

Student teachers' interactions with generative artificial intelligence in their final thesis project

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Abstract

The aim of this study is to understand how academic practices take shape in the context of a final thesis project where genAI is permitted. The analytical focus is to understand what characterises relations between students, genAI, and the assignment of writing a thesis, from a sociomaterial perspective. Previous research indicates that AI tools are deemed acceptable for early stages of writing, such as brainstorming or outlining. However, there is still a lack of knowledge about how students use genAI while working on an actual assignment. Using a sociomaterial approach, student teachers' self-reported use of genAI has been analysed qualitatively. In total, 92 students participated in the study, generating 46 reports. The results indicate that AI is used to transform information between different languages, for example, everyday to academic language. AI use shows mutual and flexible relationships based on support and control. The results also indicate a compensatory use of AI, illustrated by a proposed Reflexive Consideration Model that depicts the consideration process preceding AI use in constituent tasks. The skills that students assess as necessary but lacking can be compensated for through appropriate use of genAI, so that content is co-created and valued by the students.

Keywords: academic writing; generative artificial intelligence; sociomaterialities; teacher education; thesis project

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Introduction

Generative artificial intelligence (hereafter referred to as genAI) is now a reality that educators in the education sector must contend with. Research in higher education has already debated this subject, considering both opportunities and

challenges, even before the launch of ChatGPT in November 2022 (Bearman et al., 2023).

Simultaneously, some scholars argue that it is necessary to look beyond the "hype" and instead recognise that students have the right to learn how to manage these tools in an increasingly digitalised world (Cerratto-Pargman et al., 2024). However, to achieve this, educators in higher education need to renegotiate what academic literacy means and what it entails for students to be able to write academic texts. Furthermore, Cerratto-Pargman et al. (2024) pose the questions of what we can gain from reinterpreting literacy and what we stand to lose. They welcome empirical research that examines the impact of AI on student learning.

This study serves as an example of such research, in which we investigate how student teachers use genAI when writing their thesis projects, and how academic practices emerge in this context. Previous research indicates that students and educators find it more acceptable to use AI in the early stages of writing for tasks such as brainstorming or outlining (Barrett & Pack, 2023). However, the same study also highlights that students have not received any training on how to use these tools and what constitutes acceptable usage.

The aim of this study is to understand how academic practices take shape in the context of a final thesis project where generative AI is permitted. To meet this aim, we analyse student teachers' self-reported use of genAI. The following research question frames the study:

What characterises the relations between student teachers, genAI and the assignment of writing a final thesis, from a sociomaterial perspective?

Previous research

Since the launch of ChatGPT in November 2022, genAI has come to stay. Bearman et al. (2023) conducted a discourse analysis of leading international journals on higher education, identifying two primary discourses. The first discourse, which highlights the urgency for institutions to adapt to the availability of AI, urges immediate action. The second discourse discusses the shifting power dynamics in learning and education due to AI integration.

Bearman et al.'s study predates the launch of ChatGPT. In a follow-up study, Jensen et al. (2024) examined how generative AI has been discussed in academic debates across various forums such as Times Higher Education and The Conversation. ChatGPT is described as an unavoidable disruption requiring immediate action because it cannot be ignored. It is also considered yet another digital tool within the broader context of continually emerging digital technologies,

each with varying impacts on education. This perspective neither inherently values nor devalues the tool, focusing instead on its application (Jensen et al., 2024).

Additionally, ChatGPT is seen as linking thinking and writing processes (Jensen et al., 2024). Concerns arise that relying on AI assistance in writing could diminish the quality of thought, as writing is viewed as a driver for thinking. If writing is based on pre-existing language models, there is a risk of restraining novel ideas and perspectives. Conversely, several authors in the study by Jensen et al. argue that AI can assist students in generating new ideas, challenging their thinking, or acting as a collaborative partner. These functionalities, however, depend on students using AI consciously and with specific intentions (Jensen et al., 2024).

