI tools because others in their educational environment do so and because it is a prevailing trend. Similarly, Vanessa and Sam emphasised that their decisions were often shaped by social factors, illustrating how social dynamics influence technology adoption.

While UTAUT's emphasis on social factors forms a basis, this research enhances comprehension of AI adoption by integrating a socio-cultural viewpoint on AI-anxiety. It emphasises how social and cultural influences, like peer dynamics and cultural standards, combine with personal beliefs and technological aspects to mould students' perspectives on AI in education. This study's contribution lies in its nuanced exploration of the complex interplay between these elements in the specific context of educational AI adoption, offering a deeper cultural understanding of AI-anxiety.

### **Contribution of socio-cultural perspectives to AI**

The data indicate that socio-cultural influences significantly shape students' views on AI in educational settings. Interviews and online discussions highlighted the impact of cultural beliefs, peer influence, and institutional guidelines on AI acceptance and adoption. Vanessa and Sam's experiences illustrate how societal expectations and the presence of AI in their schools influenced their decisions to use AI, supporting previous studies on technology adoption (Venkatesh et al., 2003; Rogers, 2003).

Conversations on subreddits such as r/Education and r/Futurology highlight the significance of making well-informed decisions and employing AI responsibly in the larger socio-cultural landscape of education. The importance of transparency and clear ethical guidelines was highlighted by students, mirroring larger societal worries about the impact of AI. Educational institutions need to promote responsible AI use culture, recognizing both the advantages and ethical dilemmas related to AI incorporation (Floridi & Cowls, 2019).

The socio-cultural elements outlined in this research are in line with UTAUT components, highlighting the importance of peer pressure and cultural standards in impacting students' views on AI. This study goes beyond previous research by delving further into how these socio-cultural factors specifically lead to AI-anxiety, providing a more comprehensive insight into the factors impacting students' engagement with AI in educational environments. For example, Vanessa's and Sam's encounters highlight how peer dynamics and the prevalence of AI tools inside their academic settings impacted their choice to adopt AI technologies.

Moreover, educational institutions assume an essential part in moulding the socio-cultural climate that impacts AI adoption. The need for educational institutions to encourage a culture of responsible AI use is critical, as it tends to both the advantages and the ethical challenges related with AI integration. Educational institutions can implement AI programs that focus on technical skills and ethical considerations, as proposed by Floridi and Cowls (2019) in their framework for AI ethics.

Thus, elevating the socio-cultural aspects of the AI implementation, this research enriches the literature on the factors affecting students' engagement with AI in learning environments. The incorporation of socio-cultural factors underscores the fact that AI has many dimensions and thus requires a multi-dimensional approach to exploring the concept as well as implementing it in education.

## **Managerial implications**

Building on the findings from the earlier chapters, the following managerial implications for innovators, entrepreneurs and educational institutions can be identified. The research examines the relationship between anxiety and AI adoption in a more thorough way than previous studies.

### **For Innovators and Entrepreneurs**

Innovators and entrepreneurs can use this information to create AI tools and solutions that address adoption concerns. Recognizing that anxiety can disrupt the adoption process, developers should prioritise creating user-friendly interfaces that reduce complexity and enhance perceived ease of use (Davis, 1989). Providing precise guidance, educational activities, and support can help reduce user stress. Additionally, implementing feedback systems to enable users to report problems and receive prompt assistance can also alleviate stress and establish credibility in AI technologies (Venkatesh and Bala, 2008). These methods are consistent with the Lean Startup approach, which focuses on continuous development and incorporating customer input to develop products that are more centred on the user (Ries, 2011).

Furthermore, it is crucial to emphasise the ethical development of AI tools. Innovators need to prioritise transparency in AI operations, making sure that users comprehend the functioning of AI and how their information is used (Shin, 2020). This clearness can alleviate worries linked to privacy and

control, encouraging a feeling of safety among users. Entrepreneurs may also think about creating functionalities that permit customization and control, empowering users to tailor AI tools to suit their preferences and requirements. This method not only boosts user contentment but also supports the Business Model Canvas framework through the reinforcement of the value proposition and customer relationship aspects of the business model (Osterwalder & Pigneur, 2010). By applying these principles, innovators and entrepreneurs can develop AI solutions that address user worries and follow best practices in business development, marketing, and sustainable innovation (Martin, 2015).

