



A new era in education: Equipping first-year students with AI-driven study skills

Dr André Biederbeck, FernUniversität in Hagen, Germany

Dr Moritz Kohls, FernUniversität in Hagen, Germany

ABSTRACT

The article presents the conception, implementation and evaluation of *Learning with AI*, a new extracurricular course developed at FernUniversität in Hagen to equip first-year students with AI-supported study skills. Responding to increasing student demand for efficient, personalised learning strategies, the course introduces generative AI as an integrated component of academic learning while emphasising foundational competencies such as self-organisation, critical thinking and responsible tool use. The methodology follows the AI Course Design Planning Framework and employs a data-driven, iterative development process combining instructional design, learning analytics and student feedback.

The course is structured into five chapters covering AI fundamentals, tool orientation, basic and advanced learning scenarios and interactive virtual workshops. Learning scenarios address summarising academic texts, creating study plans, using AI as a personal tutor, generating statistical graphics or quizzes and producing AI-generated podcasts. A blended learning approach—with asynchronous modules, practical exercises, screencasts, prompting examples and synchronous workshops—supports a diverse population of lifelong learners.

Evaluation draws on pre- and mid-course surveys, workshop observations and analytics on student engagement. Results show a marked increase in students' self-assessed competence across all AI-related learning scenarios, including those initially perceived as technically challenging. Students expressed predominantly positive attitudes toward AI, viewing it as both a motivational aid and a collaborative learning partner. Learning outcomes indicate improved self-regulation, stronger strategic study behaviours and a deeper understanding of AI's affordances and limitations. However, demographic differences emerged: older learners and law students reported lower initial confidence, and gender disparities appeared in technically framed tasks such as programming quizzes.

The findings informed iterative course improvements, including new scenarios (e.g., chain of density, chain of verification, LaTeX code generation) and enhanced support structures. The article concludes with recommendations for integrating AI literacy into first-year support services and outlines future research on discipline- and age-related differences in AI competence.

Keywords: AI literacy, iterative course-development, Learning with AI, new learning techniques, student perceptions

Course implementation: Learning with AI at FernUniversität in Hagen

The extracurricular course *Learning with AI*, developed within the studyFIT programme at FernUniversität in Hagen, responds to the growing demand for efficient, AI-supported learning strategies among a diverse student population. The course was specifically designed to accommodate the needs of first-year students

in lifelong learning—many of whom balance academic study with professional and family responsibilities—by offering a flexible, modular learning experience that integrates AI into core study practices. Many students entering higher education—especially in lifelong learning contexts—struggle with establishing effective study routines, managing academic workload (Sauvé et al., 2019) and engaging with unfamiliar scholarly texts (Head et al., 2013; Marland et al., 1990). By introducing generative AI as a supportive tool, the course empowers students to organise their learning, clarify complex content and develop personalised study strategies. This early guidance fosters academic confidence and digital literacy, enabling students to navigate their studies more independently and efficiently from the outset. Building on this foundation, the course further explores how students can navigate the rapidly evolving landscape of AI tools in academic contexts.

The proliferation of AI tools has introduced new possibilities for academic learning, including automated literature summarisation, data visualisation and AI-assisted exam preparation. However, the sheer volume and diversity of available tools often overwhelm students, leading to inefficient use and, paradoxically, increased procrastination (Abbas et al., 2024). The course addresses this gap by providing structured orientation and fostering the integration of AI with traditional learning competencies such as self-organisation and critical thinking.

Teaching freshmen learning techniques is something we have done at FernUniversität for many years by offering both on-site and virtual three-hour workshops and as part of our digital self-paced introductory course, which they can take voluntarily. The workshops are particularly popular and in high demand, which initially led us to consider simply adding some workshops with the focus on learning with AI. However, we quickly realised that a workshop format alone is not appropriate in this case due to the abundance and diversity of AI tools and the many learning tasks they can be used for (cf. Fong et al., 2022). The students' disparate levels of prior knowledge regarding the concept and application of generative AI provided another reason for us to adopt a more flexible didactic design. In doing so, we had to consider the high number of students at FeU—our annual enrolment has topped 20,000 in recent years. We also had to consider the students' need for flexible learning in terms of time and place and our limited human resources. Therefore, we decided to create a non-compulsory course with a duration of 25-30 hours combining both self-paced asynchronous learning and synchronous workshops. It aims to support students from all our faculties (Law, Business Administration and Economics, Mathematics and Computer Science, Psychology, Humanities and Social Sciences). While the initial workshops had only been accessible for enrolled students, the course *Learning with AI* is deliberately available also for prospective students because we want them to have the opportunity to prepare for their studies and to experience the manner in which digital learning is facilitated at the FernUniversität.

Considering the rapidly growing possibilities of generative AI for academic purposes, we choose to iteratively develop the course based on insights we gain through our own experimental approach and by using an evaluation design, which we describe further below (see data-driven iterative development). By using surveys and learning analytics, we not only recognise students as experts in their own learning, but also gain valuable insights into how they already use AI in different contexts and how they hope to leverage it to support their learning. However, the exploratory character of our evaluation approach means that the findings described below should be regarded as indicative rather than conclusive.