The notion that technology drives pedagogical development is a common perception of how pedagogy and technology interact. Simultaneously, some researchers argue that the process can now be described as a mutual creation where purposes, teaching contexts, methods, technology, students, and teachers influence each other (Fawns, 2022). While teachers should ensure that they use technology to support their teaching objectives, these opportunities are socially and materially situated. The possibilities depend on the traditions, culture, policy, and infrastructure in which they are embedded. However, Fawns (2022) asserts that in educational contexts, the desirable scenario is for purpose, context, and values to take precedence over available teaching methods and technology. In other words, the aim of education should always lead rather than the desire to experiment with new technology (Fawns, 2022).

Students' willingness to use AI tools in their studies is greatly influenced by their attitudes towards these tools (Falebita & Kok, 2024). However, results from a study investigating students using AI for a written assignment demonstrate that students appreciate the advantages of working with genAI (Wang & Ren, 2024). They also recognised that information generated by AI could be wrong. Moreover, students demonstrated ethical awareness when integrating AI-generated content into their assignments. The results indicate that students who are exposed to AI harness the benefits of the tools.

A comprehensive Swedish study on students' attitudes towards and use of AI identified three themes (Ou et al., 2024). The first theme addresses how students employ AI tools for academic writing, ranging from translating texts from one language to another to utilising tools such as Grammarly to enhance their writing. The second theme illustrates how AI tools function as an additional instructor. In this context, students use AI tools to summarise texts, create notes and outlines, or understand concepts. Here, students must consider how their thinking relates to AI. The third theme highlights students' concerns regarding the assessment process. Cheating is a recurring issue in many survey responses, with some students

advocating for a ban on AI during examinations, while others believe it should be permitted, viewing a ban as counterproductive or even impossible (Ou et al., 2024). In our study, we build on Ou et al.'s results to investigate how student teachers describe their use of AI when working on a specific task, namely their final student thesis project.

In a systematic literature review study, Labadze et al. (2023) show that genAI could provide student feedback and work as a study assistant. Moreover, it could generate individualised feedback to help students understand concepts and improve their skills. Additionally, genAI can enhance students' writing skills by offering suggestions for language corrections. One challenge that Labadze et al. (2023) raise is fair assessment: how can an educator discern if a text is genuinely student-generated? Researchers suggest that considerations should be made on how students' use of genAI will be incorporated into teachers' assessment practices (e.g., Shahzad et al., 2024). Therefore, it is also important to know more about how students use genAI while working on an actual assignment, which, in this study, is their thesis project. Earlier research has primarily focused on students' use of AI tools more generally, rather than in connection with a specific assignment.

Theoretical framework

This study adopts a sociomaterialist perspective, which questions dichotomies such as mind—body, subject—object, and, most importantly for this study, human—technology (Fenwick, 2010). With this theoretical stance, the human is not restricted to the human body, which leads to a relational epistemology (Bearman & Ajjawi, 2023) where knowledge is not an attribute of a human or a machine. Instead, knowledge is contextualised in relationships between people, things, and places. From this viewpoint, both artefacts and humans become agents when their respective actions influence each other (Latour, 2007).

Agency, therefore, is defined based on the impact on others rather than on whether it is human. Following Bearman and Ajjawi (2023), we assume that AI can possess agency but lacks the ability to feel. The term *sociomaterial* represents this perspective, as the material world is treated as embedded in the immaterial and in humans (Fenwick, 2010). This perspective explores the stabilisation and destabilisation of boundaries between different materialities. The aim is to challenge the notion that objects, texts, human bodies, intentions, and concepts exist as separate entities. Instead, the dynamic process of materialisation is examined, where both material and discursive practices create and influence things (Fenwick,

2010). A sociomaterial approach to technology and communication implies that technology and communicative behaviours are inseparable (Contractor et al., 2011).

In line with Hort (2020), writing a thesis is viewed, in this study, as a complex interaction between different forms of agency that shape specific sociomaterial practices. Within this perspective, students are seen as individuals who respond to the situations they are confronted with. In this study, we are particularly interested in how they respond to different materialities and technologies, including genAI. Moreover, agency is seen as distributed between material resources, writers, writing technologies and norms about genre, such as academic writing (Hort, 2020).

