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Leveraging Generative AI in Higher Education: An Analysis of Opportunities and Challenges Addressed in University Guidelines

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ABSTRACT

As generative Artificial Intelligence (AI) is seen as a catalyst for a new learning and examination culture in higher education, it urges universities to reinvent themselves and to adapt to these changes effectively. By analysing the content of 67 university guidelines on generative AI, this study investigates how universities in Germany position themselves towards the rise of generative AI. Findings reveal that a majority of university guidelines explicitly permit both university lecturers and students to engage with generative AI, emphasising the importance of building AI literacy among both groups and preparing students for changing demands in the world of work. Importantly, 56.7% of university guidelines posit that the opportunities of generative AI for higher education outweigh the risks, underscoring the potential transformative impact on teaching and research. In addition, the results of a workshop with 25 faculty members were scrutinised to deepen and specify the findings of the content analysis.

1 | Introduction

The European Commission's Digital Education Action Plan (2021–2027) encompasses two strategic priorities (European Commission 2020). The first one is to foster a high-performing digital education ecosystem that is shaped by organisational capabilities and by educators who are digitally competent and confident. The second one is to enhance digital skills and competencies including a profound understanding of data-intensive technologies, such as Artificial Intelligence (AI) (Xiong, Liu, and Wang 2023).

In recent years, AI has undergone considerable advancements and has permeated various facets of our life (Zhang and Tur 2024). AI encompasses the ability of computer systems to perform functions typically associated with human cognition such as learning, reasoning, problem-solving and decision-making. This involves the development of computational models and algorithms that enable machines to process and analyse data, recognise patterns and generate predictions or decisions based on the provided information (Minkkinen and Mäntymäki 2023).

The launch of Open AI's generative AI application ChatGPT-3 in November 2022 has fundamentally changed the way of teaching and learning in higher education (Rawas 2023). ChatGPT stands for Generative Pre-trained Transformer and is based on deep learning algorithms (Baidoo-Anu and Owusu Ansah 2023). As ChatGPT is capable of generating individual manuscripts and summarising or rewriting texts according to predefined parameters, building AI literacy among both students and university lecturers has become imperative (Rudolph, Tan, and Tan 2023). However, Marche (2022) postulates that academia will require a decade to fully adapt to this new reality: 'two years to understand the technology, three more years to realise that students are using the technology,

and then five years for university administrations to decide what, if anything, should be done'. Although this perspective seems exaggerated, an UNESCO survey among universities and schools in May 2023 found that less than 10% of the 450 responding institutions have had formal guidance on AI at this point (UNESCO 2023).

Yet, the Emden-Leer University of Applied Sciences states in its AI guidelines: 'ChatGPT and other generative AI tools that can produce text, images or videos are now freely available. This situation can no longer be changed. Thus, the question is not *whether* universities have to prepare for the associated consequences, but rather *how* they do so' (Emden-Leer University of Applied Sciences). Against this background, this study follows a two-step approach to address the following research question: Which framework conditions do universities create to leverage generative AI in teaching and research and which opportunities, challenges and ethical issues do universities identify?

The conceptual framework draws from literature on AI in higher education. Methodologically, a content analysis of 67 German university guidelines for dealing with generative AI was conducted. This approach is guided by the central assumption that institutions must set the frame for university lecturers[1] to effectively and conscientiously incorporate generative AI into their activities. With an average length of 3322 words, the guidelines provide a nuanced insight into university's willingness and organisational capabilities to leverage generative AI.

In a second step, the outcomes of a faculty workshop focussing on generative AI involving 25 participants were analysed. This served to refine and deepen the understanding of what motivates or hinders academia to integrate generative AI into teaching and into the research process. Moreover, the workshop revealed university lecturers' expectations regarding student behaviour and framework conditions in higher education.

