

Review

A Social Perspective on AI in the Higher Education System: A Semisystematic Literature Review

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Abstract: The application of Artificial Intelligence in Education (AIED) is experiencing widespread interest among students, educators, researchers, and policymakers. AIED is expected, among other things, to enhance learning environments in the higher education system. However, in line with the general trends, there are also increasing concerns about possible negative and collateral effects. The consequent social impact cannot be currently assessed in depth. Balancing benefits with social considerations according to a socio-technical approach is essential for harnessing the true power of AI in a responsible and trustworthy context. This study proposes a semi-systematic literature review of the available knowledge on the adoption of artificial intelligence (AI) in the higher education system. It presents a stakeholder-centric analysis to explore multiple perspectives, including pedagogical, managerial, technological, governmental, external, and social ones. The main goal is to identify and discuss major gaps and challenges in context, looking at the existing body of knowledge and momentum. AIED should encompass pedagogical, ethical, and social dimensions to be properly addressed. This review highlights a not-always-explicit socio-technical perspective. Additionally, this study reveals a significant lack of empirical systematic evaluation of added value and institutional readiness. Because of the broad scope of the study and the intense ongoing debate on the topic, an exhaustive identification of the current body of knowledge is probably unrealistic, so this study aims mainly to identify the mainstream and major trends by looking at the most recent contributions.



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1. Introduction

Education is one of the most significant expressions of a society [1], considered to be a foundational pillar for progress by imparting knowledge, skills, and critical thinking [2]. Currently, the education system is changing significantly to prepare students for a future shaped by technology [3]. Now, education aims not just to provide knowledge but also to develop vital skills needed in a tech-centric world. This shift highlights a commitment to preparing students not just as receivable of information but as skillful individuals capable of leveraging technology to innovate, solve problems, and contribute meaningfully to society.

Higher education acts as a catalyst, driving economic development, research, knowledge sharing, and technological innovation. Its role encompasses preserving culture, advancing nations, and fueling global economic growth [4]. In the era of digitalization and globalization, embracing advanced technology becomes crucial, empowering individuals and organizations to navigate a connected world, and fostering adaptability and resilience [5]. The pandemic highlights and accelerates the need to reimagine the educational system and build a framework that uses more technology-enabled education at all levels [6]. This shift toward online and hybrid learning environments demonstrates the essential role of educational technologies.

Artificial intelligence (AI) technology is not a buzzword anymore and has taken the world by storm [7]. AI has dramatically transformed various sectors, including healthcare,

industry, and finance, and the education sector is not immune [8,9]. Defining AI remains somehow a challenge, as there is no consensus among experts on one single definition [10]. An accurate definition probably depends on the context. A relatively simplified vision assumes AI as a technology able to perform tasks requiring human intelligence [11]. AI has been called the “new oil” in recent years [10] because of its impact, or potential impact, on many aspects of lives.

In our context, Artificial Intelligence in Education (AIED) refers specifically to the adoption of AI technology in educational settings [12]. It encompasses the integration of intelligent systems, machine learning algorithms, and AI-based tools into the teaching and learning processes [11,13,14]. AIED aims to enhance educational outcomes by providing personalized learning experiences, automating administrative tasks, and facilitating the development of innovative instructional methods [10]. According to the Horizon Report 2020, AI is identified as one of the six technologies that possess the capacity to significantly influence higher education [11].

The adoption of Artificial Intelligence in Education presents impressive opportunities for enhancing the higher education system. However, its integration required a holistic understanding of the perception of a wide range of stakeholders, beyond educators and students, to ensure its successful and inclusive implementation [15,16]. Additionally, assessing and improving the readiness of educational institutions for AI integration is crucial. The collaborative effort among stakeholders is key to realizing AIED’s transformative potential responsibly and equitably [17].

Despite the potential benefits of AIED, in line with the general trends, there are also increasing concerns about possible negative and collateral effects. Indeed, while the added value is somehow tangible according to many possible assessment metrics (e.g., productivity) [18], the consequent social impact cannot be currently assessed, especially with the lack of empirical studies that should accurately measure its actual impact [12].

Recently, there have been growing concerns about the ethical and social implications of AI such as biased decisions, security and privacy of students’ data, and fear regarding dehumanization. AI emergence led to the creation of more than 80 sets of ethical principles for its implementation [10]; however, there is still a lack of materials that directly address the needs of the students, educators, parents, and other educational stakeholders [10,19,20]. In addition, a growing number of studies emphasized the need for research to have a more comprehensive vision of the impact of AI from a sociotechnical perspective [3,8,10–12,21]. Balancing benefits with social considerations according to a sociotechnical approach is essential for harnessing the true power of AI in a responsible and trustworthy context.

This study proposes a comprehensive literature review based on a semisystematic assessment to examine the current state of knowledge on AIED. It consists of a stakeholder-centric analysis to explore multiple perspectives, including pedagogical, managerial, technological, governmental, external, and social ones. The main goal is to identify and discuss major gaps and challenges in context, looking at the existing body of knowledge and momentum. Through this analysis, this research seeks to contribute to a deeper understanding of the multifaceted challenges and opportunities that AI presents in educational settings, aiming to provide a foundation for future investigations and the development of more informed strategies for AI integration.

Because of the broad scope and the intense ongoing debate on the topic, an exhaustive definition of the current body of knowledge is probably unrealistic, so this study aims mainly to identify the mainstream by looking at the most recent contributions.

This paper follows with an overview of the key background concepts (Section 2) and methodological aspects (Section 3). Section 4 deals with the stakeholder-centric analysis, while Sections 5 and 6 have a critical discussion focus.

2. Background Concepts

This section provides an overview of the key broad concepts that are object of this study, namely the adoption of technology in educational settings with a focus on higher education. Additionally, lessons from COVID-19 are briefly discussed.

2.1. Education and the Higher Education System

According to Nelson Mandela, "Education is the most powerful weapon which you can use to change the world" [22]. It also helps people to understand their rights and responsibilities towards their family, society, and the country. It is a basic human right and a critical pathway to increase productivity, competitiveness, and wealth [1].

The global digital agenda highlights the need for a shift in the pedagogical paradigm to fulfill the emerging demand for knowledge in society [23] and to increase flexibility and resilience [24]. In a common understanding, higher education is a noncompulsory or complementary learning to generate professional and skilled graduates to enable a highly trained workforce [25]. Higher education has a distinctive focus also because it is a vital engine for research and innovation [26]. Additionally, higher education has a wider scope than primary and secondary education. It includes both traditional academic programs and professional training by offering vocational courses, online learning, and academic degrees suitable for any determination in career growth [27]. This provides more flexibility for students to gain practical skills for employment and foundational knowledge that sets them up for life. The effectiveness of the higher education system depends on a set of closely cooperating stakeholders, who determine the system's performance in terms of productivity and adaptability [28].

