

Artificial Intelligence: Enhancer or Inhibitor?

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Abstract	p. 3
Introduction	p. 4
Statement of the Problem	p. 5
Purpose of the Study	p. 5
Statement of Research Questions	p. 6
Statement of Research Hypothesis	p. 6
Significance of the Study	p. 7
Literature Review	p. 8
Artificial Intelligence in Education	p. 8
Artificial Intelligence vs. Human Intelligence	p. 9
The Incorporation of Artificial Intelligence into All Areas of Higher Education	p. 10
Methods	p. 13
Study Design	p. 13
Validity & Reliability	p. 14
Data Analysis	p. 15
Participants	p. 16
Instrumentation	p. 16
Research Plan Timeline	p. 17
Discussion	p. 22
Limitations of the Proposed Study & Directions for Future Research	p. 23
References	p. 24
Appendices	p. 28

Abstract

In institutions of higher education, the use of artificial intelligence (AI) as a tool to improve learning is becoming more prevalent. The use of AI is affected by faculty perspectives, which can be both favorable and negative towards the use of AI in their curriculum. To maximize the benefits and lessen the drawbacks of AI, this proposed research study will look into the aspects that lead to these perceptions. The proposed study will be using a mixed-methods sequential explanatory design. Proposed data collection during Phase I of the study is to be collected from 15 faculty members who are teaching from diverse subject areas, employed at California State University, Los Angeles (CalStateLa). Data collection during Phase II is proposed to be from 100 undergraduate students, 18 years of age or older, from a variety of demographic backgrounds, and enrolled in 6 units or more at CalStateLa. The data collected will be analyzed to examine the effectiveness of using AI as a tool to enhance instruction and to identify any relationships between the usage of AI and learning retention. The findings of this study will contribute to the growing body of research on AI in education and will provide insights to help institutions optimize the use of AI to help improve student learning outcomes.

Artificial Intelligence: Enhancer or Inhibitor?

We live in a time where cars are driving themselves, tools write seemingly academically sound and plagiarism-free papers, cell phones respond to commands, Interactive Voice Response systems take care of phone calls, chatbots process customer complaints, questions, and so much more due to advances in AI (Haenlein, & Kaplan, 2019). Contrary to popular belief AI is not a novel phenomenon (Haenlein, & Kaplan, 2019). During World War II, Alan Turing played a crucial role in breaking the German Enigma code, which was used to encrypt secret messages sent by the German military (Cooper, 2013). Turing designed and built a machine called the Bombe, which was capable of automatically determining the settings of the Enigma machine that was used to encrypt messages (Cooper, 2013). Turing's ideas laid the foundation for modern computing and today, Turing is widely considered to be the father of computer science and AI due to his concept of the Turing machine (Cooper, 2013).

People have been both fascinated and fearful of the subject since its infancy (Adami, 2021; Haenlein, & Kaplan, 2019). There are several different definitions when it comes to what constitutes AI. As the authors of this research proposal we have agreed on utilizing the Encyclopedia Britannica definition of AI as "the ability of a digital computer or computer-controlled robot to perform tasks commonly associated with intelligent beings" (Coppelan 2023). The evolution of intelligent machines and technology has been the center stage for predictions and debates since the early creations of machinery (Adami, 2021). Haenlein and Kaplan (2019) discuss how "...experts predicted that it will only take a few years until we reach Artificial General Intelligence—systems that show behavior indistinguishable from humans in all aspects and that have cognitive, emotional, and social intelligence" (p.6). Even with the

immense advancements we are seemingly far from building technology that is indistinguishable from humans (Adami, 2021).

Statement of the Problem

Although AI has been around for several years (Adami, 2021; Haenlein, & Kaplan, 2019) its influence in higher education is a relatively new concept (Wang et al., 2020; Zawacki-Richter et al., 2019). Educators are trying to understand how to best use AI to enhance learning and see if there is a need to develop ways to mitigate the negative effects brought about by AI (Zawacki-Richter et al., 2019; Wang et al., 2020; Zhang et al., 2022). Many factors influence the willingness of faculty to use AI in their classroom including their beliefs and attitudes towards technology, their perceptions of the usefulness and effectiveness of AI, and their concerns about the impact of technology on their role as educators (Wang et al., 2020). A study conducted by Wang (2020) and associates found that faculty members who had positive attitudes toward technology and believed in the potential of AI to improve student learning were more willing to use them.