### **For Educational Institutions**

Based on the findings, it is crucial to establish broad AI education programs in the universities that will not only equip the students with the technical knowledge regarding AI development but also the ethical and societal aspects of AI (Floridi et al., 2018). Such programs should consist of modules on the responsible use of AI, the protection of personal data, the presence of bias in algorithms, and potential societal impacts of AI technologies. When institutions raise awareness among students and educators about these issues, they can prevent misuse of AI. There is the need to foster a climate that addresses the concerns that come with the development of AI. These issues should be attended to by the universities through seminars and counselling services (Beetham & Sharpe, 2013). It is also useful to have open discussions about AI insecurities to the students, in order to share the stories and get the necessary experience.

### **Collaboration Between Academia, Industry, and Policymakers**

Effective teamwork involving academia, industry, and policymakers is crucial for developing and implementing AI solutions that tackle educational challenges, promote ethical values, and promote inclusivity in society (Selwyn, 2019). Partnerships like these can assist in developing suitable recommendations for integrating AI in education, guaranteeing that AI tools are created and employed to serve all individuals participating. Identifying anxiety as a fundamental factor in the implementation of AI in the educational field can assist in developing tactics to promote the utilisation of AI in education and reduce the influence of anxiety on its acceptance. This approach can result in more efficient and morally upright AI applications in the field of education, broadening AI expertise and encouraging conscientious utilisation.

## **Limitations and suggestion for future research**

### **Methodological Constraints**

Despite the findings of the study, it is important to state its limitations and recommend possible directions for further research. One limitation involves the sample size and the depth of qualitative interviews, which proves to potentially affect the generalizability of the findings (Creswell & Creswell,



2017). While qualitative research affords in-depth understanding of individual students' experiences, there can be sampling bias in terms of students' diversity. For instance, views from students who may not fit the conventional college student demographic, including those from lower socioeconomic backgrounds or different geographic locations. Future research should include a more diverse sample population to capture a wider variety of perceptions (Patton, 2015). This method could uncover the impacts of various socio-economic backgrounds, cultural contexts, and educational settings on students' perceptions and concerns regarding AI. An increased diversity of participants may provide fresh insights into the ways that various communities perceive and use AI technologies. This may help to highlight particular barriers for AI adoption that may not be evident in less varied samples.

However, the conclusions can be made more credible by conducting both quantitative and qualitative research. The application of mixed-methods research can improve the data triangulation which can improve the assessment of the extent of the AI usage in educational settings rather than using only quantitative or qualitative data (Johnson, Onwuegbuzie & Turner, 2007). Quantitative surveys give a snapshot view of the levels of AI-anxiety among various groups of society while the qualitative interviews allow the identification of the reasons for these anxieties in detail. This mix enables a more thorough examination by corroborating results with various data sources and viewpoints, ultimately increasing the strength and dependability of the research results.

### **Intercultural Differences and Ethical Issues**

Future research should pay attention to the differences of students' attitudes towards AI in different cultures, the analysis of ethical issues related to the incorporation of AI in learning environments, and gaining the views of teachers and school administrators to have a more inclusive evaluation of the effects of AI in education (Rogers, 2003; Venkatesh et al. , 2003). Such research projects can look into the role of culture and politics in the institutions on the uptake of AI, while reviewing issues on privacy, fairness, and how AI may widen the gap of knowledge inequality (Floridi & Cowls, 2019). Subsequent studies can respond to ethical questions and develop principles for utilising artificial intelligence in education in countries with other cultural backgrounds to make this application more ethical.

### **Alternative Theoretical Perspectives**

It is also necessary to take into account that other theories can offer different ways of looking at the AI adoption process in education within the context of this study. For example, the Social Construction of Technology (SCOT) framework can provide insights into other forms of socio-technical relations involved in the process of AI implementation (Bijker et al., 2012). SCOT focuses on how social groups influence technological development and how technologies are shaped by social processes.

To build on this, employing the concept of "enabled theorising" by Dolbec and Fischer (2015) to layer different theories to explain the data could add more depth to the analysis. This concept is advantageous over a single perspective approach as it captures different views and factors regarding the teaching or learning process as influenced by AI. For example, incorporating SCOT with TAM and UTAUT can offer a complete insight into the individual and socio-cultural elements impacting AI adoption. Through the analysis of various theoretical perspectives, experts and professionals can gain a deeper insight into the intricate interactions between different factors influencing the adoption of AI, and create comprehensive approaches to address the difficulties linked to AI implementation in educational environments. Using multiple theories can provide a more detailed analysis, uncovering insights that could be overlooked if only one theory is used.