2.2. Technology in Higher Education

Technology has added value to the education system by supporting a progressive transition from relatively passive and slow environments to more interactive, engaging, flexible, resilient, and, in general, capable settings [16,29,30]. Different kinds of technologies are commonly used in education, such as information systems, collaborative technologies, social networks, virtual and augmented reality, and AI. The progression of these technologies encapsulates the evolving landscape of educational technology up to AI's role in crafting adaptive, intelligent learning experiences.

2.2.1. Information Systems (ISs): The Backbone of Modern Education

ISs serve as the foundational layer that enables the collection, storage, processing, and dissemination of educational content. ISs are crucial for managing large amounts of academic resources, supporting administrative tasks, and providing online learning platforms [31,32]. For instance, students can access a wide range of resources anytime and anywhere through online libraries and databases, enriching their learning experiences and keeping them abreast of the latest advancements in their respective fields of study [31]. More in general, ISs contribute to improving educational efficiency and productivity [24], such as administrative tasks, as well as core aspects of the teaching and learning process [32,33]. As technology continues to advance, it is crucial for institutions to better integrate ISs to enhance the educational system.

2.2.2. Collaborative Technology (CT): Enhancing Interaction and Teamwork

CTs form an integral part of the digital education ecosystem, allowing students and educators to interact and collaborate more effectively [33]. More specifically, within an educational context, collaborative learning is a valuable approach to increase academic performance and to prepare students for professional environments, where teamwork is essential [34]. CT nurtures cognitive skills such as analysis and problem-solving, as well as prosocial behaviors like empathy and kindness [34], as well as promoting student success by fostering interaction regardless of location or device [10]. Furthermore, CT increases student engagement [33,34]. More recently, the use of CT has become somehow pervasive

(e.g., WhatsApp) [35]. It is worth noting that CT can be seen as an opportunity for a more equal and enhanced global education [34]. As per ISs, a comprehensive understanding of implications in educational settings is vital to ensure a successful integration and a positive impact on the system.

2.2.3. Social Network (SN): Building Community and Knowledge Sharing

Online social networking allows individuals and communities to connect, communicate, and collaborate/cooperate at a global scale by sharing content [36,37]. SN usage has been constantly increasing worldwide in the last years [36]. Also, in an educational context, SN plays a critical role in establishing and maintaining connections, sharing knowledge, and further consolidating communication and a sense of community [38,39] by increasing interactions [36] and fostering creativity and innovation. Recent experience shows increasing concerns on the improper use of SNs and on associated risks [36], pointing out the need for a trustworthy and safe environment.

2.2.4. Virtual and Augmented Reality: Enhancing Immersive Learning

The use of virtual reality (VR) and augmented reality (AR) has increased within the field of higher education by offering novel opportunities to acquire knowledge, to participate in the learning process more actively, and to further foster engagement [40–42]. AR and VR provide immersive experiences. VR is a computer-generated environment that simulates a real-world setting, producing a sensation of presence and immersion unmatched by traditional learning environments [41,43]. Similarly, AR superimposes digital content into the real world, thereby producing an interactive and immersive learning environment [41]. This technology enables the creation of interactive learning environments that provide students with real-time feedback, increase student engagement, and bring abstract concepts to life [40]. For instance, biology students can simulate plants, mammals, birds, insects, and amphibians, while medical students can perform experimental surgical procedures in virtual reality [40].

2.2.5. Artificial Intelligence (AI): The Engine of Adaptive and Intelligent Education

AI is perceived by people differently depending on the context. Artificial Intelligence in Education (AIED) is recognized as a technological innovation capable of revolutionizing traditional education by offering highly personalized, scalable, and cost-effective alternative solutions [12,19,29,44].

AI has the potential to analyze large sets of data from ISs, CTs, and SNs to offer insights on how to improve the learning outcomes and transferring of the content [45]. It can offer personalized learning to the specific needs and preferences of the students [45]. AI, when combined with VR/AR technologies, is able to create adaptive immersive learning experiences for each learning style of the students, and in this way, more effective educational interventions are enabled [10]. AIED can be approached from different perspectives, typically student/teacher and institution [10]. For instance, it can support students by providing personalized learning experiences, assist teachers in typical tasks like grading and feedback, and help institutions in administrative processes, ultimately enhancing the overall education experience. Indeed, AIED popularity is growing rapidly (e.g., according to the Global Market Insight report), especially after the release of generative-AI-based tools such as ChatGPT [23,35], and the need for additional and more specific research is rising accordingly. Research is crucial to understand how AI can optimize learning, refine educational tools, and address ethical considerations [35,38]. Holistically, the impact of AI cannot be underestimated, and its adoption should be framed by clear objectives, ensuring alignment with an organization's culture and mission in a responsible and trustworthy environment.

2.3. The Impact of COVID-19 on Education: Flexibility and Resilience

Technology played a crucial role in maintaining the education system functioning during the COVID-19 pandemic [31,46], when educational institutions experienced man-

dated closures, necessitating students and staff to stay home. Most day-to-day activities quickly shifted to online [6]. Additionally, the outbreak has further increased potential inequality [47] and encouraged the need for inclusive and equitable access to learning [39,46]. For instance, not all students have the financial capability to rapidly adapt to this shift worldwide, with the consequent need for strategic solutions [46]. Furthermore, the pandemic was a kind of stress test and a further reminder to increase resilience and ensure the continuity of the educational process [48]. This experience has pointed out the relevance of effective communication among the different stakeholders and their active engagement, ranging from prominent organizations to individual educators [49]. The swiftly evolving nature of COVID-19 demanded an agile response [49] that was achieved by enhancing communication channels with the support of scalable IT services [46]. Ultimately, the pandemic showed that the education sector should plan a more sustainable learning model that can fully satisfy educational goals. For instance, hybrid learning was suggested as an ideal approach for a post-pandemic period [49]. This is evidence of smooth technology incorporation within educational settings to increase flexibility and resilience.

3. Methodology and Approach

AIED is a complex and multifaceted topic [8]. Additionally, the topic is gaining momentum as its potential to revolutionize the learning landscape is clearly recognized by educational institutions, as well as externally. Because of this peculiar phase, there is an active debate that is generating a variety of opinions. For instance, currently, there is no converging view on the use of generative AI within educational settings [23,29].