Purpose of the Study

The purpose of the study is to examine the use of AI as a tool to enhance learning in higher education. The goal is to uncover strategies that can motivate both students and faculty to use AI as a tool to enhance learning to improve the overall college, educational experience. The researchers hope that the data ultimately help identify options that can benefit all stakeholders. Studying AI and HI can help us develop new technologies, improve decision-making, address social challenges, and gain a better understanding of ourselves as well as the world around us (Anderson & Rainie, 2018).

AI is a rapidly growing field that has the potential to revolutionize many aspects of our lives, from healthcare to transportation to education. By studying AI, we can develop new technologies and applications that can help solve complex problems and improve the quality of life for people around the world (Anderson & Rainie, 2018; Korteling et al., 2021; Wang et al., 2020; Zawacki-Richter et al., 2019). “Higher education institutions cultivate high-level applied talents so that they can quickly adapt to the needs of society and serve the social and economic goals (Li, et al., 2021 p. 4).” By understanding the cognitive processes that underlie human intelligence (HI), we can develop tools and strategies to improve decision-making in various domains, such as healthcare, finance, politics, and education (Korteling et al., 2021). Similarly, by understanding how AI algorithms work, we can ensure that they are designed to make ethical and responsible decisions that benefit society as a whole.

Statement of Research Questions

This study addresses the following research questions:

1. What are the perceptions of higher education faculty members integrating AI in teaching and learning within higher education?
2. What is the relationship between integrating AI into teaching and enhanced learning retention by higher education students who use AI?

Statement of the Research Hypotheses

Our study hypothesizes that there are both positive and negative perceptions from faculty that influence the use of AI as a tool to enhance learning in a higher education setting. Our research will show what influences these advantages and disadvantages. Thus, serving as a foundation to develop tools to enhance the utilization and mitigate negative effects. We will

collect data representative of diverse faculty and student body at an institution of higher education. We will then analyze this data and examine if there are any indicators of the effectiveness of using AI as a tool to enhance instruction as well as identify if there is a relationship between the usage of AI and learning retention.

Significance of the Study

Wang et al., (2020) and Zawacki-Richter et al., (2019) recognize that using AI in higher education is a relatively new concept. Other research has identified a need for educators to understand how to best use AI to enhance learning as well as develop ways in which to mitigate negative effects brought about by AI (Zawacki-Richter et al., 2019; Wang et al., 2020; Zhang et al., 2022). This study will add to the academic conversation on the utilization of AI and present empirical data that can be foundational in the development of strategies to best use AI to enhance learning. Our goal is to contribute new knowledge for all higher education and AI user stakeholders, including how to develop ways to mitigate negative effects brought about by AI.

Literature Review

We reviewed existing literature to provide a foundational understanding of AI and its use as a tool in higher education settings. The literature review includes three subjects: (a): An overview of AI perception in Higher Education (b): A review of the discussion differentiating between AI and HI, and (C): A review of how AI has been incorporated into all areas of Higher Education.

Artificial Intelligence in Higher Education

The Covid 19 pandemic has had positive and negative consequences for Higher Education (“Rising to the challenge”, 2021; Zhang et al., 2022). During a (2021) hearing in front of the Subcommittee of the U.S. House Of Representatives Committee on Education And Labor, the speaker addressed how the forced transition to online and remote learning has created a barrier for historically marginalized student groups. While others recognize the added benefits of online learning to higher education, by providing flexibility, accessibility, and low-cost alternatives to diverse students (Zhang et al., 2022). Not only students but faculty and staff across all levels of the educational system were faced with a learning opportunity prompted by the accelerated transition to online learning (Ifenthaler & Schumacher, 2023; Zhang et al., 2022). There has been extensive research on instructional design strategies, achievement gaps, and desired outcomes (Castro & Tumibay, 2021; Cavalcanti et al., 2021; Teng et al., 2022). Something that seems undeniable is that the increased usage of technologies such as "...artificial intelligence, micro-credentialing, blockchain, and open educational resources...[has the]...potential [of] shaping the future of global higher education teaching and learning” (Zhang et al., 2022 p. 638).