## Conclusion

AI in learning environments is one of the newest technological trends that appear to be rather helpful in educational settings, but it also carries certain challenges, one of which is AI-anxiety among students. This research investigated the causes, effects, and coping strategies associated with AI-anxiety among students. With a socio-cultural approach the intricate and subtle relationship between societal factors and personal experiences were examined, leading to a more comprehensive understanding of AI-anxiety in educational settings.

The research sought to answer the following questions:

1. *"How do socio-cultural factors influence students' decisions to adopt and use artificial intelligence (AI) technologies despite experiencing anxiety?"*
2. *"What impact do these socio-cultural factors have on students' behaviour and coping strategies in relation to AI technology adoption?"*

The study revealed the extent to which students experience AI-anxiety because of the level of uncertainty they have about the AI's reliability, the ethical issues at play, and general effects on learning processes. Interviews and online discussions confirmed students' fears about AI misuse, dependency, and academic dishonesty, aligning with Johnson and Verdicchio (2017), who identified misconceptions about AI as primary anxiety sources.

Socio-cultural factors significantly influence students' decisions to adopt and use AI technologies. Peer dynamics, cultural norms, and institutional policies emerged as key drivers of AI adoption. For instance, peer pressure and the popularity of AI tools within the educational environment motivated students like Vanessa and Sam to adopt AI technologies. Cultural norms surrounding the acceptance of technology and institutional support for AI integration also played crucial roles in shaping students' attitudes towards AI.

These socio-cultural factors also impact students' behaviour and coping strategies in several ways. The study identified distinct coping mechanisms among students, ranging from full adoption to complete resistance. These coping strategies were influenced by personal beliefs, societal norms, and institutional support. Full adopters, like Vanessa, found AI tools enhanced their efficiency, while partial adopters, such as Francesca and Carlos, used AI cautiously, balancing its benefits with traditional learning practices. Full resisters remained sceptical, adhering to traditional methods and expressing concerns about AI's impact on learning integrity and critical thinking skills.

The research makes significant contributions by highlighting the multi-dimensional role of individual beliefs, social factors, and technological features in shaping students' attitudes towards AI in education. Using the TAM and UTAUT, this study was able to capture more elaborate knowledge about AI adoption. The study supported perceived usefulness, perceived ease of use and social influence as

key determinants among the students' perception towards AI adoption. In doing so, it expands the existing line of research on a number of different levels, showing the complex interplay between individual beliefs, social factors, and technological features.

The findings can be useful for innovators and entrepreneurs to create guidelines for AI tools that will reduce user anxiety. Stressing the necessity of user-friendly interfaces, clear instructions, and ethical transparency can significantly reduce AI-anxiety. It is also important for developers to allow feedback procedures and the ability to adapt to the given program, improving user confidence and contentment.

It also focuses on the fact that educational institutions contribute to the provision of a socio-cultural perspective of AI and serves an important role in the development of AI. However, it is relevant to note that adopting a full scope of AI education entails combining technical education approach with ethical component. Stakeholders can increase the beneficial application of AI and ensure that AI is ethically used, then the necessary educational, psychological, and social services, and a platform for people to speak with concerns and fears regarding AI should be afforded.

In conclusion, this study provides a better understanding of the complex relationship between AI-anxiety among students and their willingness to embrace the technology in their institutions. By adopting a socio-cultural approach, the research makes theoretical and methodological advancements and offers practical recommendations on how to reduce and minimise AI-anxiety, integrating AI usage efficiently and responsibly in educational environments. As AI progresses, it is essential to continue cultivating informed, ethical integration of AI in the education process. As research moves forward and continues to unravel aspects around AI anxiety, it will be possible to understand and improve on what these technologies can and should offer educationally.