What is Generative Artificial Intelligence?

GenAI is an AI system consisting of ‘a computational artefact together with the human behaviour and people who make the artefact a valuable and meaningful entity’ (Johnson & Verdicchio, 2017, p. 583). Thus, an AI system is a socio-technical system. For an AI system to be meaningful, it must be embedded in a specific context where a human uses the system to accomplish a task.

When Alan Turing introduced the idea of artificial intelligence in the ‘Turing machine’ (Turing, 1950), he argued that a computer is defined by what a person thinks it is. Two examples are when we perform a search on Google or unlock our phone using facial recognition. Both examples can be considered as using AI, not based on the underlying technology, but more on the relationship between humans and technology in that specific context (Bearman & Ajjawi, 2023). Furthermore, Bearman and Ajjawi (2023) argue that this perspective on AI requires that part of the function is invisible in a black box:

An AI interaction does not depend on how a technology is constructed, but on the relationship between the humans and the computational artefact, at a particular moment in time. (p. 1163)

According to this definition, technologies that do not present judgments on how to act are excluded. In a university environment, this means that more straightforward language and grammar-checking programs built into, for example, Microsoft Word do not constitute AI interactions.

Method

Context of the study

This study was conducted within two different teacher education programs at a Swedish university. In the thesis project course, the concluding course for both programs, the opportunity to use generative AI was introduced. The thesis course lasts 10 weeks, valued at 15 ECTS credits. The students typically work in pairs and have regular meetings with a supervisor from the program. The students formulate an aim and research questions, which they answer by collecting and analysing empirical data. The most common data collection is interviews, which the students transcribe before analysing. Thereafter, they write an essay that reports on previous research, methods, results and conclusions.

GenAI was a new concept for the students, as they had not previously been encouraged to use it, even though some of them had tried different tools on their own initiative. A resource page was created on the courses' digital platforms to support their work. The potential uses of AI presented to students included summarising scientific articles, translating texts from English to Swedish, transcribing interviews, and improving language. The students have access to Microsoft Copilot through the institution, which is the service they were encouraged to use. Students were also allowed to use AI services in other ways, provided they transparently reported their usage in the self-assessment submitted along with their thesis. In this study, we initially based our analysis on what the students classified as AI usage or AI services.

Data collection

This study is based on data from self-assessments submitted by students from two teacher education programs in conjunction with their thesis projects. The thesis project for Teacher Program 1 (TP1) was conducted at the end of the spring term of 2024, while students from Teacher Program 2 (TP2) completed their course at the end of the autumn term of 2024. Students enrolled in TP1 and TP2 received the same information on their respective learning platforms (as described above) and were provided with oral information during the course introduction. Two different instructors delivered the oral information, but it was essentially identical and included details on both permissible and prohibited uses of AI.

Data were collected from 22 self-assessments (no. 1–22) from TP1, representing 44 students, and 24 self-assessments (no. 23–46) from TP2, representing 48 students. Only the section of the self-assessments addressing students' use of AI tools was analysed. The length of the self-assessments varied, with some consisting of only a few sentences and others extending to several

hundred words. The average length was 83 words for TP1 and 100 words for TP2. The briefest self-assessments typically only noted that the students had chosen not to use AI tools. The primary difference between the instructions given to TP1 and TP2 was that TP2 received a template for their self-assessments, while TP1 received guidelines on the headings to include. The template for TP2 included the prompt: 'Describe if and how you have utilised AI tools'. The analysed material comprised 4,258 words, with each self-assessment averaging 92 words (ranging from 9 to 201).

Ethical Reflection

As previously described, this study was conducted in the students' regular coursework. The authors were responsible for the thesis courses, but had no assessment role in the course. To make sure no student felt obligated or forced to participate, students were given information about the study and asked to participate after they had submitted their assignments. They were also given the opportunity to opt out of having their texts used for research purposes. The participation of the students did not affect their grading in any way. One student declined to participate, which resulted in the exclusion of that student pair's text from the study. All material was handled with complete confidentiality, and any writing that could be traced back to specific individuals was removed from the data before analysis began. Based on our considerations, the study was conducted in accordance with the Swedish Research Council's recommendations for good research practice (Vetenskapsrådet, 2024).