2 | Literature Review

Generative AI is increasingly recognised as a transformative force in higher education, bringing with it a host of opportunities and challenges (Farrelly and Baker 2023). The advent of generative AI applications, such as ChatGPT, has revolutionised the educational landscape by offering unprecedented levels of accessibility, flexibility and efficiency (Snekha and Ayyanathan 2023). These applications provide personalised support to students around the clock, facilitating a more adaptive and responsive learning environment (Michel-Villarreal et al. 2023). This capacity for personalisation means that generative AI can tailor educational experiences to individual student needs, potentially increasing engagement and motivation.

The potential of generative AI to enhance student productivity and support the learning process is substantial (Ilieva et al. 2023). By automating routine tasks and providing instant feedback, these tools free up time for students to focus on more complex aspects of their studies. When combined with other mobile learning technologies, generative AI applications like ChatGPT can significantly improve interactive engagement in the learning process (Amjad, Aslam, and Tabassum 2024). For example, students can use AI to simulate conversations in foreign language learning or to practice problem-solving in STEM subjects, thereby enhancing their understanding and retention of course material.

However, the integration of generative AI into learning environments is not without its drawbacks. Accordingly, academics worldwide are discussing the disruptive potential of generative AI for higher education. One of the primary concerns is the potential for these tools to diminish students' capabilities in critical thinking, reasoning and expressing thoughts in their own words (Celis et al. 2023). The ease of obtaining information and answers from AI might lead students to rely too heavily on these tools, thereby undermining the development of their analytical skills.

Ethical dilemmas also arise concerning the assessment of performance when AI applications are used. The question of how to evaluate work that may have been substantially assisted by AI tools is complex and fraught with potential for unfairness (Dwivedi et al. 2023). Additionally, concerns about the quality of AI outputs are valid. Ilieva et al. (2023) point out that free generative AI tools often rely on outdated data, which can lead to incorrect or misleading answers. This issue underscores the importance of critical evaluation skills, which are essential for students to differentiate between accurate and erroneous information.

Privacy and copyright concerns are also prominent issues associated with generative AI. Rawas (2023) emphasises the risks related to data privacy and the potential for AI tools to violate copyright laws or facilitate plagiarism. These concerns highlight the necessity for robust data governance frameworks within educational institutions to protect the rights and privacy of all stakeholders including students, education professionals, researchers and policymakers (Molenaar 2022). Furthermore, the potential for generative AI to perpetuate biases and inequalities is a significant ethical consideration. Finally, Farrelly and Baker (2023) fear that the use of generative AI might compromise academic integrity and exacerbate existing prejudices and disparities within the educational system.

Guidelines and policies play a critical role in addressing these concerns by providing comprehensive frameworks for the ethical and effective integration of AI in higher education (Gbolade Opesemowo 2024). Research on the acceptance of generative AI in higher education has underscored the importance of clear and well-articulated guidelines to shape the use of AI tools within universities (Kurtz 2024). This concerns both the use by students and the use by university lecturers which in turn requires the development of AI competencies (Mikeladze, Meijer, and Verhoeff 2024).

Incorporating best practices for using generative AI tools into curricula and instructional methods is essential for developing students' skills effectively (Pavlenko 2024). This integration ensures that students not only learn how to use AI tools but also understand the ethical, practical and intellectual implications of their use. Furthermore, Ioku, Kondo, and Watanabe (2024) suggest that institutions need clear policies detailing the appropriate use of language models in higher education to align AI technologies with educational objectives. Such policies help

mitigate the risks associated with AI while maximising its educational benefits.

As generative AI continues to transform higher education, the establishment of institutional policies to govern its use in learning, teaching and research activities is imperative (Spivakovsky et al. 2023). These policies should address issues such as data privacy, intellectual property rights and the ethical use of AI-generated content. Chan (2023) stresses the need for a comprehensive AI policy education framework to inform all stakeholders about the implications of AI integration. This framework should provide guidance on the responsible use of AI, foster innovation and prepare both faculty and students for the evolving educational landscape.

