



DEPARTMENT OF EDUCATION, COMMUNICATION
AND LEARNING

Prompting Techniques and AI Feedback:

A Study of University Students' Perceptions and Efficacy in
Academic Writing

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Abstract

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Purpose: The purpose of this study is to explore how students can best leverage AI for academic support. Further, this study examines how AI-generated feedback on student writing changes when applying different prompting techniques and how students perceive this feedback across different prompting techniques. Additionally, it seeks to identify which approach students perceive to be the most effective for receiving useful, high-quality feedback.

Theory: This study is grounded in two theoretical perspectives that help explain how students interact with and evaluate AI-generated feedback in academic writing: Sociocultural Theory, particularly Scaffolding and the Zone of Proximal Development, and the Technology Acceptance Model (TAM). These frameworks complement each other, as one offers a learning-oriented lens to understand how AI can support students' writing development, and the other helps to understand perceptions of usefulness and usability of prompting techniques. Together, they offer a lens for interpreting how different prompting techniques shape students' experiences with generative AI tools.

Method: This study employed a mixed-methods, within-subjects interventional design grounded in an interpretivist perspective. Eleven students participated in a workshop where they tested three prompting techniques: zero-shot, roleplaying, and chain-of-thought, to receive AI-generated feedback on a prewritten academic text. Data were collected through a questionnaire and post-workshop semi-structured group interviews. The questionnaire provided quantitative demographic and contextual information about participants' AI tool experience, while the interviews explored students' perceptions of feedback quality and the usefulness of prompting techniques, providing qualitative data..

Results: The results of the study show that students' perceptions of AI-generated feedback varied depending on the prompting technique used. While zero-shot prompting was seen as simple and intuitive, it often led to vague and general feedback. In contrast, roleplaying and chain-of-thought (CoT) techniques were perceived as more effective in generating useful, specific, and structured feedback. However, no single prompting technique stood out as universally superior. Although roleplaying was generally viewed as easier to use and useful, students' experiences highlighted a more practical insight: effective feedback is less about selecting the "right" technique and more about knowing how to communicate clearly with the AI and staying critically engaged throughout the process. Participants who received the most useful feedback were those who provided context, iterated on their prompts, and followed up when initial responses were insufficient.

Foreword

First of all, I would like to express my gratitude to my supervisor, Sylvana Sofkova Hashemi, for her guidance and support throughout the entire process - from generating ideas to articulating them in the pages of this thesis. Your genuine interest in my topic has been both encouraging and motivating. Our supervision meetings always filled me with positivity about my work and instilled hope that I could and would succeed.

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Table of contents

1. Introduction	1
1.1 Research aim	2
1.2 Research questions	2
2. Literature review	2
2.1 AI in higher education	3
2.2 Feedback	4
2.3 AI literacy	5
2.3.1 Prompt literacy	5
2.4 Prompting techniques	6
2.5 Summary of the literature review	7
3. Theoretical framework	8
3.1 Sociocultural Theory: ZPD and Scaffolding	8
3.2 Technology Acceptance Model (TAM)	9
4. Method	11
4.1 Intervention study	11
4.2 Materials and Instruments	12
4.3 Participants	12
4.4 Data Collection	14
4.4.1 Questionnaire	14
4.4.2 Workshop	14
4.4.3 Group interview	15
4.5 Data analysis	16
4.5.1 Questionnaire data analysis	16
4.5.2 Interview data analysis	16
4.6 Research ethics	17
4.6.1 Informed consent	17
4.6.2 Data storage and access	17
5. Findings	17
5.1 Questionnaire results	17
5.1.1 The use of AI tools for studying	17
5.1.2 Familiarity and use of prompting techniques	18
5.2 Interview results	19
5.2.1 Prompting as a learning process	20
5.2.2 Varying quality and usefulness of feedback across prompting techniques	21
5.2.3 Reflections on the limitations of AI's feedback and trust issues	24

6. Discussion	25
6.1 Prompting as a learning process	26
6.2 Varying quality and usefulness of feedback across prompting techniques	27
6.3 Reflections on the limitations of AI's feedback and trust issues	28
6.4 Limitations and future research	29
7. Conclusion	30
References	31
Appendix 1. Prewritten essay	35
Appendix 2. Questionnaire	36
Appendix 3. Interview guide	37
Appendix 4. Informed consent	38

1. Introduction

The rapid advancement of artificial intelligence (AI) has brought significant changes to our daily lives. It has also influenced higher education, especially the way students study today, using technology for support and assistance. Various AI-powered tools have become increasingly popular for assisting with studying, and academic writing in particular. Chatbots such as ChatGPT are especially distinctive. Based on large language models (LLMs), these tools can generate content, suggest revisions, and provide feedback on different aspects of text, from grammar to argumentation. The possibility to engage with such tools through dialogical communication makes them easy and intuitive to use. As their use expands, understanding how students engage with AI in educational contexts becomes increasingly important - not only to evaluate the effectiveness of such tools but also to examine how they influence learning processes and the development of academic skills

Feedback has long been recognised as a crucial component of learning (Panadero, 2023). It helps students reflect on their work, identify areas for improvement, and develop a deeper understanding of the subject matter. As highlighted by Hattie and Timperley (2007), effective feedback supports learning and plays a crucial role in fostering self-regulation and independent learning. Studies suggest that AI can offer immediate, accessible feedback that helps students revise and improve their work (Dai et al., 2023; Mahapatra, 2024). This is especially helpful in large classroom settings where individualized feedback from human educators is often limited (Mahapatra, 2024). With tools like ChatGPT now able to provide real-time suggestions and commentary, students increasingly turn to AI for support in their academic writing.

Despite the growing presence of generative AI tools in higher education, scholarly debate continues regarding the nature and quality of the feedback these tools provide. Existing research points to challenges associated with using AI in writing-related tasks. Concerns have been raised about the reliability of AI-generated content, including its tendency to produce vague or overly general suggestions, factual inaccuracies, and biased perspectives (Coeckelbergh, 2022; Dwivedi et al., 2023; Kendrick, 2023). These concerns highlight the need for a more critical understanding of how students interact with AI tools and how they evaluate the feedback they receive.

As students are exposed to both the benefits and limitations of AI tools, there is a growing need for skills in communication with AI and navigating its outputs, so that collaboration with these tools becomes both effective and ethical. This connects to the importance of AI literacy, which includes not only technical ability but also critical awareness of how AI tools work, what their limitations are, and how to use them responsibly in academic settings (Walter, 2024). Communication skills in this context refer to the ability to craft clear and sophisticated prompts, as these significantly influence the relevance, depth, and quality of AI-generated responses (Hwang et al., 2024; Kim et al., 2025; Knoth et al., 2024). As noted by Zamfirescu-Pereira et al. (2023), users often rely on intuitive prompting methods that reflect everyday human communication patterns. They point out that such strategies, while natural, can sometimes be ineffective, especially when users lack a clear understanding of how LLMs interpret prompts. They stress the importance of training in effective prompting techniques, addressing LLMs appropriately, and correctly interpreting their outputs. Recent literature has identified various prompting strategies and techniques that can enhance engagement with generative AI tools (Fagbohun et al., 2024; Walter, 2024). These strategies differ based on goals and task relevance, varying in complexity and function - from providing examples or assigning roles to encouraging step-by-step reasoning.

However, there is limited research on how students experience these different approaches, especially in the context of academic writing and feedback. Prompt literacy, or the ability to formulate effective prompts to elicit meaningful responses from AI (Fagbohun et al., 2024; Walter, 2024), is still an emerging area of inquiry. It remains unclear how students learn to prompt effectively, how they

perceive the value of different prompting techniques, and how these experiences shape their engagement with AI tools as part of their academic practice. As these tools are used to supplement or even replace traditional feedback from teachers or peers, it becomes important to examine how students experience this kind of support and whether the feedback they receive is meaningful, relevant, and supports students' development as independent and reflective learners.

1.1 Research aim

By focusing on students' perspectives, the research aims to shed light on how prompting techniques influence the quality of feedback they receive, how they interpret and act upon that feedback, and how they assess the usefulness and trustworthiness of the AI tool. In doing so, this thesis contributes to ongoing discussions around AI literacy, the role of prompt design in shaping learning experiences, and the evolving relationship between students and AI in higher education.

Given that AI literacy and prompt literacy are still emerging fields, further research is needed to explore how students can best leverage AI for academic support. Therefore, the primary aim of this thesis is to examine how AI-generated feedback on student writing changes when applying different prompting techniques. Additionally, it seeks to identify which approach students perceive to be the most effective for receiving useful, high-quality feedback.

1.2 Research questions

In order to reach the aim of this research, two research questions were formulated and will be examined in this paper:

1. How do students perceive AI-generated feedback on academic writing across different prompting techniques?
2. Which prompting technique do students perceive as the most effective for generating helpful, high-quality feedback on academic writing?

The overall structure of this thesis consists of the literature review, theoretical framework, methodology, findings, and finally, discussion and conclusion. The first two chapters provide an overview of existing research on generative AI in education, with a particular focus on feedback, prompt literacy, and student engagement with AI tools. They also outline the theoretical framework that guides this study, drawing on sociocultural theory and the Technology Acceptance Model. The third chapter explains the methodological approach of this study. This is followed by a chapter presenting the findings, based on students' reflections on their experiences with different prompting techniques. The final chapter discusses the implications of these findings, highlights the study's limitations, and suggests directions for future research.

2. Literature review

For this thesis, a comprehensive literature review was conducted to explore previous research on the use of AI tools in educational contexts, AI and prompt literacy, and the application of prompting techniques. The literature search was carried out using Google Scholar and the database of Gothenburg University Library, with keywords such as "prompt literacy", "generative AI", and "prompting techniques". The purpose of this chapter is to provide an overview of existing research on the topic and identify possible gaps in the literature.

2.1 AI in higher education

Artificial intelligence (AI) used in many different domains today, and education is no exception. AI has great potential to transform education and change the traditional perceptions of learning and teaching (Adiguzel et al., 2023; Spasić & Janković, 2023). Different studies show AI's positive impact on students' learning process and outcomes - from enhanced engagement, motivation and inclusivity (Mahapatra, 2024; Xia et al., 2022) to improvements in academic performance through the aid of AI technologies (Khan et al., 2021; Kim et al., 2021).

However, the use of AI tools has been extensively discussed among educators and researchers due to its ethical issues. The main concern is that students can use AI as a tool for cheating on their assignments and exams. Such misuse is hard to detect, as although there are AI tools that claim the ability to detect AI-generated text, their effectiveness has not been proven (Dwivedi et al., 2023). Furthermore, there are such concerns as biases in AI responses, which originate both from training data and developers (Coechelbergh, 2022), lack of transparency in AI decision-making (Dwivedi et al., 2023), generation of fabricated information, when AI points to fake citations or refers to non-existent journal articles, books, or authors (Kendrick, 2023). All this can lead to misuse of AI systems and misunderstanding of their outputs, even unintentionally. Walter (2024) highlights that often students simply do not know how to introduce AI tools into their learning process and academic writing smartly and responsibly. Lack of knowledge about the possibilities and limitations of AI, same as a basic understanding of how AI algorithms work and where the generated information comes from, can be the main reason for the misuse of those tools by students and their ineffectiveness. Therefore, all this leads to an increased importance of acquiring knowledge and skills for the application of AI in learning, adopting critical thinking, and the ability to analyze and evaluate AI responses.

For the purposes of this paper, it is essential to establish a clear understanding of what is meant by artificial intelligence (AI). There is no single definition of AI, as interpretations often vary depending on the context and the specific uses of AI (Holmes & Tuomi, 2022). Popenici and Kerr (2017, p. 2) define *AI* as “computing systems that are able to engage in human-like processes such as learning, adapting, synthesizing, self-correction, and the use of data for complex processing tasks”. The authors developed this definition to analyze the impact of AI on teaching and learning in higher education, drawing on a literature review of previous definitions in the field. Given that this work is in the same domain, this definition will be adopted in this paper.

There are vast amounts of different AI tools on the market today. Some of them have been widely used by university students for their engagement in academic communication. Ou et al. (2024, p. 1) highlight a group of *AI-powered language tools (AILTs)* - “software programmes/applications that use AI methods to analyse or generate human language, including but not limited to writing assistants, machine translators, speech-to-text transcribers, and text generators (chatbots)”. AILTs complete these tasks with the help of large language models (LLMs). LLMs are focused on natural language processing (NLP), which means they can understand and process human language and perform different NLP tasks, such as translation, text analysis, essay scoring, and writing enhancement (Spasić & Janković, 2023). That makes LLM-based tools helpful for studying, in particular, language learning (Dillon, 2024) and academic writing (Mahapatra, 2024).

However, different AILTs use NLP in distinct ways. Writing assistants, such as Grammarly, do not create new content. Instead, they focus on existing text created by users, employing NLP for tasks like writing evaluation, automated essay scoring, and providing corrective feedback (Nazari et al., 2021). In contrast, chatbots like ChatGPT use NLP to recognize and analyze user prompts, generating human-like responses (Hwang et al., 2023; Spasić & Janković, 2023). Ou et al. (2024) raise concerns about the use of GPT-based chatbots in relation to academic integrity, noting that these tools incorporate generative AI and possess a degree of independent “cognitive capacity”. This corresponds with the implications of AI mentioned earlier.

2.2 Feedback

Research shows that feedback is essential for student learning, impacting motivation, self-regulation, and overall academic performance (Hattie & Timperley, 2007; Wisniewski et al., 2020). Hattie and Timperley (2007) highlight that feedback can have both positive and negative effects, depending on the feedback provider's ability to deliver effective guidance and the student's ability to understand and use that feedback to achieve their learning goals. According to the authors, for feedback to be effective, it must be clear, purposeful, meaningful, and aligned with students' prior knowledge, establishing logical connections.

Other researchers provide additional insights into effective feedback. Panadero (2023) argues that effective feedback is not just about correcting mistakes; it should also help students understand their progress, refine their learning strategies, and be personalized, as a "one size fits all" approach tends to be ineffective. Mandouit and Hattie (2023) assert that high-quality feedback should be specific, timely, and actionable, enabling students to close the gap between their current performance and their learning goals.

Conversely, vague or overly critical feedback can lead to confusion, disengagement, and reduced confidence (Laudel & Narciss, 2023). Hattie and Timperley (2007) note that certain types of feedback, such as personal comments, often fail to improve learning outcomes. Feedback that is too general, like "Good job!" or characterizes a person, such as "Good girl!", typically lacks task-related information and does not foster greater engagement, commitment to learning goals, enhanced self-efficacy, or a deeper understanding of the task (Hattie & Timperley, 2007).