Course structure and pedagogical design

In retrospect, the initial workshops which we conducted between February and May 2024 proved to be exploratory. They gave us a more nuanced understanding of the students' prior knowledge, as well as their questions and concerns about using AI for learning purposes. Furthermore, we were able to provisionally confirm our assumptions about learning scenarios that are relevant for students. In light of the aforementioned findings, and drawing upon the AI Course Design Planning Framework (Schleiss et al., 2023), we established the following design principles for the course:

1. Acknowledging the students' diverse prior-knowledge and experiences
2. Taking into account the fact that for many students it is one of their first courses in distance learning, and for quite a few their first ever course in higher ed
3. Adopting a self-paced learning mode to accommodate the life-long learners' many obligations
4. Addressing various learning scenarios because the students' objectives and preferred ways of learning differ widely
5. Taking a rigorous, hands-on approach in giving students the opportunity to assess the utility of AI for their own learning and to develop their own agency
6. Using peer-learning and collaborative learning to foster student engagement, self-confidence and self-efficacy (Qureshi et. al., 2021)
7. Allowing for direct interaction between the instructors and the students in order to learn from each other and to create a sense of belonging (Qureshi et. al., 2021)
8. Involving student assistants in the course design and delivery in order to integrate the student perspective, thereby ensuring a low-threshold and accessible learning environment

Following these principles, the course consists of five chapters (see Figure 1): Introduction to generative AI, AI models and further tools, learning scenarios (focus on learning in general), interactive virtual workshops and learning scenarios (focus on exam preparation).

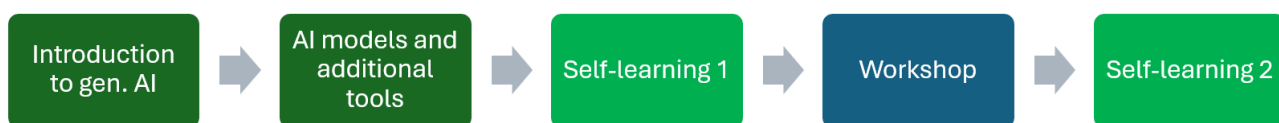


Figure 1 Course structure. The first two chapters are mandatory to unlock both chapters of learning scenarios and to attend the workshops

Although completing the self-learning activities in chapter 3 before attending the workshop is not compulsory, students are required to work through the first two chapters—Introduction to Generative AI and AI Models and Additional Tools—to ensure they understand the fundamentals of generative AI and have installed and configured the necessary tools.

The course structure then follows a recommended sequence: Chapter 3, Workshop, and then Chapter 5. While adhering to this order is advised to support a coherent and progressive learning experience and to ensure that students are well prepared for participation in the workshop, it is not strictly necessary. For

example, students may choose to skip the self-learning in Chapter 3 and join the workshop directly. Furthermore, workshop attendance is not compulsory. This kind of modular flexibility is appreciated by many and is common for all the other studyFIT courses (see Principle 3; Goredema, 2024; Biederbeck & Kohls, 2024).

Chapter 1: 'Introduction to gen. AI' and chapter 2: 'AI models and further tools'

The course begins with a compulsory introductory module on generative AI, covering commercial, open-source and institution-specific tools. Short video lectures and animated videos explain the concept of generative AI and how it works, while providing an overview of the most relevant AI tools for learning. For most learning scenarios applied in this course, the AI-based search engine Perplexity is used as a commercial AI tool, and Google's NotebookLM is used for the optional task of creating audio summaries in the form of podcasts. However, since students are free to choose their preferred AI chatbot, the most popular other commercial providers are also listed. Furthermore, the FernUniversität in Hagen provides a data protection and copyright-friendly AI experimentation environment with the open source LLM gemma, LLaMA, Mistral and Phi. Further language models with different parameters are made available on KI:connect.nrw for all students and staff of the FernUniversität.

A subsequent quiz gives students the opportunity to check whether they have sufficiently internalised the absolute basics of generative AI. In addition, students receive instructions on how to set up a VPN on their computers—a prerequisite for using the open source LLM of the AI experimentation environment at FernUniversität in Hagen. Since the following learning scenarios not only use AI chatbots, but also complementary tools such as flashcard programs (Anki) and programming environments (R/RStudio), emphasis is also placed on an introduction to the installation and operation of this software.

This segment of the course is designed to accommodate varying levels of prior knowledge, allowing students with advanced experience to progress rapidly (see Principle 1).

Chapter 3: Basic learning scenarios

Subsequent to this preliminary exposition on generative AI, the focus shifts to the question of how AI can be utilised for learning in Higher Education. The course is structured around modular learning scenarios, enabling students to select those most relevant to their individual needs. In this chapter, students have the choice to explore as many of the learning scenarios as they like.

- Summarising academic texts including Chain of Density Creating a study plan
- Using AI as a personal tutor
- Finding additional learning resources
- Conducting mathematical calculations
- Podcast production (added upon reviewing evaluation results)

To some extent, the order follows the semester cycle. Another criterion is how often the specific scenario was seen as relevant by the students attending the initial workshops leading to the development of the course (see Course implementation).

Each learning scenario constitutes a separate instructional unit based on Principles 2- 5.

A range of diverse teaching and learning materials is employed to convey the AI-supported learning scenarios. For most scenarios, screencasts are used, as they are particularly effective in demonstrating the operation of various software tools in a clear and comprehensible manner. This allows students to replicate the demonstrated steps directly on their own devices, following the process in real time.

The screencasts are partly supplemented by written guides, presented as documents enriched with screenshots and designed to support multiple commonly used operating systems. This is particularly important where significant differences exist between systems, such as the use of different text editors or VPN programs in Windows and macOS.

Detailed demonstrations using screencasts or screenshots were omitted only in a few specific scenarios that are technically and procedurally less demanding, or where the range of possible applications—such as AI as a tutor—is too broad for a single model approach to be representative. In all cases, however, sample AI chat histories are provided to illustrate potential dialogues with the AI.

For the scenario involving the generation of audio summaries (AI podcasts), a sample German-language podcast was made available within the learning environment to provide an immediate impression of a possible final product.

Some of the learning scenarios, which originate from academic research, are accompanied by links to the relevant papers as well as German-language summaries and explanations, including application examples to aid understanding of the procedures.

Additionally, the tasks include suggested approaches, short prompting examples, tips and in some cases, custom-developed AI assistants to offer students practical guidance. At the same time, students are encouraged to develop their own prompts independently.

