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The Perspectives of Academicians and Students Regarding the Use of Generative Artificial Intelligence in Higher Education

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Abstract

Education should strive to keep pace with the developments of the modern world and to fulfill its mission by not deviating from the principles of ethical and effective learning. In this process, it continues to be tested by unstoppable technological developments. GAI, with both its positive and negative effects, has spread incredibly quickly to every aspect of our lives. This study, which deals with GAI especially in the context of higher education, aims to evaluate the benefits and limitations of GAI on a common ground. In this context, both academicians and university students were asked to express their views on the current situation regarding the use of AI in higher education and their suggestions for the use of AI in higher education. In the study conducted within the framework of qualitative research, semi-structured interview forms prepared by the researchers were answered by 36 university students and 14 academicians. Academicians and students advocated the need for improvement in the use of GAIs, especially in terms of ease of access to information and teaching/learning support. In addition, it was stated that there are ethical problems in use; they stated that it would be important to take precautions and provide general awareness trainings.

Introduction

Society is now moving quite close to the mass technologization movement (Ocaña-Fernández et al., 2019). With the rapid developments in information and communication technologies, artificial intelligence (AI) has easily spread to human life (Hwang et al., 2020). The use of AI, especially in educational processes, continues to exist in some way, with or without serving the purpose of education. Education can be considered as the fundamental element that provides skills for the development of a nation (Bali et al., 2022) and for a nation to see the future open conditions (Rozi et al., 2020). Experiencing modernization, education brings about changes in the socio-cultural environments of society and behavioral patterns of individuals (Nabila et al., 2021). Higher education, which can be defined as a boundary, especially at the point of transition to professional life, is a very effective and critical point in the processes of building individuals' individual lives. With its innovation and research roles, it also has an important position in society as it transforms research insights into value (Buzzelli & Asafo-Adjei, 2023). While efforts are underway to improve the quality of education, there is also a great competition to support the life of the nation (Bali & Ruzifah, 2021). The mission of higher education institutions has shifted beyond the transmission of traditional heritage, cultural identity and the sustainability of education, and has changed to keep

education and training methods alive to change with current technological developments (Aldosari, 2020). Higher education institutions, which face many risks in fulfilling their mission, deserve special attention (Popenici & Kerr, 2017). Higher education needs to engage more with modern technologies, both internally and with its faculty and students. Unfortunately, higher education is often criticized for being too slow in adopting current methods, research and technologies (Liu et al., 2020). The future of higher education also depends on how much it stays in touch with technology. With the unstoppable development of technology, the roles and pedagogies of teachers and students in higher education, as well as the concepts of learning and teaching, need to be reconsidered (Popenici & Kerr, 2017). Higher education has accepted that it has a different mission with AI and has drawn a different route for itself. Today, higher education is taking different steps in line with the necessity of AI and high-tech education not only for students studying computer science but for all students (Ma & Siau, 2018). Therefore, higher education, its function and pedagogical models have also been reshaped by AI, and it has entered the process of thinking about the AI solutions it can offer or benefit from (Ma & Siau, 2018; Popenici & Kerr, 2017). Higher education has now accepted AI as a competitive advantage (Hannan & Liu 2023) and has stopped resisting its intense impact on the curriculum (Ma & Siau, 2018). In fact, the idea of becoming a "smart university" has become achievable with many AI-supported mechanisms (Furey & Martin 2019). However, in order for higher education to remain as institutions that sustain civilization and promote knowledge acquisition and wisdom, it must not forget its critical and questioning aspects (Popenici & Kerr, 2017).

Literature Review

While AI is a strategic technology that keeps pace with and drives both the industrial and social revolution era, it has a critical importance in economic development, social improvement, transformation in education, international sustainable, effective and good steps (UNESCO, 2021). Considering its roots, AI is a promising or worrying concept that dates back to the 1950s and is included in our lives with sharp definitions as "any aspect of the learning process and any feature of intelligence can be simulated by reference to a machine" (Russell & Norvig 2010). AI, which continues to exist in our lives as computers that are connected to the human mind and perform some cognitive tasks, is an umbrella structure that includes terms such as algorithms, data mining, neural networks, machine learning and exhibits intelligence capability (Baker & Smith, 2019; Moya et al. 2023). In particular, in the context of education, AI is a technology that has the potential to maximize the effectiveness and efficiency of the learning process through inclusive, equitable and innovative applications (Arogundade 2023; Bernard et al, 2017; Guilherme, 2019; Goralski & Tan, 2020). Artificial intelligence in education (AIEd), which still harbors many debates and concerns, may continue to be in a questionable position for a long time. There is still no common understanding of the perspective from which a technology that has spread to all areas of life should be evaluated for which field. Many definitions and understandings still focus on AI as a mechanism that can perform cognitive tasks, but ignore the philosophical, psychological and political aspects of intelligence (Popenici & Kerr, 2017). Any application with AIEd should be carried out in the most ethical, questioning and critical way. Within the scope of the Industry 4.0 era, it can be said that AIEd is becoming increasingly widespread in accordance with the search for information, analysis, use of automation services and data exchange (Rahadiantino et al., 2022). AIEd continues to increasingly enable students to reflect on their own learning and support the iterative development of student-centered, data-driven learning (Ouyang & Jiao, 2021; Zawacki-

Richer et al., 2019). The 2018 and 2019 Horizon Report emphasized that AI will grow significantly (Educase, 2018; 2019). The field of education is also in a constant movement of adapting to communities of interaction that are highly responsive to technological steps (Ocaña-Fernández et al., 2019). As it adapts, education can continue to provide equal and inclusive opportunities nationally and internationally. Without adaptation, there is a danger of a society that does not evolve and students who are left behind, unable to keep up with the advances of the times. The debate about the extent to which technology will revolutionize the world of education and the growing fears, anxieties and unknowns that AI creates is still ongoing (Ocaña-Fernández et al., 2019). In addition, the ethical issues encountered and the limitations they create are an important factor that should not be ignored (Noroozi et al., 2024b).

AIEd can ease the transition between technology and humanity (Yang et al., 2021) and is considered one of the most important developments of the current century (Becker et al., 2017). AIEd is actively used in many dimensions such as innovative teaching methods and techniques, personalized learning processes, institution-teacher-parent-student collaboration and is the subject of different researches (Reis et al., 2021). AIEd is also known to be effective in supporting people's educational processes and fulfilling their duties and responsibilities in the best way (Yang et al., 2021). In the studies carried out, it is also seen that it increases both student engagement and motivation (Noroozi et al., 2024b). This modern technology improves the quality of teaching and stimulates individual competition (Osetskyi et al., 2020). It is also preferred due to its cost-effectiveness and ability to reduce workload (Gökçearslan et al, 2024).Although the dynamic and profound impacts of AI pose some risks to social, cultural and ecological diversity (UNESCO, 2021), its great support for human well-being in many aspects such as water, food, education and energy cannot be ignored (Yang et al., 2021). More empirical evidence is also needed from the design, development and deployment of ethical, reliable and sustainable AI practices in education. We do not yet have a deep and clear knowledge of the extent to which AI is diffused in the educational context. This may be due to the complexity and uncontrolled growth of AI technology. Despite these concerns, the high-level advantages of AI in education are increasing. AIEd facilitates learning, teaching, and decision-making (Ouyang et al., 2022); provides personalized guidance and feedback to students; and can assist policymakers in decision-making processes (Hwang et al., 2020). For these reasons, four main roles for AIEd are mentioned: (1) an intelligent teacher, (2) a learner, (3) a learning tool/partner, and (4) a policy-making advisor.

Dealing with AI, which can support the educational process from every dimension but raises questions about how it can be supported more ethically and effectively, should be a shared responsibility of educators and policy makers, and should even be addressed as a global concern. AI offers unlimited opportunities for students to access information, share knowledge, collaborate and improve their learning abilities (Huang et al., 2021), increase their interest in learning, achieve higher academic performance (Yang et al., 2021) and provide real-time interventions to students (Yang et al., 2021). With AIEd, it is possible to predict student success and produce personalized learning models, especially in higher education (Cerratto Pargman & McGrath, 2021). Automated short answer grading systems and fast, convenient and less costly systems (McGrath et al., 2023) also reduce the workload of both institutions and teachers. AIEd should not be considered as a pure technology; instead, the focus should be on how it can be positioned in our lives in a human-centered way. As a matter of fact, the difference between the concepts of "technology" and "instructional technologies" should be from this perspective. Any technology that

ignores human values and judgments should not be considered as an effective and ethical instructional technology. Research on AIEd should be based on ethics and norms, and its effects on learning communities and learning processes should be further investigated (Yang et al., 2021). It is vital to support sustainable practices within the framework of ethical principles that do not ignore human values in education.