While in general terms conducting a systematic literature review may be a reasonable approach to identifying a body of knowledge, it seems not to be an ideal approach when dealing holistically with AIED at this specific moment, due to the intense ongoing debate on the topic. Indeed, a completely systematic approach is unlikely to capture the mainstream and major trends looking at the most recent contributions.

Therefore, we adopted a semisystematic approach that combines a structured core methodological element with the flexibility to narratively discuss spontaneously emerging content [50]. The key steps to achieve a more consistent result are proposed by Grant and Booth [51], who defined four sequential steps: Search, Appraisal, Synthesis, and Analysis (SASA) [50].

The process is summarized in Figure 1.

The review process starts with initial research in the most common databases for scientific literature, such as Google Scholar, Springer link, Science Direct, ERIC, and Wiley, to gather a corpus of contributions. The papers are retrieved by combining keywords as follows:

- “AI” AND “Higher Education”;
- “AI Adoption” AND “Higher Education” AND “Stakeholders”;
- “AIED” AND “Higher Education” AND (“Ethics” OR “Social Impact”);
- “Generative AI” AND “Higher Education”.

In the appraisal stage, inclusion criteria were applied. The focus is on the most recent publications, typically after 2019. Additionally, only contributions in English were considered and the priority is on Higher Educational settings.

In order to make the holistic process more consistent by looking at the aimed goals, we implemented a backward snowballing technique to uncover additional pertinent literature. As usual, it involved a screening of reference lists and the consequent exploration of potentially pertinent and relevant contributions [51].

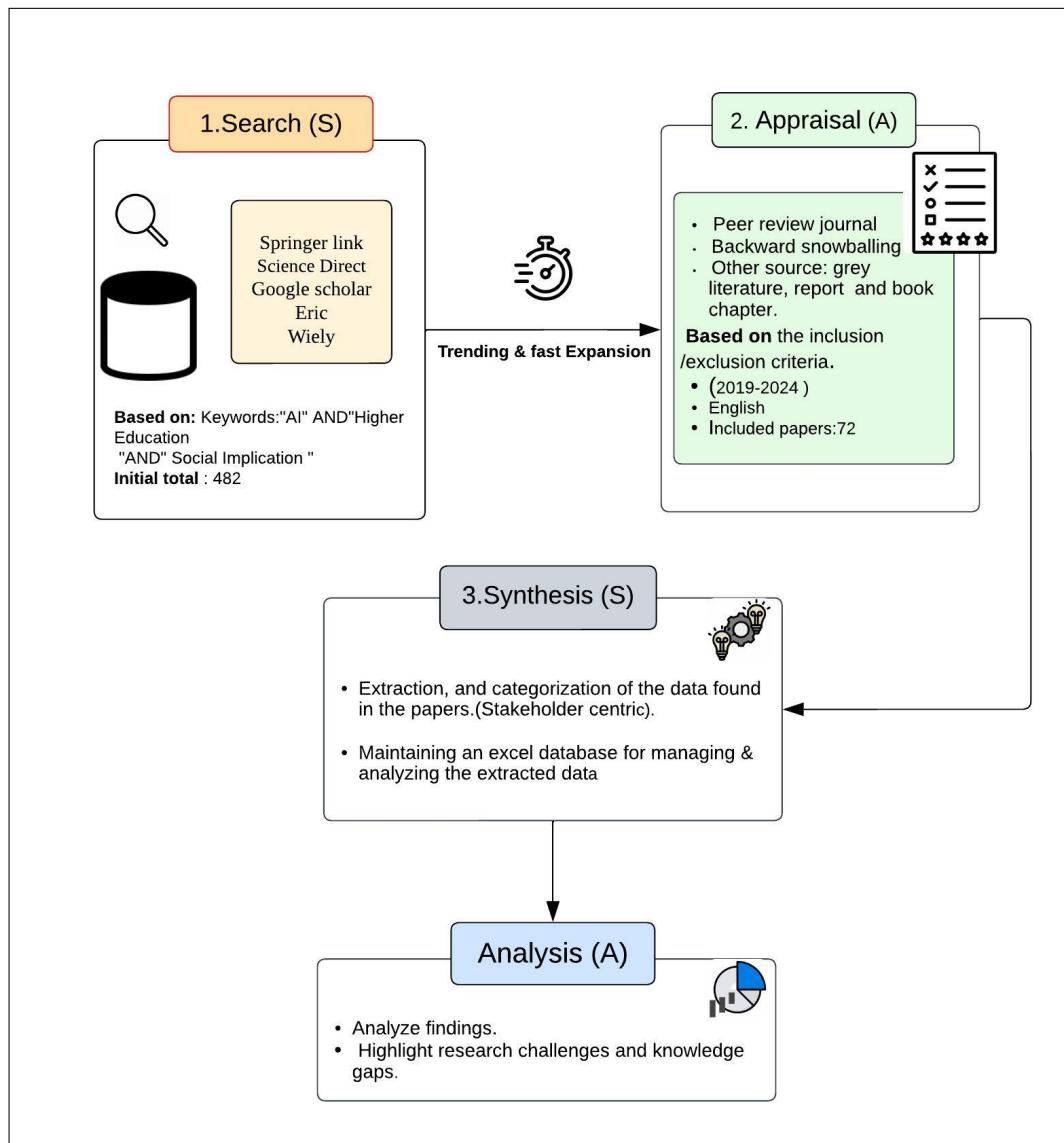


Figure 1. Flow diagram based on the SASA framework.

Also of note is that addressing a topic that elicits widely polarized viewpoints poses a significant scholarly challenge. In this specific context, the inclusion of gray literature naturally emerges to integrate the main process [52]. It normally encompasses statistical reports, white papers, and even social media content. Its utilization in this research contributes to better capturing the momentum and the intrinsic diversity of opinions not always reflected by the traditional academic literature.

Therefore, a semisystematic approach enabled a more dynamic process that allowed the identification of an initial corpus of 482 potential contributions. The critical application of inclusion criteria, also including the relevance in context, reduced the number of considered contributions to 72.

The synthesis phase encompasses two key tasks, including the extraction and categorization of data and the consequent synthesis of insights and conclusions.

Finally, we critically analyzed the findings to emphasize major challenges and gaps.