Chapter 4: Interactive virtual workshops

As the core of the course, virtual workshops form the link between chapter 3 and 5 (described further below). This overall approach aligns with the FernUniversität's blended learning model, which combines asynchronous study with live lectures and online seminars. The workshops provide direct interaction between students and instructors, as well as among students themselves, thereby fostering a sense of belonging—something especially important in distance learning (see Principle 6; Foley & Marr, 2020).

During the workshops, students are assigned to small groups of five to eight participants, working in breakout rooms on the learning scenarios. Typically, one student volunteers to work through the task outlined in the workbook, collaborating with the other group members while sharing his or her screen. Throughout this process, the workshop facilitator supports the group by offering guidance, suggestions and feedback to aid task completion. Other students in the breakout room may contribute ideas for prompt formulation and, if they wish, work on the task in parallel in the background.

The specific task descriptions provided in the workbooks are not to be regarded as prescriptive, but rather as optional suggestions. Each group jointly decides which of the listed AI-supported learning scenarios they wish to explore and agrees on a topic or learning script accordingly.

Following the breakout room session, all participants reconvene in the main Zoom room to present their approach to the task to the other groups. In the second group work phase, each group then tackles the task originally assigned to the other group. Group allocation is random in the first round and remains unchanged

in the second. Each of the two workshop facilitators supervises their respective topic throughout both phases.

Three distinct workshop formats are offered, each tailored to a separate phase within a typical semester:

- The first addresses the use of AI in general learning contexts, focusing on approaches such as Socratic dialogue and source code generation for statistical graphics. While Socratic dialogue helps to explore a specific topic in greater depth and promotes critical thinking, thereby supporting the general learning process, AI source code generation for creating statistical graphics is helpful in statistical visualisation, which can be applied in almost any field of application.
- By contrast, the second workshop adopts a more specialised orientation, concentrating on the use of AI to support examination preparation. This includes activities such as developing flashcards and cloze tests, as well as designing tasks that incorporate best-practice methods, interactive and programmed quizzes and gamification elements.
- The third workshop focuses more on writing with AI. Students learn about the structure and syntax of LaTeX, practise editing a small sample LaTeX document, and use open source generative AI to create a style template for an academic paper.

All three workshops are offered alternately on a monthly basis. Students are free to decide whether and which workshops they wish to attend. Participation is possible once the first two chapters have been completed, so that participants are sufficiently prepared to work on the tasks together in the workshop and have set up the necessary tools. Introductory videos on the individual workshop topics are also available under the workshop tile.

Chapter 5: 'Advanced learning scenarios'

Learning scenarios with a greater focus on exam preparation and scientific writing are covered in this last chapter, which includes the following sections:

- Creating flashcards and cloze tests
- Creating tasks and quizzes
- Pre-assessments
- Programming quizzes
- Chain of Verification
- Latex Source Code Generation (added, see evaluation)

The learning materials comprise screencasts, prompting histories and practical tasks with self-reflective questions, all of which support a self-paced learning experience. Screencasts are particularly valuable when working with technical tools such as the RStudio programming environment—for programming quizzes or generating statistical graphics—or applications like the Anki flashcard software, which offer extensive configuration options and can be challenging to navigate initially. Prompting histories, by contrast, provide concrete examples of how an AI chat might unfold in a specific learning scenario, enabling students to follow the precise steps involved in a given approach. This is especially useful for methods such as the chain of verification, where the AI's self-assessment follows a defined procedure, making worked examples highly

beneficial for comprehension. A simple example in the accompanying textbook and a preliminary sub-task in which students manually carry out the process ensure that they internalise the underlying process. Even in the case of pre-assessment, students often wish to understand in principle how such processes function before their learning progress is evaluated by the AI.

Data-driven iterative development

Evaluation design

Continuous evaluation should be conducted for every academic course. The need to receive feedback from both students and the wider academic community is particularly pressing in this context. Due to the rapid development of AI technologies and their relatively recent emergence in educational settings, ongoing evaluation is essential to ensure that the course remains pedagogically sound, technically relevant and responsive to evolving ethical and disciplinary standards.

Our evaluation strategy contains these components:

- An initial survey and a follow-up survey (cf. Nakayama & Yamamoto, 2011)
- The oral feedback given by students during the monthly workshops
- Learning analytics: The extent to which students use the learning materials (e.g. Which learning scenarios do they focus on? Which learning scenarios do they tend to omit?)
- Feedback by colleagues from the faculties and other universities (especially through cooperation with Koblenz University of Applied Sciences)

To conduct the learning analytics, a combination of quantitative and qualitative data sources was employed. Firstly, student survey responses were examined to allow a partial pre–post comparison of self-assessed competence and attitudes. The surveys were administered at two distinct time points, with both samples drawn from students enrolled in the same course cohort.

Secondly, manual counts were undertaken to determine how many students completed the self-reflection tasks and obtained a certificate of participation. These counts provided an objective indicator of student engagement with the course content.

Thirdly, selected open-ended survey responses were qualitatively reviewed to identify recurring themes and student perceptions of AI in learning scenarios.

The analysis was exploratory in nature, seeking to uncover potential patterns and relationships within the data and to generate hypotheses for future research.

Ethics statement

For the learning analytics, we used personal data from students enrolled in the AI course at FernUniversität in Hagen. The data obtained from the two surveys is anonymous and cannot be traced back to individuals due to the large amounts of demographic data collected. This ensures that the students' data protection is guaranteed. Informed consent was gained by students' active participation in this voluntary, extra-curricular course, and the provision of the opportunity to opt-out of use of their personal data for research purposes. Thus far no student has done so.