Thematic Analysis

The data material was analysed based on the research questions of the study. Initially, the material was coded, and the resulting codes were then themed according to the meaningful patterns that emerged through the analysis (Clarke & Braun, 2017). The thematic analysis was conducted through an exploratory, iterative, qualitative process influenced by the material published on the course platforms, theory, previous research, and discussions among the researchers (Braun & Clarke, 2019). This reflexive approach enhances the analysis.

This meant that first, we identified how the students described their use of genAI. Based on a sociomaterial perspective, thesis writing is not treated here as a single, bounded task, but as an assemblage of enacted practices comprising multiple tasks that are distributed over time. Therefore, students' engagement with genAI was analysed in relation to constituent tasks, such as searching for information, summarising academic articles and refining language.

Second, we examined whether any interaction between students and

technology appeared in their descriptions. Interaction was here defined as a description of how AI influenced the next step in the students' process. For example, an interaction could be that the students asked AI for a summary of a scientific paper; they then evaluated the summary to conclude whether the paper should be included in their further work or not. In the third step, cues on students' judgement were identified. For example, the students write about the consequences of their decisions and what AI contributed or could not contribute. This could mean that the students saved time by using genAI, or the answers they got led to a better understanding of the content.

The coding was first carried out on the material from TP1, after which saturation was achieved, as no new codes emerged. A few new codes appeared when the coding continued with TP2, but saturation was also reached in this case. This experience is likely due to the approximately six-month interval between data collections, which provided students with different starting points and allowed the course instructor to introduce AI in slightly different ways. Since the study is based on students' written self-assessments, we depend on how the students choose to express themselves when describing their use of AI. This means that it is possible that the students may have used AI differently than they communicate. However, this study has a qualitative approach and aims to demonstrate variation in how students interact with genAI. Given the number of self-assessment, we judge that the data is sufficient for this purpose.

Transforming information between languages

In this section, we will present findings regarding the characteristics of the relations between students, genAI and academic writing. Our findings show how these characteristics need to be understood in light of negotiations of the constituent tasks and students' comprehension of the overarching task of writing their final thesis project. Findings of characteristics of the sociomaterial relations will be presented in the following two sections.

Consuming academic text

The students' self-assessments reveal that AI tools are utilised to assist them in consuming (finding, comprehending, and understanding) academic information and texts. The analysis identifies four areas of usage: searching, translating, summarising, and explaining. In these areas of usage, relations between student, genAI and academic writing evolve in the thesis project.

Consuming academic text starts with *searching* for appropriate information (papers, etc.). In this phase of the thesis work, sociomaterial relations appear to be instrumental and one-sided, emphasising students' agency. In students' assessment, searching for text is not reflected upon or considered in any notable way, indicating that AI use for searching online is perceived as unproblematic for the students.

When searching for appropriate texts, students are *translating* between different languages, mostly from English to Swedish, but also other languages such as Norwegian. Students justify using AI in translation work by stating that they needed (and received) assistance in enhancing their understanding of the text's content. This comprehension is essential for assessing the relevance of the text in relation to the thesis the students are writing. The analysis identifies four distinct interaction patterns when translating academic texts, indicating a flexible and mutual agentic relation between students and AI. The interaction patterns are the following: 1) AI provides new input that students consider, 2) AI strengthens and supports students, 3) AI checks students, and 4) AI coaches students.

By these patterns of interaction, it is showcased that agency or credibility are not stable and alter between students and genAI. Instead, credibility moves between actors, depending on students' perceptions of what kind of help is needed and what AI offers. As an example, two students express: 'In our thesis, we received support from Copilot, Copilot has helped us to (...) translate English texts into Swedish and assist us in extracting method and theory from various articles when we were unable to find them ourselves' (7). This example demonstrates how AI functions in a compensatory way, as genAI supports and strengthens students when they assess that they cannot accomplish the task on their own. However, the students in the example do not describe that they have assessed the relevance of the new information themselves. Thus, it appears that the genAI is given agency in relation to the students' work.