Studies indicate that the new technological advancements allow AILTs to provide their users with high-quality feedback on their performance. For instance, Dai et al. (2023) explored ChatGPT's ability to provide formative feedback on students' open-ended assignments. The study involved undergraduate students from a university in China, who submitted assignments that were subsequently evaluated by both ChatGPT and human instructors. The researchers collected data by comparing the feedback generated by ChatGPT with that provided by human instructors, focusing on aspects such as detail, coherence, and alignment with best practices in educational assessment. They employed qualitative content analysis to assess the nature and quality of the feedback, and statistical methods to evaluate differences and similarities between AI-generated and human feedback. The findings indicated that ChatGPT is capable of generating more detailed and coherent feedback that effectively summarizes students' performance than human instructors.

Another study, conducted by Mahapatra (2024), shows that ChatGPT can provide students with valuable personalized and substantial feedback on their writing. The research focused on the impact of ChatGPT as a formative feedback tool for the academic writing skills of undergraduate English as a Second Language (ESL) students. Using a mixed-methods intervention design, the study involved tertiary-level ESL students enrolled in an intensive academic writing course. Data collection included three writing tests and three focus group discussions to assess both the quantitative improvements in writing skills and the qualitative perceptions of the students regarding the usefulness of ChatGPT. The findings indicated a significant positive effect of ChatGPT on students' academic writing. Participants reported that ChatGPT delivered timely, detailed, and personalized feedback, which was crucial for enhancing their writing proficiency. The chatbot's ability to provide immediate assistance was especially advantageous in large classroom settings, where individualized feedback from instructors is often limited. The study suggests that, with proper training, ChatGPT can effectively serve as a feedback tool, which can help students achieve their learning goals.

Hence, the studies reveal the ability of generative AI tools to provide feedback on students' performance and even exceed human educators in the quality and detail of this feedback, ultimately supporting students' learning.

2.3 AI literacy

According to Gattupalli et al. (2023), the rapid development of AI technologies and their introduction into education not only transform our perception of the education process but also change the notion of literacy, of skills required to navigate and successfully use these technologies. To harness the potential of AI for education, more than simple adoption of a new technology is needed. The challenges should be addressed complexly, with special attention to *AI literacy*. AI literacy, as defined by Ng et al. (2021), encompasses the ability to understand, use, evaluate, and create with AI technologies, while also considering the ethical implications of their use. It builds on the foundations of digital literacy by extending traditional competencies, such as critical evaluation and responsible use of digital tools, to include an understanding of how AI systems function and affect society (Ng et al., 2021). Walter (2024) also points out the importance of acquiring AI literacy as a complex of technical skills, critical thinking, awareness about the implications of AI, and practical knowledge that enables individuals to understand, effectively interact with, and navigate AI technologies in various aspects of life and work.

2.3.1 Prompt literacy

One of the key AI literacy skills is the ability to communicate with AI in a way that enables getting the desired response (Walter, 2024). Chatbots operate in a dialogical form with users; they do not simply send and receive information but engage in dynamic interaction and collaboration (Hwang et al., 2024). Communication with chatbots occurs through *prompts* - text or information entered into generative AI models - that allow the AI to understand the variables and produce appropriate outputs (Hwang et al., 2023). Multiple studies have shown that the clearer and more sophisticated the user's prompts are, the better the communication experience with the AI (Hwang et al., 2024; Kim et al., 2025; Knoth et al., 2024); while poorly constructed prompts can lead to irrelevant feedback, missing valuable learning and revision opportunities (Hwang et al., 2024). Particularly, Zamfrescu-Pereira et al.'s (2023) study with professionals and graduate students in STEM-related fields, who, however, had no experience in prompt design, demonstrates that non-experts often rely on intuition and opportunistic trial-and-error methods rather than systematic strategies when designing prompts. Participants were asked to create prompts using *BotDesigner* to instruct a chatbot to perform various tasks. The data was collected through screen recordings, think-aloud protocols, and post-task interviews. The findings showed that participants often struggled with formulating effective prompts, relying on intuition rather than systematic strategies. They frequently misunderstood how the chatbot interpreted input, leading to ineffective or unintended outputs. Such an approach can lead to struggles in AI use, as participants' expectations, shaped by human-to-human communication norms, do not align with the precise and structured input required by LLMs. As a result, poorly constructed or inappropriate prompts may yield outputs that are irrelevant, misleading, or fail to meet the user's expectations.

Chen et al. (2024) and Zamfrescu-Pereira et al. (2023) emphasize the importance of training or coaching in prompting to enhance the quality and outcomes of using AI. Ultimately, the focus is on developing the essential skills required for crafting effective prompts. Several concepts related to acquiring these skills are often used in the literature: *prompt literacy*, *prompt engineering*, *prompt design*, and what has been termed "*promptgramming*" by Gattupalli (2024). All of them are seen as a part of AI literacy (Gattupalli, 2024; Hwang et al., 2023; Kim et al., 2025; Walter, 2024) and are associated with the ability to communicate with AI, specifically crafting inputs for LLMs to receive specific responses or behaviors from them (Fagbohun et al., 2024; Walter, 2024). The terms prompt engineering, prompt design, and prompt programming are often used as synonyms for prompting (Hwang et al., 2024; Knoth et al., 2024). Gattupalli (2024) uses the term "promptgramming" as short for prompt programming, which makes it another synonym for prompting.

Prompt literacy is usually seen as a broader concept than simply prompting. Thus, Gattupalli et al. (2023) and Hwang et al. (2023) argue that prompt literacy extends beyond merely providing initial input; it involves assessing the accuracy of the results generated by AI and continuously refining the

prompt until the desired information is achieved. Additionally, prompt literacy encompasses all actions taken to generate the desired output by integrating various forms of information from different generative AI programs. However, Federiakin et al. (2024, p. 6) propose a different relation between prompt literacy and prompt engineering. They describe prompt engineering as “a composite multidimensional skill consisting of four skills intertwining in the practice of using an LLM”, where prompt literacy is one of those four skills and means the ability to formulate one’s problem clearly. Nevertheless, despite the differences in theoretical categorization of prompt literacy, its meaning refers to the ability to communicate with AI, and the current study aligns with Hwang et al.’s (2023) perspective where prompt literacy is seen as a part of a broader discipline - AI literacy.

2.4 Prompting techniques

There are various approaches to designing effective prompts that guide generative AI tools in producing desired outputs for specific tasks or goals. These approaches are commonly referred to as prompting techniques (Fagbohun et al., 2024) or prompting strategies (Bashardoust et al., 2024). Currently, a wide range of prompting techniques exists, differing based on various criteria. For example, Fagbohun et al. (2024) have proposed a categorization of prompting techniques based on their purposes and approaches. The authors argue that this categorization encompasses the most popular and contemporary techniques and serves as a valuable guide for practitioners and researchers when interacting with AI tools that operate using LLMs. This categorization is illustrated in the following table (Table 1), which also includes descriptions and example techniques for each category.

Table 1. Categorization of prompting techniques

Category	Description	Representative Techniques
Logical and Sequential Processing	Breaks down reasoning into clear steps to solve complex problems.	Chain-of-Thought (CoT), Tree-of-Thoughts (ToT), Graph-of-Thoughts (GoT), Skeleton-of-Thought (SoT)
Contextual Understanding and Memory	Maintains coherence by referencing earlier parts of a conversation or task.	In-Context Prompting, Multi-Personas Prompting, Conversational Prompting, and Socratic Prompting
Specificity and Targeting	Focuses responses on a precise goal, topic, or information type.	Show-me versus Tell-me Prompting, Target-your-response (TAR)
Meta-Cognition and Self-Reflection	Encourages the model to evaluate or improve its own response.	Prompting, Prompt Macros, End-goal Planning, Contrastive Prompting
		Self-reflection Prompting, Meta-Prompting, Anticipatory Prompting, Prompt to Code

Directional and Feedback	Guides output or improves performance through task instructions or corrections.	Responsive Feedback Prompting, Directional Stimulus Prompting, and Ambiguous Prompting.
Multimodal and Cross-Disciplinary	Uses inputs or knowledge from multiple domains or formats.	Multimodal Prompting, Cross-disciplinary Prompting, Historical Context, Visual, and Modular Prompting
Creative and Generative	Encourage LLMs to produce creative, engaging, and exploratory content for tasks like storytelling, education, and creative writing.	Flipped Interaction Prompting, Grammar Correction, Constrained Vocabulary Prompting

Note. Adapted from Fagbohun et al. (2024).

While Fagbohun et al. (2024) promote the use of particular techniques for particular tasks and purposes, there are also alternative approaches to prompting. Arora et al. (2022) argue that instead of utilizing different single techniques, it would be more effective to combine or aggregate multiple prompts into one. Another study by Reynolds and McDonnell (2021) shows that more complex prompts that include few examples of how to perform a task, often referred to as few-shot prompts, can confuse LLMs or narrow their interpretation of the task, which can hinder the accuracy of outputs. Therefore, simple prompts (zero-shot) that are customized to the context can often yield better results.

2.5 Summary of the literature review

The literature review examines the intersection of generative AI and higher education, focusing on how the application of this technology is reshaping learning practices. It explores the increasing presence of AI-powered tools in higher education, with particular attention to their dual role as writing assistants and sources of formative feedback. While these tools offer support for tasks such as idea generation, structuring, and surface-level revision, current research also identifies significant limitations related to accuracy, depth, and contextual understanding. These concerns highlight the importance of developing critical engagement strategies when using AI tools in academic contexts.

A central focus of the review is the role of feedback in learning and writing development. Feedback is seen as an important part of the learning process that can enhance student learning outcomes, motivation, and self-regulation. Recent research suggests that LLMs, such as ChatGPT, could become an additional source of feedback on students' writing, as they have the potential to provide meaningful and helpful feedback.

The review also addresses broader limitations of AI tools. Concerns include the potential for reinforcing biases, oversimplifying complex tasks, and fostering overreliance on automation. These challenges underscore the need for AI literacy, defined as the ability to critically and ethically engage with AI tools. Developing such literacy involves not only understanding how AI systems work, but also recognising their limitations and fostering critical thinking in order to effectively interact with and navigate AI technologies.

Closely related to AI literacy is the emerging concept of prompt literacy. Researchers suggest that the quality of AI outputs is significantly influenced by the way users formulate their inputs. Therefore, prompt literacy involves the skills needed to design effective, purposeful prompts that would lead to

desired outputs. The literature defines various strategies and techniques that could improve interaction with generative AI tools.

Considering this literature review, the research questions of the study are particularly relevant. By examining how students perceive AI-generated feedback, the study enhances the understanding of AI's effectiveness as a writing assistant. Additionally, exploring students' views on various prompting techniques provides valuable insights into the acceptance and practical application of these techniques. Together, these inquiries align with the literature's emphasis on the responsible and effective integration of AI in education.

3. Theoretical framework

This study is grounded in two theoretical perspectives that help explain how students interact with and evaluate AI-generated feedback in academic writing: Sociocultural Theory, particularly Scaffolding and the Zone of Proximal Development, and the Technology Acceptance Model (TAM). These frameworks complement each other, as one offers a learning-oriented lens to understand how AI can support students' writing development, and the other helps to understand perceptions of usefulness and usability of prompting techniques. Together, they offer a lens for interpreting how different prompting techniques shape students' experiences with generative AI tools.

3.1 Sociocultural Theory: ZPD and Scaffolding

Sociocultural theory emphasizes the importance of social and cultural contexts in the learning process. According to Vygotsky (1978), cognitive development does not occur only internally, in isolation, but is fundamentally shaped by the environment and interactions with others. Development is seen as the "transformation of socially shared activities into internalized processes" (John-Steiner & Mahn, 1996, p. 192). In these shared activities, learners engage with *more knowledgeable others* - individuals who possess greater skill or experience in a given task - until they are able to perform the task independently (Gibbons, 2015). Participating in group activities with different people allows learners to integrate various ideas and perspectives into their own understanding. Through collaboration, they develop effective strategies and acquire essential knowledge that enhances their learning experience (John-Steiner & Mahn, 1996).

In traditional educational settings, support or guidance in performing academic tasks usually comes from educators or peers. In this study, it is proposed that AI tools can play the role of a more knowledgeable assistant, helping students navigate academic writing challenges by providing feedback. Building on research in human-computer interaction, Kim et al. (2025) argue that AI differs from traditional technologies because it enables more autonomous and personalized interaction in a human-like manner. This shifts the perception of AI from being a passive tool to functioning more like a teammate or assistant, whose collaboration can potentially benefit students' learning (Cress & Kimmerle, 2023).

Learning, according to Vygotsky (1978), occurs in the *zone of proximal development (ZPD)*, which refers to the gap between what a learner can do independently and what they can achieve with assistance (Vygotsky, 1978). The aim of this guidance is not simply to teach a learner what to do or think, but to develop their ability to apply knowledge across different situations (Gibbons, 2015). It includes developing cognitive skills, such as reasoning, problem-solving, and transferring knowledge, so learners can engage thoughtfully with new challenges further without help.

This support can be further understood through the concept of *scaffolding*. Although Vygotsky did not use this term himself, the idea was later introduced by Wood, Bruner, and Ross (1976) to describe the

temporary support provided to learners, which is gradually removed as learners gain independence. Scaffolding includes providing feedback, breaking tasks into manageable components, or directing attention to key features of a task (Gibbons, 2015). Within this framework, AI feedback acts as a scaffold that can help students improve their writing by addressing challenges they may not be able to identify or resolve alone.

In sociocultural theory, a learner's interaction with the environment and with others is *mediated by cultural tools*. These tools help acquire knowledge, allowing internalization of information received from social interaction. Mediation tools can be mental, such as language, numbers, and symbols; and physical, such as a pen, book, or computer (John-Steiner and Mahn, 1996). Some researchers (Wells, 1999; Lantolf, 2006; Mitchell et al., 2019) view language as the central tool for learning. Particularly through language, we engage and communicate with the outer world, but also use it as a mental tool, for instance, for meaning-making, articulating a problem or developing a step-by-step solution for it (Mitchel et al., 2019). Additionally, Mitchell et al. (2019) highlight that the perception of language artifacts changes over time, shaping, to some extent, our thinking. Thus, today language is used not only for face-to-face communication, reading books, or writing, etc., but also for texting messages, creating posts on social media, or, in the context of this research, writing prompts to interact with AI.

