

A study of the perception of students and instructors on the usage of Artificial Intelligence in education

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Abstract

Artificial intelligence (AI) approaches offer effective support for online learning and teaching, including personalizing learning for students, automation for instructors' routine tasks, and fueling personalized appraisals of students. However, while the opportunities for AI are promising, the impact of AI systems on the culture of expectations and interactions between students and instructors are still vague. In online learning, learner-instructor interaction has a profound impact on students' satisfaction and learning outcomes. Therefore, identifying how students and instructors perceive the impact of AI systems on their interaction is important to identify any gaps, challenges, or barriers preventing AI systems from achieving their intended potential and risking the safety of these interactions. This study becomes pertinent especially at a time where the COVID-19 pandemic has changed the education field and how knowledge was being transferred traditionally. As online and remote learning platforms are being used at a high rate, and due to the lack of research to understand how each party perceives the role Artificial Intelligence plays has provided the need for this original study. For the purposes of this research paper and to address this need we will conduct interviews with 10 graduate online students and 2 instructors on their perception of AI in online learning.

Key words

Artificial intelligence,
Boundary,
Learner-instructor interaction,
Online learning

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Introduction

We live in a technology-intensive digital knowledge age, and artificial intelligence technologies have infiltrated every facet of our lives, including education. According to research, artificial intelligence can be used to overcome many challenges faced in online distance education and can be further helpful in enhancing teaching and learning undertakings. The accessibility of artificial intelligence technologies' ability to generate their own models, and widespread adoption of learning analytics methods force us to consider how to effectively use artificial intelligence in education in general and online distance education in particular. Due to the present heightened focus on artificial intelligence technologies, the main purpose of this paper is to examine the student and instructor perception on artificial intelligence in online distance education.

While the opportunities for AI are promising, instructors may perceive the impact of AI systems negatively. For instance, instructors may worry that relying too much on AI systems might compromise the student's ability to learn independently, solve problems creatively, and think critically (Wogu et al., 2018). It is also important to examine how students perceive the impact of AI systems in online learning environments (Cruz-Benito et al., 2019). The AI in Education (AIEd) community is increasingly exploring the impact of AI systems in online education. For example, Roll and Wylie (2016) call for more involvement of AI systems in the communication between students and instructors, and in education applications outside school context. At the same time, Zawacki-Richter, and his colleagues (2019) conducted a methodical review of AIEd publications from 2007 to 2018 and as a result found a lack of critical reflection of the ethical impact and risks of AI systems on learner-instructor interaction. Popenici and Kerr (2017) examined the impact of AI systems on learning and teaching, and discovered potential conflicts between students and instructors, such as privacy concerns, changes in power structures, and excessive control.

All of these studies called for more research into the impact of AI systems on learner–instructor interaction, which will help us identify any gaps, issues, or barriers preventing AI systems from achieving their intended potential. Indeed, learner–instructor interaction plays a critical role in online learning. Kang and I'm (2013) validated that factor of learner–instructor interaction, such as communication, support, and presence, improve students' satisfaction and learning outcomes. The learner–instructor interaction further affects students' self-esteem, motivation to learn, and confidence in facing new challenges (Laura & Chapman, 2009). Less is known, however, about how introducing AI systems in online learning will affect learner– instructor interaction. Guilherme (2019, p. 7) predicted that AI systems would have “a deep impact in the classroom, changing the relationship between teacher and student.” More work is needed to understand how and why various forms of AI systems affect learner–instructor interaction in online learning (Felix, 2020)

Literature Review

The authors conducted a three-week STEM program and study with various Artificial Intelligence assisted tools and activities for non-engineering undergraduates. The group of students were a mix of low literacy and high awareness about artificial intelligence, where students were significantly educated about these methods and made aware of various ethical questions and clouding around the concept of Artificial Intelligence (Chen, Zou, Xie, Cheng, & Liu, 2022). These studies show a considerable amount of negative mindsets among non-technology students as they claim that they become disconnected to the conventional methods of learning when artificial intelligence and related tools are introduced to them, they are wary of the change this brings about to their existing systems and find difficulty in adapting to the new way of doing things. AI education systems also make a greater shift in the way of life that people have, providing a perspective of social scientific issues that affect implementation frameworks of both education and real-world experiences. Pre-tests and post-tests were conducted during this research to determine the knowledge shift that students experience as a result of introducing artificial intelligence assisted tools in their education streamline. The various activities and training that were part of this three-week program also measured the AI understanding scale among the students who participated in the study.