Student perceptions

The compulsory student surveys are administered at two stages—prior to engaging with the learning materials and after completing half of the learning scenarios. The surveys assess students’ self-perceived competence and preferences regarding AI-supported learning. Depending on the specific learning scenario, students initially rated their own competence prior to the start of the course as predominantly low to average. This was particularly evident in scenarios perceived as technically complex, such as *producing a podcast*, *programming reproducible quizzes* and *creating flashcards* (see Figure 1), where self-assessed competence was notably low. However, this perception changed significantly by the second survey point, following the workshop and completion of the first part of the self-paced learning unit—approximately half of the course. At this stage, students reported feeling considerably more competent in applying AI within these learning scenarios, including those previously regarded as technically demanding.

How would you rate your competence in using AI in relation to learning scenario "Create flashcards"? (Date: 14.10.2025)

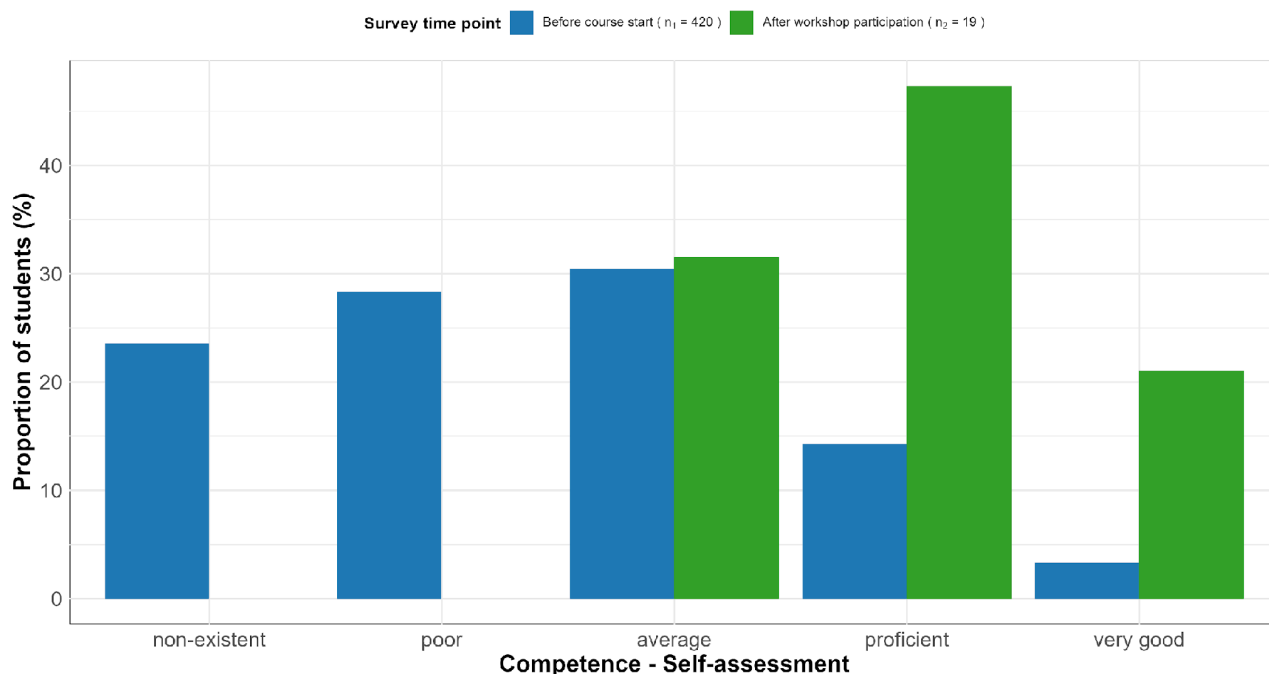


Figure 2 Self-assessment of competence in response to the question ‘How would you rate your competence in using AI in relation to the learning scenario ‘Creating flashcards’?’

Student attitudes and usage patterns

The entry surveys revealed that students have a predominantly positive, albeit cautious disposition towards AI. Its utilisation was primarily confined to content structuring, topic exploration and as a supplementary tool to conventional search engines.

Notably, AI was perceived as a motivational aid, particularly in moments of cognitive overload. Approximately 55% of students at FernUniversität reported an increase in learning motivation attributable to AI in the entry survey, while only a marginal proportion expressed scepticism.

Thus, overall, students expressed predominantly positive attitudes towards the topic “Learning with AI”. However, it is important to acknowledge a potential selection bias: individuals who are sceptical of AI or less inclined to engage with digital technologies may have been less likely to enrol in the course. As a result, critical perspectives on AI use in education may be underrepresented in the sample.

Some critical voices expressed uncertainty about the appropriate and effective use of AI, alongside concerns regarding the reliability of AI-generated information. Moreover, a quarter of respondents reported feeling pressured to adopt AI tools in order to remain competitive, although the majority did not expect any detrimental impact on their critical thinking skills.

Learning outcomes

Post-course evaluations revealed a significant evolution in students' conceptualisation of AI. The course fostered a deeper understanding of its affordances and limitations, with particular emphasis on prompt engineering as a core competency. Increasingly, students came to regard AI not merely as a tool but as a collaborative learning partner. This shift was reflected in the growing appreciation for dialogic learning formats, such as the Socratic dialogue, which ranked highly among the preferred learning approaches.

The course also promoted stronger self-regulation and more strategic learning behaviours. Students reported heightened awareness of planning and reflection in their studies, with AI supporting more personalised and flexible learning pathways. Nonetheless, disciplinary differences in perceived competence emerged: Law students expressed lower confidence in engaging with AI as a learning partner, highlighting the need for discipline-specific support structures.

Ethical considerations and learner responsibility

While the pedagogical benefits of AI were widely acknowledged, students remained critically aware of the ethical dimensions and the imperative of personal accountability. Across the qualitative data, a recurring theme was the conviction that ultimate responsibility for learning outcomes rests with the individual.

Learning analytics – deepening insights

In order to gain a deeper insight into learning analytics, additional potential influencing factors were also examined.

