

AI Assistant for Research Topic Selection in Higher Education

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At the University of Applied Sciences Burgenland, a GPT-based chatbot has been developed to support students in creating research topic proposals for scientific papers. Large Language Models like GPT-4 enable interactive conversations, allowing chatbots to facilitate complex learning processes and provide personalised learning experiences. In the rapidly changing educational landscape, specially designed educational chatbots are gaining importance. This trend, combined with the accessibility of Large Language Models and the ability to create GPTs without programming knowledge, opens new possibilities for integrating them into learning environments. To ensure these chatbots function as intelligent tutors rather than simple question-answer machines, appropriate instruction is essential.

To understand the context, it is worth looking briefly at historical developments. Chatbots have been present in the education sector since the 1960s and have evolved from simple response devices to highly sophisticated learning assistants. Kuhail et al. [1] describe this evolution from teaching agents to interactive ones. According to them, the majority of chatbots have used chatbot-driven conversation to guide users through pre-structured dialogues, whereas only a minority have relied on user-driven conversation in which learners control the interaction through AI-supported responses. LLMs like ChatGPT have fundamentally changed the capabilities of educational chatbots and made user-controlled conversations possible. Thanks to these models, chatbots can now conduct significantly more complex and demanding conversations than was possible with pre-programmed responses. These so-called Socratic chatbots use targeted questions to promote critical thinking and self-reflection instead of providing direct an-

swers. This creates a dialogue-oriented learning approach that expands learners' abilities to support complex learning processes and enables personal learning experiences.

When developing a GPT as a research topic assistant [L1], the learning objectives were first identified and the needs of the target group analysed. Based on this, a didactic concept was developed that integrates the creation of a scientific paper as the core of the learning interaction. The focus is on questioning strategies that promote critical thinking and autonomous learning. The GPT was designed as a role-play game to leverage the advantages of game-based learning. These enable learning as a combination of theory and application in authentic situations [2]. Role-play games demonstrably increase student interest in learning. The GPT prompt was newly developed following the methodology described by Stampfl and Prodingler [3], who demonstrated how ChatGPT can be effectively employed as an assistant for topic selection in scientific papers.

The "Themendispo Assistant" operates according to a structured dialogue principle. Students are systematically guided through various dimensions of their research project. The interaction begins with identifying the overarching topic area and systematically delves into more specific aspects such as problem formulation, resulting research gaps, goal definition, and scientific questioning. The theoretical background, choice of methods, and anticipated results are also critically examined. Through targeted questions, the tutor encourages users to consider and challenge the structure of their research project. This not only promotes understanding of the topic but also trains analytical thinking and problem-solving skills.

A particular strength of the "Themendispo Assistant" lies in its ability to evaluate logical consistency between elements of the research design. It accepts only precise, scientifically grounded answers. In cases of inconsistency or insufficient precision, it requests revision. The communicative style of the Themendispo Assistant is deliberately formal and demanding. At the same time, the constructive support function is not neglected. This requires a high degree of scientific rigour and conceptual clarity from students, corresponding to academic standards of excellence. The assistant supports learners in expanding their knowledge through dynamically generated ques-



Figure 1: Collaborative XR learning environment as a basis.

tions that build on users' previous answers, creating a personalised learning experience that encourages independence.

The prototypes of these tutors were created using the GPTs in GPT-4 and evaluated in various test phases. Initial testing was conducted in a controlled environment to verify the technical and didactic effectiveness. User feedback was collected to measure the quality of interaction and learning success. This feedback was crucial for iterative adjustments to both the target group approach and functional design of the chatbot. Ongoing tests and adjustments served to increase the effectiveness of tutors and ensure a personalised learning experience that actively supports users in their learning processes.

The GPT was designed as a complement to conventional supervision. The Themendispo Assistant represents progress in applying artificial intelligence in education and illustrates the potential of adaptive dialogue systems for quality assurance in academic training. Through systematic guidance in developing consistent research concepts, the system promotes scientific competence among students while reducing demands on academic staff. The application of Socratic methods in chatbots stimulates a dialogue between teachers and learners that goes beyond the mere retrieval of information and supports the development of a sound understanding of the subject matter. Future research could examine the long-term effects of such AI tutors on the quality of scientific work.

Links:

- [L1] <https://kwz.me/hIC>
- [L2] <https://openai.com/blog/introducing-gpts>
- [L3] <https://barbarageyer.substack.com>
- [L4] <https://www.linkedin.com/in/barbara-geyer/>

References:

- [1] M. A. Kuhail et al., "Interacting with educational chatbots: A systematic review," *Education and Information Technologies*, vol. 28, no. 1, pp. 973-1018, 2023. <https://doi.org/10.1007/s10639-022-11177-3>
- [2] J. Matute Vallejo and I. Melero, "Learning through play: The use of business simulators in higher education teaching," *Universia Business Review*, vol. 51, pp. 72-111, 2016. <https://doi.org/10.3232/UBR.2016.V13.N3.03>
- [3] R. Stampfl and M. Prodingler, "KI-Planspiel zur Themendisposition: ChatGPT als Assistent zur Themenfindung für wissenschaftliche Arbeiten," *R&E-SOURCE*, vol. 11, no. 4, pp. 119-130, 2024. <https://doi.org/10.53349/resource.2024.i4.a1345>

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Developing Human-Centred Trustworthy AI as Infrastructure for Reliable Decision Support

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THEMIS 5.0 is generating evidence, tools, and methods that help scientific communities evaluate when AI systems can be trusted. Through pilots in healthcare, maritime operations, and journalism, the project is exploring how trustworthiness assessments can help organizations take up AI in a responsible manner.

As AI becomes central to modelling, prediction, and analysis, work in domains of critical societal importance increasingly relies on systems that operate as collaborators rather than mere computational tools. But such reliance requires that AI models are used responsibly. Hence, organizations need to know: How accurate is the model? How stable is it under different conditions? Is it fair across groups? What risks might it amplify? Without rigorous answers, AI can introduce hidden errors into critical work processes, distort outputs, or produce misleading guidance.

THEMIS 5.0 [L1] addresses this emerging challenge. Instead of treating trustworthiness as an abstract principle, the project investigates how scientists and practitioners understand trustworthiness and what it takes to allow for decisions to be based on model outputs. Towards this end, the project has involved users and stakeholders within healthcare, port operations, and journalism in requirements identification, scenario development, and feedback on trustworthiness components. These activities produced empirical insights, which illuminates what people truly need to use AI responsibly and confidently in their research and work. Figure 1 illustrates how technical performance and user priorities together shape trust in AI-supported decision making [1].

Protecting the Integrity of Decision Making with AI

Reliable performance is the primary concern for professionals using AI. In THEMIS 5.0 user and stakeholder involvement, clinicians have stressed that high global accuracy is essential not only for patient safety but also to ensure that downstream research and decisions are based on stable predictions. Journalists highlighted how accuracy varies across languages, noting that cross-lingual inconsistencies can distort content analysis and misinformation research. Port operators similarly emphasised robustness, the ability of models to remain stable under changing conditions, as a prerequisite for reproducible simulation and planning.

In response, research in THEMIS 5.0 integrates tools to assess trustworthiness characteristics, at the level of individual samples. This allows for a tiered approach to accuracy assessment, augmenting assessments of global and group-specific accuracy with assessments of accuracy for individual samples.