The study of Technology Acceptance Model (TAM) helps in understanding the orientation teachers have towards accepting Artificial Intelligence and its assistance in educational tools. The authors have studied the perspective of 83 science teachers in Abu Dhabi, where the results show a positive relationship between teachers and AI tools in education on various determinants (Al Darayseh, 2023). The TAM Model is a theory that analyses the way users lean towards or away from technology, and how they perceive it to be a useful tool based on certain criteria. The sample that the authors selected, had a positive inclination towards technology since they recognized the utility of technology for science-based curriculums, and the acceptance rate among teachers for Artificial Intelligence is quite high based on various dimensions and criteria used in the study to understand teacher orientation towards AI. The dimensions used to standardize the test were the easy to use factor of AI, whether it is user friendly or not for various levels of technology adeptness, self-efficiency where the meter was to understand how effective and independent the technology makes students, the benefits of technology assistance over traditional methods of books and learning materials, various attitudes of the users and how technology can be tailored according to individual users, how behavioral factors affect the way knowledge is transferred among others. Teachers were also inclined towards technology and AI Assisted models for imparting knowledge and skill to students as they believed that it was less stressful and less anxious according to the study

Human Centered Artificial Intelligence (HCAI) in the field of education is researched in this paper by the authors Li and Gu who study the benefits of AI and focus on the risks it poses on the result of gaining knowledge in our education systems (Li, & Gu, 2023). AI has created a revolution in education by enhancing the learning experience of students through data analysis models, making the practice more independent, real-time, and often an immersive component of learning. The benefits reaped by students also include chat-bots that provide real-time clarifications for doubts, tailoring the content through machine learning where the student's profile is scanned to develop a study method and topic inclusion based on the student's online activity and needs. However, the risks indicators that are identified by the authors for this study are eight and are: misunderstanding the concept, misusing the available resources, mismatching the pedagogy, increase in privacy security risk, transparency risk, accountability risk, bias risk, and perceived risk. These indicators are further

divided into four categories to help in conclusions, and the method followed to conduct the study was the Delphi-AHP method, to develop the risk indicator framework and study the relationships between each indicator and how they affect the outcome of gaining quality education. A key finding in this study was the lack of AI governance methods that would significantly reduce the risks of Artificial Intelligence in education through setting regulations and standards to be adopted industry wide.

The advent of digitalization of education through technology and Artificial Intelligence has brought about a multitude of benefits for students and at the same time created challenges that question the ethics in these technologies being used and misused (Kassymova, Malinichev, Lavrinenko, Panichkina, Koptyaeva, & Arpentieva, 2023). The authors make an interesting comparison between education or training provided by humans versus machines and argue that students cannot develop in a wholesome manner when choosing the later those leads to lack of values, missing spiritual and moral competency developments. This research touches upon the cultural and family relation effects that AI and digital education brings about in our society. Education does play a pivotal role in shaping the values and relationship aspects of generations, as students are deeply affected by not only what they learn but also how they learn it. The methodology used for this study is a theoretical analysis that helps the authors establish the results that digital transformations have brought about in our society. The research results are nothing but astonishing where the researchers have found that digital education has revolutionized the pattern of learning but severely lags in the human touch thus producing a race of humans who have redefined 'being human' by critical thinking rather than emotional thinking. Culture as a whole has been shifting from 'living in groups' as humans are a social being by nature to living in an extreme state of independence and lack of empathy. Therefore, the ethical responsibility of education where a person is developed in a wholesome manner is overlooked by skillsets and technical knowledge attained through digital means.