Generative AI (GAI) systems use deep learning to identify or mimic the data patterns and structures of whatever input systems they are trained with (Baidoo & Ansah, 2023). Although the contribution of deep learning to the academic process is quite great, it causes a very cautious and prejudiced approach to GAI in higher education institutions due to the fact that academic integrity is jeopardized by GAI. Despite the intense pressure and panic about the use of GAI in the education world, GAI is now part of our lives and will continue to be so (Farrelly & Baker, 2023). Opinions on the use of GAI are divided into two poles: those who want to ban its use completely and those who want to start a process of guidance on its ethical and effective use (UCL, 2023). There is already an extensive literature on GAI in general and ChatGPT in particular, and on academic integrity (Michel-Villarreal et al., 2023). Reliability, accuracy, and plagiarism problems have been consistently reported for the use of ChatGPT in education (Kasneci et al., 2023; Lo, 2023). It is also stated that students can successfully pass some assessment systems with ChatGPT (Lim et al., 2023) and that problem solving skills and critical thinking skills will be negatively affected as a result of unquestioning trust in this system (Kasneci et al., 2023). Even when focusing on its negative features, it is not difficult to understand the views on banning its use in educational processes. However, with ethical and effective use, quite high level benefits can be achieved. Both academicians and students can use GAI very effectively to generate initial ideas or worksheets for an existing study topic (AlAfnan et al., 2023). It can also help researchers by providing feedback on the prepared studies for preliminary editing (Farrokhnia et al., 2023). Thanks to language editing and translation support for groups with language and cultural disadvantages, GAI can take place as a support system in the dimensions of equity and inclusion in education (Lim et al., 2023). It can also be used as a very valuable system for educators in terms of creating lesson plans and producing personalized lesson resources and activities (Michel-Villarreal et al., 2023). GAI can take its place in educational environments as a technology that encourages critical thinking and supports sustainable discussions (Farrokhnia et al., 2023).

After 2020, many studies have started to shed light on the connection between AI and higher education. For such a profound and new technology, more qualitative and quantitative studies and deep discussions are needed. Moreover, it is emphasized that instead of debating whether or not to use AI in education, it is necessary to realize that this technology is past its infancy and move on to the stage of educating society about AI (Kong et al., 2021). AI literacy, which can be considered as an emerging branch of digital literacy, includes critical skills beyond the risk, opportunity, ethical and pedagogical aspects of general technology use (Bruneault et al., 2022; Long & Magerko, 2020). The prediction that we are seeing a fragment of the future (Qadir, 2023) with the threats and challenges brought by ChatGPT, which is at the peak of its popularity, can be frightening. In the study conducted by Michel-Villarreal et al. (2023), while examining the use of GAI in higher education from a qualitative perspective, ChatGPT was determined as the participant of the research. ChatGPT responded to semi-structured questions determined by the researchers. ChatGPT identified opportunities, challenges, barriers, and mitigation strategies for the use of GAI in higher education. In addition, the themes suggested by ChatGPT were reported to

be consistent with many studies. While ChatGPT describes itself as a structure that offers opportunities in many areas such as lifelong learning, supplemental learning resource, innovative learning experience, support for teachers, research and data analysis, language and communication skills; it criticizes it for its lack of quality control, expertise and authorise, negative effects on communication and collaboration. Instead of seeing the irreversible effects of its continued uncontrolled use, the education world needs to focus on how AI can be positioned through ethical and effective use. AI holds great opportunities and barriers for higher education and has the potential to transform education (Anctil, 2023; Dai et al., 2023; Farrelly & Baker, 2023; Smolansky et al., 2023; Yeralan & Lee, 2023; Wang, 2023). However, it is also stated that the literature is still insufficient and both hypothetical and speculative (Michel-Villarreal et al., 2023). In this study, it was aimed to determine the current situation evaluations of university students and academicians regarding the use of AI in higher education and their suggestions for the use of AI in higher education. Obtaining the opinions of academicians and students is critical in terms of evaluating the extent to which AI can be accepted in the higher education process, how it is positioned, preferability and effective use suggestions. The study will provide a national perspective in order to establish a conceptual framework for the use of AI in higher education in line with the views of both academicians and students and to explain the connection between higher education and AI. The research questions of the study were formulated as follows: (1) What are the opinions and suggestions of academicians regarding the use of AI in educational processes? (2) What are the opinions and suggestions of university students regarding the use of AI in educational processes?

Method

Research Design

The study was designed in a qualitative framework. Qualitative methodology involves philosophical perspectives, propositions, assumptions, in order to bring the researchers' work and the purpose of the current research into a form that is open to criticism, replication or adaptation (Vaismoradi et al., 2013). The nature of this research explains that the type of knowledge being explored is examined from an epistemological perspective, with strategies that are consistent with it (Giorgi, 2002; Holloway & Todres, 2007). With qualitative research, real-world problems can be examined from a deep perspective (Moser & Korstjens, 2017). In this way, how and why questions, open-ended questions, and non-linear and comprehensive data can be obtained. Qualitative research has the ability to explain elusive patterns of human behavior and thoughts (Foley et al., 2021).

Participants

In this study, the convenience sampling method was adopted in order to make the processes of taking the opinions of instructors and students comfortable in terms of accessibility. In the convenience sampling method, the fast execution of the process and the relatively low cost of the data collection process are taken into consideration (Yıldırım & Şimşek, 2021). It is obvious that this method, which is mostly used for exploratory or pilot studies (Patton, 2014), has a significant disadvantage in terms of generalizability (Creswell & Creswell 2017). For this reason, data collection process was continued until data saturation was reached.

In the selection of the participants, especially those who stated that they actively use artificial intelligence in their daily lives and in academic contexts and who wanted to contribute to the description of the process by voluntarily participating in this study were taken into consideration. There were two groups of participants (academicians and university students). Table 1 shows the main features of the participants. The 14 academicians included in the study were selected among those who have general ICT competencies and use instructional technologies effectively in their courses. They have a minimum of 5 years and a maximum of 21 years of experience and their age range is between 30-47 years. Among the academician participants, 8 were female and 6 were male. 36 university students were selected from among those who had general ICT competencies and experienced the use of instructional technologies in their courses. The age range of the students was between 18-25. 16 of the research participants were female and 20 were male.

Table 1. Participant Features

Academicians	Female	8	University	Female	16
(N: 14)	Male	6	students	Male	20
	Experience	5-21 years	(N: 36)	Age	18-25years
	Age	30-47 years			

Data Collection and Analysis

The semi-structured interview method requires a certain level of prior knowledge and preparation (Kelly et al., 2010). This method supports the research process in terms of eliminating the complexity between the interviewer and the participant (Galletta, 2013) and allowing improvised follow-up questions depending on the participant's response (Rubin & Rubin 2005). Based on the semi-structured interview framework defined by Kallio et al. (2016), the prerequisites for the semi-structured interview were first identified in line with the purpose of the study. Through a detailed literature review, research team discussion/brainstorming process and knowledge of other qualitative researchers, general judgments about the content and form were formed. Preliminary interview guide was prepared; purpose and sub-objectives, main theme and target group were evaluated. In the pilot testing phase, internal testing, expert assessment and field testing processes were completed. Finally, interviews were conducted in the field with the presenting the complete interview guide phase. The participants were reached and interviewed in the fall semester of the 2023/24 academic year. The semi-structured interview data were transcribed and checked by an independent researcher. Then, the analysis process was carried out using thematic analysis. Thematic analysis is an analysis method that includes accessible and systematic procedures for revealing, analyzing and interpreting patterns of meaning in qualitative data (Clarke & Braun, 2017). Thematic analysis provides an opportunity to interpret various aspects of the research topic (Boyatzis, 1998). Thematic analysis not only provides a flexible method of analysis, but also does not threaten the depth of the analysis process and enables a systematic and open analysis process (Javadi & Zarea, 2016).

The stages of the thematic analysis process followed in the study are based on Braun and Clarke (2006). In the "Familiarizing yourself with your data" stage, the data were re-read, digitally transcribed and re-read. Initial ideas were noted after the readings. In the "Generating initial codes" stage, the entire data set was coded in a systematic

way. In the "Searching for themes" stage, the codes generated in the previous stage were placed under possible themes and this process was carried out and compared independently by the researchers. In the "Reviewing theme" stage, a thematic map of the analysis was created and the matching of themes, codes and quotations was checked for all data. In the "Defining and naming themes" stage, clear names and definitions were created for the themes. In the last stage, "Producing the report", the data obtained were critically examined with the literature.

The reliability and validity of the study is also a dimension that should be taken into consideration. Reliability describes the soundness of the research regarding the application and implementation of the chosen method within the scope of qualitative research (Rose & Johnson, 2020). Reliability explains the ability of researchers to question whether the research is methodologically consistent and its reasonable stability over time (Creswell, 2014). Method justification, analytical procedures regarding the operation of the method, and reporting with clear explanations also support reliability (Rose & Johnson, 2020). Cross-checking the codes and themes developed by different researchers by comparing them later also supports the reliability of the study (Gibbs, 2007). Validity refers to the fidelity of the research findings (Rose & Johnson, 2020). Validity is also ensured by verifying qualitative data with themes and codes and proving it with quotations (Cho & Trent, 2006). Additionally, providing a rich, thick description to see contextual details is also very effective for validity (Creswell, 2014; Rose & Johnson, 2020). However, as a limitation of the study, it should not be ignored that self-reported data were obtained from the students. Some studies (Noroozi et al., 2024a) have shown that students' self-perceptions may be weak in reflecting their actual experiences.