This literature review was structured by reflecting the multistakeholder focus of the target system and includes different perspectives, i.e., pedagogical, managerial, governmental, technological, external, and social. Related statistics in terms of paper distribution by perspective are reported in Figure 2. The selection of papers followed criteria that explicitly focused on the social implications of AIED. Additionally, the chosen papers

are the ones that explicitly state and focus on specific stakeholders such as students and teachers. Another important criterion was to consider the most recent contributions in the last 5 years to ensure that the analysis presented is current and reflects the latest trends and insights into the social implications of AIED. We also organized the selected papers within tables under each perspective of the various stakeholders in the paper, therefore ensuring a clear overview of the research relevance and focus to be addressed by the respective groups of involved people.

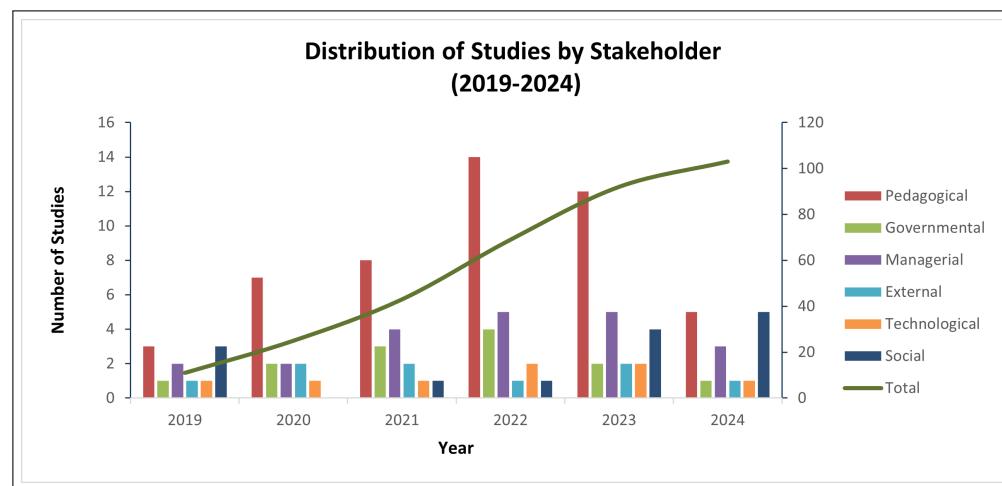


Figure 2. Distribution of studies over the time for each perspective.

As shown in Figure 2, there was a consistent increase in the number of publications related to AIED. Therefore, keeping track of such a dynamic field can indeed be challenging, as it requires constant updating of the knowledge base and adaptability to new research directions. It also implies the necessity for a robust and flexible research design that can accommodate shifts in the field and a critical eye toward emerging trends and their underlying causes.

The pedagogical perspective, which encapsulates the interests of students and teachers as well as the methodologies of teaching and learning has dominated the research landscape. This prominence highlights the central role that these actors play in the educational system. Although the pedagogical stakeholders are paramount, the managerial, governmental, technological, and external stakeholders also need to be considered. This indicates that a holistic approach to AIED is needed and recognizes that a diverse array of stakeholders will experience the ripple effects of AI integration into the educational framework. Therefore, it is crucial for research, especially in fields as dynamic as AI, to consider such multifaceted viewpoints to ensure comprehensive and equitable advancements.

4. AI in Higher Education (AIED): A Multistakeholder Analysis

Educational systems have undergone significant evolution, including higher education. The evolution starts from Education 1.0's traditional teacher-centered approaches to the technology-driven paradigms of Education 4.0, characterized by digitalization and automation [53,54]. Recently, there have been calls for Education 5.0, a shift towards a more human-centric focus that emphasizes personal development, creativity, and social skills over mere technological integration [53].

Parallel to these educational shifts, the latest advancements in AI are profoundly impacting the higher education system, affecting all stakeholders at different levels [11]. Accordingly, in our study, we adopt a stakeholder-centric approach is an integral part of the sociotechnical perspective to address the complexities of this transition within the higher education settings (Figure 3). Based on our approach, it may help to ensure that AI not only supports but also amplifies the human elements of learning, harmonizing technology with the personal and collaborative skills that Education 5.0 prioritizes. This model serves

as a guide for higher educational stakeholders through the complexities of integrating technology with a focus on enhancing the human experience, thereby preparing students for a future where personal and technological capabilities are equally valued.

Higher education systems present a certain complexity, as different stakeholders are involved. We categorized a number of main classes, including *Pedagogical Stakeholders*, *Managerial Stakeholders*, *Technological Stakeholders*, *Governmental Stakeholders*, and *External Partners*. Social Stakeholders are implicitly the object of Section 5.

Pedagogical stakeholders are first-line and internal actors and typically include students, teachers, tutors, mentors, supervisors, and program/course and content designers. Managerial stakeholders are the institutional-level participants, such as central management, local management, and administration. Technological stakeholders encompass those involved with the maintenance of infrastructure, technology provision, and support services. Governmental stakeholders are understood at a more holistic level, focusing on policy and funding. External partners include industry, alumni, and others who are indirectly part of the system. Finally, society is seen as a broad category, as in its common meaning.

Each of these groups plays a distinct and unique role in the system and, therefore, is affected by AI adoption in a different way. In the following subsections, the different identified categories are addressed separately.

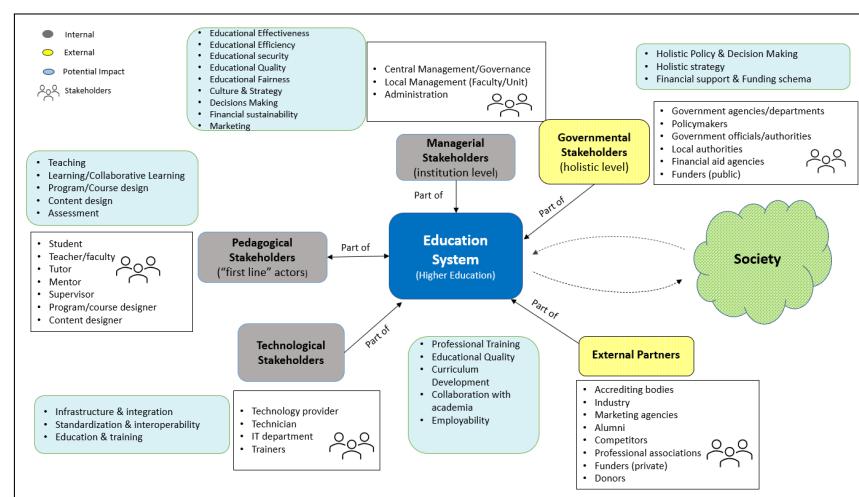


Figure 3. Conceptual model for the higher education system.

