

THESIS BUDDY – GENERATIVE ARTIFICIAL INTELLIGENCE IN THESIS SUPERVISION

Krista Sorri¹, Anu Helena Suominen¹, & Nasir Md Shuvo²

¹Information and Knowledge Management Unit, Tampere University (Finland)

²GPTLab, Tampere University (Finland)

Abstract

This paper aims to explore how generative artificial intelligence (GenAI) can support master's thesis (M.Sc.) supervision in higher education (HE), particularly by reducing repetitive guidance and improving access to institution-specific information. Specifically, it focuses on the use of a recently developed AI chatbot, "Thesis Buddy", designed to supplement traditional supervision by providing continuous, on-demand support to students. Accordingly, the paper presents an exploratory study of design and early user experiences with "Thesis Buddy", conducted as a Design Science Research (DSR) in a HE context. The chatbot utilizes document retrieval and large language models (LLM) to answer student queries based on internal university documents and selected external sources, while offering citations and administrative oversight. The results show that although students continue to prefer human supervision, they perceive "Thesis Buddy" as educationally valuable for basic, procedural, and institution-specific questions related to the thesis process. At the same time, the findings highlight challenges related to usability and the need for a clearly articulated pedagogical role. This study contributes to educational research and practice by providing design-oriented insights into how GenAI tools can be pedagogically integrated into supervision processes, supporting scalable guidance, knowledge transparency, and informed educational decision-making in HE.

Keywords: *Generative Artificial Intelligence, chatbot, thesis supervision, computer assisted learning, design science research.*

1. Introduction

Our world was disrupted in November 2022, when Open AI launched ChatGPT 3.5, the first LLM based chatbot open to general public (Lewis et al., 2025). Since then, these bots have permeated nearly all parts of our life from banking to manufacturing industries. HE is no exception. While the initial reaction in many HE organizations was detecting ways to hinder malpractice of GenAI in studies, the current view focuses more on teaching the students on ethical use of GenAI (Kangwa et al., 2025). Concurrently, the number of HE students in Finland is increasing as Finnish government has set a target of 50% of all 25–34-year-olds to hold a HE degree (OKM, 2017) and simultaneously, funding is being linked more closely to target graduation times and rates (OECD, 2025; YLE, 2025). One of the focal HE teaching processes is thesis supervision. With the growing numbers of students, the teachers need to prioritize their value-adding practices in their supervision. However, supervisors frequently repeat guidance found on universities' intranet, which seems to be hard for students to locate. For that purpose, GenAI provides possibilities to support the students with basic information retrieval, which is repetitive and time-consuming for the supervisors. To address this possibility, "Thesis Buddy" -chatbot was designed to provide time-independent/constant support for students. According to DSR methodology, the "Thesis Buddy" design was based on using document retrieval and LLMs to answer queries based on both internal and external files, offers citations, and includes an admin interface for monitoring content and users. Thus, our research question is:

RQ: How is an ethical and reliable GenAI-based tool created to support students' basic information retrieval for thesis project time-independently?

2. Theoretical background

Two theoretical motivations initiated the development of “*Thesis Buddy*”. For one, it is a known fact that support on thesis process and content (e.g. methodology and structure) increase the likelihood of completing the thesis on time (Mårtensson & Söderström, 2026). This contributes to timely graduation, which is a significant part of university funding in Finland (YLE, 2025). Second, while supervisor support especially in early phases of the thesis project is seen valuable, simultaneously the students are expected to conduct the project independently and hence, the supervisor resource allocation has been reduced (Todd et al., 2004). Therefore a substitutive or supplementary support mechanism is required. Large language models (LLMs) are one possibility as they can find the required instructions and support tirelessly at any time of a day.

LLM-based GenAI does not have a ubiquitous definition. In this study, LLM refers to large scale, pre-trained, neural network based conversational systems focusing on solving tasks (Chen et al., 2020; Zhao et al., 2023). The LLM-based chatbots generate human-like responses enabling students to find relevant information and explanations from a vast range of sources (Neumann et al., 2025). Perhaps the most well-known application of LLM is ChatGPT, a state-of-the-art natural language processing model that uses deep learning techniques to analyze and generate text. It is a highly skilled chatbot created by OpenAI that uses algorithms to generate new text. In the field of education, ChatGPT has multiple uses: creating virtual tutors, answering student questions, and providing personalized learning experiences. (Su & Yang, 2023).

The second motivation in HE context is that LLMs can offer significant benefits for the students but also create risks such as hallucinations of incorrect information, plagiarism and bias (Chang et al., 2024). The thesis project requires autonomy from the students and each HE institute has unique processes and instructions in conducting the projects. To address this, a Retrieval-Augmented Generation (RAG) based system was selected to be developed, as RAG enhances the accuracy of the responses, while it understands the context better than a regular LLM (Arslan et al., 2024).