In some cases, AI is agentic in controlling the students' translations: 'translated a section of Lager's (2020) study to ensure we correctly understood the English text (...)' (8). This example shows that students first read an article and formed their own understanding of the content. They then used an AI tool to create a translation, which they compared with their interpretation. By doing so, students describe that genAI "ensures" the accuracy of their own interpretation. In this example, students do not evaluate the AI's output. It can be interpreted as having high trust in genAI. In similar ways, our findings show that relationships between students, AI, and writing when translating academic text are mutually controlling and supporting.

When consuming texts, students also use AI tools to *summarise* information and articles, as a way to speed up the comprehension of scientific content and to

decide whether the article is relevant to the thesis work. The analysis indicates that the summaries are produced in two ways. Either, students' statements reveal an instrumental use of AI for summarising texts, for example: 'We used Co-pilot to summarise articles during our search for previous research' (21). Or, summaries are created collaboratively between the students and genAI, wherein the students make their own assessments of the relevance and utility of the new information. The analysis reveals two forms of such collaboration, where the students are given more agency than genAI—students check AI's errors and AI provides new input that students consider.

In the process of summarising, the relationship between students and AI is characterised with more doubt or suspicion from the students' side. Students' comprehension of the information they have read is valued more highly than AI's summaries. In this way, students create ownership of their interpretations of consumed text. 'This tool was used sparingly, and we recognised its limitations. Upon closer inspection, the tool can miss relevant results in summarising studies' (22). This example illustrates how students describe recognising the limitations of genAI based on their assessments and knowledge. The students explain that the summaries are not always accurate, requiring them to evaluate the information's correctness. The students' descriptions give them significant agency in relation to genAI. It is interpreted that the students believe they possess the necessary knowledge to determine the relevance of information and scientific texts.

To improve the comprehension of scientific literature, students also describe their use of AI tools to obtain *explanations* for text excerpts from the literature or articles containing information or individual words and concepts. GenAI functions as a dictionary or an encyclopaedia. The analysis of students' descriptions of AI use for explanations reveals both one-directional use and interactional use of AI. Regarding the one-directional, the students only mention that they have used genAI to get an explanation, for example: 'Moreover, we have used Chat Gpt to ask about the meaning of concepts' (6). The example indicates an instrumental use of AI similar to looking something up in an encyclopedia. The analysis also exposes two distinct forms of interaction between genAI and the students: AI strengthens and supports students and AI checks students.

When processing academic text, the relationship between student and AI is characterised by support: 'ChatGPT has also been a valuable support during this thesis by providing explanations of concepts' (24). This example demonstrates how students describe their use of genAI as a "valuable support" for explaining various concepts. This indicates a compensatory use of genAI, wherein AI supports the students when they assess that their own competence or capabilities are insufficient. Consequently, AI is given a significant degree of agency as the students' description

implies that AI provided them with "correct" explanations of the concepts. The students in the example do not show that they have further evaluated the new information. Therefore, the knowledge and the credibility of that knowledge are positioned with genAI, and the student is positioned as a passive receiver of new information.

Producing academic texts

The students' self-assessments indicate that AI tools are employed to assist them in producing academic information and texts. The analysis identifies four areas of usage: language processing, data production, data processing, and transcription. Students frequently use AI for various *language processing* tasks. This includes spelling, grammar, sentence structure, and text disposition. Additionally, AI is employed to find synonyms for repetitive words and to assist in reformulating sentences. Furthermore, students utilise AI to reduce texts that are too long and to aid with reference management and improve text disposition. The analysis showed different patterns of interaction between students, AI, and academic writing: 1) students check AI's errors, 2) AI provides new input that students consider, 3) AI strengthens, coaches, and supports students, 4) AI checks students, and 5) students generate ideas or text that AI can reinforce.