Based on an analysis of 68 guidelines on generative AI, Ioku, Kondo, and Watanabe (2024) distinguish four profiles to classify universities' acceptance of generative AI in higher education. The policies stem from universities ranked among the top 100 in the Quacquarelli Symonds (QS) university rankings. Profile 1 (29.4% of investigated guidelines) includes universities that strongly oppose unauthorised AI use, emphasising academic integrity. In Europe, the University of Oxford, the Imperial College London and the ETH Zurich are assigned to this profile. Profile 2 (20.6%) comprises universities such as the University of Zurich that support responsible AI use. Profile 3 (23.5%) represents universities with a neutral stance on AI and a strong international presence, including the University of Bristol, the University of Warwick and the University of Birmingham. Profile 4 (26.5%) also takes a neutral stance, featuring universities with moderate international presence such as the University of Amsterdam, KU Leuven and the Trinity College Dublin.

In conclusion, university guidelines are crucial for the ethical and effective integration of generative AI in higher education. These guidelines ensure responsible AI deployment, foster innovation and prepare both faculty and students for the use of generative AI. By addressing ethical concerns, promoting critical evaluation skills and establishing clear policies, higher education institutions can harness the potential of generative AI while safeguarding academic integrity and promoting social equality. The development and implementation of comprehensive AI policies and educational frameworks are essential steps towards achieving these goals, ultimately leading to a more effective and equitable educational environment.

3 | Methodology

In a first step, this study involved the collection and analysis of university guidelines to examine how academic institutions are adapting generative AI tools. A total of 145 universities in Germany were included in the study, covering 63 public universities, 68 public universities of applied sciences, 11 private universities of applied sciences and three ecclesiastical universities. Among these 145 institutions, 59 had published AI guidelines on their websites. For the remaining 86 institutions, the respective head of the department for didactics/teaching has been contacted by email to find out whether there are guidelines in place that are not publicly accessible.

Together with the 59 publicly accessible guidelines, eight additional guidelines sent by email led to an effective sample of 67 guidelines. These stemmed from 41 public universities, 20 public universities of applied sciences and six private universities of applied sciences. The collection period ended on 31 October 2023. Calculated back from this date, the 43 guidelines indicating a concrete creation date were 196 days old on average (M) with a standard deviation (SD) of 95 days. On average, both public ($M = 209$ days, SD = 150 days) and private universities of applied sciences ($M = 212$ days, SD = 31 days) were faster in developing guidelines than public universities ($M = 196$ days, SD = 95 days). However, guidelines of public institutions were longer which applied both for public universities ($M = 3368.6$ words) and for public universities of applied sciences ($M = 3335.3$ words). In contrast, guidelines of private universities of applied sciences were considerably shorter ($M = 503.6$ words).

The content analysis aimed at reducing data complexity, examining concepts grounded in the data, and understanding underlying patterns and relationships (Corbin and Strauss 2015). Initially, the 67 university guidelines were subjected to open coding to delineate simpler and more general concepts that represented the ideas contained in the guidelines. Concepts with shared properties, representing relevant phenomena, were grouped into higher-level categories (Saldaña 2021). The analysis focussed on identifying key aspects such as the integration of generative AI tools in academic writing, ethical considerations, transparency in AI use and implications for academic integrity.

The software MAXQDA 2020 was utilised for coding and categorising the guidelines. To ensure the objectivity and reliability of the analysis, ten randomly selected guidelines—constituting 14.9% of the total sample—were independently coded by a second researcher (Campbell et al. 2013). The categorisation of the data was subsequently discussed among the involved researchers to evaluate the coding process and resolve any discrepancies (Scandura and Williams 2000). This approach ensured a rigorous and replicable analysis.

In the subsequent phase, an analysis was conducted on the results of a faculty workshop that centred on generative AI. This workshop took place in January 2024 at a university of applied sciences and engaged 25 faculty members including teaching assistants, lecturers, professors and scientific staff. The participants were split into four groups that discussed different aspects of the use of generative AI tools. These aspects included ethical issues and consequences of generative AI tools. Furthermore, the groups elaborated on necessary technical competencies that should be included in the curriculum and on how to enhance university lecturers' readiness to integrate generative AI into their teaching.