4.1. Pedagogical Perspective

The term “pedagogy” is a classic concept in education, and it may be interpreted in a slightly different way depending on the historical and cultural traditions, as well as on the context [55]. For the purpose of this study, we adopt a human science perspective where pedagogy deals with education, with emphasis on the relationship and interaction between the instructor and the learner [55]. The use of electronic or digital tools, media, and resources to enhance a student’s learning experience is referred to as tech-based pedagogy [3].

AIED holds the potential to transform pedagogy in higher education, enabling personalized learning experiences and improving student engagement and success [8,10,56]. Its future application promises to make education more adaptive, efficient, and aligned with the demands of a technologically evolving world.

To simplify and better capture the essence of the different contributions mentioned in the literature, we address two specific categories, students and instructors, in addition to a generic one that includes all pedagogical stakeholders different from the previously mentioned, such as tutor and mentor.

Studies on different pedagogical stakeholders are organized as follows: student-focused research in Table 1, instructor-focused in Table 2, both students and instructors in Table 3, and other stakeholders in Table 4.

4.1.1. Student

AIED holds great potential for students in various ways, such as personalized learning, one-on-one coaching through AI tutors and chatbots, quick solutions to common queries, and continuous access to learning resources [10,16,20,57,58]. AI-assisted technologies are designed with the primary goal of benefiting students. In order to fully comprehend their impact, it is essential to provide two main examples of AI tools that can assist students.

First and foremost, Intelligent Tutoring Systems (ITSs) stand out as a prominent and well-known application of AI in education. It is a computer-based learning system powered by AI that provides instruction similar to that of a human instructor but without the need for direct human involvement [5,10,57,59,60]. ITSs create individualized learning environments wherein learners receive immediate feedback and guidance, and they have been widely discussed in research papers as a famous application of AIED [9,19,29,57,61,62]. Importantly, ITSs have played a crucial role in leveling the playing field for students with disabilities, allowing them equal opportunities for learning and self-education [10,58,63].

Secondly, the emergence of AI-powered chatbots such as ChatGPT has taken the education system by storm and generated substantial discussions within the field [16,23,44,64,65]. It is a type of generative AI tool that uses an advanced language model created by OpenAI [38,66]. ChatGPT, as a common example, possesses the ability to comprehend and produce human-like responses [16]. It has demonstrated impressive capabilities in understanding and responding to complex queries across multiple languages, offering transformative potential for students [23,67–69]. In addition, it facilitated personalized learning by providing students with instant feedback, and help, and enhancing traditional learning techniques. Among many potentials of generative AI tools, it even enables research students to collaborate on coauthoring with AI and publish journal articles [19,58].

Despite the significant potential benefits of AI for students, concerns remain regarding the absence of universal ethical guidelines for its usage [10,19,24,38,69]. For instance, student privacy and data security are legitimate concerns in the educational context of AI [23,38,64,68,70]. Some view AIED as a tool for improving student performance, while others worry about its potential to disrupt traditional learning methods and compromise academic integrity.

In addition, some researchers argue that AI may impede natural human learning processes and hinder students' ability to engage in critical thinking [42,57]. It could also make students overly reliant on technology, potentially diminishing their capacity to solve problems independently [8,35]. Another notable concern is the risk of addiction to AI, which could deter students from self-directed learning and effective interaction with teachers [65,71–73].

Furthermore, since pedagogy revolves around the interaction and relationship between students and teachers, AI may create communication barriers for students. There is a substantial distinction between human-to-human communication and communication with AI [11,42,74,75]. Students need to interact with their teachers and learn from them, and AI has not yet demonstrated the emotional intelligence necessary to understand students' circumstances and respond accordingly [57,63,70,71,76]. The lack of emotional intelligence is one of the drawbacks of AI in student education.

Another important and concerning dimension is preparing students for a new world when humans can be easily replaced by machines. Higher education systems must step in and ensure a learning experience that meets future needs. In his book titled *Robot-Proof: Higher Education in the Age of Artificial Intelligence*, Joseph E. Aoun proposed a useful blueprint for preparing learners for a future dominated by rapid technological advancement in AI [77,78]. Aoun suggested a new curriculum called "Humanics", which combines three literacies, which are technological literacy, data literacy, and human literacy. This model advocates for a curriculum that nurtures creativity, critical thinking, data literacy, technological fluency, empathy, and cultural agility, ensuring that graduates possess unique human capacities that machines cannot replicate [77]. This kind of learning experience may contribute to filling the existing gap between theoretical knowledge and the practical use of

that knowledge, while enabling students to grapple with issues, be adaptive, and innovate in real-life situations. It is also the major driver of a culture of lifelong learning.

Therefore, assessing students' perception and their level of awareness of the consequences of AIED is significant to ensure better learning outcomes. Studies that discuss and focus on students as core stakeholders and the impact of AI on their learning experience are listed in Table 1.

Table 1. Papers that discuss AIED from a student perspective.

Title	Year
From Chatting to Self-Educating: Can AI Tools Boost Student Learning Outcomes? [69]	2024
Is it Harmful or Helpful? Examining the Causes and Consequences of Generative AI Usage Among University Students [68]	2024
Academic Communication with AI-Powered Language Tools in Higher Education: From a Post-Humanist Perspective [75]	2024
The Impact of Adopting AI Educational Technologies on Projected Course Satisfaction in University Students [58]	2023
To Use or Not to Use ChatGPT in Higher Education? A Study of Students' Acceptance and Use of Technology [57]	2023
Students' Voices on Generative AI: Perceptions, Benefits, and Challenges in Higher Education [16]	2023
Determinants of College Students' Actual Use of AI-Based Systems: An Extension of the Technology Acceptance Model [71]	2023
Artificial Intelligence in Higher Education: Promises, Perils, and Perspective [64]	2020

4.1.2. Instructors

The applications of Artificial Intelligence in Education have emerged as useful assets for educators, exhibiting a notable influence on a variety of aspects of teaching and learning. The use of these technologies has the potential to improve pedagogical decision making as well as instructional methods [15,79–81]. The effective synergy between educators and AI tools results in several benefits, one of which is the capability to compare the decisions made by teachers with the resources provided by AI [10,15,82].

Many AI tools such as Intelligent Tutoring Systems can help not only students but also instructors. It offers interfaces for teachers, often based on open learner models, showcasing individual or group learning progress [10,79]. However, challenges arise as these interfaces may not provide real-time insights into students' interactions with ITS, potentially hindering timely support from teachers [10,59].