Hence, even when producing academic text in their thesis project, the relationship between students and AI is mutual and flexible in agency and credibility. In some cases, AI is held accountable for knowledge and truth: 'We also used Copilot to check spelling and grammar in the text. Similarly, we used Word's program to ensure accurate spelling and grammar.' (17). This example illustrates how AI is used for spelling and grammar checks. The students address their identified needs for spelling and grammar assistance. Here, AI is employed as a tool to verify the text produced by the students without further reflection on the output generated by AI. But in other cases, the interactions are more dialogic in character: 'Chat GPT was used for rephrasing sentences and for inspiration on how we could strengthen the arguments we have written for the study's purpose. However, ChatGPT has been used cautiously, as we have discovered that certain responses were not relevant to the study' (11). This example demonstrates that students use genAI to assist with rephrasing sentences they have authored. Simultaneously, the students show that they evaluate the responses they receive from AI by assessing their relevance to the context. Thus, it appears that the students adopt an analytical approach and verify the outputs they receive from AI.

At times, AI use is described as a collaboration between students and an AI tool, as AI is portrayed as a coach or supporter to the students: 'We wrote a section of the study, copied it into Copilot, asked if it could improve the language or provide

a suggestion, and we received a response. At times, we used words suggested by Copilot, and in certain instances, we copied the suggested text, which we had actually authored' (36). This example demonstrates that students employ genAI to receive suggestions on how their self-produced texts can be enhanced. The students then make an active decision, sometimes opting to retain their original text and sometimes utilising the suggestion generated by AI. This indicates that students evaluate the output received from genAI before incorporating it, signifying a mutual and supportive collaboration.

For language-improvement purposes, students report AI use to read their self-produced text aloud, to reveal mistakes in language or text disposition. This use was not characterised by dialogue or assessment by the students, but as merely a one-way interaction.

When planning and conducting *data production* and *data processing* in their thesis work, some students utilised AI tools to obtain suggestions for interview questions to ask their informants. This highlights the following interaction patterns between students and AI: AI provides new input that students consider, and AI coaches and supports students.

The relationships emerging when constructing an interview guide are characterised by support and coaching: 'We asked AI to formulate an interview guide based on our aim and research questions. Once we received the completed interview guide from AI, we revised the questions that we felt did not fit the context and added some additional follow-up questions that we deemed important to obtain deeper answers in the interviews we conducted' (41). This example demonstrates that the students allowed AI to generate an interview guide based on the purpose and research questions created by the students themselves. By revising the questions and adding further inquiries, the students show that they evaluate the new information generated by AI.

A few students reported using AI tools in their analytical work. However, this is not a widespread practice among the students. This interaction and relationship between students and AI is interpreted as a coaching character: 'AI tools have provided us with new perspectives in our coding process by suggesting themes based on collected data and have also inspired us with suggestions for titles and word choices' (29). This example indicates that students use AI tools to receive assistance in their analytical work. AI becomes someone they can think together with. Students describe how this assistance involves receiving suggestions for themes. However, the example does not specify how the use of genAI was implemented or how students assessed the new information. Nevertheless, students express that the use of AI has contributed to 'new perspectives'.

Many students reported having utilised genAI to *transcribe* audio files containing interviews. In doing so, students weigh the benefits of saving time by avoiding manual transcription against the potential time needed to ensure the accuracy of AI-generated transcriptions. Nevertheless, most students find that the time saved using genAI outweighs the time required to verify the transcriptions, indicating an unequal relationship wherein AI does the labour and the students control the accuracy of the transcriptions: ‘After Word generated a draft of the interviews, we listened to the interviews once more and made corrections where the program had transcribed incorrectly’ (8). In this example, students use a transcription function, and subsequently, they review the interviews to check for errors made by the program. While students know that the program will make mistakes, this example does not indicate that they make any further considerations regarding its use. The students possess agency, and genAI is employed merely to execute a specific function.