Demographic influences

A key area of interest was whether demographic variables such as age and gender, or different student groups—e.g., students from various faculties, stages of study or modes of study—had an influence on attitudes and self-assessments regarding AI. For instance, students were asked whether they often require more time to formulate an appropriate prompt (see Figure 2). A clear age-related trend emerged: the response options “not at all” or “somewhat disagree” were most frequently selected by the youngest age group (18–25), whereas the options “somewhat agree” or “completely agree” were predominantly chosen by the oldest age group (66+). Notably, half of the respondents in the latter group selected “somewhat agree”.

"I often need more time than expected to formulate the right prompt."

First survey date (before course start). Item answered: 18-25: 27/27 (100%); 26-35: 140/143 (98%); 36-45: 192/195 (98%); 46-55: 212/214 (99%); 56-65: 176/179 (98%); 66+: 72/73 (99%) Date: 14.10.2025

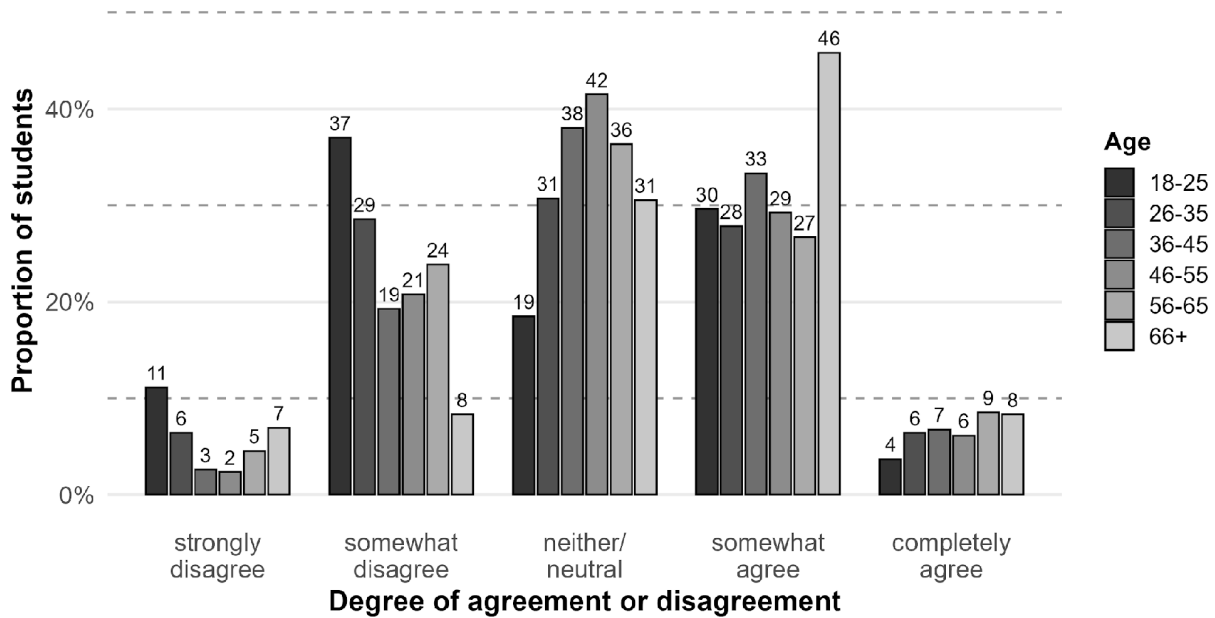


Figure 3 Degree of agreement with the statement ‘I often need more time than expected to formulate the right prompt’ by age group

The second demographic variable examined was gender as some research shows a significant difference between males and females in using generative AI (Kim et al., 2025; Møgelvang et al., 2024). One focus was on self-assessed AI competence. In some learning scenarios—such as those involving purely dialogic interaction with the AI chatbot in the role of tutor or learning companion—no significant gender differences were observed. However, in other more technically oriented scenarios, marked disparities were evident. For example, in the scenario involving the creation of reproducible quizzes, students were required to generate source code using AI, insert it into a programming environment and execute it. This task demands a basic practical understanding of installing and operating programming tools. As illustrated in Figure 3, a significantly higher proportion of female students reported feeling incompetent at the beginning of the course, whereas only male students reported feeling very competent. Consequently, analysis of submissions for this scenario revealed that substantially more male than female students completed or submitted the task.

This discrepancy in technically framed learning scenarios—often signalled by terms such as “programming”—also contributed to a notable difference in course completion rates. Almost twice as many male students as female students progressed to the stage at which they could generate a certificate of participation, which is only possible once all mandatory learning scenarios have been completed, including the one involving the programming task.

Competence self-assessment by gender

Learning scenario: Programming reproducible quizzes

First survey data (before course start). Item answered: female: 84/459 (18%); male: 66/369 (18%). Date: 14.10.2025