Furthermore, AI chatbots like ChatGPT offer significant potential for educators by streamlining the creation of various teaching resources, such as syllabi, lesson plans, and classroom management strategies, thereby saving considerable time [83,84]. A study conducted on English teachers using AI chatbots [85] showcased the educational potential of such technologies, revealing that AI chatbots enhance interactive communication, support personalized learning, and boost learner confidence and motivation, making them invaluable in language teaching. Moreover, a recent study investigating ChatGPT's role as a substitute teacher [83] revealed its capabilities in improving knowledge recall and reasoning skills. However, the study also highlighted challenges in student engagement and completion rates [83]. While these advancements hint at chatbots' growing role in education, they are unlikely to replace human teachers entirely [84] due to the nuanced and irreplaceable value of human interaction and empathy in teaching.

Additionally, technologies such as plagiarism detection tools and AI-powered classroom monitoring systems are gaining prominence among educators [10,86–89]. Plagiarism detection services incorporating machine learning, like Turnitin, aid teachers in maintaining academic integrity.

Despite AI's promising contributions to educators, its role should be recognized as supportive rather than substitutive, ensuring that teachers remain central to the learning process [90,91]. Many studies show that teacher replacement is one of the biggest fears when considering AI adoption [15,80,82,91–94]. Consequently, AIED adoption necessitates considering teachers' perceptions and readiness, facilitating effective implementation within higher education systems.

Studies discussing AIED from teachers' perspectives are listed in Table 2, followed by the list of contributions that discuss both student and teacher perspectives on AIED in Table 3.

Table 2. Papers that discuss AIED from instructors' perspectives.

Title	Year
Exploring the Potential of ChatGPT as a Substitute Teacher: A Case Study [83]	2024
Artificial Intelligence in Education: Next-Gen Teacher Perspectives [81]	2024
How Should We Change Teaching and Assessment in Response to Increasingly Powerful Generative Artificial Intelligence? Outcomes of the ChatGPT Teacher Survey [79]	2024
Will AI Replace Teachers? [84]	2023
The Use of Artificial Intelligence in Education (AIED): Can AI Replace the Teacher's Role? [88]	2023
Leading Teachers' Perspective on Teacher-AI on Collaboration in Education [82]	2023
Perceptions of Preservice Teachers on AI Chatbots in English Education [85]	2022
Determinants Affecting Teachers' Adoption of AI-Based Applications in EFL Context: An Analysis of Analytic Hierarchy Process [91]	2021
Focusing on Teacher Education to Introduce AI in Schools: Perspectives and Illustrative Findings [94]	2019

Table 3. Papers that discuss AIED from an instructor/ student perspective.

Title	Year
Artificial Intelligence in University Education: Systematic Review [60]	2024
Revolutionizing Education: Artificial Intelligence Empowered Learning in Higher Education [76]	2024
Systematic Literature Review on Opportunities, Challenges, and Future Research Recommendations of Artificial Intelligence in Education [89]	2023
Is Artificial Intelligence Really the Next Big Thing in Learning and Teaching in Higher Education? A Conceptual Paper [87]	2023
AIED—Coming of Age? [9]	2023
AI: New Source of Competitiveness in Higher Education [63]	2023
The AI Generation Gap: Are Gen Z Students More Interested in Adopting Generative AI such as ChatGPT in Teaching and Learning than their Gen X and Millennial Generation Teachers? [65]	2023
Stakeholder Perspectives on the Ethics of AI in Distance-Based Higher Education [67]	
Prospects and Obstacles in Using Artificial Intelligence in Saudi Arabia Higher Education Institutions—The Potential of AI-Based Learning Outcomes [20]	2023
State of the Art and Practice in AI in Education [10]	2022
Discourses of Artificial Intelligence in Higher Education: A Critical Literature Review [72]	2022
AI-Based Chatbots Adoption Model for Higher-Education Institutions: A Hybrid PLS-SEM-Neural Network [59]	2022
Artificial Intelligence and Higher Education Institutions [66]	2022

Table 3. Cont.

Title	Year
The Potential of Artificial Intelligence in Higher Education [11]	2021
Artificial Intelligence in Education: The Three Paradigms [95]	2021
AI Technologies for Education: Recent Research and Future Directions [12]	2021
Factors Affecting the Adoption of AI-Based Applications in Higher Education [43] Discussing Factors Affecting Teachers' Intention to Incorporate AI Technologies.	2021
Systematic Review of Research on Artificial Intelligence Applications in Higher Education—Where are the Educators? [56]	2019
Application Scenario of Artificial Intelligence Technology in Higher Education [73]	2019
Role of Artificial Intelligence in Higher Education—An Empirical Investigation [96]	2019

4.1.3. Other Stakeholders

In the higher education system, various stakeholders collaborate with students, engage with other educational professionals, and contribute significantly to the overall educational experience. These stakeholders include mentors, tutors, supervisors, and content or program designers. While it is true that some of these roles could be performed by faculty members themselves [97], it is important to recognize these individuals as essential supporting contributors within the educational pedagogy framework. Notably, the existing literature has not mentioned these individuals as supporting stakeholders in the higher education system [87,98,99]. Nevertheless, it is imperative to acknowledge them because their roles are inevitably influenced by the adoption of AI technologies in education. For instance, the usage of Intelligent Tutoring Systems can significantly impact the tasks and responsibilities of tutors. Studies focusing on the perspective of other stakeholders are listed in Table 4.

Table 4. Papers that discuss AIED from other stakeholder perspectives.

Title	Year
A Bibliometric Analysis of Publications on ChatGPT in Education: Research Patterns and Topics [97]	2024
Is Artificial Intelligence Really the Next Big Thing in Learning and Teaching in Higher Education? A Conceptual Paper [87]	2023
Two Decades of Artificial Intelligence in Education: Contributors, Collaborations, Research Topics, Challenges, and Future Directions [99]	2022

4.2. Managerial and Organizational Perspective

Management practices are essential for optimizing educational outcomes and efficiently utilizing resources in schools and colleges. In the management world, AI technologies not only impact the operational or managerial aspects of the higher education system but also have the potential to influence the organizational culture and decision-making processes. It can lead to a shift in the organizational culture by fostering a data-driven mindset [18,100,101]. As shown in the conceptual model (Figure 3), the stakeholders who come under this categorization are the university management, local management, and the administrative staff [102], and their roles and responsibilities will be altered in many ways by AI technologies.

According to Holmes [10] and Bates [19], AI algorithms have the capability to analyze huge volumes of data and provide administrators and decision makers with insights that are more based on facts. This is in contrast to the traditional approach of depending exclusively on intuition or previous practices. This promotes a culture of evidence-based

decision making, where data-driven insights play a central role in shaping strategies and policies [18,100].