Summary of the results

Our analysis shows that students’ engagements with genAI are formed by a dynamic and sociomaterial relation between the students, AI tools and the constituent tasks of writing a final thesis. The character of the specific task places a central role in how genAI is taken up and what kind of agency it is afforded. In instrumental tasks, such as information searching, transcription or grammar processing, genAI tends to be positioned as a tool that is delegated responsibility for solving the task. At the same time, our analysis indicates that students’ prior knowledge influences how they evaluate and rely on AI generated content. When requesting explanations of unfamiliar concepts, students assign high credibility to genAI. In contrast, when genAI is asked to summarise scientific articles that students themselves have the ability to assess and evaluate, its output is questioned and critically assessed. Taken together, these findings highlight that students’ use of genAI cannot be understood as stable nor uniform, but rather emerges situationally through the interplay between students prior knowledge and their interpretations of the task at hand, and the role genAI is assigned within the activity. Thereby, the form and distribution of agency is shaped in each specific situation.

Discussion

This study aims to understand how academic practices take shape in relations between students, genAI technologies and academic writing in the context of a final thesis project. The analysis shows that students need to assess the overarching task

of writing a thesis, and its constituent tasks, to judge how and if AI could be used. The assessment of the task includes reflections and definitions on the following:

- *What needs to be done*: what constituent tasks build the overarching assignment
- *What are the time frames for the task*: how long can be used for the different constituent tasks
- *What is relevant in relation to the task*: what information is useful, and how to prioritise

In this assessment, students have to evaluate their skills and capabilities in relation to the assignment. The students show in their statements that they use AI to compensate for these different aspects of understanding the task. By viewing academic practices as relations between different actors, we argue that students' interactions with genAI also involve considerations and actions based on their understanding of the above. Hence, academic practices emerge through relations between the different human and non-human actors involved (Fenwick, 2010).

This study contributes empirical evidence that AI can assist students in working with their theses, which complements the study by Jensen et al. (2024). Jensen et al. (2024) show that this potential was raised in academic debates shortly after the launch of ChatGPT. However, students' use depends on an awareness of what AI can do, indicating that students have specific intentions with their AI use. In line with Wang and Ren (2024), our results also show that students are aware that output generated by AI could be false or wrong, which requires considerations and negotiations of the trustworthiness of the output. We propose the following in response to the research question we pose above: what characterises the relations between student teachers, genAI, and the assignment to write a final thesis, from a sociomaterial perspective?

First, students need to interpret the task. In this case, students need to be aware that writing a thesis contains several constituent tasks. However, the results also show that students evaluate their own capacity to solve these tasks. The evaluation makes them use genAI to compensate for their self-perceived lack of competence. The use of genAI for academic writing resonates with similar results (Ou et al., 2024).

Second, students need knowledge about AI, and how AI can be employed to enhance students' work on their thesis. Research indicates that students recognise and acclimate to both AI's advantages and limitations through practical engagement (Wang & Ren, 2024). A similar pattern is evident in this study, since the students, willing to try AI, acknowledge both pros and cons. However, we also want to raise

an important issue here—if educators choose to make the use of AI optional for students without offering any introduction to students unwilling to try the tools, this might mean that some students do not even try them (see also Falebita & Kok, 2024). Since AI can work in a compensatory way, depending on the students' prior knowledge, it is urgent that students are given equal opportunities to learn how to use the tools. Otherwise, introducing AI might widen the gap between students who can use genAI constructively and those who can not.

Our results also indicate that agency is distributed between material resources, writers, AI and other technologies and norms about academic writing (see also Hort, 2020). On the other hand, genAI could also be a potential threat to what teacher educators recognise as academic writing (Bearman et al., 2023), leaving thesis supervisors in an intricate position in supporting constructive AI use (Stolpe & Hedrén, 2025). As research indicates, higher education teachers are concerned with how to discern the originality of students' written assignments (Labadze et al., 2023) and how these should be assessed in the age of genAI (Shahzad et al., 2024). Our study deepens knowledge about how academic practices unfold in sociomaterial relations between students, genAI, and academic writing.