3. Methodology

“*Thesis Buddy*” is developed through DSR, which is a widely used methodology in creating information systems artefacts (Hevner & Malgonde, 2019). As a research methodology, DSR includes six iterative phases (Peppers et al., 2007). First, it starts with identifying the problem and showing its importance. In the second phase, the artifact is defined, i.e. what should be accomplished with it. The third phase focuses on developing the artifact, i.e. Proof of concepts (PoC). As fourth and fifth phases, it is demonstrated to the users and then evaluated. The process iterates between phases to improve the artifact. In the final sixth phase, the artifact is published in either academic or professional publications; sometimes both. (Peppers et al., 2007) Here are the “*Thesis Buddy*” -phase descriptions according to DSR:

1. The project was initiated in early 2024, when a conflict in the number of thesis supervisions per educator in a Finnish University became apparent. As a problem, it was recognized that the questions students ask and the instructions supervisors give are largely the same regardless of the thesis subject. Unfortunately, this means that the time provided for guidance for study-specific questions and helping the students to improve their scientific thinking is scarce.
2. The project started in a small team mapping the phases of masters’ thesis project process, its information needs and possible sources of the required information (e.g. University instructions, methodological sources, referencing instructions, guidelines for creating a synthesis). It is worthwhile to notice that the masters’ program is implemented in co-operation with two faculties, therefore “*Thesis Buddy*” is required to understand the context to some extent.
3. After mapping the process and information needs, the user requirements for “*Thesis Buddy*” were specified. The requirements were: 1. Documents are easy to upload (an administrator role for supervisors), 2. versatile document formats can be included (word, PowerPoint and pdf documents or web pages), 3. “*Thesis Buddy*” should collect the questions students ask anonymously to identify what type of information should be added.
4. Furthermore, the application of the “*Thesis Buddy*” was coded and the full source code was shared openly on GitHub (<https://github.com/nasiriubat/thesis-buddy>).
5. After the initial PoC-chatbot, supervisors tested it. Over 200 documents were added to the database. These documents included e.g. research methodology articles, university intranet pages for students, referencing standards, and seminal papers.
6. The PoC1 was piloted with masters’ students. While the number of students is relatively small and the thesis projects take 6-8 months, we tested the system for a year and improved the system concurrently. In PoC2, the reference information was added to the responses, which helped the students to verify “*Thesis Buddy*’s” responses. From supervisor’s point of view, updating the

system was easy but risk of duplicate documents became apparent as more than one supervisor had the admin. Therefore, a joint Zotero-folder was implemented to solve the problem. This was tested in PoC3, but it did not work. When references are linked to the joint Zotero folder, the pdfs are visible only to the person who uploaded the document. While most of the documents are behind a paywall, "*Thesis Buddy*" could not find them.

7. A user test with students in fall 2025 and spring 2026 was conducted. To understand, students' perceptions of the support "*Thesis Buddy*" provides, a survey was conducted.

4. Results

According to DSR, this chapter describes first the technical application of "*Thesis Buddy*" and then the students' perceptions of the use.

4.1. Technical implementation

"*Thesis Buddy*" was implemented as a web-based chat application hosted on a Linux server provided by CSC and running continuously using a process manager. The full source code, including the FAISS-based implementation and an administrative interface for managing data and interactions, is openly available on GitHub (<https://github.com/nasiriubat/thesis-buddy>).

Students can access the chat without login, while teachers use an authenticated admin interface to manage the system. Through this interface, teachers can upload and manage materials such as PDF, DOCX, text files, web pages, and manually entered text.

The system processes all materials by dividing them into smaller text segments and converting them into numerical representations using a pre-trained language model. These are stored and indexed using a similarity search method, allowing the system to retrieve relevant content efficiently. When a student asks a question, the system retrieves the most relevant segments and uses a language model to generate a response based on them. The references used are also shown to the user to improve transparency. The system supports both English and Finnish.

Teachers can monitor all questions and responses through the admin interface. Students can provide simple positive or negative feedback on answers. Questions which are not answered well can be reviewed by teachers, who can then provide a correct answer and add it to a frequently asked questions (FAQ) section. This allows the system to improve over time.