4 | Results of the Content Analysis

4.1 | Results of the Content Analysis

The content analysis of 67 university guidelines revealed a nuanced approach towards the integration of AI tools in higher education, addressing both opportunities and challenges. The

data reflects varying degrees of regulation concerning nine categories that are listed in Figure 1 and described in the following.

1. Permitted use of GenAI for lecturers

As a result, 73.1% of the analysed institutions explicitly permit their staff to use generative AI, often by indicating possible application scenarios for university lecturers such as: 'create standardised text types (course descriptions/messages to students (e.g., reminders of deadlines)/instructions for writing written assignments)' (Rhein-Main University of Applied Sciences). While 3.0% of institutions generally forbid the use of generative AI, 23.9% include no explicit regulation in their guidelines.

2. Permitted use of GenAI for students

Similarly, 83.6% of the university guidelines generally permit students to use AI tools, reflecting widespread acceptance and recognition of AI's potential benefits in enhancing learning. However, the definition of specific regulations for each course is delegated to the educators, for example, by stating 'The University Senate has recommended that generative AI systems be generally permitted as an aid in unsupervised written examinations, for example in term papers, seminar papers and final theses, but the decision is made by the examiners' (University of Hohenheim). Only 3.0% of the universities explicitly forbid students from using these tools, and 13.4% have guidelines that do not clearly regulate it.

3. Voluntariness of GenAI use

The guidelines reveal that only 20.9% of universities explicitly state that the use of AI tools must be voluntary at any time. This applies to university lecturers, for example, by stating 'all recommendations and possible applications are only to be understood as impulses for reflective experimentation and as an invitation to discourse' (Rhein-Main University of Applied Sciences), as well as to students. One example is the following extract: 'In order to make the possibilities and conditions for students' voluntary use of AI tools transparent, teachers are recommended to discuss the regulations on the use of AI-based applications (in short: AI regulations) with their students at the beginning of each course' (Leuphana University of Lüneburg). None of the universities outrightly discourage voluntary use, yet 79.1% have guidelines that do not address this aspect at all.

4. Building AI competencies

Regarding the relevance of building specific AI competencies, 62.7% of the universities emphasise this in their guidelines, indicating that they recognise the importance of teaching students how to effectively use AI tools as part of their skill set, as the following excerpt demonstrates: 'The HWR Berlin must actively work to ensure that students understand how AI-supported applications for generating texts work, question them critically and know their special features - but also learn to use them' (HWR Berlin). None of the guidelines explicitly states that competence transfer is irrelevant, but 37.3% don't explicitly mention it.

5. Curriculum adaptation

The guidelines from 25.4% of institutions indicate plans to adjust the curriculum to integrate AI tools effectively. Statements like the following reflect a proactive approach to evolving educational needs: 'Courses should be offered [...] that introduce the use of AI-supported applications, but also take a critical look at their effects and functionality' (HWR Berlin). Meanwhile, 3.0% have explicitly decided against such changes, and a significant 71.6% have guidelines that do not address this issue.

6. Examination adaption

A notable 71.6% of institutions plan to adjust their exam protocols to account for the use of AI, recognising its growing influence in education. This includes measures like changing exam formats or incorporating AI-related questions to better assess students' understanding, for example, 'Just like the learning objectives and teaching-learning activities, the examination formats and tasks based on them should also be viewed critically. [...] The focus should not be on considering how the use of AI-supported tools in exams can be fundamentally prevented. General bans are neither didactically effective nor can they be effectively enforced' (unpublished guideline sent to the author via email). Only 1.5% explicitly reject the need for such adjustments, while 26.9% have not mentioned this adaptation in their guidelines.