Building on this, prompts can be viewed as cultural tools that mediate the communication between students and AI. Through prompting, students engage in a form of dialogue with the AI, articulating needs, questions, or goals, and receiving tailored feedback in response. The structure and clarity of prompts directly influence the relevance and usefulness of the feedback received. Thus, prompting becomes central in shaping the quality of the AI-assisted learning experience.

In this study, prompting techniques are seen as strategic ways of using prompts that influence the level and quality of support that AI can provide. These techniques can vary in specificity, complexity, or framing, and they shape both the type of feedback generated and its alignment with the student's current learning needs. From a sociocultural perspective, prompting techniques function like scaffolding tools: they help determine the extent to which the AI can act as a more knowledgeable assistant and support learning within the student's ZPD. Since students come from diverse backgrounds with varying levels of AI and prompt literacy, sociocultural theory also provides a valuable lens for analyzing how they perceive and engage with AI-generated feedback.

In summary, sociocultural theory provides a useful lens for this study by framing AI not as a passive tool, but as an interactive assistant that aids students' academic writing through mediated dialogue. In this view, prompts function as a form of language and thus as cultural tools that mediate communication between the student and the AI. Prompting techniques, in turn, are viewed as strategic uses of these tools that can influence the quality and relevance of the feedback received. Additionally, sociocultural theory emphasizes the importance of context, including learners' backgrounds, prior experiences, and levels of AI and prompt literacy. This makes it particularly valuable for analyzing how students perceive and engage with AI-generated feedback.

3.2 Technology Acceptance Model (TAM)

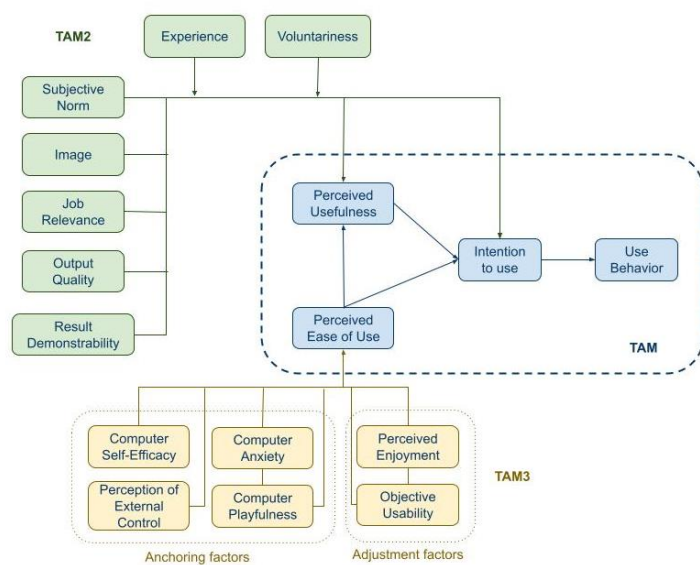
To complement this learning-focused lens, the Technology Acceptance Model (TAM) offers a way to understand how students evaluate their experiences with different prompting techniques. Originally, TAM was developed by Davis (1986) and aimed to improve understanding of the process of users' acceptance of computer-based information systems. TAM suggests that a user's *intention to use* that leads to decision to adopt a technology is largely based on two factors: *perceived usefulness* (PU) and *perceived ease of use* (PEOU). Davis (1989) describes PU as referring to how much a user believes that a technology helps them perform better, while PEOU reflects how easy they think it is to use. Davis (1989) also proposed that the easier a technology is to use (PEOU), the more useful (PU) it is perceived to be.

TAM was later extended to TAM2 by Venkatech and Davis (2000) and TAM3 by Venkatesh and Bala (2008). TAM2 expands the original TAM by adding social and cognitive factors to better explain PU and intention to use a technology, especially in organizational or task-oriented contexts (Venkatesh & Davis, 2000). Venkatech and Davis (2000) suggest two categories of factors that influence PU: (1) social influence processes (*subjective norm, voluntariness, and image*) and (2) cognitive instrumental processes (*job or task relevance, output quality, result demonstrability, and perceived ease of use*). They also view that the *experience* of use moderates the influence of social processes on PU: the more experience a user has with the system, the less significant social influence is on their behavior.

TAM3 integrates elements from TAM and TAM2 (Venkatesh & Bala, 2008). While TAM2 focuses on PU and its determinants, TAM3 brings a comprehensive framework that simultaneously explains both PU and PEOU, including how users form these perceptions through experience, social influence, and personal traits.

Venkatesh and Bala (2008) suggest six factors that influence perceived ease of use: *computer self-efficacy, perception of external control, computer anxiety, computer playfulness, perceived enjoyment, and objective usability*. These six factors are categorized into *anchoring factors*, which shape users' initial expectations before using the system, and *adjustment factors*, which are formed through direct interaction and experience with the system. This distinction highlights how both prior beliefs and hands-on engagement influence how easy a technology is perceived to be.

Figure 1. Technology Acceptance Model and its extensions (Davis, 1986; Venkatesh & Davis, 2000; Venkatesh & Bala, 2008)



TAM3 is particularly relevant to this study because it captures both the users' prior attitudes (e.g., confidence in using AI tools) and the experiential aspects (e.g., enjoyment and usability of prompts), which are critical for understanding students' engagement with various prompting strategies. For instance, a student with high computer self-efficacy may be more willing to experiment with advanced prompting techniques, while one with higher computer anxiety might prefer simpler, more familiar prompts. Likewise, perceived enjoyment may play a role in students' continued use of certain techniques that make the AI interaction feel more engaging or rewarding.

In this study, TAM is not applied to the AI system as a whole, but more specifically to the prompting techniques students use to interact with it. While TAM is traditionally applied to entire systems, this study considers prompting techniques as distinct interaction strategies within the AI system. These techniques shape the perceived value and usability of the AI's feedback, making them suitable subjects for TAM-based evaluation. Each technique represents a different way of engaging with the technology. Students might find some prompts more intuitive, or they might think that certain prompts produce clearer or more relevant feedback. These judgments relate directly to TAM's core ideas: some prompting techniques may feel more useful, others more effortful, and these perceptions are likely to shape which techniques students are willing to use again in the future.

To summarize, TAM and its extensions offer a nuanced framework for understanding how students form perceptions of different prompting techniques by integrating both social and cognitive dimensions of technology use. By examining perceived usefulness and perceived ease of use together with the factors that shape them, this model helps explain how students evaluate and potentially adopt prompting strategies when engaging with AI tools in academic writing. Combined with the sociocultural perspective, which emphasizes the role of tools, language, and context in learning, TAM3 contributes a complementary lens that focuses on students' evaluative judgments and decision-making processes.

4. Method

To answer the research questions, this study adopts an interpretative position employing a within-subjects interventional research design. It aims to explore how students perceive AI-generated feedback on their writing across different prompting techniques.

Following an interpretivist view, this study employs a mixed-methods approach. According to Clark et al. (2021), both qualitative and quantitative methods have their strengths and complement each other when used within one research design. Qualitative research, according to Clark et al. (2021), aims to create a deep understanding of a phenomenon based, among other things, on individuals' interactions and perceptions of things. Cohen et al. (2011) emphasize that the qualitative approach means seeing a situation through the eyes of participants, through their experiences. Quantitative methods allow for collecting numerical, generalizable data, which can serve as a benchmark in the research, as well as create a necessary context and complete the findings (Clark et al., 2021).

Building on this, a mixed-methods approach seems to be the most appropriate for this study. It allows the collection of qualitative data that includes student reflections gathered through interviews and offers deeper insights into how participants perceive and experience the feedback. It also enables understanding of differences in feedback from different prompts and which prompting technique leads to the highest-quality feedback. Quantitative data, collected through a questionnaire, provides valuable information about participants' backgrounds and experiences in AILTs usage. This information allows for creating a context for qualitative data gathered from interviews, ensuring a well-rounded and reliable exploration of the research questions.

4.1 Intervention study

This study implemented an intervention to answer the research questions that are aimed at exploring students' perceptions of utilizing an AILT for receiving feedback on their writing, using three different prompting techniques. Aggarwal & Ranganathan (2019) define intervention as a study where the researcher actively engages with participants' environment by introducing a deliberate change to observe how participants perceive and respond to those interventions. Additionally, the design of this study carries characteristics of a within-subjects design. Gravetter and Forzano (2018, p. 214) define it as one that "compares two or more different treatment conditions (or compares a treatment and a control) by observing or measuring the same group of individuals in all of the treatment conditions being compared". Thus, every participant is exposed to all experimental conditions, which allows for comparing how the same participants respond to different interventions, or examining how their behavior changes with the change of circumstances (Charness et al., 2012).

In the context of this work, the interventions are the prompting techniques that students are invited to test during a workshop. Participants are supposed to follow the researcher's directions, which is different from a simple observation of participants naturally using AILT. Participants were asked to perform the same task - to receive feedback from a chatbot on their writing using the same prompting

techniques, one technique at a time. The effect of the interventions was then examined based on the participants' perceptions collected through interviews (the procedure is described in [Data collection](#)).

The chosen design is beneficial, as by having each participant experience all conditions, it allows for decreasing inter-subject variability, eliminating differences in individual characteristics that could otherwise confound comparisons between conditions, and enables detection of effects with a smaller sample size (Charness et al., 2012). However, within-subject design carries certain risks for biases. Apart from environmental variables, such as time of a day when participants were tested, events in their lives, etc., Gravetter and Forzano (2018) highlight so-called order effects, which include practice, fatigue, and carry-over effects. These effects can be present when, in a series of conditions, participation in one condition may influence participants' behavior in the following conditions. As the authors argue, short time of the whole testing period as well as breaks between conditions can increase the risk of order effects presence. Nevertheless, the potential risks were recognized and will be considered in the limitations of this study.

4.2 Materials and Instruments

To examine AI's feedback on students' writing, this study employed the general-purpose chatbot ChatGPT-4o, which is a product of the US company OpenAI. For this study, the participants were not required to buy any subscription or sign up with OpenAI to use the chatbot.

ChatGPT allows for communication in a dialogical form. As it was mentioned before, it reacts to users' prompts, generating responses. In order to receive feedback on their writing from it, participants were required to include an essay in their prompts to ChatGPT. Participants were provided with a short pre-written essay (Appendix 1). The essay was generated by ChatGPT-4o and was a response to the following prompt: "Generate a short argumentative essay on a random topic, as if you were a master's student and this essay was an assignment you needed to submit. Include references."

4.3 Participants

As this study aims to explore students' utilization of AILTs for studying, the participants were recruited among students of one of the universities in Sweden based on their desire to participate in the study. Originally, the study aimed to recruit first- and second-year master's students who studied an international program focused on the application of technologies in education. As the program does not require any specific educational or professional experience, the students have varied academic and professional backgrounds, as well as varied levels of skills in communication with AI. Moreover, the program is available for students from different countries. This allows for capturing a broad spectrum of insights and experiences. As the number of individuals who agreed to participate was lower than expected, the option of recruiting students from other programs was considered. This would also bring even more variety in backgrounds, knowledge and skills, and therefore would provide more comprehensive outcomes.

The invitation to participate in the study was distributed through students' group chat on the messenger WhatsApp and a learning management system that the university uses. In total, 11 students participated in the study: 9 second-year and 1 first-year master's students who studied the application of technologies in education, and 1 third-year bachelor's student from a program focused on social work. There were 9 females and 2 males among the participants. The following table provides an overview of the participants' demographic information, focus of their studying at the moment the research was conducted, the area of their previous academic and professional background, and self-assessed level of AI skills (from no experience to advanced).

Table 2. Information about the participants

Id	Age	Country of origin	Focus of current program	Current position if employed	Area of previous academic or professional background	Self-assessed level of experience with AI tools
P1	29	Vietnam	The application of technologies in education	-	Support online learning by creating content, materials, and instruction	Intermediate
P2	29	Sweden	The application of technologies in education	Systemadmin/IT-teacher	System science with a focus on business development	Advanced
P3	41	China	The application of technologies in education	-	EdTech with focus on marketing	Beginner
P4	25	Czech Republic	The application of technologies in education	Piano teacher	Bachelor's in Adult Education and Personnel Management; manager assistant	Advanced
P5	33	USA	The application of technologies in education	-	Social issues/education	Intermediate
P6	30	Italy	The application of technologies in education	-	Administration	Intermediate
P7	32	Thailand	The application of technologies in education	Teacher	Primary school teacher	Intermediate
P8	26	Austria	The application of technologies in education	Learning experience designer	Educational science & communication	Intermediate
P9	26	Sweden	The application of technologies in education	-	Bachelor's in Cognitive Neuroscience	Intermediate
P10	30	India	The application of technologies in education	-	Civil engineering	Advanced
P11	25	Sweden	Social work	Social worker	Civil engineering in automation and mechatronics	Intermediate

As it is seen from *Table 2*, the sample includes a relatively wide range of ages, geographical locations, and backgrounds. All participants previously had experience with AI tools, and most of them rated their skills quite positively. It is important to note that since participants were asked to self-assess their level of experience with AI tools, this measure is interpreted as a general indicator of their familiarity and perceived comfort with such tools, rather than as a validated or objective assessment of AI-related skills. All of them also responded that they used AI tools for studying, particularly for writing assistance. Some of them used chatbots to provide feedback on their writing. When asked about the utilization of prompting techniques, most participants responded that they are familiar with prompting techniques, and some of them use particular techniques or self-developed strategies of communication with AI. Among the products students used were ChatGPT, Copilot, Gemini, Grammarly, Claude, and others. Given participants' interest and experience in the use of AI as an aid in studying, their

responses would provide valuable insights into the use of AI as a source of feedback on students' writing.

4.4 Data Collection

The process of data collection included collecting responses to the questionnaire, arranging a workshop, and conducting semi-structured group interviews after it. Data collection was organized over two sessions based on participants' availability. Participants 1-6 attended the workshop and interview during the first session, while participants 7-11 participated in the workshop and interview via video call in the second session. Each step of data collection is described below.

4.4.1 Questionnaire

To collect necessary information about participants, a questionnaire was developed and distributed among those willing to participate. Participants were asked to fill in the questionnaire one day before the workshop, and the interview took place. The questionnaire was created with the help of Microsoft Forms. It included both closed- and open-ended questions and consisted of three sections of questions: *I. Demographic information* (included questions about age, country of origin, educational and/or professional background, self-assessed level of experience with AI tools); *II. Experience with AI tools for studying*, which aimed to investigate their experience of using AI tools for studying; *III. Awareness of prompting techniques*, which aimed to collect information about participants' level of awareness of different prompting techniques and examples of their prompts. The complete questionnaire can be found in Appendix 2.