Moreover, the use of AI technologies in managerial tasks can streamline decision-making processes, making them more efficient and effective [18,72]. For instance, AI-powered systems can automate the evaluation of financial aid applications, course planning, and scheduling, reducing the time and effort required by administrators [3,10]. This allows decision makers to focus their attention on higher-level strategic decisions and initiatives that require human expertise, creativity, and critical thinking [23].

Moreover, improving security in educational institutions, particularly at universities, remains a critical challenge. The role of AI-driven analytics software is crucial, extending beyond physical access control to enhance safety infrastructure [89]. This technology can analyze data to identify potential threats, monitor activities in real time, and predict incidents, allowing for preemptive measures. Its integration supports a safer learning environment, making it an essential component of modern security strategies in education [23,24].

On the other hand, the integration of AI technologies in decision-making processes also raises ethical considerations [10,18]. While AI algorithms provide valuable insights, it is essential to critically evaluate their recommendations and consider potential unintended consequences. Decision makers must exercise their judgment and ensure that AI-driven decisions align with ethical principles and the institution's values [19]. Ensuring transparency of AI functions within decision-making frameworks, along with providing avenues for human oversight and intervention, is essential [10,24,29]. Therefore, evaluation of the perception and readiness of managerial stakeholders within higher education institutions is essential for the cultivation of an effective and trustworthy decision-making process. The studies that discussed AIED from a managerial perspective are listed in Table 5.

Table 5. Papers that discuss AIED from a managerial perspective.

Title	Year
The Digital Frontier: AI-Enabled Transformations in Higher Education Management Indonesian Journal of Educational Research and Technology [18]	2024
Generative AI and the Future of Education: Ragnarök or Reformation? A Paradoxical Perspective From Management Educators [23]	2023
State of the Art and Practice in AI in Education [10]	2022
Artificial Intelligence Technologies in Education: Benefits, Challenges and Strategies of Implementation [100]	2021
Possibilities and Apprehensions in the Landscape of Artificial Intelligence in Education [3]	2021
Can Artificial Intelligence Transform Higher Education? [19]	2020
Artificial Intelligence in Education: A Review [29]	2020

4.3. Governmental Perspective

With the rapid expansion of AI, governments started to heavily invest in AI technologies, with approximately 90% of them worldwide making continual investments [16]. To effectively transform their services and scale digital projects, governments must react and adopt a holistic experience strategy as there is a lack of such a strategy especially in education systems [10,16,103,104].

Moreover, a systematic literature review on AI applications in higher education revealed that a considerable portion of the studies focused on AI-supported administrative and institutional services [5,56]. This highlights the vital role of AI in automating processes, facilitating citizen's communication, and optimizing resource allocation [10,56]. AI-driven features are essential for governmental bodies, such as ministries of education, as they enhance overall performance and sustainability in the education sector [16,38].

As key stakeholders, policymakers play a crucial role in enhancing higher education through the incorporation of AI technologies. Policymaking processes require the

utilization of up-to-date knowledge, relevant data, and effective data analysis [103]. AI can significantly facilitate this process by providing policymakers with analytical tools to identify patterns, predict outcomes, and make evidence-based decisions [5,12,86]. By harnessing the power of data and human interactions, AI systems can generate new knowledge and models that inform the development and evaluation of policies [5,10,105].

However, with the great potential of AI for governments, ethical and social concerns are always a matter of discussion. The literature extensively documents that while numerous scholars contribute insights into the field [10,24,38,56,104], policymakers among many educational stakeholders are under significant pressure and responsibility to formulate trustworthy and effective policies for the integration of AIED within higher education, ensuring its alignment with ethical standards and educational objectives. The studies that discuss the governmental perspective on AIED are listed in Table 6.

Table 6. Papers that discuss AIED from a governmental perspective.

Title	Year
A Comprehensive AI Policy Education Framework for University Teaching and Learning [16]	2023
Education for AI, not AI for Education: The Role of Education and Ethics in National AI Policy Strategies [5]	2022
Human-Centred Artificial Intelligence in Education: Seeing the Invisible Through the Visible [86]	2021
Trustworthy artificial intelligence (AI) in Education Promises and Challenges [104]	2020
AI in Education: Learner Choice and Fundamental Rights [105]	2020

4.4. Technological Perspective

Technological stakeholders are crucial in the current higher education system due to the rapid advancements in technology and the need for digital transformation [3,98]. Their specialized expertise in educational technology allows them to guide and support institutions in leveraging technology to enhance teaching, learning, research, and administrative processes [106]. They bring innovative tools, platforms, and systems that improve efficiency, effectiveness, and access to educational resources and services [98,106]. Technological stakeholders in this context are technology providers, technicians, trainers, and IT departments, which also contribute to preparing and training stakeholders for AI literacy programs [98].

It is worthwhile to mention that most published papers in the literature regarding AIED focused on pedagogical and managerial stakeholders rather than technological stakeholders. However, their role could be affected by AI adoption in educational settings, especially with the urgent need for an AI specialist workforce [10,14,35]. They need to adapt their skill sets to accommodate the development, implementation, and maintenance of AI systems. In addition, they must navigate ethical considerations surrounding data privacy, security, and bias mitigation. Moreover, the rapid pace of AI advancement may necessitate frequent updates and adjustments to technology infrastructure, requiring agile and responsive approaches. In the proposed model mentioned above, we added them as a considerable internal stakeholder in the current higher education system. The studies listed in Table 7 mention technological stakeholders indirectly and implicitly.

Table 7. Papers discuss AIED from a technological perspective.

Title	Year
Possibilities and Apprehensions in the Landscape of Artificial Intelligence in Education [3]	2021
Data-Driven Artificial Intelligence in Education: A Comprehensive Review [14]	2020
Connecting Stakeholders through Educational Technology for Effective and Digitalised Higher Education Environments [98]	2019

4.5. External Partners

In the context of higher education, external partners play a crucial role in enriching educational experiences, fostering research, and bolstering institutional success [25,107]. These stakeholders are the most heterogeneous group, ranging from industry partners to accrediting agencies and donors, according to Magalhães and Amaral [107], who noted that some people described these stakeholders as “imaginary friends” due to their lack of formal influence over university strategies. However, the evolving governance landscape of higher education has enhanced their role, granting them greater authority in shaping university policies, especially in the context of AI adoption [107,108].