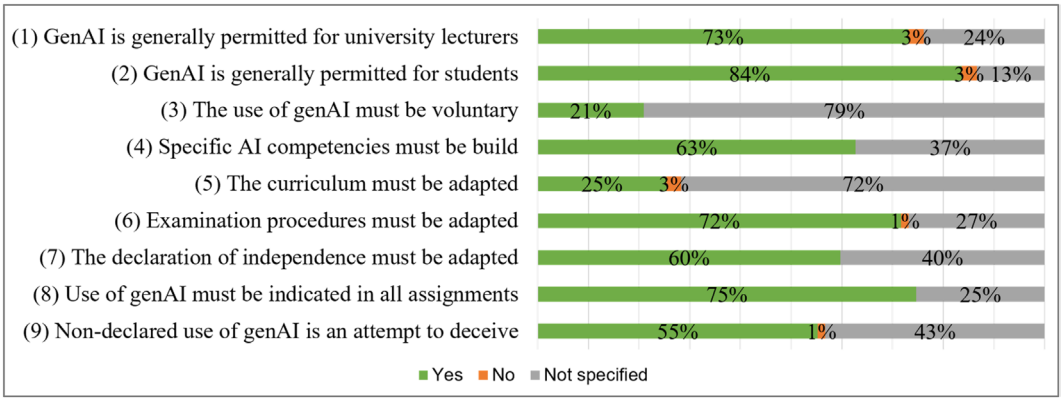

FIGURE 1 | Degree of AI regulation in the analysed university guidelines.

7. Academic integrity

The majority of universities, more precisely 59.7%, require students to include a signed declaration of independence when submitting their thesis, affirming that the work submitted is their own, with AI tools being supplementary aids. This measure aims to maintain academic integrity by ensuring that AI's role is transparent. Some declarations expect students to indicate the use in detail, for example, 'In this work I used ChatGPT or another AI as follows [...]. I assure that I have fully stated all uses. Missing or incorrect information will be viewed as an attempt to deceive' (University of Göttingen). None of the universities explicitly negate the need for such a declaration, but 40.3% do not address it in their guidelines.

8. Transparency of GenAI use

Similarly, a significant 74.6% of the institutions mandate that any use of AI tools must be indicated as an aid in any student work, ensuring transparency and honesty in academic submissions: 'In order to create more clarity and transparency in the use of AI tools, existing explanations can be supplemented in a subject-specific manner as to whether and, if so, to what extent and under what conditions AI tools can be used' (TU Dortmund). None of the institutions analysed explicitly state that such indications are not required. However, 25.4% of the guidelines do not mention this requirement.

9. Addressing deception

Although there is no means to prove whether and to which extent AI has been used, 55.2% of institutions recognise the non-declared use of AI tools as a potential attempt to deceive: 'The (unmarked) use of chatbots for coursework and examinations contrary to tasks or declarations of independence to the contrary is not permitted and, like the use of other (conventional) unauthorised aids, is considered an attempt to deceive' (Bielefeld University). These universities have clear policies in place that classify unauthorised AI use as academic misconduct. In contrast, only 1.5% explicitly do not consider it a deception attempt, while 43.3% have guidelines that do not clearly address this aspect.

4.2 | Opportunities and Risks of AI Integration

All 67 analysed university guidelines address both the opportunities and risks of using generative AI in higher education. Key opportunities include enhancing knowledge and digital literacy, which represents a benefit primarily for students that is cited in 40.3% of the guidelines. Opportunities benefiting university lecturers include the preparation and individualisation of course material, noted in 32.8% of the guidelines. Equally, 32.8% of the guidelines highlight the role of generative AI as a sparring partner.

The primary risk addressed is scientific inaccuracy. Accordingly, 53.7% of the guidelines express concerns about misinformation stemming from unreliable and low-quality data. The issue of plagiarism and deception is the second most frequently mentioned risk, appearing in 31.3% of the guidelines. Additionally, 28.4% of the guidelines emphasise data protection issues, cautioning that information used to formulate prompts could be employed to train AI algorithms, potentially leading to the unintended dissemination of sensitive information.

Overall, the content analysis reveals that 56.7% of the guidelines conclude that the opportunities presented by generative AI outweigh the risks, highlighting its potential transformative impact on teaching and research. Another 10.4% of the guidelines maintain a balanced view, acknowledging both opportunities and risks, while 13.4% perceive the risks as predominant. The remaining universities do not take a definitive stance on the issue. This distribution underscores the nuanced perspectives within higher education regarding the integration of generative AI into academic environments.