4.4.2 Workshop

The workshop was organized to create an opportunity for participants to test prompting techniques in a controlled environment, where they were supposed to act according to the given instructions. Participants were asked to interact with ChatGPT in order to receive feedback on the provided short essay, using three different prompt techniques: zero-shot, roleplaying, and chain-of-thought. These particular techniques were chosen for several reasons, which are described below. In their prompts, they were supposed to paste the prewritten essay, completely or only its particular part they wanted feedback on. In addition to this essay, they wrote their requests in the prompts, using each of suggested techniques.

Participants received oral instructions with the description of each technique and examples from the researcher on how they could apply it. However, they were not provided with exact prompts; on the contrary - they were asked to interpret the techniques based on their personal understanding, not simply copying the given examples.

There were no strict time limits per technique. However, participants were asked not to build long conversations with the chatbot; instead, design one prompt per technique. An exception was roleplaying: participants could assign different roles to experience a variety of responses within one technique. Still, they were asked to use one prompt per assigned role.

Participants tested the techniques one by one, without discussing them or expressing their opinions in between. Instead, they were suggested to make notes, which could help them capture their thoughts and opinions and keep them for the interview part. This could help prevent some order effects mentioned before and facilitate more concrete perceptions of each technique.

Zero-shot prompting

There are two main ways of prompting LLMs: zero-shot and few-shot prompting (Walter, 2024). While few-shot prompts are more complex as they include a few examples of how to perform a task, zero-shot prompts are much simpler and more intuitive. They include only a description of the task (request to AI) without any specific examples or excessive instructions. This simplicity makes zero-shot prompting a commonly used approach, as it does not require in-depth knowledge about

prompting, allowing anyone to utilize it easily. Some studies (Walter, 2024; Hedlin et al., 2025) argue that standard simple prompts can lead to vague and general outputs. However, others (Reynolds & McDonnell, 2021; Kojima et al., 2023) assert that even straightforward prompts, if clear and specific, can yield satisfactory results.

Therefore, zero-shot prompting was selected for this study because it does not require prior knowledge of prompting techniques, making it accessible to all students regardless of their prompting skills. It also allows participants to formulate prompts in a way that feels natural to them, without being constrained by specific structures or strategies. Moreover, prior research (Reynolds & McDonnell, 2021; Kojima et al., 2023) suggests that in some cases, simple and direct prompts can be as effective as more complicated prompting methods.

Roleplaying

Role-play prompting is placed by Fagbohun et al. (2024) in the category Contextual Understanding and Memory (called Multi-persona prompting in Table 1), as it provides LLM with the context necessary for a particular task. As evident from the name, this technique allows for assigning different roles for AI. It can be a certain person or an expert in the relevant field. Such roleplaying proved to provide better results, making AI's output more specific and concrete (Walter, 2024).

This technique can be particularly useful in this study, as it enables students to assign roles such as a supervisor, teacher, or peer to the AI, allowing them to receive feedback from multiple perspectives. By framing the AI as a specific persona, students can better simulate real-life academic interactions, which may help them reflect on their writing from different angles.

Chain-of-Thought

Chain-of-thought (CoT) prompting has already been mentioned in the literature review, as it was among techniques categorized by Fagbohun et al. (2024). It is attributed to the category Logical and Sequential Processing, which means that the use of techniques from this category would encourage LLM to break down complex tasks into smaller, solvable steps (Fagbohun et al., 2024). CoT is one of the more advanced techniques. It causes AI to show its reasoning when performing more complex tasks, making it mimic step-by-step thinking or "think aloud" (Federiakin et al., 2024; Walter, 2024). CoT prompts can be both few- and zero-shot: in the first case prompt has to contain an example of multi-step reasoning, while in the other one, it is enough to add "Do it step by step" or a similar phrase to the prompt (Kojima et al., 2023; Walter, 2024).

This technique was selected for the current study because providing feedback on academic writing is a complex task that requires a step-by-step analysis and assessment from various perspectives. While straightforward prompts may yield broad and vague feedback, which is often unhelpful for students, CoT has the potential to facilitate more substantial and detailed feedback. Moreover, CoT is a popular technique, yet researchers often point to its effectiveness primarily in solving mathematical tasks (Wei et al., 2022; Kojima et al., 2023). Consequently, there is a lack of studies exploring the use of this technique for other tasks, particularly in writing assistance. The study by Hedlin et al. (2025) demonstrated CoT's potential effectiveness in processing academic texts, which inspired its adoption in the current research.

4.4.3 Group interview

After all participants finished the exercise with ChatGPT and expressed readiness to share their experiences, semi-structured group interviews were conducted to gather data on students' perceptions of the chatbot as a source of feedback, applying different prompting techniques. According to Clark et al. (2021), interviews in qualitative research can provide a researcher with a deeper understanding of what respondents think or feel about the issue studied. The authors define semi-structured and unstructured interviews, which are common for this kind of research. Semi-structured interviews are particularly useful for the current study because their open-ended questions facilitate detailed responses. Additionally, having a predefined list of questions adds structure to the interviewing

process and helps guide the discussion. Conducting interviews with participants in a group setting aimed to encourage group discussion and create an environment where one participant's comments could inspire others to share their thoughts or recall memories that might not have surfaced otherwise. Furthermore, since interviews can be quite time-consuming, including the design, the interviewing process itself, as well as transcription and analysis, group interviews appear to be a more time-efficient option.

As mentioned earlier, interviews were conducted in person with participants 1 - 6 during the first session, while participants 7 - 11 joined via video call for the second session. Both group interviews were recorded: the first session was captured through audio recording, and the second session was recorded on video. Participants who joined the interview via video call were encouraged to turn off their cameras if they preferred not to have their faces recorded.

Interview guide

The interview guide was developed to bring structure to the interviews and guide both the interviewer and respondents through the session. However, this structure was not strict. Clark et al. (2021) highlight that the main benefit of semi-structured interviews lies in their flexibility, as the interviewer does not have to follow the interview guide strictly - the order of questions can be changed, and the questions themselves can be formulated slightly differently depending on the direction and flow of the conversation. Also, including follow-up questions can help clarify answers to receive more precise and closely related responses to the studied issue. Therefore, the current interview guide included three themes, starting with the questions about general impressions from the feedback participants received during the workshop, then moving to comparing results from each prompting technique used, and ending with questions related to the practicality and future use of the tested techniques. The complete interview guide can be found in Appendix 3.

4.5 Data analysis

4.5.1 Questionnaire data analysis

The questionnaire was analyzed using a mixed-methods approach. Responses to closed-ended questions were summarized descriptively to capture general trends in participants' experiences, backgrounds, and attitudes. Open-ended responses were read closely and coded manually to identify recurring ideas, patterns, or noteworthy points. Given the relatively small sample size, the focus was on capturing the range and nuance of individual responses rather than generating generalizable categories. The insights gained from both types of responses were used to provide contextual background for interpreting the interview data.

4.5.2 Interview data analysis

The recorded interviews were transcribed manually by the researcher to ensure accuracy and gain a deeper understanding of the data. The transcriptions were read and reviewed multiple times to ensure consistency and to refine the accuracy of the textual representation. Initial interpretations were cross-checked with the original audio recordings to confirm that they reflected participants' intended meanings.

To analyze the data gathered from the interviews, Braun and Clarke's (2006) thematic analysis model was applied. More specifically, inductive thematic analysis was conducted, which means that the themes are developed based on found patterns in the data. It differs from deductive or theoretical analysis, where the data is supposed to fit into predefined themes. The literature review for this thesis was done continuously starting from the early stages of the research. Although Braun and Clarke (2006) argue that such engagement can influence the development of themes and is more common for deductive analysis, they still point out that researchers are always influenced by their theoretical and epistemological beliefs, and in some cases, engagement with the literature can improve analysis, allowing for finding nuanced details in the data. Braun and Clarke (2006) also define the stages of data

analysis: 1) familiarizing with the data; 2) developing codes; 3) searching for themes (by grouping related codes together to identify potential themes); 4) reviewing themes; 5) defining and naming themes; 6) producing the report (by conducting final analysis, linking findings to the research question and literature, selecting examples and compiling a report of the analysis). The stages of data analysis described by Braun and Clarke (2006) were implemented in the current study, and the results of this process are described in the next chapter, [Findings](#), structured around defined themes.

4.6 Research ethics

The current study was conducted with a thorough consideration of ethical concerns. Following GDPR guidelines, special attention was paid to developing informed consent, secure storage of the collected data and respecting privacy of the participants.

4.6.1 Informed consent

Informed consent was presented at the beginning of the questionnaire form along with information about the research project and the researcher, and the link to a document that contained the information about the processing of personal data (Appendix 4). Participants were asked to read the information about the research and data processing before agreeing to participate. The informed consent was manifested through the warning that by submitting the questionnaire, participants agree to participate in the research project, consent to the processing of their personal data, and confirm that they have read the information about the processing of their personal data. It was emphasized in the consent that the participation is voluntary and the consent can be withdrawn by participants anytime, at any stage of the research.

4.6.2 Data storage and access

The collected data is securely stored on OneDrive storage, access to which is provided by the university. Access to the storage was limited to the researcher and the supervisor of this project. This prevents unauthorized individuals from viewing and altering the stored information. The collected data is used exclusively for the purposes of this study and will be deleted after it is completed.

To protect participants' confidentiality and uphold their integrity, all identifying information was removed during data processing. During transcription participants' names were replaced with a unique identification number assigned to each participant.

5. Findings

The results of this study are presented in two parts. The first part, Questionnaire Results, presents findings from the questionnaire. The second part, Interview Results, presents findings from the group interview.

5.1 Questionnaire results

The responses collected through the questionnaire provide valuable information about participants' practices regarding the use of AI tools for studying and their usual prompting strategies. Some findings were already presented earlier to describe the participants. In this chapter, the information about participants will be presented in a more thorough way and include information about what AI tools students use for their studying and for what particular purposes, their satisfaction with these tools, their familiarity with and use of techniques or strategies in communication with AI.

5.1.1 The use of AI tools for studying

As was already mentioned, all participants (11) use AI tools for studying. Their responses indicate that they use different tools for different purposes in studying. All participants replied that they utilize

chatbots for studying assistance. The most popular are ChatGPT (10), Gemini (3) and Microsoft Copilot (3). Participants use them for purposes such as: 1) brainstorming and generating ideas; 2) helping understand concepts or texts; 3) writing assistance, including feedback on their writing and adjusting language style. They also use AI tools with specific purposes, for example, Grammarly (5) - for grammar checking and spelling correction, Consensus (1) and ResearchRabbit (1) - for searching relevant literature, and others. Most participants (10) reported that they use several different AI tools, rather than relying on a particular one.

Participants were asked to rate their experience of using AI tools for studying on a scale from 0 to 10, where 0 is “Not satisfied” and 10 is “Very satisfied”. The satisfaction was rated between 6 and 8, and the average was 7,4 (see Table 3), which indicates that the use of AI tools for studying purposes was fairly satisfactory, although there is still room for improvement.

5.1.2 Familiarity and use of prompting techniques

The questions regarding participants’ awareness of prompting techniques and their use in communication with AI tools (chatbots in particular) provided information presented in Table 3:

Table 3. Participants’ experiences with AI tools

Id	Self-assessed level of experience with AI tools	Satisfaction from using AI tools in assisting with academic tasks (0-10)	Familiarity with the concept of prompting techniques	Use specific techniques or strategies in communication with chatbots
P1	Intermediate	6	Somewhat familiar	Yes
P2	Advanced	8	Very familiar	Yes
P3	Beginner	6	Somewhat familiar	Yes
P4	Advanced	8	Somewhat familiar	Yes
P5	Intermediate	7	Somewhat familiar	Yes
P6	Intermediate	7	Somewhat familiar	Yes
P7	Intermediate	8	Somewhat familiar	Yes
P8	Intermediate	7	Somewhat familiar	Yes
P9	Intermediate	8	Somewhat familiar	Yes
P10	Advanced	8	Very familiar	Yes
P11	Intermediate	8	Not familiar	No
Average		7,4		

As seen from Table 3, in some cases high self-assessed level of experience with AI tools (intermediate or advanced), as well as a higher satisfaction rate (7 or 8), correlates with awareness and use of prompting techniques or special strategies of communication with AI tools. Still, one cannot assume

causality between these variables in the current study, as one student, who reported being not familiar with and not using prompting techniques, expressed high satisfaction from using AI for studying and claimed to have an intermediate level of experience with such tools. At the same time, some participants, despite their awareness about prompting techniques and their application, rated their experience or satisfaction lower.

In their communication with AI, participants use different techniques and strategies, with different levels of complexity and specificity. The main strategy across participants is making their prompt as detailed as possible, as well as providing the chatbot with context and examples. Some participants mentioned that they describe the result they expect in their prompts and use follow-up questions. Two students mentioned that their strategies change depending on the kind of response they need. Thus, for simpler requests such as summarizing a text or explaining a concept, they use simple, straightforward prompts (*zero-shot*), while for more complex tasks, they design more specific, detailed prompts with explicit step-by-step instructions. Several students mentioned that they use the *roleplaying* technique specifically for writing assistance or receiving feedback on their performance, assigning roles of writing partners or assistants, supervisors, or other relevant roles. One participant mentioned iteration - refining prompts based on the chatbot's responses until getting an accurate answer - as one of their main strategies. Another participant shared that to make sure the chatbot's response is accurate, they ask it to double-check the provided information before reading its first response. Also, this participant shared that another strategy they use is giving the chatbot a reason why its answer is important, as the participant is convinced that this strategy encourages the chatbot to give "better answers".

These results provide insights into some anchoring factors that influence perceived ease of use (PEOU). Anchoring factors refer to general beliefs about technologies and their use and form initial expectations before using the system (Venkatesh & Bala, 2008). These factors are computer self-efficacy, perception of external control, computer anxiety, and computer playfulness. *Computer self-efficacy* refers to one's confidence in the ability to use technology. In the context of participants' answers, computer self-efficacy means confidence in their ability to apply prompting techniques in communication with AI. The fact that most students in this study are aware of prompting techniques and that they use these techniques themselves, indicates the positive influence of this factor on PEOU. As participants agreed to participate in this study and test different prompting techniques, and had an interest in AI technologies, this indicates their *playfulness* and low *computer anxiety*. Playfulness is viewed by Venkatesh and Bala (2008) as the user's intrinsic motivation to use technology. Thus, a user with a playful or curious attitude toward technology tends to experiment and explore, which increases comfort and lowers the perceived difficulty of new systems. Anxiety refers to a user's fear or nervousness about using technology (Venkatesh & Bala, 2008). According to Venkatesh and Bala (2008), hands-on experience reduces anxiety related to the use of technology; therefore, as some students had previous experience using zero-shot and roleplay prompting techniques, it may positively influence PEOU of these techniques, compared to the chain-of-thought technique that was not mentioned in the responses. The fourth determinant of PEOU perception of external control is related to the user's belief that technical support or assistance is available. Although there are various resources, such as literature and tutorials, that can aid in the use of prompting techniques, participants were not asked if they utilize these resources. As a result, there is no data on their perceptions of external control.