Reflexive Consideration Model of Students' AI Use in Academic Writing

We suggest the Reflexive Consideration Model (Figure 1) to describe students' compensatory use of genAI in academic writing.

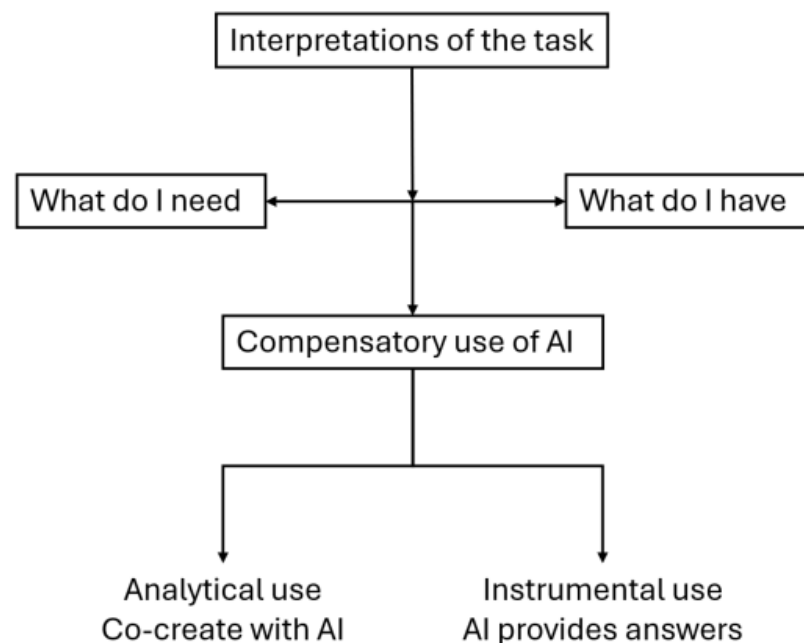


Figure 1. *The Reflexive Consideration Model: The students assess their skills and capabilities in relation to the task at hand. AI could work in a compensatory way in relation to the students' needs. Moreover, the students can choose to use AI analytically or instrumentally.*

The model shows how students assess what skills and capabilities they need for solving the specific task and relates those to the skills and capabilities they already have. Thus, AI can compensate for the skills that the students lack, but still find necessary. In that sense, genAI could work as an always-available tutor (Jensen et al., 2024; Labadze et al., 2023). However, as our results suggest, reflexive considerations precede the decision to use genAI. As earlier research also indicates, attitudes towards genAI will also influence the decision (Falebita & Kok, 2024). Moreover, the model proposes an analytical or instrumental use of AI. Whether the use is analytical or instrumental emerges in the academic practice through relations between students' self-evaluated capacity, their interpretation of the task, and genAI (cf. Fenwick, 2010). With an instrumental use, the students use AI unidirectionally, where students prompt and AI provides answers, such as translations, summaries, or explanations. With an analytical approach, students and AI work together to co-create content valued by the students. To reach this approach, students need to practice their skills in using AI, but our results also suggest they need to be aware of their strengths and weaknesses. This model needs to be further validated with further empirical research. Moreover, this is a small-scale study, conducted in a specific higher education context with students' self-reported genAI use. More research, with multiple research designs is needed to validate students' academic practices in authentic educational contexts.

In conclusion, the results from this study not only show how academic practices emerge through relations between students, genAI, and a specific task, but they also demonstrate that students' awareness of their skills and capabilities is of importance for whether genAI can work compensatory or not. This is something educators in higher education need to take into consideration when planning for integration of genAI in courses and assignments (see Shahzad et al., 2024). Moreover, our results imply that educators should give all students the opportunity to reflect on their own capacity in relation to given tasks to provide transparent academic practices in the presence of genAI.

Author biographies

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Sanna Hedrén is a senior lecturer in pedagogical work at Linköping University. Her research focuses mostly on children's and young people's meaningfulness in different leisure institutions. Her research aims to give insight on what is meaningful for children and young people and how that can be understood in relation to societal expectations and needs. Sanna also teaches in final exam courses in different teacher programmes.

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