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## Appendices

**Appendix I: Supplementary Quotes Table**

Nr.	Quote	Source	Theme/ Category	Context/Notes
1	"Everyone else was doing it, so I thought, why not give it a try?"	Catherina	Peer Influence	Initial nonchalant approach to AI adoption
2	"Especially now that I've started with HBO, I realize that you have to type quite a few things. And because it was very popular in my class, I started trying it too."	Vanessa	Peer Influence	Influence of class popularity on AI adoption
3	"If a lot of people use something, you tend to gravitate towards it. But on the other hand, I also think it's used by so many students that it's also just very valuable to keep using."	Sam	Peer Influence	Balancing peer influence and perceived value of AI
4	"Using AI as a tool is completely fine. It's a great tool to get some ideas/arguments/theory about essentially any topic."	r/StudyInThe Netherlands	Practical Use	Emphasises AI as a supportive tool for generating ideas and arguments

5	"Always cross-check AI-generated content with reliable sources to ensure accuracy and credibility."	r/StudyInThe Netherlands	Practical Use	Advocates for the verification of AI-generated content to maintain accuracy and credibility
6	"It's important to have clear guidelines and ethical standards in educational settings."	r/StudyInThe Netherlands	Ethical Concerns	Calls for transparency and ethical standards in AI usage
7	"Later this school year, a group was indeed caught with AI, and from that moment on, I became a bit more careful with it."	Carlos	Anxiety Response	Shift in perspective after witnessing consequences of AI misuse
8	"I sometimes use such a generator to see what percentage of AI is in your report. And if that's below 40%, I'm often satisfied."	Vanessa	Anxiety Response	Strategy to manage anxiety by monitoring AI usage in academic work

9	"I, as well as 5 others in my class, got accused during my thesis of using ChatGPT even though I've never used it in a serious way. It turns out that they only just started using a system to detect AI in writing so it wasn't perfect in detecting AI yet but how will you be able to prove that you haven't used AI during your work?"	r/StudyInThe Netherlands	Anxiety Response	Concerns about the validity of AI detection systems and potential false accusations
10	"It never helped even a little bit, only caused me a headache."	r/AskTechnology	Negative Experience	Expresses frustration with AI tools being unhelpful
11	"I think positively, because you spend less time researching the information you get, you do have more time to find more information about a topic. So you actually have a broader knowledge on a particular topic."	Vanessa	Full Adoption	Positive impact of AI on learning efficiency and breadth of knowledge
12	"A real gadget freak" that would exploit AI in an instant."	Matthew	Full Adoption	Enthusiasm for integrating AI tools into daily study routines
13	"I'm just careful with it. Because I know what the dangers are."	Carlos	Partial Adoption	Balanced approach to AI usage, mindful of potential dangers

14	<p>"For example, last week I had to write a report, but I thought I would start. I just apply it as some kind of support, so that sometimes I don't know how to phrase it. And then I say, It was also a report in English, so then I put the piece I typed in it. And then I say, for example, improve my English or remove language mistakes. Well, he does that and then I like it, then he really uses it as a tool to improve my English, for example. But in the end, due to some time pressure, I thought yes, now you have to help more than just improve the English. So then I just. Yes, I put certain specific questions in there and actually copied that and just worded it differently. Then I added my own thing, but then it was a good collaboration between ChatGPT and myself."</p>	Francesca	Partial Adoption	Using AI as a supportive tool under time pressure
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15	<p>"I have used AI basically as a tutor and it has been game changing. I'll have it open when reading my textbook so that I can ask questions in real time as they come into my brain. That kind of instant feedback really helps to keep me engaged even when reading really dense and dry material. I've also used it to grade my papers before I turn them in. It's so far been really great at giving pointers and advice to help me edit. I DO NOT HAVE THE AI DO THE WORK FOR ME. Obviously you need to be careful and check that it's giving you good information because of the whole hallucination thing. Like any tool it's imperative to learn its limitations so that you can understand the proper context to use it in, but the only way to get that kind of understanding is to use it. Personally I think schools ought to lean into using AI, there is so much potential."</p>	r/GPT3	Partial Adoption	Using AI as a real-time tutor and for paper editing guidance
16	<p>"I only use it for grammar and spelling checks, and also get some inspiration from ideas I hadn't thought of."</p>	r/StudyInThe Netherlands	Partial Adoption	Selective use of AI for grammar, spelling checks, and inspiration