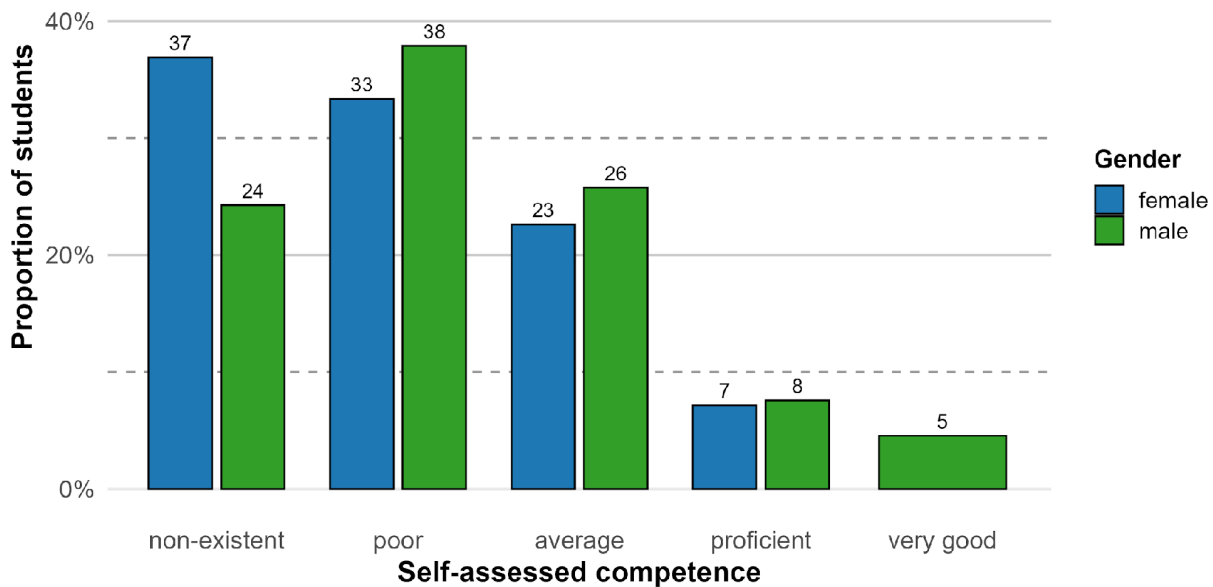


Figure 4 Self-assessed competence in the learning scenario ‘Programming reproducible quizzes’ by gender

Not only did different age groups assess their competence differently, but differences in self-assessed competence were also found among the various faculties at the FernUniversität in Hagen. In particular, it was noticeable that students in the Faculty of Law felt less competent at the beginning of the course than students in other faculties, with as many as 24% stating that they did not feel competent (see Figure 4). This may also be due to the fact that the use of AI for learning is not yet as widespread in the field of law as it is in other subject groups, and that fewer meaningful application scenarios with AI have been established specifically for law. For example, law students are less familiar with source code generation and statistical analysis than their fellow students in other subjects.

Limitations

Several limitations must be acknowledged. The pre–post comparison was based on two separate samples rather than a true longitudinal design, as the anonymity of the surveys precluded temporal linkage of individual responses. In addition, the sample size at the second survey point was relatively small, constraining the generalisability of the findings. Finally, the exploratory character of the study means that the results should be regarded as indicative rather than conclusive.

Self-assessed Competence by Faculty

Learning scenario: AI as personal tutor/learning companion

First survey time point (before course start). Items answered:

HSS: 151/238 (63%); MCS: 53/98 (54%); PSY: 101/170 (59%); Law: 50/77 (65%); BAE: 72/138 (52%); Other: 62/116 (53%); Date: 14.10.2025

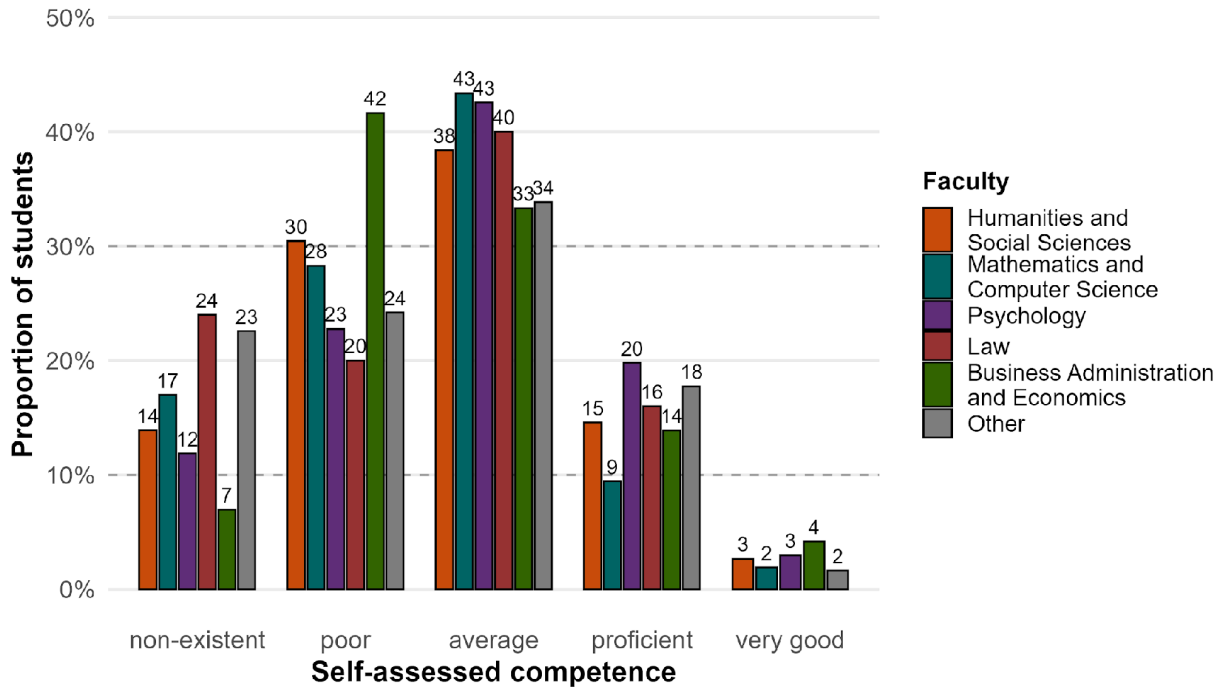


Figure 5 Self-assessment of competence in the learning scenario ‘AI as personal tutor/learning companion’ by faculty

Adjustments based on evaluation

In response to student feedback, the course was expanded to include additional learning scenarios and support structures:

- Written text summary with ‘Chain of Density’
- Visualising learning content
- Producing educational podcasts
- Conducting a pre-assessment
- Applying the “chain of verification” method
- Generating LaTeX source code
- Developing meta-prompts to enhance prompt literacy

The reasons for incorporating the listed learning methods into the course varied. In order to gain an overview of a new subject area, such as a module, course or chapter, in the first learning scenario scripts and sections were summarised.