Results

Interview data are reported under four groups: academician-university student and evaluation and usage suggestions for the current situation. The main distribution of the findings is summarized in Figure 1.

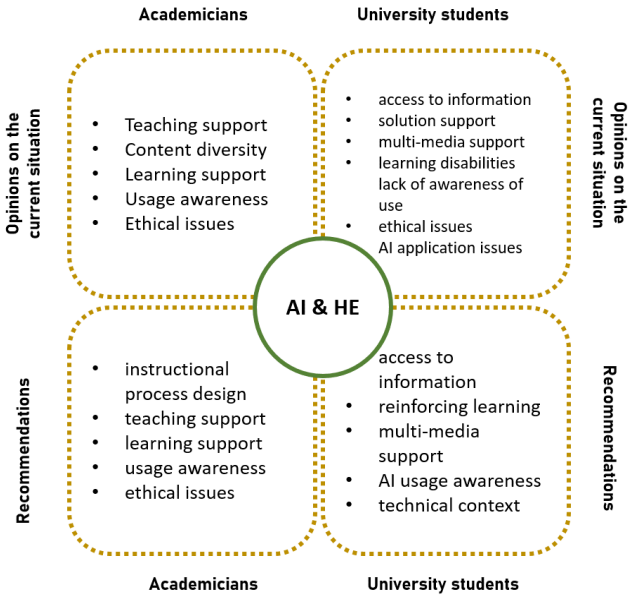

Figure 1. General Distribution of Opinions

RQ1: What Are the Opinions and Suggestions of Academicians Regarding the Use of AI in Educational Processes?

Within the scope of RQ1, academicians' current opinions on the use of AI in teaching processes and their suggestions for improving the process were taken. The opinions and suggestions offered by 14 academicians were analyzed in separate contexts. Academicians' opinions about the current situation were analyzed and the themes and codes obtained are as shown in Figure 2.

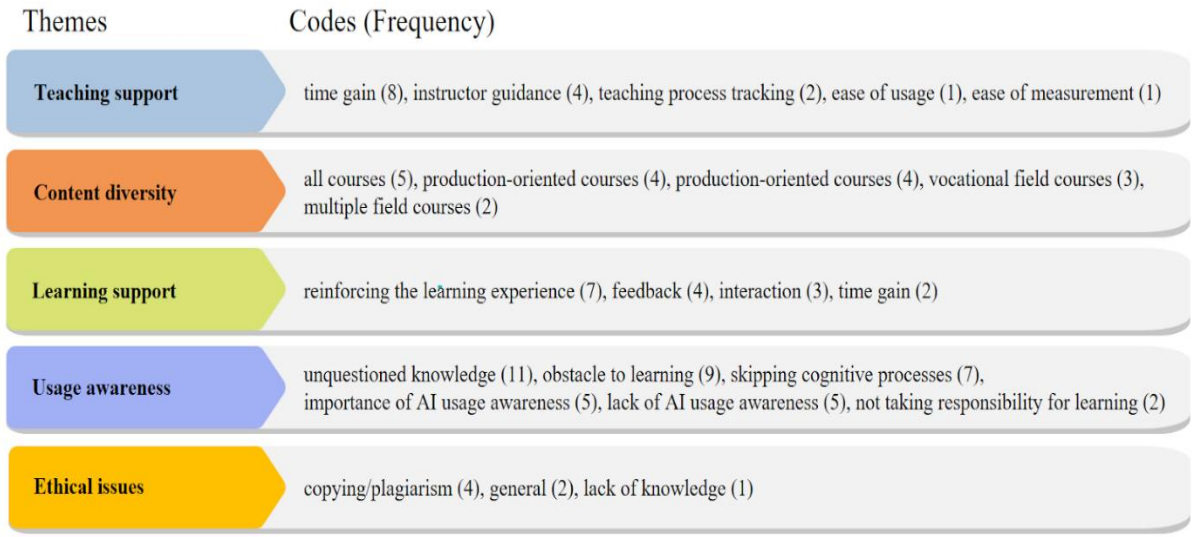

Figure 2. Academicians' Current Situation Assessments on the Use of AI in Higher Education

When the codes under the theme of 'teaching support' were examined, it was seen that mostly academicians mentioned that using AI in their teaching processes 'saved them time'. As a result of this situation, it has been stated that AI provides 'instructional guidance'. In addition, it has been stated that it provides 'usage' and 'easiness of measurement' along with 'teaching process follow-up'. When the general scope of the theme is examined, it is understood that AI has a structure that primarily saves time and facilitates the actions of academicians in carrying out their teaching processes.

> *I11: "AI tools do within minutes tasks that do not require very high mental skills, but which we can describe as a burden that every teacher has to spend hours to do. It also provides stimulating information for instructional activities and designs. Presentations made from AI tools cover different aspects of the subject."*

It has qualified the appropriate courses in which AI applications are used or can be used in the academicians' teaching processes. The opinions they conveyed were collected under the theme of 'content diversity'. In this context, it has been observed that the courses in which AI can be used are not limited. It has been stated that it can be applied in all courses. In addition, it is stated that it will contribute to production-oriented and vocational field courses and support courses that address more than one field.

> *I01: "AI provides very good opportunities to eliminate deficiencies in the application of procedural knowledge. While AI is very effective for STEAM coverage, it can also provide support in supporting*

language skills for social skill acquisition."

Within the theme of 'learning support', academicians' opinions on the impact of AI applications on students' learning were included. As can be seen from the codes revealed, it has been determined that it contributes to the reinforcement of students' learning experiences. In this process, the feedback and interaction opportunities provided by AI were also mentioned and it was stated that students gained time in their learning processes.

I08: "On a positive note, a process that supports autonomous learning has emerged. It is possible for them to access the same content through different experiences depending on their interests. Additionally, chatbots provide support in areas such as language development and writing skills."

When the scope of the 'usage awareness' theme, which emerged in line with academicians' opinions, is examined, it is seen that students do not take responsibility for learning by accepting information without questioning; As a natural consequence of this, it has been stated that it prevents learning without the cognitive processes required for learning. In addition, it has been stated that students have a lack of awareness of AI use within the scope of their learning processes and this importance should be understood.

I02: "First of all, it should be explained to students very well what artificial intelligence is, how they can benefit from it in their learning processes, and its possible risks. Activities that will develop their creativity should be designed, they can be asked to explain how they benefit from artificial intelligence in the activities they carry out and what kind of contributions they make, thus a process in which the student is active can be developed."

When the theme of 'ethical issues' was examined, it was seen that academicians included their opinions about the ethical violations that students resorted to in their use of AI. In particular, it was determined that students, in addition to the cheating and plagiarism actions they carried out during their learning processes, also violated general ethics and thought that they did not have enough information to prove that the actions they took in this regard were wrong.

I13: "I do not find the students' equipment regarding learning ethics sufficient. For this reason, since AI is very suitable for use uncontrolled or outside ethical frameworks, there is a high potential for students to think of it as a tool that will perform some learning tasks instead of receiving support."

The recommendations of academicians were analyzed and the themes and codes obtained are as shown in Figure 3. When the codes within the scope of the 'instructional process design' theme were examined, academicians presented their suggestions especially regarding instructional design and process planning, material preparation and providing support for collaboration opportunities in these processes. In addition, it has been observed that providing the opportunity for process monitoring, developing teaching content and providing ease of measurement are also recommended in this direction.

I04: "First of all, it will save time in some standard processes. For example, scoring standardized tests, etc. There will be no loss of time in such processes. I think that tracking and feedback systems appropriate to student performance will be useful, especially for e-learning environments. By supporting virtual and remote laboratories with AI, it is possible to create highly interactive

application environments."