17	<p>"The use of AI for learning purposes is risky. Once you use it it becomes addictive. You won't be able to learn without it. It robs people of their confidence to learn without incorporating the usage of AI."</p>	r/University	Full Resistance	Concerns about AI addiction and loss of learning confidence
18	<p>"I am against it. During your studies, you should be able to develop your own skills and knowledge. If you are wrong about something, that's fine, that's part of the experience but don't use AI to help you write assignments or inform yourself about matters because they won't give you reliable information about niche topics in academia for example. I tried to test ChatGPT on concepts I used during my Bachelor program and it got it all wrong even though it sounded like something reliable."</p>	r/StudyInTheNetherlands	Full Resistance	Advocates for traditional learning methods and skepticism about AI reliability
19	<p>"We're going to have people in the workforce in 5 years that did their entire education with AI and none of them actually know what they're doing."</p>	r/University	Full Resistance	Concerns about future workforce competence with over-reliance on AI



20	"AI is very useful, but I am still wary of over-reliance. I use it to complement my studies, not replace my own efforts."	Matthew	Partial Adoption	Cautious approach to AI usage, ensuring it supplements rather than replaces personal effort
21	"Using AI for learning is great, but I always make sure to verify the information it provides. Trust but verify is my motto."	Sam	Practical Use	Emphasises the importance of verifying AI-generated information to ensure its accuracy
22	"I tried using AI for my assignments, but I quickly realized that it doesn't understand the context as well as a human does."	Francesca	Negative Experience	Expresses the limitations of AI in understanding complex contextual information
23	"In my class, almost everyone uses AI for some part of their work. It's just become a normal part of the study routine."	Catherina	Peer Influence	Indicates the normalisation of AI usage among peers
24	"AI tools can sometimes give wrong information, so I always cross-check with other sources to be sure."	Vanessa	Practical Use	Highlights the necessity of verifying AI-generated content

25	"AI has been a game-changer for me in terms of managing my study time more efficiently."	Matthew	Full Adoption	Positive impact of AI on study time management
26	"I have mixed feelings about AI. It's helpful, but I worry about becoming too dependent on it."	Carlos	Anxiety Response	Expresses concerns about dependency on AI despite its helpfulness
27	"I think AI is a great tool, but it's important to use it ethically and not let it do all the work for you."	Sam	Ethical Concerns	Emphasises the importance of ethical AI usage in educational settings

## **Appendix II: Plain Language Statement**

**Title of the Study:** Understanding AI-Anxiety Among Students

### **Introduction:**

You are invited to participate in a research study conducted by Mika Herold from Radboud University Nijmegen. The objective of this research is to investigate the reasons, impacts, and ways to manage AI-anxiety in students.

### **What is Involved:**

If you agree to join, you will be requested to engage in an interview lasting about 45 minutes. In the interview, you will need to share your experiences, perspectives, and emotions related to the integration of AI technologies in your educational setting.

### **Risks and Benefits:**

Taking part in this study does not entail any significant risks. Your involvement is optional, and you can choose to leave at any point without facing any repercussions. This research has advantages in enhancing comprehension of AI-anxiety in students, potentially shaping educational practices and policies.

### **Confidentiality:**

All data obtained in the course of this research will be maintained as confidential. Your personal information will be kept confidential, and any mentions of you in the study results will be done using a false name. Information will be kept safe and will only be available to the researcher.

### **Contact Information:**

If you have any inquiries regarding this research, feel free to reach out to [mika.herold@ru.nl](mailto:mika.herold@ru.nl).

Thank you for considering participation in this study.

Sincerely,

Mika Herold

### **Appendix III: Verbal Consent Form Text**

Hello, I'm Mika Herold, and I'm currently researching AI-related anxiety in students. The aim of this research is to investigate the reasons, impacts, and ways of managing AI-anxiety in educational environments.

Your involvement is completely optional, and you can opt out at any point without facing any repercussions. If you accept to join, you will be requested to engage in an interview that is expected to take around 45 minutes. In the interview, you will discuss your experiences, opinions, and emotions related to the use of AI technologies in your educational setting.

There are no significant risks linked to enrolling in this research. Any information gathered will be confidential and your identity will remain anonymous. A pseudonym will be used for any mentions of you in the research results. The information gathered will be kept safe and only the research team will have access to it.

Do you have any questions about the study? [Pause for questions]

Do you agree to participate in this study? [Wait for verbal consent]

Thank you for your participation.