4.2. Students' perceptions of the test use of "*Thesis Buddy*"

To understand, how students find the support from the "*Thesis Buddy*", a survey was conducted. The survey was sent to the whole pilot group (n= 22). The survey responses (n=8) indicate that "*Thesis Buddy*" AI chatbot is/was still at an early stage of adoption among the participating students. The actual use remained limited: six respondents (75%) reported that they had only assessed the tool to answer the survey, whereas two respondents (25%) reported using it less than once a month. This limited exposure was also reflected in the usefulness-ratings. When evaluating with 5 star scale (5 = very useful, 1 = not useful at all), the perceived usefulness of Thesis "*Thesis Buddy*" in the master's thesis process was low to moderate (M = 2.4/5), with five of the eight respondents rating the tool at 1 or 2 and no respondent rating it at 5, indicating perceived situational usefulness rather than strong endorsement. The perceived value of "*Thesis Buddy*" as a complement to supervisor support was even lower (M = 1.9/5): six respondents rated it at 1 or 2, and again none selected 5.

Table 1. Summary of open-ended responses.

Theme	Key findings
Main uses of Thesis buddy	University instructions, thesis structure, methodology, literature review, citation practices, and personal study planning
Complementary role to thesis supervisor	Potential first-line support for basic guidance and clarifying institutional instructions.
Main shortcomings	Unclear intended use and source base, limited added value compared with other AI tools, English answers to Finnish questions, weak formatting/readability, and no direct source links
Development needs	Clearer value add proposition compared to other AI tools, improved usability, answer structure, faster and more flexible responses, and feedback mechanism for continuous improvement.
Other AI tools in use	ChatGPT (also paid versions), Claude, Copilot/Copilot Studio, Gemini, and in some cases local models for brainstorming, planning, sparring ideas, and article reading, and customized support

This suggests that students saw potential value in “*Thesis Buddy*” as **complementary support**, but not as a replacement for human supervision. Taken together, the quantitative findings suggest that “*Thesis Buddy*” had not yet established a clear role as a strongly valued support tool in the thesis process.

The open-ended responses help explain these ratings. The table 1 presents the results based on the responses concerning **five open-ended questions** concerning the use of “*Thesis Buddy*”, the added support it might provide, “*Thesis Buddy*’s” shortcomings and development needs, as well as the use alternative AI tools.

Overall, the qualitative responses indicate that while students recognized the **intended pedagogical role** of “*Thesis Buddy*,” they did not yet perceive it as competitive with or superior to widely used general-purpose AI tools.

5. Conclusions

The results of this article create new knowledge and add to the research of GenAI usage as a part of computer assisted learning in HE teaches, especially in the masters’ thesis supervision context. Concluding a preliminary pilot study in a Finnish university, this article makes a couple of contributions. The main results of our research question “*How is an ethical and reliable GenAI-based tool created to support students’ basic information retrieval for thesis project time-independently?*” are two-fold, revealing the following:

First, the results in this small pilot reveal, that “*Thesis Buddy*”, a RAG-based bot created to support the master thesis supervision with DSR-methodology, appears to have its strongest educational potential as a first-line support tool for basic, institution-specific questions, as intended, rather than as a substitute for supervisor expertise. Students recognized relevant use cases related to university instructions, thesis structure, methodology, literature review, and citation practices, but the tool did not yet offer sufficiently clear added value in comparison with the general-purpose AI systems they already use.

Second, the results of the survey informed the next iterations of the “*Thesis Buddy*” according to the DSR-methodology: to become a meaningful part of thesis supervision, “*Thesis Buddy*” should clarify its intended use and source base, as well as pedagogical rationale, communicate its unique value more explicitly, and further improve the usability, clarity, flexibility, and speed of its responses. A built-in feedback function could also support continuous pedagogical and technical development. After which the tool could be introduced more widely as part of the thesis guidance ecosystem, alongside traditional thesis supervision rather than being perceived as redundant.

This study contributes to the ongoing discussion on GenAI’s chatbots, and particularly RAG-based system as part of computer assisted learning in the master thesis supervision context (Arslan et al., 2024; Neumann et al., 2025). Furthermore, this study contributes to GenAI’s effects on master’s thesis supervision in HE by offering an open-source code for further development of GenAI applications in thesis supervision. Furthermore, it contributes by expanding the understanding of student expectations and attitudes towards GenAI-enabled thesis supervision (Kangwa et al., 2025). While the students are already capable of utilizing commercial GenAI applications, they still require more specific information on where “*Thesis Buddy*” is most beneficial and how it differs from the general commercial applications. The feedback from the students helps the developer team to improve the system but also to create clearer instructions to the students. These actions together with teaching students the ethical use of GenAI can help HE organizations to achieve the targets of number of people having an HE degree (Kangwa et al., 2025; OECD, 2020)

While the student feedback is essential for further development, it needs to be emphasized that the number of respondents was small, which creates a significant limitation to this study. Moreover, the testing time has been short, and the application is still under development. Keeping these in mind, further research is required. Namely, the testing and development in this specific masters’ program needs to be continued but also more pilots in different context should be conducted to confirm our findings.

“*Thesis Buddy*” does, however, offer potential to revise the thesis supervision practices.

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