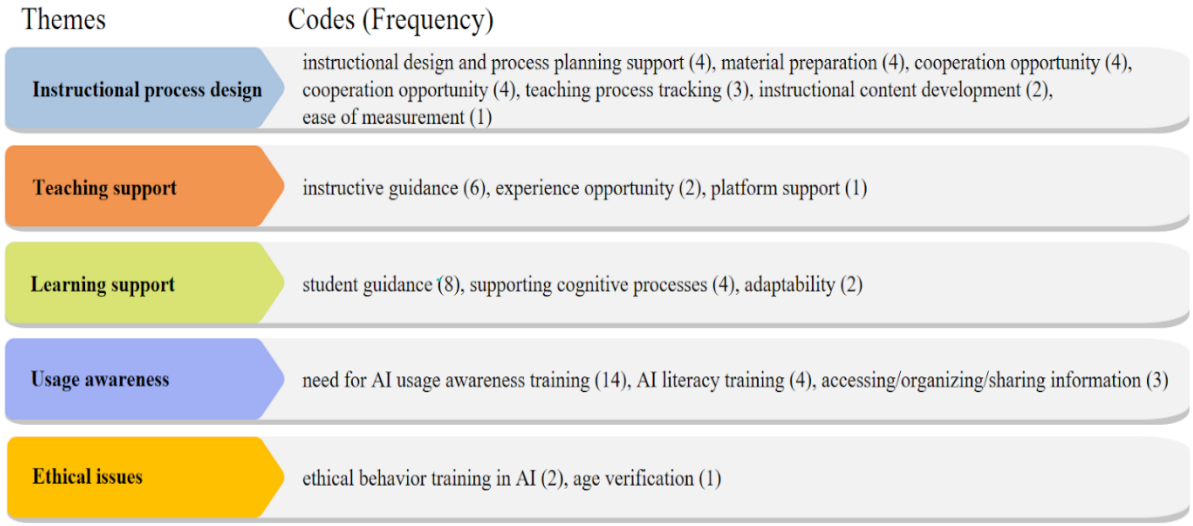

Figure 3. Academicians' Suggestions for Using AI in Higher Education

In the 'teaching support' theme that emerged within the scope of the AI usage suggestions offered by the academicians, they requested general instructional guidance and stated that it was necessary to gain experience with AI applications and provide support for relevant platforms.

I14: "Nowadays, especially considering the high course load of faculty members, it may be good to benefit from AI applications as an assistant for difficult and time-consuming tasks."

Within the scope of the 'learning support' theme, the suggestions offered by academicians regarding the ways in which AI applications support students' learning are included. It has been observed that academicians, similarly to themselves, stated that guidance is important for their students. In addition, it was stated that cognitive processes should be supported in order to strengthen their learning. They also suggested providing adaptability conditions that take into account students' differences and choices.

I02: "First of all, it should be explained to students very well what AI is, how they can benefit from it in their learning processes, and its possible risks. Activities that will develop their creativity should be designed, and they can be asked to explain how they benefit from AI in the activities they carry out and what kind of contributions they make, thus a process in which the student is active can be developed."

RQ2: What Are the Opinions and Suggestions of University Students Regarding the Use of AI in Educational Processes?

Within the scope of RQ2, university students' current opinions on the use of AI in education and training processes and their suggestions for improving the process were taken. The opinions and suggestions offered by 36 university students were analyzed in separate contexts. Students' opinions about the current situation were analyzed and the themes and codes obtained are as shown in Figure 4.

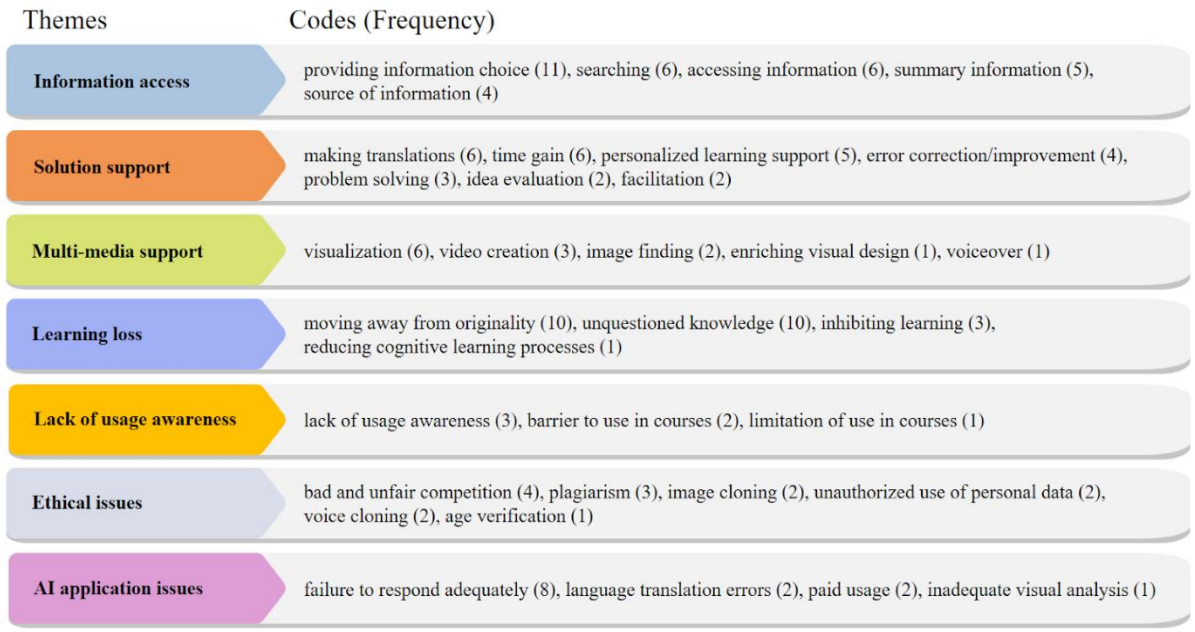

Figure 4. University Students' Views on the Use of AI in Education and Instruction Processes

Under the theme of information access', there are codes indicating that students use AI applications to access information. Students stated that they see AI applications as providing different information options, being able to summarize the information they want, giving them the opportunity to do research, and being a source of information.

> *S19: "First, I research the assigned homework and at the end of this research, I try to get different ideas by asking the AI about this, thus I try to synthesize both my own ideas and the information that the AI provides me."*

In the theme of 'solution support', students talked about the alternative solution support they received from AI applications in their learning processes. It has been observed that they especially benefit from opportunities such as translation and saving time. It was determined that they also expressed it as a structure where they received support for special learning situations, obtained solutions to problems and consulted ideas. It has been stated that AI applications make their work easier in the solutions they demand and allow them to see and correct errors in the situations they are working on.

> *S07: "I benefit from him by asking for sources, information and examples. If I want detailed information about a subject, I tell Chat GPT my level on the subject and where I want to end up, and I ask it to recommend the most suitable resources for me accordingly. Requesting information consists of short instructions. For example, a word may have a meaning in another language and I would like it to produce suitable examples for me with this word. In this way, I use it as a more reinforcing learning."*

The theme of 'multi-media support' included students' opinions about the multimedia components they receive support from in AI applications in their teaching processes. In this context, it was determined that students mostly used multimedia support for visualization, video creation, visual discovery, visual design enrichment and voice-

over.

> *S12: "I use it mostly for homework. For poster design, video production, video dubbing and text content ideas.."*

Under the theme of learning losses', students explained how using AI applications in their learning processes could have negative effects on their learning. In this context, they stated that they moved away from originality and tended to accept the information they accessed through AI without questioning. As a result, they stated that they hindered their learning and reduced the cognitive learning processes necessary for learning.

> *S10: "From what I have seen and heard, many students use AI applications in their homework and exams. However, many students copy and paste these answers without reading them. Not only is there no learning, they also answer incorrectly."*

When the student opinions obtained within the scope of the theme 'lack of usage awareness' were examined, it was seen that the students stated that they had no awareness of the use of AI. In addition, they stated that both students and academicians prevented or limited their use of AI in courses because they did not have sufficient awareness of AI use.

> *S19: "In my opinion, using the results of these AI applications directly is bad use. Of course, we should benefit from these applications, but if we just let him do everything, what would be our point here? As humans, we must benefit from these practices and create a synthesis."*

In the theme of 'ethical issues', students stated that AI applications can cause bad and unfair competition, especially when used while doing homework. Here, there were statements that they found it unethical when compared to the efforts of those who did not use original production (direct copying or plagiarism) in their assignments and did not use AI applications. They also mentioned unauthorized use of personal data and image and audio cloning. They also stated that the lack of age control when accessing AI applications is a negative situation.

> *S13: "There are huge problems in the copy section. Most people deliver the output they receive from AI as if it were their own design. It is now clear from the language used in assignments such as slide assignments that Chat GPT has prepared them."*

In the theme of 'AI application issues', students talked about the problems they generally encountered in AI applications. The first of these was not being able to find adequate answers while doing research. They also mentioned the translation errors encountered in translations into different languages. They stated that having fee-based limitations on the use of AI applications also prevents effective use. They stated that visual analyzes made with AI applications should also be improved.

> *S07: "Limited usage and insufficient language translation support"*

The recommendations of students were analyzed and the themes and codes obtained are as shown in Figure 5. In the theme of 'information access', students stated that they wanted to access a wider variety of sources when searching for information. They stated that the results they obtained should be detailed, accurate, clear and

concise. In addition, they emphasized the necessity of a structure that checks the accuracy of information.