The authors have researched publications from the year 2000 to 2019, to conduct a quantitative analysis to identify the various trends and improvements in the field of Artificial Intelligence in education. Machine based learning techniques were introduced in the early 2000's and have gained momentum by extreme transformation in the education industry (Lin, Yu, Shih, & Wu, 2021). The authors identified a gap in assessment of the AI methods due to the absence of quantitative studies to determine accurate results. Data collection was undertaken from nearly 4000 publications, duplicates that were irrelevant were excluded and the final data sets were processed through four methodologies- bibliometric indicators, social network analysis, structural topic modelling and Mann-Kendell trend test. These were utilized to study the consistency and exclusivity of AI study methods to understand various trends across this period of time. Artificial Intelligence in education creates a unique and novel learning experience for students utilizing machine learning algorithms, natural language processing (NLP) methods, robot assistance for learners among others; these methods assist learners to excel, providing them constant guidance, evaluation, feedback, and predictions. Student emotions can also be captured and processed with advanced AI systems and recommends personally tailored sessions for value addition and individual attention to students. There are few challenges that are identified in this study, including the massive issue of data privacy as these systems continually collect and store user information, acceptance among the general public, and ensuring technical support for these methods of instructions as and when needed. It is also a valid recommendation to shift from machine learning to deep learning to overcome most of the cons in the former.

Discussion and Research Questions

Our research questions focused on examining how students and instructors perceive the impact of AI systems on learner-instructor interaction in online learning. Although the growing body of AIED research has been conducted to investigate the useful functionalities of AI systems (Seo et al., 2020b; Popenici & Kerr, 2017; Zawacki-Richter et al., 2019), little has been done to understand students' and instructors' concerns on AI systems.

Recent use of AI systems in online learning showed that careless application can cause surveillance and privacy issues (Lee, 2020), which makes students feel uncomfortable (Bajaj & Li, 2020). In this study, we found that students and instructors perceive the impact of AI systems as double-edged swords. Consequently, although AI systems have been positively recognized for

improving the quantity and quality of communication and for improving the feeling of connection, there were concerns about responsibility, agency, and surveillance issues.

The Figure below shows the number of AIED articles published from 2000 to 2019, indicating an overall increasing tendency, particularly since 2012. The increasing interest in AIED research is mainly due to the increased positive findings of AI's effects on learning performance and outcomes.

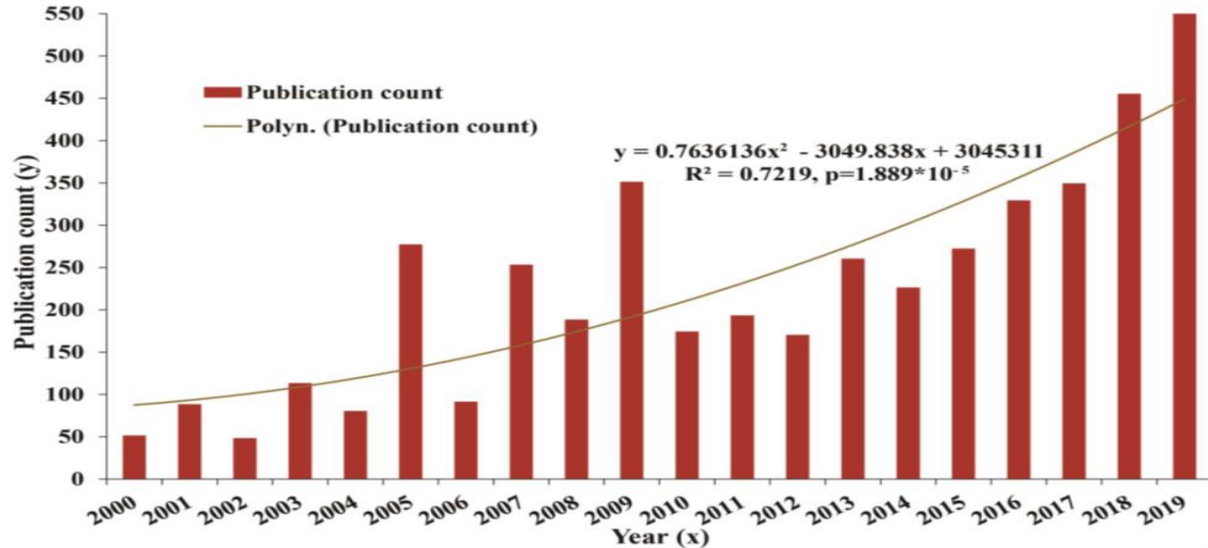


Figure 1 Year-by-year number of AIED publications (Chen, Zou, Xie, Cheng, & Liu, 2022).