The text summarisation section has been supplemented with an advanced structured method known as the ‘chain of density’. This has several advantages over the simple ‘vanilla prompt’: The text can be condensed iteratively in several steps, and by selecting suitable parameters, the text summary can be personalised in terms of the desired information density and length, among other things. In addition, the ‘lead bias’ is reduced.

Drawing on feedback from students and with research showing the potential of podcasts for academic purposes (Ng’ambi & Lombe, 2012), the idea emerged to supplement existing AI-generated written materials with auditory formats. To further support students who prefer learning on mobile devices while on the go—a common practice among those at the FernUniversität in Hagen due to time constraints—a new learning scenario was introduced: ‘AI-generated podcasts.’ This format combines both advantages, catering to auditory preferences and mobile accessibility.

Furthermore, students also benefit from a structured, hierarchical representation of subject matter—mind maps being especially effective for presenting topics and their interrelationships clearly and at a glance. This learning scenario, which focuses on visual summarisation, fits in well with the purely written and auditory text summaries that precede and follow it.

Professional dialogue with colleagues, coupled with the existing use of this tool in another studyFIT course—a Mathematics preparatory module—sparked the idea of enhancing the learning scenario with a pre-assessment component. Unlike AI-generated quizzes, pre-assessments are designed to provide a time-efficient yet comprehensive evaluation of students’ prior knowledge within a university course. The feedback generated serves as the basis for offering highly targeted learning recommendations, supporting the development of an efficient and personalised study plan.

In addition to the pre-assessment scenario, two further learning scenarios were integrated into the course: Chain of Verification and LaTeX source code generation.

The Chain of Verification scenario was introduced in response to students’ concerns regarding the reliability of AI-generated outputs. During the course, it was emphasised that the responsibility for verifying the correctness of content produced by generative AI lies with the users themselves, particularly given the known tendency of such systems to hallucinate. This scenario encourages students to critically assess and validate AI-generated results through structured verification steps, thereby fostering a more reflective and responsible use of AI tools.

The LaTeX source code generation scenario was proposed by a student assistant with a background in Mathematics and Computer Science. Drawing from his own experience of regularly using LaTeX for assignments and academic writing, he highlighted the potential of generative AI to assist in producing LaTeX code—especially given that LaTeX documents are not assembled through graphical interfaces like MS Word, but rather compiled from source code. This scenario not only supports students in creating professional, formula-rich and robust documents but also appeals to those interested in sustainable, open-source alternatives for academic publishing and also students in non-STEM fields.

These mentioned adjustments reflect a commitment to inclusivity and responsiveness, ensuring that the course remains relevant across diverse learner profiles.

Lessons learned and recommendations for transfer

During the pilot phase of the course, we collaborated for evaluation purposes with colleagues from Koblenz University of Applied Sciences, who were also developing a course on learning with AI at the same time, albeit with a slightly different focus in terms of content (Gerber et. al., 2025). By using common items in our surveys—in our case, the initial survey and follow-up survey—we were able to gain comprehensive insights into successful learning with AI, which we present here in the form of lessons learned and recommendations.

The most universally usable learning scenario

There is a high demand for AI as a personal tutor, with students valuing dialogic learning formats such as the Socratic dialogue.

Disciplinary and demographic disparities

There are disciplinary and demographic disparities, especially notably lower self-assessed competence among law students and older learners.

Structured orientation

Students benefit from curated overviews of AI tools and application scenarios. Prompt catalogues have proven particularly effective in facilitating initial engagement, alleviating concerns about using AI incorrectly and enabling users to generate strong initial outputs with less effort. The involvement of student assistants in developing these catalogues has been especially valuable: they design prompts based on their own learning experiences, test them within their academic contexts and refine them iteratively. Likewise, examples contributed by participating students are warmly welcomed and incorporated when found to be suitable.

Systematic reflection

Reflection diaries served as cognitive anchors, promoting sustained engagement with the ethical and strategic dimensions of AI use. The diaries enable students to document which AI applications they have explored, for what purpose and with what degree of success. This provides insight into the extent to which AI has contributed to more efficient learning over the medium term. For us as instructors, the diaries also represent a valuable source of information for gaining a better understanding of the potential of AI in educational contexts.

Experiential learning

Practical engagement with AI was essential for students to evaluate its usefulness, as theoretical instruction alone proved insufficient. Through hands-on experience (cf. Cridlin, 2007), students gained insight into how a tool can be used and the effort required to craft effective prompts. This process enabled them to experience their own self-efficacy and to perceive themselves as experts in their own learning.

Integration of writing support

Given the widespread use of AI in academic writing contexts, close alignment with writing support services has become both necessary and highly beneficial. Techniques such as summarising scientific texts and conducting literature research—originally tested for exam preparation—are now widely employed by students in the context of academic writing. Consequently, course supervisors are increasingly confronted with questions concerning academic writing and good scholarly practice, which they are better equipped to address through collaboration with colleagues from the Academic Writing Centre.

In recent years, the Academic Writing Centre has amassed substantial expertise in the effective use of AI—both in terms of strategies and techniques—as well as in evaluating the reliability of AI-generated content. This knowledge has been integrated into the development of course materials, particularly in relation to learning scenarios such as developing meta-prompts to enhance prompt literacy, generating text summaries, using AI as a tutoring tool and identifying supplementary learning resources.

Facilitated exchange

Continuous access to instructional support and peer interaction—particularly through synchronous workshops—proved critical in fostering reflective practice and mutual inspiration, both across disciplinary boundaries and between students and teachers. These workshops serve as condensed, intensive learning spaces where new insights readily emerge.

Conclusion & future research

The data-driven approach to iterative course development has proved highly effective in keeping the *Learning with AI* course up-to-date and responsive to students' needs. Since the course was launched in October 2024, the disparity in students' generative-AI skills has widened: While some still lack a basic grasp of how these tools function, others have progressed to the point of proposing their own solutions—contributions that can be incorporated into the course and shared with their peers. In this context, the hands-on design and synchronous workshops are crucial, enabling direct interaction between instructors and students and creating space to demonstrate, test and refine additional approaches.