5.2 Interview results

The following section presents the results of the thematic analysis conducted on the interview data. The analysis generated three interrelated themes that reflect students' experiences and perceptions of AI-generated feedback when using different prompting techniques. These themes are: Prompting as a learning process, Varying quality and usefulness of feedback across prompting techniques, and Reflections on the limitations of AI feedback and trust issues. Each theme contributes to answering the research questions through the theoretical lens of sociocultural theory and TAM.

5.2.1 Prompting as a learning process

This theme explores how students experienced the act of prompting as a learning activity in itself. Rather than treating prompting as a neutral step to receive feedback, participants described it as a reflective, sometimes challenging process that shaped how they thought about their writing. This theme supports the first research question by highlighting how students' perceptions of AI-generated feedback are inseparable from the process of crafting prompts. It also lays important groundwork for understanding their later evaluations of different techniques.

Students' reflections revealed that engaging with generative AI through prompting was not merely a technical task but a learning experience in itself. For many students, the act of prompting encouraged them to pause and think more thoroughly about what kind of feedback they needed and how to formulate their request. This process often required them to identify specific aspects of their writing they were uncertain about, identify what kind of feedback they expected to receive, and express those needs in a focused way. P8 noted that it is not always an easy task: "[...] I actually need to know what I want to know. And that sometimes is hard, I think. I'm not always clear when I ask for feedback. [...] it's hard to actually verbalize what I'm looking for".

Defining and phrasing learning goals requires effort, nevertheless, this is crucial for receiving necessary and relevant support. Another student highlights this, adding that providing more information increases the chance of receiving more comprehensive feedback:

[...] the more context and the more concrete instruments you give it, the more concretely you describe what your problem is and what you want, the better it will help you, in the same way as how you interact with humans. If you go to a consultant, they won't suggest you a solution without you explaining to them as deeply as possible what your problem is. That's a basic approach. Any help starts with understanding the problem on a deeper level. (P4)

In this context, prompting, acting as a *mediation tool*, helps students externalize their thinking, clarify their goals, and reflect on their writing practices. It scaffolded their engagement with the chatbot in this feedback process, enabling them to move into the ZPD where they could build new understandings with the support of the AI tool.

As students experimented with how to communicate their needs to the AI, they also shared different ideas about what kind of interaction was appropriate. Some of them compared communication with AI to communication with humans and applied their human communication norms. For instance, P4 mentioned it in the citation above - for receiving help, the description of the problem is necessary for both humans and AI. Students noted that they often included words commonly used in human-to-human interactions, such as "hi", "please", "thank you", etc. Some students observed that such a polite tone and explaining why the feedback is important actually improved the chatbot's performance. Others, however, emphasized that AI is fundamentally a machine and should be treated as one. Therefore, prompts should differ from the language we use with humans:

[...] even in natural life we talk differently with different people. I'm not going to talk the same way to my professor as I talk to a student, [...]. And I think we need to learn to talk differently with the chatbots as well. [...] So we need to learn the language in a way, or change our tone, how we talk to it. And I think that's part of prompting, that you need to learn how to talk to it to get what you want out of it. (P9)

[...] it's like a code language, [...] like C# or Python. You have to have the right prompts. You can use if statements and there's a code language, and be very specific. I think it really helps because I feel like ChatGPT thinks the code somehow. (P11)

These contrasting approaches illustrate how perceptions of AI differ among students and how these perceptions shape their prompting practices and, therefore, the feedback they receive. By

experimenting with different approaches, students learn which ways and strategies of communication lead to the most relevant outcomes.

This search for approaches on how to communicate effectively with AI also supports critical thinking. To phrase appropriate prompts, students needed to analyze their writing, anticipate possible feedback, and evaluate the usefulness of the responses they received. Students' responses indicate that over time, they became more intentional and strategic in their prompting, adapting based on previous experiences. This iterative, self-directed engagement reflects movement from assisted performance to a more independent one, a key process within the ZPD. By participating in and reflecting on the prompting process, students developed not just technical skills but also metacognitive awareness about writing, communication, and learning itself.

5.2.2 Varying quality and usefulness of feedback across prompting techniques

This theme directly addresses the first and second research questions, providing insights into students' perceptions of AI-generated feedback across three prompting techniques they tested within the workshop: zero-shot, roleplay, and chain-of-thought. Students' experiences with different prompting techniques revealed a wide range of perceptions about the quality and usefulness of AI-generated feedback. Throughout the workshop and subsequent interviews, it became clear that the type of prompt used had a notable impact on the feedback students received. Many described inconsistencies in the feedback's depth and relevance, observing that the same chatbot could produce anything from vague and generic suggestions to context-tailored, useful responses, depending on how the prompt was constructed. These experiences can be better understood by applying the Technology Acceptance Model (TAM), which helps explain how students evaluated the AI feedback in relation to their academic writing goals. The determinants of perceived usefulness (*task relevance*, *output quality*, and *result demonstrability*) and adjustment factors of perceived ease of use (*objective usability* and *perceived enjoyment*) were reflected differently depending on the technique applied.

Perceptions on zero-shot prompting

Several students pointed out that overly broad prompts, particularly in the *zero-shot* condition, where no specific guidance or examples were given, often resulted in feedback that was too general and superficial. Without specific and detailed instructions, the AI tended to default to surface-level observations, which limited its value for improving specific aspects of students' writing. Mostly, students perceived feedback from zero-shot prompts as too general, lacking context, and being too vague regarding what should be improved in the student's essay. For example, P3 and P10 perceived the feedback as one that was hard to apply since it was too broad and did not include any details. P8 shared that ChatGPT suggested being "more consistent" in the essay without highlighting where exactly this consistency is lacking, which was quite imprecise and therefore unhelpful. For some students, it was disappointing that they received obvious or overly positive feedback:

When you use zero-shot prompting, I feel like it always says, "You have used very clear language". Even though [...] I'm sure that this is a bad text, and it's so happy about it. Like how? It's so bad! Like everything should be changed there. (P2)

P6 highlighted that such things undermine their trust for AI: "I think it's like P2 said, it's too nice. I almost feel that it's fake. [...] I don't trust it. [...] Even when I tell it to be more critical, it's still too nice to my opinion".

However, some students perceived feedback within the zero-shot condition as quite effective. For example, P5 noted that the feedback was surprisingly detailed given the simplicity of the prompt. Similarly, P4 received a helpful suggestion from the AI to consider different perspectives in their essay. Additionally, several students commented that even though they received positive feedback, they still valued it highly and considered it just as important as critical feedback. Overall, students agreed that to receive substantial and useful feedback within zero-shot prompting, only one prompt is

rarely enough. They highlighted the necessity of specific and detailed prompts, providing AI with context and asking follow-up questions.

Therefore, in terms of the TAM and more specifically determinants of PU, students' perceptions indicate low task relevance, output quality, and result demonstrability of the zero-shot technique, as it facilitated mostly too general and vague feedback, which lacked precise and actionable suggestions on how students could improve their writing. Students' perceptions regarding determinants of PEOU - perceived enjoyment and objective usability - were mixed. The objective usability of the zero-shot prompting technique is indicated by its almost effortless use and short prompting time. However, more precise and detailed feedback requires additional prompting, which increases the efforts and time needed. Participants' perceived enjoyment varied based on their expectations: those who received the results they anticipated from their prompts enjoyed the technique more than those whose expectations were not met by the AI's feedback.

Perceptions on roleplay prompting

In contrast to simple zero-shot prompting, students expressed more positive perceptions of the feedback produced through *roleplay* prompting. Some reported that they had used this technique before, even if they hadn't identified it as a distinct prompting strategy or labeled it as such. Others admitted they had not previously encountered or experimented with roleplay prompting. Still, students' responses indicate that the technique was generally experienced as intuitive and effective. As P8 explained, academic writing is typically directed at a particular audience, such as a professor or peer, which makes it natural to describe that imagined reader when formulating a prompt. In doing so, students were able to assign AI a specific role, such as a supervisor, academic writing consultant, professor, peer, or even themselves. They emphasized that specifying a role, especially one embedded in a relevant context, helped generate feedback that was more substantial and targeted. As P8 described:

I prompted ChatGPT, and I looked up what he's [professor] specialized in and all of these kinds of things. So that was probably a way more precise than I usually would prompt it. And it actually gave super valuable feedback, because it was probably very precise. (P8)

Beyond specifying the role, students also found it useful to provide additional instructions on how the AI should behave. For instance, they noted that asking the AI to adopt a critical stance resulted in more constructive and evaluative feedback: "[...] it was exactly following what I wanted. It was more critical. Like when it's saying too much positive [feedback], [you can tell it] "try to be critical". And then it becomes more critical (P4).

Participants also appreciated the immediacy and efficiency of the roleplay technique. Several highlighted that it often yielded relevant and detailed feedback right after the first prompt, without requiring further refinement or follow-up questions. This perceived efficiency was seen as a practical advantage, particularly in time-constrained academic settings.

However, despite these benefits, roleplay prompting was not without its limitations. One challenge mentioned was the difficulty of inventing a suitable role or crafting the right instructions for the AI, particularly when students were unsure what kind of perspective would produce the most useful feedback. Moreover, some students expressed disappointment with the repetitiveness of AI-generated feedback across different techniques. They observed that, at times, the feedback provided with the help of roleplay or chain-of-thought prompting contained essentially the same content as zero-shot responses, only reformulated in a more academic tone. These differences shaped how the feedback was received and interpreted. Even when the core message was the same, the way it was framed could influence students' willingness to act on it, indicating that not only the substance but also the delivery of feedback matters in shaping learning interactions.

Students' perceptions of the roleplay prompting technique indicate its usefulness through high job relevance, output quality, and result demonstrability. These factors are reflected in their positive views on receiving more critical and content-specific feedback, as well as their belief that this feedback is effective and can enhance their academic writing skills. Although using this technique may require more effort compared to not using any technique at all, students reported that roleplaying often facilitates valuable feedback on the first attempt, without needing additional prompts. Furthermore, most students found it easy to come up with a role to assign, highlighting its objective usability. The majority of students expressed a desire to use this technique in the future, indicating their perceived enjoyment of the technique.

Perceptions on chain-of-thought

Students' perceptions of the *chain-of-thought* (CoT) technique, designed to guide the AI through step-by-step reasoning, were much more controversial. While some found it quite helpful, others perceived its result as inappropriate and overly complicated. Among the benefits, students noted that it resulted in some extra nuanced feedback:

I was surprised that actually it gave even some extra feedback. I thought I already asked for all possible kinds of feedback and improvements in the first and the second types. But then it also found some imperfection in the APA citation style that I was surprised that it spotted. (P4)

Another positive aspect was that CoT has the potential to facilitate more detailed and personalized feedback compared to other techniques. However, students admitted that in order to receive more helpful feedback, they would need to continue interacting with the chatbot through additional prompting and asking follow-up questions. This makes CoT quite time-consuming. Also, many of them concluded that they would rather use CoT in combination with other techniques, which indicates that it is perceived as not fully sufficient on its own, but rather as a component within a broader prompting strategy.

Other students highlighted that CoT was not helpful at all. They perceived the feedback as overly complicated and irrelevant, and felt the need to continue prompting to receive some clarification and explanation of this feedback, not only to apply it but at least to understand. One student, instead of feedback, received a description of how ChatGPT was thinking and made a conclusion, that it was unnecessary and not helpful:

I really don't want to know how you go there. [...] I just want to know what I can do better, or not, or change. So, to be honest, I think it's interesting if you want to understand ChatGPT. But for myself, thinking of [receiving feedback on a text], it's probably too much detail. (P8)

These critiques reflect a broader perception that while CoT has the potential to support deeper engagement, its benefits are not guaranteed and may come at the cost of increased time and cognitive load. This indicates low objective usability of the technique, which hinders its ease of use. Ultimately, students regarded it as a technique best used selectively and in combination with others, depending on the task and the kind of feedback needed. Students' controversial perceptions make it hard to define factors of PU, as while for some students, feedback was both relevant and helpful, others viewed it as overly complicated or did not receive expected feedback at all. Therefore, factors such as task relevance, output quality, and result demonstrability are difficult to define in a uniform way, as they were experienced and interpreted differently by individual students.

In summary, students expressed mixed perceptions regarding all three prompting techniques. Although from interview responses, roleplaying stands out compared to the other two techniques, students emphasized that the usefulness of each technique varied based on the nature of the task, their learning objectives, and the type of feedback they were aiming to receive. Instead of relying on a single technique alone, they prefer to combine techniques and not limit their conversation with AI to one prompt. Students believed that in order to achieve more precise and contextually relevant feedback,

more engaging and flexible behavior is needed: continuing to ask questions, reflecting on their own input and AI's responses, and searching for ways for productive communication. This tendency reflects students' growing awareness of prompt design as a form of strategic mediation, which goes far beyond simply applying a prompting technique. Experimenting with interactions with AI enhances their engagement with complex writing tasks, ultimately extending their capabilities and promoting more autonomous learning practices.

5.2.3 Reflections on the limitations of AI's feedback and trust issues

This theme explores students' reflections on the limitations of AI-generated feedback and the trust issues that emerge in the process of engaging with AI as a learning partner. It contributes to the study by highlighting students' critical awareness of when and how AI feedback can support or hinder their learning.