Artificial Intelligence vs. Human Intelligence

There is a lot of debate surrounding the proper integration of AI as a simulator of HI in higher education (Adami, 2021; Baker, 2016; Ifenthaler & Schumacher, 2023; Li et al., 2021). A literary analysis by - Adami (2021) concluded that the human brain can serve as a model for developers to further work on technology and applications that are capable of recreating HI. When it comes to the expansion of AI as a tool to enhance learning in higher education, Li et al., (2021) propose a framework for developing a higher education system that incorporates AI technology. They argue that AI can enhance various aspects of the higher education system, including student learning, faculty teaching, administrative operations, and institutional research. The study examines the potential applications of AI in higher education and identifies several key considerations for designing an effective AI-based system, such as data privacy, transparency, and ethical concerns. Li et al., (2021), suggesting that integration of AI technology can improve efficiency and effectiveness of higher education institutions, while also addressing some of the challenges and limitations of traditional educational models.

Ifenthaler and Schumacher (2023) examine the complex relationship between AI and HI in the field of education. The authors argue that while AI has the potential to enhance teaching and learning, it also poses significant challenges and risks to the role of human educators and the quality of education. The article discusses the reciprocal nature of AI and HI in education and identifies several key issues, including the need for ethical guidelines and standards for AI in education, the potential for AI to perpetuate bias and inequality, and the importance of developing human skills such as creativity and critical thinking in the context of AI (Ifenthaler & Schumacher, 2023). Ifenthaler and Schumacher (2023) emphasize the importance of integrating

AI and HI in a complementary and mutually beneficial way to achieve the best possible outcomes for learners.

The idea of using both AI and HI in a mutually beneficial way is not new. Nine years ago, (2016) Baker published an article in the *International Journal of Artificial Intelligence in Education* titled "Stupid Tutoring Systems, Intelligent Humans". This article explores the role of HI in the development and use of Intelligent Tutoring Systems (ITS) in education. Baker (2016) argues that while ITS has shown promise in improving learning outcomes, they also have limitations and challenges. One of these is the "expert blind spot" of ITS and the need for human expertise and intervention to supplement their limitations (Baker, 2016). The article also emphasizes the potential of HI to complement and enhance the capabilities of ITS, through the use of peer collaboration and social learning (Baker, 2016). After a literary analysis of the complex conversation surrounding HI and AI, it became clear that many scholars agree on the importance of considering the role of both technology and human expertise in improving learning outcomes. (Adami, 2021; Baker, 2016; Ifenthaler & Schumacher, 2023; Li et al., 2021).

The incorporation of AI into all areas of Higher Education

For years AI technologies have been used in higher education to facilitate learning for students with disabilities (Fichten, et al., 2022; Khazanchi & Khazanchi, 2021; Sghaier et al., 2022). In (2021) a chapter titled "Artificial Intelligence in Education: A closer look into intelligent tutoring systems" Khazanchi and Khazanchi (2021) examine the potential of intelligent tutoring systems (ITS) of improving educational outcomes for students with special needs using features, such as adaptivity, feedback, and personalization. The authors also discussed the advantages and limitations of ITS compared to traditional teaching methods, including their

ability to provide individualized feedback, and their potential to increase student engagement and motivation (Khazanchi & Khazanchi, 2021). Khazanchi and Khazanchi (2021) identified challenges and ethical considerations associated with the use of AI in education, such as privacy, bias, and transparency. Privacy concerns are something that researchers working with AI in higher education identify as a potential challenge (Fichten, et al., 2022; Ifenthaler & Schumacher, 2023; Li et al., 2021; Khazanchi & Khazanchi, 2021). For AI to serve a user's needs the system is constantly collecting data (Fichten, et al., 2022; Khazanchi & Khazanchi, 2021). Although users are provided with the option of opting out from data collection this affects the performance and efficiency of the tool or application being used (Fichten, et al., 2022).

Broadening the incorporation of AI to all areas of higher education is currently a central subject for research (Fichten, et al., 2022; Ifenthaler & Schumacher, 2023; Zhu, 2022). Scholars are concerned about how to best use these applications and technologies to ultimately enhance the teaching and learning experience for all stakeholders involved in the complex higher education system (Fichten, et al., 2022; Ifenthaler & Schumacher, 2023; Zhu, 2022). To assess the use of AI technology in higher education Mengqing Zhu (2022) experimented to assess the level of English proficiency of engineering students using AI technology. The study identified several factors that can affect the accuracy of AI-based language assessment, including quality of training data, complexity of language models used, and cultural, or linguistic background of the students (Zhu, 2022). Zhu (2022) proposed a framework for designing an effective AI-based language assessment system that takes into account these factors and provides accurate, reliable, results.