> *S19: "What I would like in this AI application is that the information be given in a much more specialized and sourced manner. So I can master the subjects faster."*

Under the theme of 'reinforcing learning', students listed their suggestions for AI applications to support their learning. They stated that, first of all, originality should be supported. In their queries, they stated that the presentations should be enriched with sample sources, advanced guidance should be provided in the requested supports, and problem-solving-oriented supports should be provided. In order to reinforce learning, it has been stated that AI applications should give homework and generate questions regarding achievements. Improving translation is another suggestion.

> *S30: "AI finds wrong results in physics questions because it cannot think logically. I would like to produce an AI that thinks more humanely. In fact, if every branch of science is developed, our learning skills will increase in this way."*

Under the theme of 'multi-media support', students made suggestions by referring to the types of media they frequently use in their learning processes. They especially stated that presentation and visual supports needed to be improved. In addition, they suggested increasing the possibilities for visualizing information, taking design principles into account, and producing in all media types. Improving video support and enriching visual design were also among the suggestions.

> *S21: "I would like to have an AI application that can switch between AI, design according to the visual you send, give ideas and convert the image into text, and perform the tasks of many applications in a single application."*

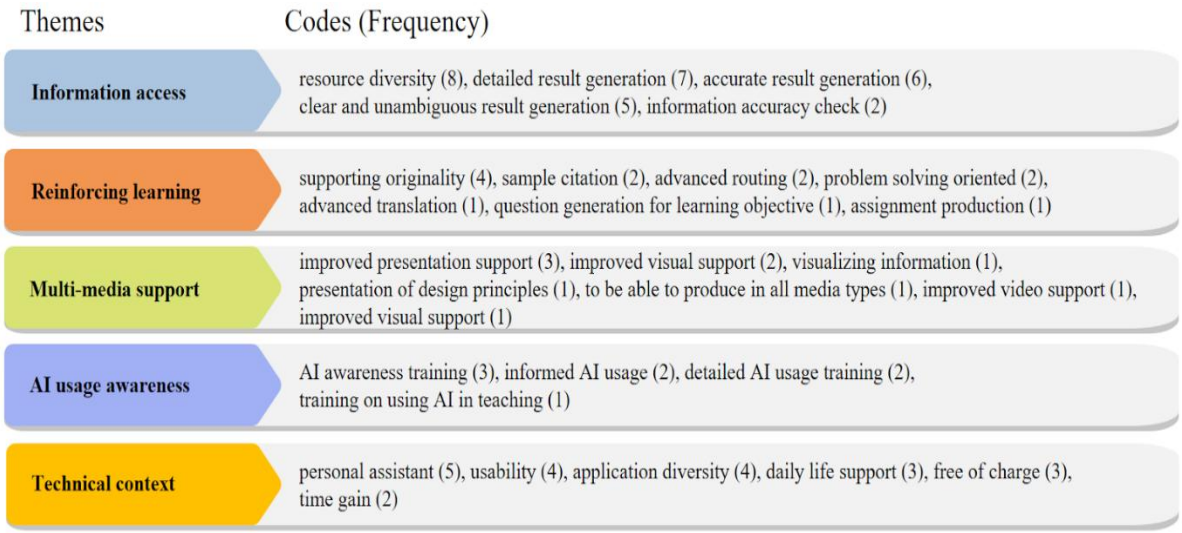

Figure 5. Students' Suggestions for Using AI in Higher Education

Under the theme of 'AI usage awareness', students made suggestions for the AI use problems they see in the current situation. In this context, they emphasized that AI should be used consciously and stated that there should be AI awareness training, training in the use of AI in teaching and detailed training in the use of AI.

S09: "The classification of these applications and the principles of their use in learning processes should be clearly defined. In order to be used in an educational context, it is important for educators to teach AI-based applications to students theoretically and practically."

In the theme of 'technical context', students stated that they wanted to use AI applications as their own personal assistants and also in a structure that would provide support in daily life. They stated that it should have a more usable structure and offer more application diversity. In addition, they suggested that it would provide more time savings and that the limited use subject to a fee should be abolished.

S13: "There should be no daily credit limits, it should be completely free. It should give me a lot of AI model options for the rendering part."

Discussion and Conclusion

This study aimed to examine the current situation evaluations and suggestions of academicians and students regarding the use of AI and GAI in higher education. Academicians' current situation evaluations were distributed under the themes and codes of teaching support, content diversity, learning support, usage awareness. While some of the data obtained are in line with the literature, some new findings are also noteworthy. In the study, within the theme of 'teaching support', it was seen that the use of AI has a very good potential in terms of lesson planning, supplemental learning resource and instructor guidance during the learning process, as stated by academicians (Hwang et al., 2020; Luckin et al., 2016; Michel -Villarreal et al., 2023; Popenici & Kerr, 2017; Zawacki-Richter et al., 2019).

With AI, the workload in student registration-transfer, course planning and administrative work is reduced and time is saved (Chen et al., 2020; Heilinger et al., 2023; McGrath et al., 2023; Popenici & Kerr, 2017; Zawacki-Richter et al., 2019). Also, AI provides numerous opportunities for research, measurement and evaluation processes in the learning process (Michel-Villarreal et al., 2023; Zawacki-Richter et al., 2019). In addition, ease of use and the opportunity to follow the teaching processes are also considered advantageous. Academicians say that AI applications can be applied in all courses; They stated that it would be especially functional for production-oriented and various field-specific courses. Under the theme of 'Learning support', consolidating and strengthening learning experiences (Korashi, 2023; Shan & Lui, 2021; Michel-Villarreal et al., 2023; Sirichokcharoenkun et al., 2023; Yang et al., 2021; Zawacki-Richter et al., 2023), real-time feedback (Yang et al., 2021; Zawacki-Richter et al., 2019), interaction (Yang et al., 2021; Perez et al., 2017) and saving time in the learning process In terms of efficient use (McGrath et al., 2023; Popenici & Kerr, 2017), AI is a system that offers effective solutions.

However, the lack of awareness regarding the use of AI (Michel-Villarreal et al., 2023) was also emphasized by academicians in the context of their opinions collected under the theme of 'usage awareness'. In particular, they stated that students' unquestioning acceptance of the data they obtained through AI causes situations that may hinder their learning process. In this context, it was stated that it is necessary to have awareness of the use of AI. Within the scope of the current situation assessment of the use of AI, the theme of 'ethical issues' is emphasized both in this study and in other studies (Fowler, 2023; Gillham, 2023; Kasneci et al., 2023; Lo, 2023; Michel-

Villarreal et al., 2023). It draws attention as an important theme emphasized. Academicians have stated that especially students tend to cheat and plagiarize in AI applications.

Students' current situation evaluations were distributed under the themes and codes of information access, solution support, multi-media support, learning loss, lack of usage awareness, ethical issues and AI application issues. While some of the data obtained are parallel to the literature, some new findings were also obtained. When the opinions stated under the theme of 'Information access' are examined, it is seen that university students always actively use AI at the point of accessing information (Huang, 2021; Michel-Villarreal et al., 2023) and in the process of searching for information (Huang, 2021), which supports the literature. It has been seen that they stated. In addition, students found AI applications functional in the context of being a source of information, offering options and customizing information. Additionally, within the theme of 'solution support', students; ensuring simultaneous and realistic language translation (Le Scao et al., 2003), time gain (Chen et al., 2020; Heilinger et al., 2023; Popenici & Kerr, 2017; McGrath et al., 2023), They stated that AI applications are very useful in terms of personalized learning support (Michel-Villarreal et al., 2023; Zawacki-Richter et al., 2019) and providing real-time feedback (Yang et al., 2021). Students stated that it is functional for facilitating solution processes, helping problem solving and idea evaluation. In addition, providing innovative learning experiences thanks to 'multi-media support' with AI (Michel-Villarreal et al., 2023) is considered positive for students. In the context of multimedia support, students also emphasized AI's support for image discovery, visualization, visual design support, video creation and voiceover. Students also expressed their opinions about 'lack of usage awareness' regarding the use of AI (Michel-Villarreal et al., 2023).

The existence of obstacles and limitations in the use of AI in classrooms has also emerged as a very important finding. Technological barriers and resistance to change are stated as important factors in the widespread use of physical AI (Michel-Villarreal et al., 2023). When we look at the opinions expressed by the students in the context of the theme of 'Learning loss', they mentioned that there is a lack of usage awareness, that the students accept the information without questioning, and therefore they are prevented from learning by moving away from originality. Therefore, it has been stated that cognitive learning processes have decreased. Students are aware of the problems experienced in the context of 'ethical issues' in the use of AI in higher education and consider them as plagiarism (Noroozi et al., 2024b; Gökçearslan et al., 2024; Kasneci et al., 2023; Lo, 2023; Michel-Villarreal et al., 2023), unauthorized use of personal data, image and sound cloning features, they refer to as age verification (Michel-Villarreal et al., 2023). To solve similar ethical problems, legal and regulatory consideration is required first (Noroozi et al., 2024b; Michel-Villarreal et al., 2023). They also stated that doing homework with AI causes unfair competition between them and those who do original tasks without using this application. Within the scope of the theme 'AI application issues', students talked about language translation errors in applications, insufficient visual analysis and the limitations of free use.