Through the interview, participants often mentioned the importance of being critical and careful when using AI for studying assistance. The main reason is the different kinds of limitations that AI possesses. First of all, it is the potential unreliability of AI outputs. Several students pointed out that AI-generated feedback can include biased, inaccurate, or entirely fabricated information. For example, P5 was hesitant towards ChatGPT's comments on the reliability of sources cited in the essay: "[...] ChatGPT and AI are not known for being very good at knowing what is real and what's not when it comes to sources. So, of course, I would take that with a grain of salt". Another student noticed the west-oriented nature of ChatGPT in its feedback:

I found also that ChatGPT thinks in an American way sometimes. Like, if it chooses some kind of information, it's all usually based on American thinking. I think it is a bit problematic sometimes. [...] And I can see it in this text also. I recognize it as maybe a peer review from American stuff I have read before. (P11)

This quotation highlights the problem of biases that AI contains, which can lead to providing one-sided feedback without considering different points of view. In such cases, rather than serving as a reliable scaffold within students' ZPD, the AI risks leading students in unproductive directions, providing feedback that is not only unhelpful but also confusing or misleading. Here is again emphasized the importance of critical thinking and reflectiveness when using AI. In this way, the AI's scaffolding function becomes dependent on the learner's ability to mediate the output critically rather than accepting it unconditionally.

This sense of cautious engagement extended to ethical concerns about how AI should be used in academic contexts. Students reflected on the ease with which AI could suggest full rewrites or produce answers directly, potentially facilitating academic dishonesty. This recognition of AI's double-edged potential highlights the need for responsible mediation, where prompts are used not to bypass learning but to support it. As one student (P2) pointed out, AI can assist in studying and help students achieve their learning outcomes, as well as complete assignments for them. However, in the latter case, actual learning does not take place. Additionally, students observed that AI always produces some form of output, even when the prompts are poorly constructed. These reflections emphasize that not only is the quality or complexity of the prompts important, but also the intended purpose of AI use, students' understanding of its limitations, and the ethical implications of its application. From a sociocultural perspective, these insights suggest that for improved learning outcomes, students should not blindly follow AI's suggestions but should instead internalize what truly facilitates their learning.

Students' awareness of the limitations of AI influenced their varying levels of trust in AI-generated feedback. Many participants, particularly those who are non-native English speakers, reported having greater confidence in the AI's suggestions for correcting grammar and providing stylistic advice. However, trust levels dipped when it came to the AI's ability to offer analytical feedback or assess argumentation and structure. Unlike grammar and spelling corrections, which are rule-based,

analytical skills are more subjective and complex, and AI tends to fall short in this area. Nevertheless, students generally viewed AI as a helpful “ball plank” for generating ideas and as a source of inspiration or brainstorming. This distinction suggests that students considered AI to be more reliable for addressing lower-order concerns or providing a starting point, while more complex, higher-order thinking tasks still required human insight, which chatbots constantly mimic.

Another layer to students’ reflections focused on the language AI uses, which at times blurs the line between machine and human. Participants noticed that some phrases made the AI sound more conscious or intentional than it is:

When I [used CoT prompting technique], I also asked it to double check before giving me the answer, and it actually says that it looks at the citation, and then it's like “in my mind”, “I pull the deal”, “I check”, [...] “I think this”, “this is my thought” [...]. It was very human-sounding. (P8)

Such humanization was significant with roleplay prompting. As one student observed:

[...] when I asked it to give feedback as a professor, it gave like a little bit of short encouragement: “Keep up the good work!” I didn't expect it to give those. So I just feel like it gives a kind of a sense of humanity by giving such comments. (P1)

Students noted that such tone can be engaging but also potentially misleading, as it can enhance the illusion of talking to a human. Additionally, if AI acts and sounds professionally, as an expert, it can also cause overreliance or misplaced trust. Here, students pointed to the necessity of separating AI from human educators and, as their interview answers showed, demonstrated an ability to do so. Their responses indicated that they could make this distinction. They emphasized that AI lacks the contextual awareness that teachers or supervisors possess - an understanding rooted in a student’s progress, disciplinary expectations, and specific program goals. Because of this limitation, AI cannot fully tailor its support to meet the unique needs of each student. This reinforces the idea that while AI can facilitate learning, it cannot replace the crucial role of human educators in guiding student development.

Overall, this theme illustrates that while students recognize the potential of AI to scaffold learning, this potential is influenced by their ability to understand and manage its limitations. Trust in AI as a study assistant plays an important role. It is established through experience, critical reflection, and an awareness of what AI can and cannot accomplish. From a sociocultural perspective, these insights emphasize the importance of responsible guidance and highlight the central role of the learner in navigating AI’s scaffolding function.

6. Discussion

This study aims to investigate, based on students’ perceptions, how AI-generated feedback on student writing varies across different prompting techniques, and to determine which approach students find most effective for receiving useful, high-quality feedback. In the previous chapter, the results of the study were analyzed, and the research questions were addressed. Therefore, the present chapter aims to summarize and discuss the findings of the study in relation to the literature discussed in the literature review. Its structure reflects the structure of the interview findings chapter and includes three themes: Prompting as a learning process, Varying quality and usefulness of feedback across prompting techniques, and Reflections on the limitations of AI’s feedback and trust issues. Taken together, they provide insight into how prompting techniques, students’ reflective engagement, and their critical awareness of AI’s limitations interact to shape the educational value of AI-generated feedback in academic writing.

6.1 Prompting as a learning process

The findings from the interviews revealed that, rather than being a simple functional task, prompting facilitated cognitive and reflective processes among students. Although the students did not explicitly state that they perceived it as learning, their responses indicated that writing a prompt for the chatbot required them to articulate their study needs and the aspects they needed support with. This process encouraged them to clarify their learning goals and reflect on their writing. Moreover, engaging with AI stimulated their critical thinking, as they analyzed the feedback provided by the chatbot, considering its value and relevance to their learning needs. These perceptions align with the concept of *prompt literacy*, defined by various researchers: as the ability to formulate one's problem clearly (Federiakin et al., 2024) and as the process which involves more than just writing an initial input but also includes iterating, refining prompts, and assessing AI's responses to improve communication and achieve better learning outcomes (Gattupalli et al., 2023; Hwang et al., 2023). This suggests that students grasp the importance and meaning of prompt literacy. Since the participants were not asked during the interviews or in the questionnaire whether they were familiar with this concept formally, it can be assumed that they arrived at an intuitive understanding through experimenting with AI. However, considering that all participants have either academic or professional backgrounds related to IT, it is possible that they had learned about this concept prior to the study.

By constructing prompts, these informants also learn how to better communicate their needs to AI. The findings regarding the influence of the language they use on AI's outputs partially reflect the findings in Zamfirescu-Pereira et al.'s (2023) study. In line with findings from Zamfirescu-Pereira et al.'s (2023) study, some students relied on intuition and applied norms of human-to-human communication when crafting their prompts. However, there is a key difference in the outcomes of these prompting techniques. In Zamfirescu-Pereira et al.'s study, some prompts resulted in irrelevant outputs, whereas participants in the current study noted that ChatGPT performed better when treated with politeness. It is important to mention that different AI products were used in these two studies, which could account for the varying outputs and perceptions of their quality.

Although the participants in this study used human communication patterns in their prompts, this does not imply that they perceive AI as a human conversational partner. On the contrary, their responses revealed that they recognize AI as a machine. However, they may not always know how to address it effectively, as developers of AI-based products typically do not provide guidance on how to communicate with AI before it is used. This supports Walter's (2024) argument that students often lack a formal understanding of how to interact effectively with AI and must rely on self-directed experimentation. Through such experimentation and intuitive construction of prompts, the participants of this study developed strategies to communicate with AI that produced helpful outputs, even though they seemed like human-to-human conversations.

Importantly, the process of articulating learning needs serves as a form of scaffolding, helping students progress into their *ZPD* by externalizing their thoughts and creating a space for more focused engagement with both writing and feedback. For effective collaboration within the *ZPD* and to establish conditions that enable students to achieve their learning goals, effective communication is essential. Language as a *mediation tool* plays a crucial role in this communication, as it directly influences the feedback from AI. In this context, meaningful and productive collaboration is possible only if the participants in this communication can find common ground and reach mutual understanding. This responsibility lies with the user, who must formulate their requests in a way that ensures the AI's responses are meaningful and meet their expectations. This reflective engagement also influenced how students positioned themselves in relation to the chatbot. Rather than viewing it as a passive tool that simply delivers information, students saw AI as a participant in a collaborative exchange. Crafting prompts gave them a sense of control over the interaction, turning the feedback process into a two-way dialogue. In this sense, prompting not only scaffolds cognitive activity but also supports a shift in learner identity - from a passive recipient of feedback to an active agent in their own

learning. Therefore, prompting serves not only as a technical function for delivering information but also as a medium for metacognitive reflection, which contributes to the development of students' autonomy and critical awareness of their learning process.

6.2 Varying quality and usefulness of feedback across prompting techniques

Overall, the findings from the questionnaire and interviews support the literature that recognizes generative AI tools as a source of feedback. Many students used AI for writing assistance and feedback generation in particular before the study, and expressed the intention to continue doing so in the future. Moreover, during the workshop, they received quite useful suggestions and even surprisingly nuanced feedback, which aligns with Dai et al.'s (2023) and Mahapatra's (2024) findings on ChatGPT's ability to deliver meaningful formative feedback on students' writing.

Students' experiences with zero-shot, roleplay, and chain-of-thought (CoT) prompting techniques demonstrated that no single technique can be identified as the most effective. Although roleplaying was perceived as more useful and easier to use compared to the other two techniques, these results can be explained by TAM3. Perceived usefulness and ease of use varied not only based on the feedback facilitated by techniques but also were significantly dependent on students' prior experience, expectations, and specific writing goals. These findings reflect the connections described by Venkatesh and Bala (2008) within TAM3, especially the connection between *experience* and *perceived ease of use*. As with hands-on experience, students will have more information regarding the technique's functioning, they can become accustomed to it, and based on that, build new expectations from the technique. This would also make the technique easier to use (Venkatesh & Bala, 2008). Hence, roleplay prompting could be perceived as intuitive and efficient, possibly because some students had already used this approach previously, sometimes without knowing that they used a specific technique. This also supports the idea that familiarity with the technique and the perception of it as easy to use increase perceived usefulness and influence further intention to use the technique (Venkatesh & Bala, 2008).

CoT, on the other hand, was not mentioned by students among their usual prompting strategies. Assuming that it was unfamiliar to them can explain why students often found its results frustrating and hard to apply. However, considering that some students saw a potential in this technique to provide useful and personalized feedback, leads to the conclusion that with increased hands-on experience, CoT may possibly become an effective tool that facilitates high-quality feedback without too much effort. All in all, findings regarding CoT in this study suggest that its effectiveness for academic writing tasks is controversial despite its success in other domains like mathematics (Wei et al., 2022) or text simplification (Hedlin et al., 2025). In this context, its output was often perceived as irrelevant or overly complex, suggesting that the technique may not readily transfer to writing-focused tasks without further training or adaptation.

While Fagbohun et al. (2024) recommend certain prompting techniques for specific tasks, and Reynolds and McDonnell (2021) caution that too much complexity can confuse AI models, this study's participants revealed a more practical insight: effective feedback is not just about choosing a technique, but about knowing how to communicate clearly with the AI and remaining critically engaged throughout the process. Students who succeeded in eliciting helpful feedback were those who provided context, iterated, and followed up when the initial responses were insufficient. This aligns with the literature on prompt design and engineering (Chen et al., 2024; Knoth et al., 2024), which positions effective prompting as a learned skill that can significantly shape the outcomes of AI interaction. In this context, even simple zero-shot prompts can lead to useful feedback if they contain relevant information. As students noted, in real-life settings, they would combine a few techniques rather than rely on a single one. This aligns with the idea of Arora et al. (2022) that combining multiple prompts or techniques into one leads to more accurate and helpful results. However, which techniques exactly should be combined and how the prompt should be constructed, depends also on

the kind of task and the kind of feedback students want to receive. In receiving feedback on academic writing, students seldom rely on the very first output they received. Asking follow-up questions, clarifying their own prompts, and asking AI to clarify its suggestions is seen as the most effective strategy to receive truly valuable support from AI in their learning. While prompting techniques in this context are seen as an addition to other necessary skills, students still believe that their use can significantly improve AI's performance.

6.3 Reflections on the limitations of AI's feedback and trust issues

The third theme revealed that while AI proved to be a source for feedback, it is not free of limitations. However, students did not blindly trust AI feedback, but actively evaluated its credibility and appropriateness. This reflects a growing *AI literacy*, in which students are not only learning how to prompt but also learning to question the validity and reliability of AI-generated responses. As emphasized in prior research (Coeckelbergh, 2022; Dwivedi et al., 2023; Kendrick, 2023), AI outputs can contain fabricated information, biases, and culturally specific framing - issues that students in this study also recognized and critiqued. For instance, some participants noted that ChatGPT reflected American-centric perspectives. This issue is connected to the problem of bias, described by Coeckelbergh (2022). Since ChatGPT is a product of an American company, it is developed and functions under local traditions. Therefore, the outputs it produces can be irrelevant to users with different cultural backgrounds. In such cases, rather than offering neutral or universally applicable advice, the AI may provide feedback that aligns with a specific academic culture, which may not fully correspond to the expectations or practices of other educational contexts. Together with irrelevant and unreliable information, such limitations reduce students' trust in AI as a source of feedback.

Another concern was also related to trust. Students noted the tendency of ChatGPT to use overly humanized language in its outputs. Particularly, as a result of one student's prompting with the CoT technique, the chatbot started referring to its thinking process and the use of its mind. Since obviously AI does not possess either mind or human-like thinking, such behavior was quite confusing for them. Similarly, during roleplay prompting, the chatbot could use a more professional and confident tone, which risks creating a false sense of competence or authority. Students highlighted that not all users of ChatGPT are aware of how AI works, as well as not all of them are critical to its outputs. Therefore, such language can cause overreliance and make users believe that AI possesses greater capabilities, while it does not. In these circumstances, AI literacy is viewed as a crucial skill, necessary for effectively applying AI. This supports Walter's (2024) warning that, apart from technical skills, AI literacy must include critical awareness of AI's limitations and an understanding of its operational boundaries.

Students' evaluative stance toward AI also connects back to feedback theory. As Hattie and Timperley (2007) stress, one of the indicators of effective feedback is that it aligns with students' prior knowledge. One of the main critiques of AI-generated feedback was that it assessed students' writing without knowing their background. Unlike human teachers or supervisors, AI is not aware of what knowledge and experience a student possesses, what their study pace and learning goals are. While students can prompt the program or course they are studying, it is still hard to put all the necessary context in a prompt. Therefore, AI can support writing to some extent, but it cannot replace the deeper, context-aware feedback of human educators.