The incorporation of AI into higher education transcends into all areas of instruction and student services. Zhang, Shankar, and Antonidoss, (2022) explore the potential of using AI in art education, arguing that AI can enhance art education in several ways, including personalized learning, improved student engagement, and providing real-time feedback. On one hand, Zhang and colleagues (2022) are proposing the use of the “Artificial Intelligence assisted Effective Art Teaching Framework (AIEATF) to expand the ability to adapt to AI-oriented art instruction, develop intelligent teaching styles, and enhance AI-oriented art teaching art knowledge...” (p. 2141005-1). On the other hand, they address the challenges and limitations of using AI in art education, such as the need for a human element in teaching and a potential for bias in AI algorithms (Zhang et al., 2022). Zhang and colleagues (2022) argue that creative art cannot be a substitution for work education, which may lead to a few creative practices that may have a particular methodology. The authors conclude that AI can be a valuable tool in art education and instruction, but it should be used in conjunction with traditional teaching methods, with consideration for ethical concerns (Zhang et al., 2022).

Conversations surrounding the incorporation of AI into all areas of higher education are not new. In (2015) Nye published an article in the *International Journal of Artificial Intelligence in Education* that reviews the trends and approaches for developing Intelligent Tutoring Systems (ITS) in the context of developing countries. The challenges identified by Nye (2015) are relevant to understanding the experiences of historically marginalized communities within the higher education system. While ITS has the potential to enhance education, limited infrastructure, cultural diversity, and a lack of local expertise can pose challenges in developing

countries as well as historically marginalized communities in higher education (Nye, 2015 “Rising to the challenge”, 2021).

Nye (2015) discusses several approaches for addressing these challenges, including development of low-cost and open-source ITS, integration of ITS with mobile technologies, involvement of local stakeholders in design, and implementation of ITS. These proposed approaches are similar to the ones discussed during a (2021) hearing in front of the Subcommittee On Higher Education And Workforce Investment Of The Committee On Education And Labor U.S. House Of Representatives. With a six-year gap both Nye (2015) and the members of the Subcommittee from the U.S. House Of Representatives agree that ITS can play a valuable role in improving education but that a context-specific approach is necessary to ensure their effectiveness and sustainability

Methods

Study Design

The proposed study will be using a mixed-methods sequential explanatory design, wherein quantitative data is initially collected and evaluated during phase one, then qualitative data is obtained and analyzed in Phase II. Following this method of research will provide us with an opportunity to integrate both quantitative and qualitative data obtained from both research methods in a single study. This methodology design aims to enable a more thorough understanding of the relationship between integrating AI into teaching and learning retention by higher education students, as well as the perceptions of higher education faculty members in integrating AI in teaching and learning in higher education. The qualitative portion of the

study will be given higher priority. Findings from this initial stage will serve as a foundation to further develop a second and quantitative stage.

Validity & Reliability

Validity of this research could be threatened by rapid changes current AI development is going through, and the credibility of answers provided by respondents could be out of date by the time the study is complete. Since AI integration with education seems to be a new concept, respondents might not be aware of AI software, or AI tools available for educational use. Respondents might not consider some of the tools they are currently using in education to be an AI tools. The credibility of the research could be threatened by the residents not understanding what AI is, and how it is integrated into several applications, or their day to day life. Research credibility could be threatened by respondents not disclosing honest answers when responding to interview questions. so overstating, or understating their answers to the interview questions could discredit the overall results of the study.

Phase I: Gathering and Analyzing Qualitative Data

At this initial stage of our proposed mixed-methods sequential explanatory design, we are aiming to collect qualitative data using semi-structured interviews with participants selected using a non-probability convenience sampling. The focus of semi-structured interviews is solely to explore participant perceptions of integrating AI in teaching and learning in higher education. Participation in this study is completely voluntary. We are aiming to interview 15 faculty members currently teaching from diverse subject areas employed at CalStateLA. The brief 30 min semi-structured interviews will follow the prompt found in Appendix A. Using informed consent, the participants will be informed on the nature of the study, their right to

refuse to participate and answer questions. Participants have an opportunity to withdraw from the study at any time, and the semi-structured interview will be audio-recorded using Zoom which provides initial transcription.