The suggestions put forward by academicians regarding the use of AI in higher education are distributed under the themes and codes of instructional process design, teaching support, learning support, usage awareness, ethical issues. While some of the data obtained are in line with the literature, some new findings are also noteworthy. Academicians have emphasized the importance of AI support in 'supporting instructional process design'. Many

AI-supported applications are actively used by educators to plan their learning processes (Kardan et al., 2013; Kardan & Sadeghi, 2013; Michel-Villarreal et al., 2023; Steenbergen- Hu & Cooper, 2014; Zawacki-Richter et al., 2019). In this process, AI is very effective for material preparation, instructional content development and ease of measurement (Zawacki-Richter et al., 2019). It is also thought that it will contribute to the monitoring of teaching processes. While academicians recommend the use of AI to ensure student-educator-institution collaboration; Michel-Villarreal et al. (2023) emphasize that this should be a priority for the use of AI in higher education. Academicians emphasize the need for more effective and ethical use of AI to support 'teaching processes'; support the learning process (Hwang et al., 2020; Popenici & Kerr, 2017; Luckin et al., 2016; Michel-Villarreal et al., 2023), instructive guidance and experience opportunity Michel-Villarreal et al., 2023; Zawacki-Richter et al., 2019) also recommend its use in their processes. It has been stated that the platform supports offered by the application will facilitate these processes.

Student guidance (Hwang et al., 2020) while 'supporting students' learning processes' (Michel-Villarreal et al., 2023; Yang et al., 2021) They emphasized the effectiveness of AI with its supporting cognitive processes (Zawacki-Richter et al., 2019) and adaptability (Cerratto Pargman & McGrath, 2019; Zawacki-Richter et al., 2019) features. However, for effective and 'ethical AI use', AI 'use awareness' and consciousness must be created (Noroozi et al., 2024b; Gökçearslan et al, 2024; Brunealut et al., 2022; Farrelly & Baker, 2023; Kong et al., 2021; Santana & Díaz-Fernández, 2023; UNESCO, 2023) and the need for legal and regulatory consideration (Noroozi et al., 2024b; Michel-Villarreal et al., 2023). They also stated that it is important for people to take conscious actions in accessing, organizing and sharing information when using AI.

Students' suggestions distributed under the themes and codes of information access, reinforcing learning, multi-media support, AI usage awareness, technical context. While some of the data obtained are in line with the literature, some new findings are also noteworthy. In their suggestions it was observed that AI should be used more in the 'information access' process (Huang, 2021). However, resource constraint as a barrier is a serious problem in the process (Michel-Villarreal et al., 2023). Also they stated that the diversity of sources should be increased, detailed and accurate results should be produced, and information verification support should be provided. 'Reinforcing learning' (Zawacki-Richter et al., 2019), providing guidance during the learning process (Kaplan-Rakowski et al., 2023; Wu et al., 2023), providing support to become a good problem solver (Michel-Villarreal et al., al., 2023), AI is stated as a very effective tool for students in terms of advanced translation services (Korashi, 2023; Sirichokcharoenkun et al., 2023), and its widespread use in these respects is emphasized. In addition, it was stated that it would be good to provide resource display support.

They stated that producing exercise questions and homework would also be functional to reinforce learning. Various studies have shown that it is very effective for students to receive feedback through GAI in their learning processes and that they often receive more reliable feedback than peer assessments (Banihashem et al., 2024). Accordingly, it may be important to encourage students to use GAI applications in this context. Students also explained that they needed improved 'multi-media support' in their use of AI. In this regard, they stated that visualization, visual support, visual creation, video creation and advanced presentation creation supports should be improved. Students also recommend raising awareness of conscious, ethical and effective use of 'AI usage',

disseminating AI usage training, and supporting AI skills (Farrelly & Baker, 2023; Kong et al., 2021; Brunealut et al., 2022; Farrelly & Baker, 2023; Kong et al., 2021; Santana & Díaz-Fernández, 2023; UNESCO, 2023). Under the theme of 'Technical context', students will see the widespread use of AI in the role of personal assistant (Kaplan-Rakowski et al., 2023; Michel-Villarreal et al., 2023; Wu et al., 2023) and their use in both social and academic life. They state that it will save time (Chen et al., 2020; Heilinger et al., 2023; McGrath et al., 2023). However, they stated that its usability should be improved and the features in different applications should be blended. They stated that the fact that AI applications are free and can be used as daily life support will support them. For future studies, it may be recommended to examine the use of AI in different contexts and cultures with different methodological approaches.

It seems that AI will deeply affect our lives for a long time and we will do more work, especially experimental, to get to know it. Improving AI usage awareness and literacy for all segments of society seem to be among the first and most important steps to be taken. In addition, preventing the unethical use of AI as much as possible will help remove the barriers to the use of AI. In addition when the studies on AIed are examined, it is mostly seen that AI has an effect on achievement and motivation. However, the permanence of this effect can be examined with longtidunal studies (Polat et al., 2024). Considering the limitations of this study, which is discussed with the self-reported data of the participants, it will be important to construct studies that will positively affect the reliability of the study by analyzing the systemic data and comparing the consistency with the participant views (Noroozi et al., 2024a). In addition to all these, it would be important to conduct studies comparing the effects of human supports and GAI supports on teachers and students. In this context, providing feedback to students (Banihashem et al., 2024), providing real-time collaborations (Ifenthaler & Schumacher, 2023) and providing support with its representation in the social context (Krishna et al., 2022) etc. can be tested and human and GAI comparisons of these processes can be made.

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References

AlAfnan, M.A., Dishari, S., Jovic, M., & Lomidze, K. (2023) Chatgpt as an educational tool: Opportunities, challenges, and recommendations for communication, business writing, and composition courses. *J. Artif. Intell. Technol., 3*, 60–68.

Aldosari, S. A. M. (2020). The future of higher education in the light of artificial intelligence transformations. *International Journal of Higher Education*, *9*(3), 145-151.

Anctil, D. (2023). Higher education in the era of generative AI. *Pédagogie Collégiale*, *3*6(3).

Arogundade, O. R. (2023). Structuring Knowledge Bases with AI and Machine Learning.

Baidoo-Anu, D., & Ansah, L. O. (2023). Education in the era of generative artificial intelligence (AI): Understanding the potential benefits of ChatGPT in promoting teaching and learning. *Journal of AI, 7*(1), 52-62.

Baidoo-Anu, D., Owusu Ansah, L. (2023). Education in the era of generative artificial intelligence (AI): Understanding the potential benefits of ChatGPT in promoting teaching and learning. SSRN.

Banihashem, S. K., Kerman, N. T., Noroozi, O., Moon, J., & Drachsler, H. (2024). Feedback sources in essay writing: peer-generated or AI-generated feedback?. *International Journal of Educational Technology in Higher Education, 21*(1), 23.

Baker, T., & Smith, L. (2019). Educ-AI-tion rebooted? Exploring the future of artificial intelligence in schools and colleges. Retrieved from Nesta Foundation website: https://media.nesta.org.uk/documents/Future_of_AI_and_education_v5_WEB.pdf

Bali, M. M. E. I., & Ruzifah, D. (2021). Mitigation of Student Deviant Behaviour through Al-Ghazali's Perspective Spiritual Values in the Disruptive Era. *Jurnal Pendidikan Progresif, 11*(1), 63-76.

Bali, M. M. E. I., Kumalasani, M. P., & Yunilasari, D. (2022). Artificial Intelligence in Higher Education: Perspicacity Relation between Educators and Students. *Journal of Innovation in Educational and Cultural Research, 3*(2), 146-152.

Becker, B. (2017). Artificial intelligence in education: what is it, where is it now, where is it going. *Ireland's Yearbook of Education, 2018*, 42-46.

Bernard, J., Chang, T. W., Popescu, E., & Graf, S. (2017). Learning style Identifier: Improving the precision of learning style identification through computational intelligence algorithms. *Expert Systems with Applications, 75*, 94-108. https://doi.org/10.1016/j.eswa.2017.01.021

Boyatzis, R. E. (1998). Transforming qualitative information: Thematic analysis and code development. Sage.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. Qualitative research in psychology, 3(2), 77-101.

Bruneault, F.; Sabourin Laflamme, A.; Mondoux, A. AI Ethics Training in Higher Education: Competency Framework. Research Report to Pôle Montréalais D'enseignement Supérieur en Intelligence Artificielle (PIA). 2022. Available online: https://poleia.quebec/wp-content/uploads/2022/04/C03_AIEthics.CompetencyFramework.pdf

Bruneault, F.; Sabourin Laflamme, A.; Mondoux, A. (2022). AI Ethics Training in Higher Education: Competency Framework. Research Report to Pôle Montréalais D'enseignement Supérieur en Intelligence Artificielle (PIA). Available online: https://poleia.quebec/wp-content/uploads/2022/04/C03_AIEthics.CompetencyFramework.pdf

Buzzelli, M., & Asafo-Adjei, E. (2023). Experiential learning and the university's host community: rapid growth, contested mission and policy challenge. *Higher Education, 85*(3), 521-538. https://doi.org/10.1007/s10734-022-00849-1

Cerratto Pargman, T., & McGrath, C. (2021). Mapping the ethics of learning analytics in higher education: A systematic literature review of empirical research. *Journal of Learning Analytics, 8*(2), 123-139.