The evaluation indicates that students' conceptualisation of AI has shifted, with many now perceiving it as a collaborative learning partner. Alongside this, stronger self-regulation and more strategic learning behaviours are emerging, leading to greater awareness of planning and reflection in their studies.

While gender and disciplinary differences in generative-AI use have been noted since its emergence, age is still too often overlooked. However, because lifelong learning is central to the mission of the FernUniversität, our future research will focus in particular on how older students can be supported and empowered to use AI for learning with confidence. Since the findings are based primarily on students' self-assessments of their abilities, the next step will be to expand our evaluation design even further to examine the actual ability to use generative AI for learning purposes. In this context, the reported lower self-confidence of law students could be one of the starting points for further investigation.

Biographies

Dr André Biederbeck coordinates the FernUniversität in Hagen's studyFIT programme, which offers more than 40 services for developing both general and subject-specific academic skills. His responsibilities include drafting guidelines for the use of AI in teaching and learning, as well as exploring and implementing AI-based applications to support these activities.

Dr Moritz Kohls is a specialist in data analysis at the FernUniversität in Hagen. He supports students entering higher education through online formats designed to develop mathematical competence, data literacy and AI literacy. Among his varied interests is the gamification of learning experiences, aimed at fostering sustained student motivation.

References

- Abbas, M., Jam, F. A., & Khan, T. I. (2024). Is it harmful or helpful? Examining the causes and consequences of generative AI usage among university students. *International journal of educational technology in higher education*, 21(1), 10.
DOI:10.1186/s41239-024-00444-7
- Biederbeck, A., Bills, A., Giesbert, A., Karolyi, H., Kempka, A., Opel, S., Sperl, A., & de Witt, C. (2024). KI-Leitfaden der FernUniversität in Hagen. *Grundsätze und Orientierungshilfen für die Nutzung von Künstlicher Intelligenz in Lehre und Studium*. FernUniversität in Hagen.
- Biederbeck, A., & Kohls, M. (2024). Data Literacy Basic Course, in: *European Association of Distance Teaching Universities Supporting Retention and Student Services in Online and Distance Education*, 87-90.
DOI:10.5281/zenodo.11120440
- Cridlin, L. D. (2007, March). The importance of hands-on learning. In *International Laser Safety Conference* (Vol. 2007, No. 1, pp. 151-156). Laser Institute of America.
DOI:10.2351/1.5056625
- Foley, K., & Marr, L. (2020). Online, extracurricular skills workshops for distance learning students to develop skills and facilitate belonging to an academic community, in: *The Envisioning Report for Empowering Universities*, 36-38.
- Fong, A., Gupta, A., Carr, S., & Bhattacharjee, S. (2022). Workshop: Hands-on Sampling of Experiential Learning Modules that Promote AI Competency Across STEM Disciplines. In *2022 IEEE World Engineering Education Conference (EDUNINE)* (pp. 1-2). IEEE.
- Gerber, C., Lückenbach, F., Biederbeck, A., & Kohls, M. (2025). Chattest du nur oder lernst du auch?
<https://hochschulforumdigitalisierung.de/lernen-mit-ki/>
- Goredema, P. (2024). English Learning Support: Immersive, interactive and open to all, in: *European Association of Distance Teaching Universities. Supporting Retention and Student Services in Online and Distance Education*, 67-70.
DOI:10.5281/zenodo.11120440
- Head, A. (2013). Learning the ropes: How freshmen conduct course research once they enter college. *Available at SSRN 2364080*.
DOI:10.2139/SSRN.2364080
- Kim, J., Klopfer, M., Grohs J.R., Eldardiry, H., Weichert, J., Cox L.A., & Pike, D. (2025), Examining Faculty and Student Perceptions of Generative AI in University Courses, *Innovative Higher Education 2025*, 50, 1281-1313.
<https://doi.org/10.1007/s10755-024-09774-w>
- Marland, P., Patching, W., Putt, I., & Putt, R. (1990). Distance learners' interactions with text while studying. *Distance education*, 11(1), 71-91.
DOI:10.1080/0158791900110106
- Møgelvang, A., Bjelland, C., Grassini, S., & Ludvigsen K. (2024), Gender Differences in the Use of Generative Artificial Intelligence Chatbots in Higher Education: Characteristics and Consequences. *Education Sciences 2024*, 14, 1363.
<https://doi.org/10.3390/educsci14121363>

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- Nakayama, M., & Yamamoto, H. (2011). Assessing student transitions in an online learning environment. *Electronic Journal of e-Learning*, 9(1), 75-86.
- Ng'ambi, D., & Lombe, A. (2012). Using podcasting to facilitate student learning: A constructivist perspective. *Journal of Educational Technology & Society*, 15(4), 181-192.
- Qureshi, M. A., Khaskheli, A., Qureshi, J. A., Raza, S. A., & Yousufi, S. Q. (2021). Factors affecting students' learning performance through collaborative learning and engagement. *Interactive Learning Environments*, 31(4), 2371–2391. DOI:10.1080/10494820.2021.1884886
- Sauvé, L., Racette, N., Papi, C., Gérin-Lajoie, S., Desjardins, G., & Marineau, S. (2019, September). Self-regulation strategies of students enrolled in a distance and online university education program. In *International Conference on Web-Based Learning* (pp. 165-176). Cham: Springer International Publishing. DOI:10.1007/978-3-030-35758-0_16
- Schleiss, J., Laupichler, M. C., Raupach, T., & Stober, S. (2023). AI Course Design Planning Framework: Developing Domain-Specific AI Education Courses. *Education Sciences*, 13(9), 954. DOI: 10.3390/educsci13090954