5 | Results of the Faculty Workshop

5.1 | Group No. 1—Ethical Implications

The workshop with 25 faculty members at a university of applied sciences was organised into four groups. The first group explored the ethical implications of incorporating AI into higher education. Numerous concerns about deception, autonomy, data protection, the data basis for AI systems and the current capabilities of students with AI were raised. Accessibility to licensed AI programs was another concern. The group emphasised that AI tools should be accessible to all students, ensuring no one is disadvantaged due to financial constraints. Furthermore, the group proposed organising joint workshops with students to explore their current use of AI, identify their needs and determine which tools are most relevant in specific teaching areas. This collaborative approach aims to bridge the gap between students' practical experiences and university lecturers' theoretical knowledge.

A significant recommendation was to enhance skills in questioning and critically examining AI results. University lecturers need to teach students how to scrutinise AI outputs and understand the limitations of AI technologies. For instance, students should recognise the dangers of relying on AI for tasks and learn strategies to avoid such practices. Discussions also focussed on whether AI influences mainstream opinions and whether individuals should form opinions using AI, considering the potential bias from one-sided data sources. These discussions underscore the importance of teaching students to critically assess AI-provided information.

5.2 | Group No. 2—Consequences of GenAI

Discussing the broader consequences of AI's presence in academia, the second group recommended to give the discussion component in academic assessments more weight than the written part. To better evaluate students' understanding and potentially excessive reliance on AI, extending the duration of oral examinations would allow for a more thorough assessment through increased questioning. This method not only enhances the evaluation process but also encourages students to develop a deeper understanding of the subject matter and their use of AI.

Integrating AI-related competencies into method training early in the academic curriculum, rather than delaying it until the later semesters, was also proposed. Teaching these skills frequently, starting from the beginning of the course, in smaller, manageable chunks is essential to ensure a solid foundation. Additionally, the group highlighted the importance of data protection, recommending the use of internal university AI models that ensure data confidentiality. Implementing these models can help safeguard sensitive information and comply with data protection regulations, addressing a significant concern in the digital age.

5.3 | Group No. 3—Required Skills

The third group discussed the technical skills required for effective AI use. Emphasis was placed on the necessity for both teachers and students to understand how AI works and the principles behind it. This foundational knowledge is crucial for efficient use and accurate evaluation of AI-generated results. Recognising the potential and limitations of AI is also important, as AI might not always be the best tool and other methods may sometimes be more effective. The group stressed the need for university lecturers to be aware of which AI programs use specific data and how the origin of data can influence results.

As the quality of AI results is highly dependent on the quality of prompt engineering, university lecturers should teach students how to formulate effective prompts to obtain meaningful AI outputs. Keeping university lecturers updated with the latest AI advancements is essential for this continuous integration. Establishing a directory of further training opportunities and conducting in-house training sessions were recommended to keep university lecturers proficient with the latest AI technologies. These measures ensure that teachers remain competent and confident in their ability to instruct students on AI, thereby maintaining a high standard of education.

5.4 | Group No. 4—Building Lecturers' AI Literacy

Focussing on the preparedness of university lecturers to educate students about AI, the fourth group highlighted the importance of gaining hands-on experience with AI tools. By attempting to solve tasks using AI, university lecturers can better understand the adaptations needed for teaching. It was concluded that teaching AI effectively is not possible without personal experience. University lecturers must first engage with AI tools themselves to provide meaningful instruction to their students. This approach, often referred to as 'learning by doing', helps university lecturers develop a practical understanding of AI, which can then be translated into more effective teaching strategies.

Furthermore, the group suggested that academia should try to solve their own academic or administrative tasks using AI to gain insights into the tool's applicability and limitations. This first-hand experience is invaluable for identifying potential challenges students might face and developing appropriate instructional methods to address them. Continuous professional development and ongoing training for university lecturers were emphasised as critical components for successfully integrating AI into the curriculum.