Chen, X., Xie, H., Zou, D., & Hwang, G. J. (2020). Application and theory gaps during the rise of artificial intelligence in education. Computers and Education: *Artificial Intelligence, 1*, 100002.

Cho, J., & Trent, A. (2006). Validity in qualitative research revisited. *Qualitative Research, 6*(3), 319-340.

Clarke, V., & Braun, V. (2017). Thematic analysis. *The Journal of Positive Psychology*, *12*(3), 297-298.

Creswell, J. W. (2014). A concise introduction to mixed methods research. SAGE publications.

Creswell, J. W., & Creswell, J. D. (2017). *Research design: Qualitative, quantitative, and mixed methods approaches*. Sage Publications.

Dai, Y., Liu, A., & Lim, C. P. (2023). Reconceptualizing ChatGPT and generative AI as a student-driven innovation in higher education.

EDUCAUSE. (2018). Horizon report: 2018 higher education edition. Retrieved from EDUCAUSE Learning Initiative and The New Media Consortium website: https://library.educause.edu/~/media/files/library/2018/8/2018horizonreport.pdf

EDUCAUSE. (2019). Horizon report: 2019 higher education edition. Retrieved from EDUCAUSE Learning Initiative and The New Media Consortium website: https://library.educause.edu/-/media/files/library/2019/4/2019horizonreport.pdf

Farrelly, T., & Baker, N. (2023). Generative artificial intelligence: Implications and considerations for higher education practice. *Education Sciences*, *13*(11), 1109.

Farrokhnia, M.; Banihashem, S.K.; Noroozi, O.; Wals, A. A SWOT analysis of ChatGPT: Implications for educational practice and research. *Innov. Educ. Teach. Int. 2023*, 1–15.

Foley, G., Timonen, V., Conlon, C., & O'Dare, C. E. (2021). Interviewing as a vehicle for theoretical sampling in grounded theory. *International Journal of Qualitative Methods*, *20*, 1609406920980957.

Fowler, G.A. We Tested a New ChatGPT-Detector for Teachers. It Flagged an Innocent Student. Washington Post. 2023. Available online: https://www.washingtonpost.com/technology/2023/04/01/chatgpt-cheating-detectionturnitin/

Furey, H., & Martin, F. (2019). AI education matters: a modular approach to AI ethics education. *AI Matters*, *4*(4), 13-15.

Galletta, A. (2013). Mastering the semi-structured interview and beyond: From research design to analysis and publication (Vol. 18). NYU press.

Gibbs, G. R. (2007). Thematic coding and categorizing. *Analyzing Qualitative Data*, *703*, 38-56.

Gillham, J. Do AI Detectors Work? Open AI Says No—Prove It for Charity. Originality.ai Blog. 2023. Available online: https://originality.ai/blog/do-ai-detectors-work

Giorgi, A. (2002). The question of validity in qualitative research. *Journal of Phenomenological Psychology*, *33*(1), 1-18.

Goralski, M. A., & Tan, T. K. (2020). Artificial intelligence and sustainable development. *The International Journal of Management Education*, *18*(1), 100330.

Gökçearslan, S., Tosun, C., & Erdemir, Z. G. (2024). Benefits, challenges, and methods of artificial intelligence (AI) chatbots in education: A systematic literature review. *International Journal of Technology in Education*, *7*(1), 19-39.

Guilherme, A. (2019). Considering AI in education: Erziehung but never Bildung. *Artificial Intelligence and Inclusive Education: Speculative Futures and Emerging Practices*, 165-178.

Hannan, E., & Liu, S. (2023). AI: new source of competitiveness in higher education. *Competitiveness Review: An International Business Journal*, *33*(2), 265-279.

Heilinger, A., Wooden, O., & Siirtola, H. (2023). Managing the strategic transformation of higher education

through artificial intelligence. *Administrative Sciences, 13*(9), 196. https://doi.org/10.3390/admsci13090196

Holloway, I., & Todres, L. (2007). Thinking differently: Challenges in qualitative research. *International Journal of Qualitative Studies on Health and Well-being, 2*(1), 12-18.

Huang, J., Saleh, S., & Liu, Y. (2021). A review on artificial intelligence in education. *Academic Journal of Interdisciplinary Studies, 10*(206).

Hwang, G. J., Xie, H., Wah, B. W., & Gašević, D. (2020). Vision, challenges, roles and research issues of Artificial Intelligence in Education. *Computers and Education: Artificial Intelligence, 1,* 100001.

Ifenthaler, D., & Schumacher, C. (2023). Reciprocal issues of artificial and human intelligence in education. *Journal of Research on Technology in Education, 55*(1), 1-6.

Javadi, M., & Zarea, K. (2016). Understanding thematic analysis and its pitfall. *Journal of Client Care, 1*(1), 33-39.

Kallio, H., Pietilä, A. M., Johnson, M., & Kangasniemi, M. (2016). Systematic methodological review: developing a framework for a qualitative semi-structured interview guide. *Journal of advanced nursing, 72*(12), 2954-2965.

Kaplan-Rakowski, R., Grotewold, K., Hartwick, P., Papin, K. (2023). Generative AI and Teachers' Perspectives on Its Implementation in Education. *J. Interact. Learn. Res, 34,* 313–338.

Kardan, A. A., & Sadeghi, H. (2013). A decision support system for course offering in online higher education institutes. *International Journal of Computational Intelligence Systems, 6*(5), 928–942. https://doi.org/10.1080/18756891.2013.808428

Kardan, A. A., Sadeghi, H., Ghidary, S. S., & Sani, M. R. F. (2013). Prediction of student course selection in online higher education institutes using neural network. *Computers and Education, 65*, 1–11. https://doi.org/10.1016/j.compedu.2013.01.015

Kasneci, E., Seßler, K., Küchemann, S., Bannert, M., Dementieva, D., Fischer, F., Gasser, U., Groh, G., Günnemann, S., Hüllermeier, E., et al. (2023). ChatGPT for good? On opportunities and challenges of large language models for education. *Learn. Individ. Differ. 103*, 102274. [

Kelly, S. E., Bourgeault, I., & Dingwall, R. (2010). Qualitative interviewing techniques and styles. *The SAGE Handbook Of Qualitative Methods in Health Research, 19,* 307-326.

Kong, S.-C., Cheung, M.-Y.W., Zhang, G. (2021). Evaluation of an artificial intelligence literacy course for university students with diverse study backgrounds. *Comput. Educ. Artif. Intell., 2,* 100026.

Krishna, R., Lee, D., Fei-Fei, L., & Bernstein, M. S. (2022). Socially situated artificial intelligence enables learning from human interaction. *Proceedings of the National Academy of Sciences, 119*(39), e2115730119.

Le Scao, T., Fan, A., Akiki, C., Pavlick, E., Ilić, S., Hesslow, D., Castagné, R., Luccioni, A.S., Yvon, F., Gallé, M., et al. (2003). BLOOM: A 176B-Parameter Open-Access Multilingual Language Model. arXiv Preprints 2003, arXiv:2211.05100v.

Lim, W.M., Gunasekara, A., Pallant, J.L., Pallant, J.I., Pechenkina, E. (2023). Generative AI and the future of education: Ragnarök or reformation? A paradoxical perspective from management educators. *Int. J. Manag. Educ., 21*, 100790

Liu, S., Guo, D., Sun, J., Yu, J., & Zhou, D. (2020). MapOnLearn: The use of maps in online learning systems for

education sustainability. *Sustainability, 12*(17), 7018. https://doi.org/10.3390/su12177018

Lo, C.K. (2023). What Is the Impact of ChatGPT on Education? A Rapid Review of the Literature. *Educ. Sci., 13*, 410.

Long, D., Magerko, B. (2020). What is AI literacy? Competencies and design considerations. In Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems, Honolulu, HI, USA, 25–30 April 2020; pp. 1–16. Available online: https://aiunplugged.lmc.gatech.edu/wp-content/uploads/sites/36/2020/08/CHI-2020-AI-Literacy-Paper-Camera-Ready.pdf

Luckin, R., Holmes, W., Griffiths, M., & Forcier, L. B. (2016). Intelligence unleashed. *An Argument for AI in Education,* 18.

Ma, Y., & Siau, K. L. (2018). Artificial intelligence impacts on higher education.