Data analysis

Collected qualitative data will be initially analyzed by comparing the audio file to the automatic transcripts provided by Zoom. The text will be updated as needed. The second layer will be a thematic analysis. The goal is to gather perceptions of integrating AI in teaching and learning in higher education. Survey participants will be recruited through proactive recruitment practices including emails, social media, and department meetings. The participating faculty will be asked for their voluntary collaboration and participation moving through to phase two of the research, where students enrolled in their courses will become the participants.

Phase II: Gathering and Analyzing Quantitative Data

Phase II of our mixed-methods sequential explanatory design is taking the form of quantitative non-experimental research. The variables in our research design are autonomous and naturally spontaneous. We are not intending to alter the statistical relationship between the variables because they should be studied as they are. Doing so would be unethical and impractical. We do not intend to randomly assign participants to conditions. Because of this, we find that it is crucial to emphasize that non-experimental research cannot establish causation. This is especially true for our study, which examines non-causal statistical relationships between integration of AI into teaching and learning retention by students of higher education.

Participants

To mitigate challenges with random sampling the researchers plan to compile a list of prospective participants who are at least 18 years old, currently enrolled at CalStateLA, and the faculty who took part in phase one of this study. Prospective participants at this stage are 100 undergraduate students, 18 years of age or older, from a variety of demographic backgrounds, enrolled in 6 units or more at California State University, Los Angeles (CalstateLa), and taking a course taught by a faculty member who took part in phase 1 of this study. The sample will be drawn from CalstateLa's student body. Data from the Fall 2022 Enrollmentrollment system (ERSS) indicates that the student body at CalstateLa is around 27, 000 students, with the majority from Hispanic or Asian ethnic backgrounds.

Instrumentation

The primary research method used at this stage will be a semistructured computerized questionnaire using Qualtrics. The proposed questionnaire will contain 50 questions, including multiple-choice, rating scale, and other closed-ended items, all of which can be coded as well as subjected to quantitative analysis. Theoretical foundations that outline the design of the electronic survey come from different disciplines including educational psychology, and educational technology. From the field of educational psychology our proposed study will be using cognitive load theory. Cognitive will serve as a foundation to develop questions that analyze student's ability to retain information and how this is affected by incorporation, or exclusion of AI into the classroom (Sweller, 2011). Another theoretical framework that will be foundational to the development of this survey is from the field of educational technology, and is the technology acceptance model (TAM). The TAM contends that two important elements

influencing users' acceptance of technology are its perceived utility and ease of use (Huang, & Liu, 2015). TAM will serve as foundation to investigate how students' perceptions of the usefulness and simplicity of using AI in the classroom affect how much information they retain (Huang, & Liu, 2015).

Research Plan Timeline

The proposed timeline is based on a projected 805-hour total including regular contact with research advisor(s) through scheduled weekly Zoom meetings.

Table 1

Research Timeline

Weeks	Dates	Hours	Research Activities
	Spring 2023	N/A	• Actively seek research advisors to support and guide us through this research project • Meet with and discuss project proposal with advisors • Make suggested modifications to the proposal
	Summer 2023	N/A	• Complete research proposal and submit it to IRB for review • Upon receiving approval from IRB work on requested modifications promptly • Once we received IRB approval begin outreach to potential participants via recruitment methods specified in the proposal

1-2	Fall 2023	40 hours (20 hours/week)	• Initiate Phase I recruitment of faculty participants • Email college Deans and ask for collaboration to disseminate the recruitment email to their faculty body
3-5	Fall 2023	100 hours	Continue with literature analysis initiated during the Spring 2023 semester- focusing on gathering evidence and staying connected to current findings concerning AI and education

6-12	Fall 2023	210 hours (35 hours/week)	• Conduct semi-structured interviews • Review automated Zoom transcriptions and edit as needed • Analyze data collected and code • Consult with project advisor regarding emerging coding scheme and recode data using a revised scheme as necessary
12-16	Fall 2023	105 hours (35 hours/week)	• Use findings to support further development of the semistructured computerized questionnaire in Qualtrics • Prepare communications to go out to students in Phase II
	Winter 2024	N/A	• Maintain contact with Phase I participants and preparation for Phase II in Spring 2024