The impact of Artificial Intelligence on learners and instructors have been categorized under three dominant factors, communication, support, and presence to understand the perception of both learners and instructors as to whether it has a positive (+) or negative (-) image in their minds. The table depicts the results of the study published in 'The impact of artificial intelligence on learner-instructor interaction in online learning' authored by Kyoungwon Seo, Joice Tang, Ido Roll, Sidney Fels and Dongwook Yoon.

Factor of learner-instructor interaction	The impact of AI systems	Students' perceptions	Instructors' perceptions
Communication	Quantity & Quality	(+) Students believe that the anonymity afforded by AI would make them less self-conscious and, as a result, allow them to ask more questions	(+) Instructors believe that AI could help answer simple, repetitive questions, which would allow them to focus on more meaningful communication with students
	Responsibility	(-) Students worry that AI could give unreliable answers and negatively impact their grades	(-) Instructors predicted conflicts between students and the instructor due to AI-based misunderstandings or misleadingness
Support	Just-in-time support	(+) Students believe that AI would support personalized learning experiences, particularly with studying and group projects	(+) Instructors believe AI could be effectively leveraged to help students receive just-in-time personalized support
	Agency	(-) Students perceived that canned and standardized support from AI might have a negative influence on their ability to learn effectively	(-) Instructors are wary of the fact that too much support from AI could take away students' opportunities for exploration and discovery
Presence	Connection	(+) Students believe that AI can address privacy concerns and support learner-instructor connections by providing social interaction cues without personal camera information	(+) Instructors believe that the addition of AI would help them become more aware of students' needs
	Surveillance	(-) Students are uncomfortable with the measurement of their unconscious behavior, such as eye tracking or facial expression analysis, because it feels like surveillance	(-) Instructors were negative about relying on AI interpretation to understand students' social interaction cues

Figure 2 The impact of Artificial Intelligence on learners and instructors (Seo, Tang, Roll, et al., 2021)

Methodology

Research design

The research philosophy focuses on the mechanism of perceptions regarding AI usage in education. While carrying out this study, the authors evaluated the validity and reliability tools to ensure rigor in data. The primary approach is used because the data collected in this research is first-hand, which means it is collected directly from the respondents.

Sample and sampling techniques

The purposive sampling technique was used in this study for the primary data collection. This technique is used because it targets a small number of participants to participate in the survey, and their feedback shows the entire population. Purposive sampling is a recognized non-probabilistic sampling technique because the author chose the participants based on the study's purpose. The respondents of this study were students and instructors at Campbellsville University, Kentucky in the USA. Following the ethical guidelines, consent was taken from the participants. After that, they were asked to give their responses through a questionnaire. The number of participants who took part in the study was 50.

Research Questions

Introduction

- Hello, thank you for taking time for this interview today. We are looking forward to learning from your experience with online learning. Our goal is to reveal your perceptions of AI in online learning. For your information, the interview will take about 5-10 min. The interview will be recorded but will be confidential and de-identified.

Questions

- Do you have any reservations or other concerns about the use of AI technology in education?

Do you think this AI system supports learner-instructor interaction? Yes, no, or do you feel neutral? Why?

- [When the participant is a student] Would the incorporation of this AI system into your courses change your interaction with the instructor.