McGrath, C., Pargman, T. C., Juth, N., & Palmgren, P. J. (2023). University teachers' perceptions of responsibility and artificial intelligence in higher education-An experimental philosophical study. *Computers and Education: Artificial Intelligence, 4*, 100139. https://doi.org/10.1016/j.caeai.2023.100139

Michel-Villarreal, R., Vilalta-Perdomo, E., Salinas-Navarro, D. E., Thierry-Aguilera, R., & Gerardou, F. S. (2023). Challenges and opportunities of Generative AI for higher education as explained by ChatGPT. *Education Sciences, 13*(9), 856.

Moser, A., & Korstjens, I. (2017). Series: Practical guidance to qualitative research. Part 1: Introduction. *European Journal of General Practice, 23*(1), 271-273.

Moya, B., Badías, A., González, D., Chinesta, F., & Cueto, E. (2023). Computational Sensing, Understanding, and Reasoning: An Artificial Intelligence Approach to Physics-Informed World Modeling. *Archives of Computational Methods in Engineering*, 1-18. https://doi.org/10.1007/s11831-023-10033-y

Nabila, E. A., Santoso, S., Muhtadi, Y., & Tjahjono, B. (2021). Artificial intelligence robots and revolutionizing society in terms of technology, innovation, work and power. *IAIC Transactions on Sustainable Digital Innovation (ITSDI), 3*(1), 46-52.

Noroozi, O., Alqassab, M., Taghizadeh Kerman, N., Banihashem, S. K., & Panadero, E. (2024a). Does perception mean learning? Insights from an online peer feedback setting. *Assessment & Evaluation in Higher Education*, 1-15.

Noroozi, O., Soleimani, S., Farrokhnia, M., & Banihashem, S. K. (2024b). Generative AI in education: Pedagogical, theoretical, and methodological perspectives. *International Journal of Technology in Education, 7*(3), 373-385.

Ocaña-Fernández, Y., Valenzuela-Fernández, L. A., & Garro-Aburto, L. L. (2019). Artificial Intelligence and Its Implications in Higher Education. *Journal of Educational Psychology-Propositos y Representaciones, 7*(2), 553-568.

Osetskyi, V., Vitrenko, A., Tatomyr, I., Bilan, S., & Hirnyk, Y. (2020). Artificial intelligence application in education: Financial implications and prospects. Financial and Credit Activity Problems of Theory and Practice, 2(33), 574-584.

Ouyang, F., & Jiao, P. (2021). Artificial intelligence in education: The three paradigms. *Computers and Education: Artificial Intelligence, 2*, 100020. https://doi.org/10.1016/j.caeai.2021.100020

Ouyang, F., Zheng, L., & Jiao, P. (2022). Artificial intelligence in online higher education: A systematic review of empirical research from 2011 to 2020. *Education and Information Technologies, 27*(6), 7893-7925.

https://doi.org/10.1007/s10639-022-10925-9

Patton, M. Q. (2014). *Qualitative research & evaluation methods: Integrating theory and practice.* Sage Publications.

Perez, S., Massey-Allard, J., Butler, D., Ives, J., Bonn, D., Yee, N., & Roll, I. (2017). Identifying productive inquiry in virtual labs using sequence mining. *In Artificial Intelligence in Education: 18th International Conference, AIED 2017*, Wuhan, China, June 28–July 1, 2017, Proceedings 18 (pp. 287-298). Springer International Publishing.

Polat, H., Topuz, A., Yıldız, M., Taşlıbeyaz, E., & Kurşun, E. (2024). A bibliometric analysis of research on ChatGPT in education. *International Journal of Technology in Education (IJTE), 7*(1).

Popenici, S. A., & Kerr, S. (2017). Exploring the impact of artificial intelligence on teaching and learning in higher education. *Research and Practice in Technology Enhanced Learning, 12*(1), 1-13.

Qadir, J. (2023, May). Engineering education in the era of ChatGPT: Promise and pitfalls of generative AI for education. In 2023 IEEE Global Engineering Education Conference (EDUCON) (pp. 1-9). IEEE.

Rahadiantino, L., Fahmi, A., Aparamarta, H. W., Moerad, S. K., & Shiddiqi, A. M. (2022). Implementasi Pembelajaran Artificial Intelligence Bagi Siswa Sekolah Dasar di Kota Batu, Malang, Jawa Timur. *Jurnal Inovasi Pendidikan Dan Pembelajaran Sekolah Dasar, 6*(1), 92-101.

Reis, T., Bornschlegl, M. X., & Hemmje, M. L. (2021). Toward a Reference Model for Artificial Intelligence Supporting Big Data Analysis. In Advances in Data Science and Information Engineering: Proceedings from ICDATA 2020 and IKE 2020 (pp. 561-572). Springer International Publishing.

Rose, J., & Johnson, C. W. (2020). Contextualizing reliability and validity in qualitative research: Toward more rigorous and trustworthy qualitative social science in leisure research. *Journal of Leisure Research, 51*(4), 432-451. https://doi.org/10.1080/00222216.2020.1722042

Rozi, F., Bali, M. M. E. I., Firdaus, S., Wijaya, M., Mursyidi, R. A., Haqiki, M. W., & Abidin, Z. (2020, August). Learning management; identifying learning styles of language learners in madrasah. In Proceedings of the International Conference on Industrial Engineering and Operations Management (Vol. 5, pp. 3783-3790).

Rubin, H.J. & Rubin, I.S. (2005). Qualitative interviewing: the art of hearing data (2nd edition). Thousand Oaks, CA: Sage.

Russell, S. J., & Norvig, P. (2010). Artificial intelligence a modern approach. London.

Santana, M., Díaz-Fernández, M. (2023). Competencies for the artificial intelligence age: Visualisation of the state of the art and future perspectives. *Rev. Manag. Sci., 17,* 1971–2004.

Shan, S., & Liu, Y. (2021). Blended teaching design of college students' mental health education course based on artificial intelligence flipped class. *Mathematical Problems in Engineering, 2021*, 1-10.

Sirichokcharoenkun, Y.; Tipayavaravan, N.; Cao, L. ChatGPT: A New Tool for English Language Teaching and Learning at Vietnamese High Schools. EdArXiv Preprints 2023. Available online: https://edarxiv.org/m7k4y/

Smolansky, A., Cram, A., Raduescu, C., Zeivots, S., Huber, E., & Kizilcec, R. F. (2023, July). Educator and student perspectives on the impact of generative AI on assessments in higher education. In Proceedings of the Tenth ACM Conference on Learning@ Scale (pp. 378-382).

Steenbergen-Hu, S., & Cooper, H. (2014). A meta-analysis of the effectiveness of intelligent tutoring systems on

college students' academic learning. *Journal of Educational Psychology, 106*(2), 331–347. https://doi.org/10.1037/a0034752

Toronto Metropolitan University, 2023. ProfBot, a New AI-Powered Chatbot, Could Be Student's Next Study-Buddy. Ted Rogers School of Management News. 4 May 2023. Available online: https://www.torontomu.ca/tedrogersschool/news-events/2023/05/ai-powered-chat-bot-study/

UCL. Engaging with AI in Your Education and Assessment. Available online: https://www.ucl.ac.uk/students/exams-and-assessments/assessment-success-guide/engaging-ai-your-education-and-assessment

UNESCO. (2021). Artificial intelligence and the futures of learning. https://www.unesco.org/en/digital-education/ai-future-learning

UNESCO. (2023). UNESCO AI Competency Framework for Teachers and School Students: A Work in Progress. Available online: https://liveuclac-my.sharepoint.com/:w:/g/personal/utnvmcu_ucl_ac_uk/Ebcn9V8JR8pCrZqm7RJAHAEBVKO9gkp6GpEtXu3uWGJtKw?rtime=Y9mExmvB20g

Vaismoradi, M., Turunen, H., & Bondas, T. (2013). Content analysis and thematic analysis: Implications for conducting a qualitative descriptive study. *Nursing & Health Sciences, 15*(3), 398-405.

Wang, H., Dang, A., Wu, Z., & Mac, S. (2023). Generative AI in higher education: Seeing ChatGPT through universities' policies, resources, and guidelines. *arXiv preprint arXiv:2312.05235*. https://doi.org/10.48550/arXiv.2312.05235

Yang, S. J., Ogata, H., Matsui, T., & Chen, N. S. (2021). Human-centered artificial intelligence in education: Seeing the invisible through the visible. *Computers and Education: Artificial Intelligence, 2*, 100008.

Yeralan, S., & Lee, L. A. (2023). Generative AI: Challenges to higher education. *Sustainable Engineering and Innovation, 5*(2), 107-116.

Yıldırım, A., & Şimşek, H. (2021). *Sosyal Bilimlerde Nitel Araştırma Yöntemleri (12th Ed.).* Seçkin Yayıncılık.

Zawacki-Richter, O., Marín, V. I., Bond, M., & Gouverneur, F. (2019). Systematic review of research on artificial intelligence applications in higher education–where are the educators*? International Journal of Educational Technology in Higher Education, 16*(1), 1-27.

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