1-2	Spring 2024	40 hours (20 hours/week)	• Actively distribute survey to students.
3-8	Spring 2024	100 hours	• Continue with proactive promotion and electronic distribution of the survey to students • Continue with literature analysis initiated during the Spring 2023 semester to stay connected to current findings about developments of AI in education
8- 12	Spring 2024	105 hours (35 hours/week)	• Filter, classify, merge, clean, and statistically analyze response data • Export data into SPSS to conduct further analysis

12-16	Spring 2024	105 hours (35 hours/week)	• Draft results and data analysis sections as well as discussion conclusion sections of this research • Seek opportunities to present findings to stakeholders including, but not limited to the institution's students, faculty, and staff • Seek opportunities and apply to present the research at relevant conferences
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Discussion

The incorporation of AI in teaching and learning is a relatively new phenomenon. Examining faculty members in higher education's perspectives on this integration is crucial, as is the connection between incorporating AI into instruction and students' retention of what they are learning. According to research, there are differing opinions among faculty members in higher education about the use of AI in instruction (Brown et al,2020). There is an indication that some faculty members have concerns about moral ramifications of adopting AI in the classroom, how it will affect student motivation, participation, and whether automation would result in job loss (Brown et al,2020). It has been a few years since the COVID–19 pandemic has shifted everybody from in-person format to online learning. This proposed research study adds to the body of research concerning the incorporation of AI in teaching and learning. This proposed research is attempting to answer the following questions:

1. What are the perceptions of faculty members in higher education integrating AI with instruction and student learning in higher education?
2. What is the relationship between integrating AI into teaching and learning retention by higher education students?

By employing a mixed-method sequential explanatory design, wherein the quantitative data is initially collected and evaluated during phase one. Qualitative data is obtained and analyzed in Phase II. Data collected will be analyzed using existing data analysis tools such as Qualtrics, or SPSS. The proposed research is seeking to understand how to best use AI to enhance learning. Our goal is to contribute new knowledge for all higher education, AI user

stakeholders, including how to develop ways in which to reduce negative effects brought about by AI.

Limitations of The Proposed Study & Directions for Future Research

Incorporation of AI into the educational system can be seen as an area of interest across multiple disciplines. Numerous uncontrollable and unaccountable factors can affect how both the field of education and AI are understood. Instructional differences are one of the potential limitations. CalStateLA campus will serve as the site of this proposed study. The demographic composition and culture of the CalStateLA campus will affect the data's transferability. By including comparison groups from various public and private higher education institutions in California and across the United States the transferability of the study's findings could be further reinforced. When it comes to data collection, we consider the willingness of both faculty participating in Phase I and students completing the electronic survey in Phase II. Future research should consider working with campus administration to guarantee that every enrolled CalStateLA student has an equal chance to participate.

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Appendix A

The first set of questions lead to the instructor's teaching philosophy, approach to pedagogy

1. Tell us about your educational background and how you became interested in teaching.
2. Can you discuss your teaching philosophy and how it informs your approach to instruction?
3. What are some challenges you have faced while teaching at the college level?
4. Can you tell us about your experience with online or hybrid teaching?
5. How do you stay up-to-date with latest trends and best practices in your field?
6. Do you incorporate technology into your teaching? Why? Or why not?
 - a. Can you share a specific example of a successful project or initiative you implemented using technology, in one of your courses?

Set 2: This second set of questions lead toward the instructors perception of AI,

7. Are you familiar with AI?
8. What are your thoughts about it?
9. What do you think about the integration of AI with instruction and learning in higher education?
10. How do you believe AI can benefit students in higher education?
11. What are some potential drawbacks of incorporating AI in higher education, and how can they be addressed?
12. In your opinion, what types of AI applications are best suited for use in higher education, and why?
13. Do you think the use of AI in higher education will lead to a decrease in the need for human teachers and professors, or do you see it as a supplement to human instruction?
14. How can institutions of higher education ensure that the use of AI is ethical and transparent?
15. What steps can institutions of higher education take to prepare faculty and staff for integration of AI in teaching and learning?
16. What role do you see AI playing in the future of higher education, and how do you think it will evolve over time?