6 | Conclusion

The integration of generative AI in higher education presents both opportunities and challenges that universities need to address. An analysis of 67 university guidelines in Germany shows that institutions are recognising the transformative potential of AI in teaching and research. The guidelines indicate a general acceptance of AI tools among those universities that have already established guidelines. These guidelines focus on building AI literacy, adapting curricula and examination procedures to effectively incorporate AI. While most universities see the opportunities of generative AI outweighing the risks, a significant portion remains undecided or perceives risks as predominant.

A faculty workshop further stresses the importance of ethical considerations, competency development, technical understanding and continuous university lecturer training in embedding AI skills in higher education. Recommendations include instilling critical evaluation skills in students, ensuring equitable access to AI tools and integrating AI-related competencies early in the curriculum. The workshop underscores the necessity for university lecturers to gain hands-on experience with AI tools to effectively teach students and highlights the importance of continuous professional development to keep abreast of AI advancements.

Addressing the emerging field of digital challenges in higher education, both content analysis and workshop results demonstrate to which extent universities encourage and enable their faculty members to actively embrace generative AI. Thereby, this research contributes to a better understanding of drivers and hurdles with regard to the two strategic priorities of the European Commission's Digital Education Action Plan. Understanding universities' reactions to the adoption of new AI applications is crucial for staying competitive in the digital landscape. Accordingly, the findings provide valuable insights for policymakers, university lecturers and researchers.

6.1 | Limitations

However, this research is not free of limitations. Firstly, this study was conducted in Germany where the level of concern about data privacy tends to be very high (Kozyreva et al. 2020; Leboukh, Baba Aduku, and Ali 2023). To enhance the generalisability of the findings, the content analysis of university guidelines could be extended to different regions. Secondly, while 145 institutions were included in the study, only 67 of them had published AI guidelines or provided them upon request by October 31, 2023. Thus, the findings are not generalisable to all higher education institutions in Germany. As the evolution of generative AI tools is a highly dynamic field of research, the search for and content analysis of university guidelines could be extended at a later point of time. Thirdly, the workshop with 25 faculty members has been conducted at a university of applied sciences. Not all recommendations elaborated by the workshop participants equally apply to other institutions. For example, learning groups are generally larger at universities and this may hinder from switching to oral exams. Furthermore, student needs and study patterns may differ between universities and universities of applied sciences (Haas 2023).

6.2 | Implications

The application of generative AI tools has the potential to transform teaching and learning, aligning them with the demands of the digital future (Munoz Acuna 2024). This shift can enhance the educational experience by personalising learning pathways, predicting student needs and optimising educational outcomes. Additionally, understanding power relations during the digital transformation journey is crucial for ensuring equitable access to AI tools and fostering a supportive learning environment (Zhao, Liao, and Sun 2020).

Digital innovation and transformation provide opportunities in education and workplace environments, emphasising the importance of digital competencies in an increasingly digitalised world (Mohamed Hashim, Tlemsani, and Matthews 2022). Universities need to adapt their curricula to include AI-related competencies, ensuring that students are equipped with the skills necessary for the digital age (Gallastegui and Forradellas 2024).

By implementing strategies that address these key areas, universities can better prepare their graduates for an AI-enhanced workforce. This preparation extends beyond technical proficiency to encompass ethical, social and practical implications of AI use. As AI technologies evolve, higher education institutions must adapt their educational practices to equip both university lecturers and students with the necessary knowledge and skills to thrive in a digitally transformed world.

In conclusion, the theoretical and practical implications of integrating AI in higher education are multifaceted. By embracing AI technologies, universities can enhance the educational experience, prepare students for the digital future, and foster innovation and sustainability in higher education. It is essential for universities to consider both the theoretical underpinnings and practical applications of AI integration to ensure a comprehensive and effective transition towards a digitally transformed educational landscape.

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Conflicts of Interest

The author declares no conflicts of interest.

Data Availability Statement

The analysed guidelines are available upon request to the corresponding author.

Endnotes

[1] In the following, the term university lectures will be used to describe all individuals that teach at universities or universities of applied sciences, including teaching assistants, lecturers and professors.

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