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Figure 3. The impact of artificial intelligence on learner-instructor interaction in online learning

Results

The implications of the results are presented, along with recommendations for the future, to ensure AI can be effectively integrated into classrooms. As a finding of the study, it was noted that students with a higher self-reported understanding of AI and students who were enrolled in technological courses like STEM reported more positive thoughts about integrating AI into their classrooms. The students with a low understanding of AI and those who had not been exposed to technology at large tended to be fearful of AI. Majority of the students and instructors indicated a thorough understanding of the positives of incorporating AI into on-line but perceived that AI could never match human creativity in the education process also indicating strongly that technology can assist educators effectively however cannot replace human instructors.

Theoretical implications

This study provides theoretical implications for a learner-instructor interaction framework by highlighting and mapping key challenges in AI-related ethical issues (i.e., responsibility, agency, and surveillance) in online learning environments. Researchers have requested clear ethical guidelines for future research to prevent AI systems from accidentally harming people (Loi et al., 2019). Although several ethical frameworks and professional codes of conduct have been developed to lessen the potential dangers and risks of AI in education, significant debates continue about their specific impact on students and instructors (Williamson & Eynon, 2020). The results of this study increase our understanding of the limitations that determine student and instructor trust and acceptance of AI systems and provide a theoretical background for designing AI systems that positively support learner-instructor interactions in a variety of learning situations.

Practical implications

This study has practical implications for both students and instructors. Interestingly studies show that most of the negative experiences with AI systems came from students' impractical expectations and misunderstandings about AI systems. These misconceptions can be barriers to the effective use of AI systems by students and instructors. To address this, it is important to foster AI literacy in students and instructors without a technical background (Long & Magerko, 2020). For example, recent studies have published guides on how to incorporate AI into K-12 curricula (Touretzky et al., 2019), and researchers are exploring how to engage young learners in creative programming activities involving AI (Zimmermann-Niefield et al., 2019).

Furthermore, in order to minimize the negative impact of AI systems on learner-instructor interaction, it is important to address tensions where AI systems violate the boundaries between students and instructors (e.g., responsibility, agency, and surveillance issues). Researchers such as Seo, et.al. (2021) have proposed that future AI systems should ensure accountability with careful data collection and presentation. According to Seo, et.al. (2021), AI systems will be more closely integrated into future online learning therefore it is important to note that the present AI systems should not replace the entire role of human instructors. Further according to Seo, et. al (2021) in the online

learning of the future, AI systems and humans will work closely together, and for this, it is important to use these systems with consideration about perceived advantages and disadvantages.

Limitations

The study does not differentiate between focus groups with backgrounds in STEM and non-STEM as that might provide insights into perception of groups that are technologically sound and ones like humanities and art that are not inclined towards technological advances; most studies in the past have focused on STEM groups (Darayseh, 2023, p6). There is limited access to data as Artificial Intelligence is an evolving technology and researchers have yet to review much of the advances of various updates. Time has also been a constraint for the study as the research problem could not be tracked and measured over time to induce factors that might change the perceptions and capture the results.

Discussion and conclusion

Our research questions focused on examining how students and instructors perceive the impact of AI systems on learner–instructor interaction in online learning. Although the growing body of AIED research has been conducted to investigate the useful performance of AI systems (Seo et al., 2020b; Popenici & Kerr, 2017; Zawacki-Richter et al., 2019), little has been done to understand students' and instructors' concerns on AI systems. Recent use of AI systems in online learning showed that careless application can cause surveillance and privacy issues (Lee, 2020), which makes students feel uncomfortable (Bajaj & Li, 2020). In this study, we found that students and instructors perceive the impact of AI systems as double-edged swords. As a consequence, although AI systems have been positively recognized for improving the quantity and quality of communication, for providing well-timed, personalized support for some students, and for improving the feeling of connection, there were concerns about responsibility, effectiveness, and surveillance issues. In fact, what students and instructors perceive negatively often stemmed from the positive aspects of AI systems. For example, students and instructors appreciated AI's immediate communication, but at the same time they were concerned about AI-based misunderstandings or misleadingness. Although students and instructors valued the just-in-time, personalized support of AI, they feared that AI would limit their ability to learn independently. Students and instructors valued the social interaction cues provided by AI, but they are uncomfortable with the loss of privacy due to AI's excessive data collection.

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