Summarizing, AI-generated feedback is only effective when learners are able to interpret and act upon it. In this study, students' growing skepticism and critical thinking reflect this capacity, not merely receiving feedback but judging its quality and applicability. Their ability to mediate AI's input, rather than relying on it uncritically, marks an important step in becoming independent learners and reflects the internalization of scaffolding support envisioned in sociocultural theory.

6.4 Limitations and future research

While this study provides valuable insights into students' experiences with different prompting techniques for AI-generated feedback, several limitations must be acknowledged. These limitations not only define the scope of the current findings but also suggest meaningful directions for future research.

The study focused on three prompting techniques: zero-shot, roleplay, and chain-of-thought. They were selected for their varying levels of complexity and relevance to educational contexts. However, other prompting strategies were not tested. These alternatives may lead to different types or qualities of feedback and thus warrant exploration in future studies. Likewise, the study relied exclusively on ChatGPT as the generative AI tool. Although it is one of the most widely used LLMs, findings derived from it may not fully translate to other systems with different capabilities or training data. Comparative studies involving multiple chatbots could shed light on whether users' perceptions and prompting strategies vary across platforms.

Another limitation lies in the lack of systematic analysis of the interaction between students and the AI. While participants were asked to reflect on their experiences with each prompting method, their actual prompts and the corresponding AI responses were not analyzed. As a result, the study cannot account for how the content or quality of AI feedback shaped participants' evaluations, as well as how exactly students formulated their prompts, and how it affected AI's feedback. Future research could benefit from incorporating prompt-response data to better understand what constitutes "useful" or "helpful" feedback in the eyes of students and how this may vary by prompt type.

Conducting interviews in group settings was motivated by creating an opportunity for participants to discuss their perceptions and reflect on the feedback collaboratively. However, it may also have influenced participants' responses. Interviewing in groups can cause what Thomas (2022) calls prestige bias - when participants, influenced by society, tend to answer what sounds "right", rather than their honest opinion. Group dynamics such as peer conformity, dominant voices, or social desirability may have shaped what participants chose to share. Some may have withheld criticism or aligned their views with others in the group. Including individual interviews or anonymous written reflections in future studies could help capture more diverse and candid perspectives.

This study has some limitations regarding generalizability. Given the small sample size of 11 participants and the qualitative nature of the research, the findings are not intended to be statistically representative of a broader population. Instead, the study offers in-depth insights into students' experiences with AI-generated feedback and prompting techniques, which may be transferable to similar educational contexts. Although this study investigated students' perceptions and their backgrounds through a mixed-method study, it does not provide objective or generalizable measures of the effectiveness of each prompting method. A quantitative study could complement these findings by measuring the actual quality of AI feedback based on predefined criteria, its impact on writing outcomes, or how helpful AI support is for students' learning over time. Additionally, broader studies involving a larger sample of participants from different disciplines and educational levels could provide a more comprehensive understanding of how prompting strategies are interpreted and used across varied learning environments.

Finally, the within-subjects design, in which each participant tested all three prompting methods within one workshop, raises the potential for carryover effects (Gravetter & Forzano, 2018). As students became more familiar with prompting and AI interaction, their later experiences may have been affected by earlier ones. This makes it difficult to isolate the impact of experience with each technique. Future studies could employ a between-subjects design with separate control groups to mitigate these effects and strengthen causal interpretations.

Despite these limitations, the findings offer promising avenues for further research. They highlight the need for deeper exploration into prompt literacy as a skill, the pedagogical integration of AI tools in writing education, and the development of frameworks to evaluate the quality of AI-generated feedback. As students increasingly interact with AI in academic contexts, understanding how they learn to prompt, interpret, and critically engage with these tools will remain a crucial area of inquiry.

7. Conclusion

This thesis explored how students engage with generative AI tools to receive feedback on academic writing, with a particular focus on how different prompting techniques shape their perceptions of feedback quality and usefulness. Drawing on sociocultural theory, the study positioned AI as a learning partner and prompts as mediating tools that facilitate human-AI interaction. The research was grounded in the view that feedback is a dialogic and developmental process, and that the ability to prompt effectively is a crucial skill that intersects with broader notions of AI and prompt literacy.

The study combined a review of existing literature with an empirical investigation involving university student participants who tested three prompting techniques: zero-shot, roleplaying, and chain-of-thought, and reflected on their experiences through a group interview afterwards. The thematic analysis of their responses generated three key themes: prompting as a learning process; varying quality and usefulness of feedback across techniques; and limitations of AI feedback and trust issues. These findings reveal that prompting is not merely a technical task but a situated, reflective process that can enhance students' critical engagement with AI tools, as well as help them in achieving their learning goals. The results of the study show that students' perceptions of AI-generated feedback varied depending on the prompting technique used. While zero-shot prompting was seen as simple and intuitive, it often led to vague and general feedback. In contrast, roleplaying and chain-of-thought (CoT) techniques were perceived as more effective in generating useful, specific, and structured feedback. However, no single prompting technique stood out as universally superior. Although roleplaying was generally viewed as easier to use and useful, students' experiences highlighted a more practical insight: effective feedback is less about selecting the "right" technique and more about knowing how to communicate clearly with the AI and staying critically engaged throughout the process. Participants who received the most useful feedback were those who provided context, iterated on their prompts, and followed up when initial responses were insufficient.

The thesis contributes to the growing field of research on AI in higher education by offering empirical insights into how students make sense of and learn through prompting. While many studies focus on the capabilities or limitations of AI tools, this study shifts attention to the user side, specifically, to how prompting strategies can shape the learning experience and foster a more active, agentic role for students in their interactions with AI. The findings also have practical implications for educators and institutions. As generative AI tools become increasingly integrated into higher education, there is a need to move beyond basic usage toward pedagogical strategies that cultivate AI literacy, critical thinking, and ethical awareness. Introducing prompting or prompt literacy as a skill to be taught and practiced could be one way to support this transition.

Ultimately, the thesis advocates for a more reflective and pedagogically grounded approach to AI use in higher education - one that recognizes students not just as users of AI, but as learners who can shape and be shaped by their interactions with it.

References

- Adiguzel, T., Kaya, M. H., & Cansu, F. K. (2023). Revolutionizing Education with AI: Exploring the Transformative Potential of ChatGPT. *Contemporary Educational Technology, 15*(3), ep429. <https://doi.org/10.30935/cedtech/13152>
- Aggarwal, R., & Ranganathan, P. (2019). Study designs: Part 4 – Interventional Studies. *Perspectives in Clinical Research, 10*(3), 137. https://doi.org/10.4103/picr.picr_91_19
- Arora, S., Narayan, A., Chen, M. F., Orr, L., Guha, N., Bhatia, K., Chami, I., Sala, F., & Ré, C. (2022, November 19). *Ask Me Anything: A simple strategy for prompting language models*. ArXiv.org. <https://doi.org/10.48550/arXiv.2210.02441>
- Bashardoust, A., Feng, Y., Geissler, D., Feuerriegel, S., & Shrestha, Y. R. (2024). The Effect of Education in Prompt Engineering: Evidence from Journalists. *ArXiv (Cornell University)*. <https://doi.org/10.48550/arxiv.2409.12320>
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology, 3*(2), 77–101. <https://doi-org.ezproxy.ub.gu.se/10.1191/1478088706qp063oa>
- Charness, G., Gneezy, U., & Kuhn, M. A. (2012). Experimental methods: Between-subject and within-subject design. *Journal of Economic Behavior & Organization, 81*(1), 1–8. <https://doi.org/10.1016/j.jebo.2011.08.009>
- Chen, C., Lee, S., Jang, E., & Sundar, S. S. (2024). *Is Your Prompt Detailed Enough? Exploring the Effects of Prompt Coaching on Users' Perceptions, Engagement, and Trust in Text-to-Image Generative AI Tools*. 31, 1–12. <https://doi.org/10.1145/3686038.3686060>
- Clark, T., Foster, L., Sloan, L., & Bryman, A. (2021). *Bryman's Social Research Methods* (6th ed.). Oxford University Press.
- Coeckelbergh, M. (2022). *The Political Philosophy of AI*. John Wiley & Sons.
- Cohen, L., Manion, L., & Morrison, K. (2011). *Research methods in education* (7th ed.). Taylor & Francis Group.
- Cress, U., & Kimmerle, J. (2023). Co-constructing knowledge with generative AI tools: Reflections from a CSCL perspective. *International Journal of Computer-Supported Collaborative Learning, 18*, 607–614. <https://doi.org/10.1007/s11412-023-09409-w>
- Dai, W., Lin, J., Jiang, H., Li, T., Tsai, Y., Gašević, D., & Chen, G. (2023). *Can Large Language Models Provide Feedback to Students? A Case Study on ChatGPT*. 323–325. <https://doi.org/10.1109/icalt58122.2023.00100>
- Davis, F. D. (1986). A technology acceptance model for empirically testing new end-user information systems : theory and results [Doctoral Thesis]. In *Mit.edu*. <http://hdl.handle.net/1721.1/15192>
- Davis, F. D. (1989). Perceived usefulness, Perceived Ease of use, and User Acceptance of Information Technology. *Journal of Risk and Uncertainty, 18*(3), 321–325. JSTOR. <https://doi.org/10.1023/a:1011156710779>
- Dwivedi, Y. K., Kshetri, N., Hughes, L., Slade, E. L., Jeyaraj, A., Kar, A. K., Baabdullah, A. M., Koochang, A., Raghavan, V., Ahuja, M., Albanna, H., Albashrawi, M. A., Al-Busaidi, A. S., Balakrishnan, J., Barlette, Y., Basu, S., Bose, I., Brooks, L., Buhalis, D., & Carter, L. (2023). “So what if ChatGPT wrote it?” Multidisciplinary perspectives on opportunities, challenges and implications of

- generative conversational AI for research, practice and policy. *International Journal of Information Management*, 71(0268-4012), 102642. <https://doi.org/10.1016/j.ijinfomgt.2023.102642>
- Fagbohun, O., Harrison, R. M., & Dereventsov, A. (2023). An Empirical Categorization of Prompting Techniques for Large Language Models: A Practitioner's Guide. *Journal of Artificial Intelligence, Machine Learning and Data Science*, 1(4), 1–11. <https://doi.org/10.51219/jaimld/oluwole-fagbohun/15>
- Federiakina, D., Molerov, D., Zlatkin-Troitschanskaia, O., & Maur, A. (2024). Prompt engineering as a new 21st century skill. *Frontiers in Education*, 9. <https://doi.org/10.3389/feduc.2024.1366434>
- Gattupalli, S., Maloy, R. W., & Edwards, S. A. (2023). Prompt Literacy: A Pivotal Educational Skill in the Age of AI. *College of Education Working Papers and Reports Series*, 6. <https://doi.org/10.7275/3498-wx48>
- Gattupalli, S. (2024). *The Art and Science of Promptgramming*. College of Education, University of Massachusetts. <https://doi.org/10.7275/mk13-q340>
- Gibbons, P. (2015). *Scaffolding language, scaffolding learning: Teaching english language learners in the mainstream classroom* (2nd ed.). Heinemann.
- Gravetter, F. J., & Forzano, L.-A. B. (2018). *Research methods for the behavioral sciences* (6th ed.). Cengage Learning Inc.
- Hattie, J., & Timperley, H. (2007). The Power of Feedback. *Review of Educational Research*, 77(1), 81–112. <https://doi.org/10.3102/003465430298487>
- Holmes, W., & Tuomi, I. (2022). State of the art and practice in AI in education. *European Journal of Education*, 57(4), 542–570. <https://doi.org/10.1111/ejed.12533>
- Hwang, M., Jeens, R., & Lee, H.-K. (2024). Exploring Learner Prompting Behavior and Its Effect on ChatGPT-Assisted English Writing Revision. *The Asia-Pacific Education Researcher*. <https://doi.org/10.1007/s40299-024-00930-6>
- Hwang, Y., Jang Ho Lee, & Shin, D. (2023). What is prompt literacy? An exploratory study of language learners' development of new literacy skill using generative AI. *ArXiv (Cornell University)*. <https://doi.org/10.48550/arxiv.2311.05373>
- John-Steiner, V., & Mahn, H. (1996). Sociocultural approaches to learning and development: A Vygotskian framework. *Educational Psychologist*, 31(3), 191–206. https://doi.org/10.1207/s15326985ep3103&4_4
- Kendrick, C. (2023, January 26). *The Efficacy of ChatGPT: Is it Time for the Librarians to Go Home?* The Scholarly Kitchen. <https://scholarlykitchen.sspnet.org/2023/01/26/g>
- Khan, I., Ahmad, A. R., Jabeur, N., & Mahdi, M. N. (2021). An artificial intelligence approach to monitor student performance and devise preventive measures. *Smart Learning Environments*, 8(1). <https://doi.org/10.1186/s40561-021-00161-y>
- Kim, H.-S., Kim, N. Y., & Cha, Y. (2021). Is It Beneficial to Use AI Chatbots to Improve Learners' Speaking Performance? *The Journal of AsiaTEFL*, 18(1), 161–178. <https://doi.org/10.18823/asiatefl.2021.18.1.10.161>
- Kim, J., Yu, S., Lee, S.-S., & Detrick, R. (2025). Students' prompt patterns and its effects in AI-assisted academic writing: Focusing on students' level of AI literacy. *Journal of Research on Technology in Education*, 1, 1–18. <https://doi.org/10.1080/15391523.2025.2456043>

- Knoth, N., Tolzin, A., Janson, A., & Jan Marco Leimeister. (2024). AI Literacy and its Implications for Prompt Engineering Strategies. *Computers and Education: Artificial Intelligence*, 6(100225). <https://doi.org/10.1016/j.caeai.2024.100225>
- Lantolf, J. P. (2006). Language Emergence: Implications for Applied Linguistics--A Sociocultural Perspective. *Applied Linguistics*, 27(4), 717–728. <https://doi.org/10.1093/applin/aml034>
- Laudel, H., & Narciss, S. (2023). The effects of internal feedback and self-compassion on the perception of negative feedback and post-feedback learning behavior. *Studies in Educational Evaluation*, 77, 101237. <https://doi.org/10.1016/j.stueduc.2023.101237>
- Mahapatra, S. (2024). Impact of ChatGPT on ESL students' academic writing skills: a mixed methods intervention study. *Smart Learning Environments*, 11(9). <https://doi.org/10.1186/s40561-024-00295-9>
- Mandouit, L., & Hattie, J. (2023). Revisiting “The Power of Feedback” from the perspective of the learner. *Learning and Instruction*, 84, 101718. <https://doi.org/10.1016/j.learninstruc.2022.101718>
- Mitchell, R., Myles, F., & Marsden, E. (2019). *Second Language Learning Theories* (4th ed.). Routledge.
- Nazari, N., Shabbir, M. S., & Setiawan, R. (2021). Application of Artificial Intelligence powered digital writing assistant in higher education: randomized controlled trial. *Heliyon*, 7(5), e07014. <https://doi.org/10.1016/j.heliyon.2021.e07014>
- Ng, D. T. K., Leung, J. K. L., Chu, S. K. W., & Shen, M. Q. (2021). Conceptualizing AI literacy: An Exploratory Review. *Computers and Education: Artificial Intelligence*, 2(1). <https://doi.org/10.1016/j.caeai.2021.100041>
- OpenAI. (2025). *ChatGPT* (Mar 27 version) [Large language model]. <https://chat.openai.com/chat>
- Ou, A. W., Stöhr, C., & Malmström, H. (2024). Academic communication with AI-powered language tools in higher education: From a post-humanist perspective. *System*, 121, 103225. <https://doi.org/10.1016/j.system.2024.103225>
- Panadero, E. (2023). Toward a paradigm shift in feedback research: Five further steps influenced by self-regulated learning theory. *Educational Psychologist*, 58(3), 193–204. <https://doi.org/10.1080/00461520.2023.2223642>
- Popenici, S. A. D., & Kerr, S. (2017). Exploring the Impact of Artificial Intelligence on Teaching and Learning in Higher Education. *Research and Practice in Technology Enhanced Learning*, 12(1), 1–13. <https://doi.org/10.1186/s41039-017-0062-8>
- Reynolds, L., & McDonell, K. (2021). Prompt Programming for Large Language Models: Beyond the Few-Shot Paradigm. *Extended Abstracts of the 2021 CHI Conference on Human Factors in Computing Systems*, 1–7. <https://doi.org/10.1145/3411763.3451760>
- Spasić, A. J., & Janković, D. S. (2023). Using ChatGPT Standard Prompt Engineering Techniques in Lesson Preparation: Role, Instructions and Seed-Word Prompts. *58th International Scientific Conference on Information, Communication and Energy Systems and Technologies (ICEST)*, 47–50. <https://doi.org/10.1109/icest58410.2023.10187269>
- Thomas, G. (2022). *How to Do Your Research Project : a Guide for Students* (4th ed.). Sage.
- Venkatesh, V., & Bala, H. (2008). Technology acceptance model 3 and a research agenda on interventions. *Decision Sciences*, 39(2), 273–315. <https://doi.org/10.1111/j.1540-5915.2008.00192.x>

Venkatesh, V., & Davis, F. D. (2000). A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies. *Management Science*, 46(2), 186–204.
<https://doi.org/10.1287/mnsc.46.2.186.11926>

Vygotsky, L. (1978). *Mind in society: the Development of Higher Psychological Processes*. Harvard University Press.

Walter, Y. (2024). Embracing the future of Artificial Intelligence in the classroom: the relevance of AI literacy, prompt engineering, and critical thinking in modern education. *International Journal of Educational Technology in Higher Education*, 21(1). <https://doi.org/10.1186/s41239-024-00448-3>

Wells, G. (1999). *Dialogic Inquiry Towards a Sociocultural Practice and Theory of Education*. Cambridge University Press.

Wisniewski, B., Zierer, K., & Hattie, J. (2020). The power of feedback revisited: A meta-analysis of educational feedback research. *Frontiers in Psychology*, 10(3087).
<https://doi.org/10.3389/fpsyg.2019.03087>

Xia, Q., Chiu, T. K. F., Lee, M., Sanusi, I. T., Dai, Y., & Chai, C. S. (2022). A self-determination theory (SDT) design approach for inclusive and diverse artificial intelligence (AI) education. *Computers & Education*, 189(104582), 104582. <https://doi.org/10.1016/j.compedu.2022.104582>

Zamfirescu-Pereira, J. D., Wong, R. Y., Hartmann, B., & Yang, Q. (2023). Why Johnny Can't Prompt: How Non-AI Experts Try (and Fail) to Design LLM Prompts. *Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems*. <https://doi.org/10.1145/3544548.3581388>

Appendix 1. Prewritten essay

The Impact of Social Media on Political Polarization

Social media has become an essential tool for political engagement, but its role in shaping public opinion has sparked intense debate. While platforms like Twitter, Facebook, and TikTok offer opportunities for political discourse, they also contribute to increasing polarization by reinforcing ideological echo chambers and amplifying misinformation. Given these concerns, there is a pressing need for regulatory measures and platform accountability to mitigate the divisive effects of social media on democracy.

One of the primary drivers of political polarization on social media is the creation of echo chambers, where users are predominantly exposed to content that aligns with their preexisting beliefs.

Algorithmic curation plays a significant role in this process, as platforms prioritize engagement by showing users content that reinforces their views. Research by Bakshy et al. (2015) found that Facebook's news feed algorithm significantly limits users' exposure to diverse political perspectives, exacerbating ideological divisions. Without deliberate efforts to promote cross-cutting discussions, social media will continue to deepen societal fractures.

Moreover, misinformation spreads rapidly on social media, further entrenching political divisions. False or misleading information often gains traction due to sensationalism and emotional appeal, outpacing fact-based reporting. A study by Vosoughi, Roy, and Aral (2018) found that false news spreads six times faster than true news on Twitter. The widespread dissemination of misinformation fuels distrust in institutions and fosters political animosity, making it essential for platforms to implement stronger fact-checking measures and transparency policies.

Some argue that social media democratizes political discourse by giving a voice to marginalized groups and enabling grassroots activism. While this is true, the benefits of online activism must be weighed against the harms of algorithm-driven polarization and misinformation. To balance these concerns, policymakers should require platforms to disclose their content moderation practices, implement algorithmic transparency, and invest in digital literacy initiatives to equip users with critical thinking skills.

In conclusion, social media plays a dual role in modern politics, serving as both a tool for civic engagement and a driver of polarization. The amplification of ideological echo chambers and misinformation necessitates stronger platform accountability and regulatory oversight. Without such measures, social media will continue to erode democratic norms rather than foster informed and constructive political discourse.

References

Bakshy, E., Messing, S., & Adamic, L. A. (2015). Exposure to ideologically diverse news and opinion on Facebook. *Science*, 348(6239), 1130-1132. <https://doi.org/10.1126/science.aaa1160>

Vosoughi, S., Roy, D., & Aral, S. (2018). The spread of true and false news online. *Science*, 359(6380), 1146-1151. <https://doi.org/10.1126/science.aap9559>

Appendix 2. Questionnaire

a. Demographic Information:

1. How old are you?
2. What country are you from?
3. What program do you study now?
4. If you're employed, what is your occupation?
5. What did you study or work with before?
6. How would you describe your level of experience with AI tools? (None, Beginner, Intermediate, Advanced)

b. Experience with AI Tools for Studying:

7. Have you ever used AI tools (e.g., ChatGPT, Grammarly, etc.) to assist with your studies? (Yes/No)
8. If yes, which AI tools have you used and for what purposes? (e.g., ChatGPT for writing, Grammarly for grammar checks, etc.)
9. How would you rate your satisfaction with AI tools in assisting with academic tasks? (1-10 scale)

c. Awareness of Prompting Techniques:

10. How familiar are you with the concept of prompting techniques? (Not familiar, Somewhat familiar, Very familiar)
11. Do you use specific techniques or strategies to refine the responses from AI tools (e.g., giving detailed instructions or examples, asking follow-up questions)? (Yes/No)
12. If yes, please provide examples of techniques you use. If no, please describe how do you formulate your request to AI.

Appendix 3. Interview guide

1. General Impressions of AI Feedback

- How did you find the feedback from AI?
- Did AI feedback from each prompt align with what you expected? Or was it anything that surprised you?
- Were there any aspects of the feedback that felt misleading or unhelpful?

Possible follow-up questions:

- Did you notice any major differences in feedback quality across techniques?
- Was the feedback clear and easy to understand?
- Did the feedback seem relevant and actionable?

2. Comparing Prompting Techniques

- Which prompting technique in your opinion gave you the most useful feedback? What exactly indicated its usefulness? (If opinions in the group are different, they could discuss it, reasoning for a preferred technique)
- Were there any that felt less helpful? What do you think was missing?
- Did any of the techniques make it easier or harder to interact with AI?

3. Future Use & Practicality

- Now that you've tested these different prompting techniques, do you see yourself using any of them in the future?
- Would you consider integrating these techniques into your studying or writing process? (The group could discuss why they would or would not.)
- Do you think using prompting techniques could help students get a better experience of interaction with AI tools?

Closing Questions

1. Is there anything else you'd like to share about your experience with AI-generated feedback?
2. Would you be interested in seeing the final research findings?

Appendix 4. Informed consent

Hello, and thank you for participating in this study! My name is Marharyta, and I am a master's student researching how generative AI provides feedback on academic writing and how different prompting techniques influence that feedback.

This questionnaire aims to gather some background information about your experience with AI tools and prompting techniques before we begin the main study. Your responses will be very helpful! All information provided will be kept confidential.

Your participation is voluntary and you can withdraw your consent at any time until the work has been submitted. Please read the information about processing of personal data before agreeing to participate: [link to the Information about the processing of personal data for educational purposes at the University of Gothenburg]

By submitting this questionnaire, you:

- Agree to participate in my project as described above.
- Consent to the processing of your personal data in the project.
- Confirm that you have read the information about processing of personal data.

Information about the processing of personal data for educational purposes at the University of Gothenburg

The General Data Protection Regulation (GDPR) requires that you are informed about how your personal data is processed. This document describes how the processing is carried out and what rights you have as a data subject.

Who is responsible for the processing of your personal data?

The University of Gothenburg is the data controller for the processing carried out by students in the context of their studies.

If you have questions about the processing, you can contact the student who carries out the processing:

Course code	PDA699
Title of the student's project	Prompting Techniques and AI Feedback: A Study of University Students Perceptions and Efficacy in Academic Writing
Name of the student	Marharyta Pylypenko
Email address of the student	guspylma@student.gu.se

Legal basis and purpose of the processing

According to chapter 1 §2 of the Higher Education Act (1992:1434), the university has a mission to organize education. This means that the university has the right to process personal data on the legal basis of public interest when it is necessary to fulfil its educational mission according to article 6.1 e GDPR.

This also means that individual students process personal data for educational purposes. Students process personal data in their education, e.g. when carrying out individual projects, essays or field studies. In these cases, the student must formulate an explicit and limited purpose for the project. The student has filled in the purpose of the project below.

Purpose for the student

The collection and processing of data are essential for the project. The primary aim of this study is to examine how generative AI provides feedback on academic writing and how different prompting techniques influence that feedback. The data collected will offer valuable insights into the potential of AI to support learning and students' perceptions of such support.

The student will process the following data about you

Below, the student has ticked the data the student will process about you:

- name, contact information and/or address information
- only indirect personal data such as answers to survey questions, etc.
- ethnic origin
- political views
- religious or philosophical beliefs
- membership of a trade union
- health
- information about sexual life or sexual orientation
- genetic data
- biometric data used to uniquely identify a person
- data on offences against the law
- other types of personal data, please specify in free text:

Method of collection (to be filled in by the student)

Below, the student has ticked the method(s) that will be used for data collection in the project.

- Image or video recording
- Sound recording
- Survey
- Interview
- Observation
- Other method, describe it here:

Who will be able to access the personal data?

Only the persons involved in the project that the student is conducting for educational purposes at the University of Gothenburg will be able to access your personal data. This means, for example, that the student and a possible supervisor of the student will have access to your personal data.

Data can be requested under the principle of public access to official records

Your personal data or documents containing your personal data may, if submitted to the university by the student, be subject to a request in accordance with the principle of public access to official records. This means that individuals can request access to official documents and thus gain access to information in which your personal data appears, if these are not covered by confidentiality. These requests are handled in accordance with the principles of the Freedom of the Press Act (1949:105) and the Public Information and Privacy Act (2009:400).

Students are encouraged not to submit information about you that can identify you directly (name, contact details, etcetera) when submitting their finalised work. This way, it will in most cases only be possible to request indirect personal data about you from the university.

For how long will the personal data be processed?

Your personal data will only be processed for the duration of the student's work for educational purposes. After the project has been completed, the student will delete the personal data. However, this does not apply to data that has been submitted to the university and which thus becomes an official document (see above).

Will your personal data be processed outside the EU/EEA?

As the result of the university's activities, the university may transfer personal data to third countries; i.e. to countries outside the EU/EEA. In such circumstances, special legislation applies. In these cases, the university will take all reasonable legal, organizational and technical measures required to achieve an appropriate level of protection for the personal data. A transfer to the US may occur when

the student is using the text editing and file storage tools provided by the university. The university uses Microsoft for these services.

Your rights according to GDPR

GDPR states that individuals have a number of rights. The most relevant rights are listed below. If you want to read a more detailed description of your rights according to GDPR, please visit <https://www.gu.se/en/about-the-website/processing-personal-data>.

Right of access (register extract)

As an individual, you have the right to once a year, free of charge, request information about what personal data the university processes about you. Contact us via dataskydd@gu.se to request an extract of your personal data from us.

The right to be forgotten

As an individual, you have the right to have your personal data erased in cases where the personal data is no longer needed to fulfil the purpose for which it was collected (the right to be forgotten). There may be other legislation stating that personal data cannot be erased, in which case this legislation applies and the data cannot be erased.

In cases where there are legal obstacles to the deletion of personal data, the university will limit the processing of these personal data to only include processing to the extent that there is a legal basis for.

The right to object to processing

As an individual, you have in certain cases the right to object to the university processing your personal data. If there are no compelling reasons for the university to continue processing the personal data, such as to fulfil legal requirements, the university will cease processing.

Contact details for the Data Protection Officer

If you have questions about the specific processing, you can contact the student who collected the data. The student has filled in his/her/their name and contact details under the heading "Who is responsible for the processing of your personal data?" in this document.

If you have questions about the processing or have complaints, you can also contact the university's Data Protection Officer, by email dataskyddsbud@gu.se.

If you want to read more about how the University of Gothenburg processes personal data in general and a detailed description of your rights according to GDPR, please visit <https://www.gu.se/en/about-the-website/processing-personal-data>.

You have the right to complain to the Swedish Authority for Privacy Protection (IMY)

If you believe that the university processes your personal data in violation of GDPR, you have the right to file a complaint with the Swedish Authority for Privacy Protection, IMY. Further information on how to make a complaint can be found on the website of IMY, www.imy.se/en.