AI has the potential to revolutionize higher education by helping universities adapt to a rapidly digitizing world. It helps in preparing students for the job market, and ensuring graduates remain competitive in the workplace. By harnessing the power of big data sources such as job postings, course catalogs, and resumes (CVs), AI can play a vital role in creating a two-sided market where employers seeking specific skills and students/graduates possessing those skills [109,110]. Through AI’s ability to identify job-specific skills and bridge any gaps between graduates and job requirements, it can prompt students and graduates to address those deficits and recommend relevant courses to acquire the necessary skills [10,110]. This continuous education and training facilitated by AI empower the student to enhance their online skills profile and navigate their professional learning journey [110].

However, implementing a digital education strategy that effectively leverages AI must also consider the challenges associated with educational system transformation. Changes brought by technology and digitalization can have significant implications for the quality of education and the outcomes achieved. If students are not adequately prepared and resources are not properly invested, the quality of graduates may suffer [25].

Another important stakeholder under this category is accrediting agencies. Their role in higher education is crucial, ensuring quality through the accreditation process [111]. AI can significantly enhance these agencies’ operations by automating data gathering, analysis, and monitoring, which helps in improving efficiency and accuracy in accreditation [111–113]. AI’s capabilities enable the identification of trends and anomalies in education quality metrics, allowing for more informed decision making and standardized assessments. Furthermore, AI assists in streamlining tasks like data analysis and reporting, enabling agencies to allocate more resources towards complex evaluative tasks and continuous quality improvement [109–111].

Additional stakeholders included in higher education systems are donors, funders, and alumni, each playing a significant role in the adoption of AI technologies within the higher education system [108,114]. Their involvement, particularly from a financial standpoint, is instrumental in supporting universities and schools to attain their educational objectives effectively. For instance, AI may transform alumni engagement through personalized communication, data-driven decision making, and predictive analytics, allowing institutions to understand alumni preferences, tailor outreach efforts, and strengthen connections [6,113,114]. This results in more effective fundraising campaigns, higher participation in alumni events, and enhanced support for institutional missions and goals.

Competitors also play a pivotal role in reshaping the higher education system, aligning it with global standards. Their impact on the adoption of AI in higher education is diverse. Competitors act as catalysts for innovation and industry evolution, inspiring others through successful AI implementations [107,109]. This competitive dynamic drives institutions to embrace AI to enhance programs, attract students, and maintain competitiveness [109].

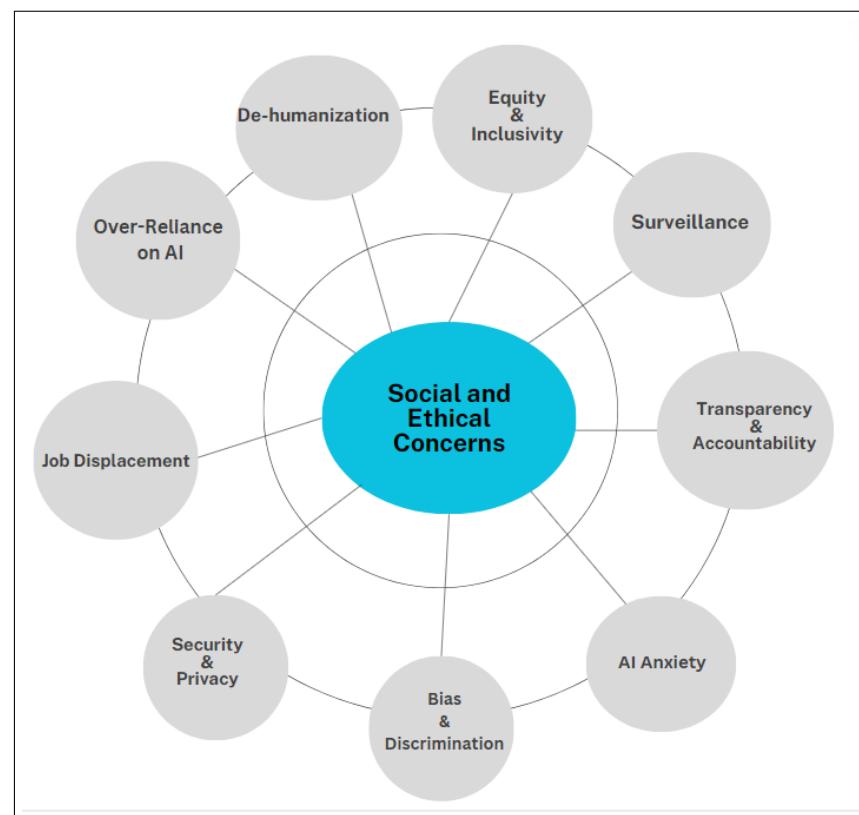
It is worth mentioning that there is a lack of literature reflecting the perception and readiness for AI adoption from external stakeholders’ perspectives. Therefore, their inclusion in discussions is crucial for future considerations in AI technology adoption strategies. The studies that discuss the external stakeholders and AIED are shown in Table 8.

Table 8. Papers that discuss AIED from an external perspective.

Title	Year
Navigating the Confluence of Artificial Intelligence and Education for Sustainable Development in the Era of Industry 4.0: Challenges, Opportunities, and Ethical Dimensions [113]	2024
The Evolution of AI-Driven Educational Systems During the COVID-19 Pandemic [6]	2021
Rethinking Education System for the Fourth Industrial Revolution [109]	2020
Drivers, Barriers and Social Considerations for AI Adoption in Business and Management [112]	2020

5. Education and Society: Towards a Further Dehumanization of Education

The rapid advancements in AI raise significant implications for society, extending beyond its passive reception of technological changes. Elon Musk, the cofounder and CEO of Tesla Motors, has famously stated that “AI is more dangerous than nuclear weapons” [115]. Additionally, the influential AI researcher known as the “Godfather of AI”, Geoffrey Hinton, left his position at Google to openly express his concerns about the potential dangers of the technology he helped create [116]. All these surrounding alarms that come from AI’s famous figures can be frightening when considering the integration of AI in various aspects of society, including education. Therefore, discussing the social and ethical implications of AIED is essential to enhance the level of social awareness. We categorized the major social and ethical concerns in Figure 4.

**Figure 4.** Common social and ethical AIED concerns.

- **Bias and discrimination.** AI-generated data may lead to unequal and discriminating decisions [8–10,24]. For instance, many papers [9,35,117] have indicated that ChatGPT’s output can sometimes exhibit political bias [35]. This extends beyond politics and can also encompass biases related to religion, race, gender, and notions of fairness [35,59]. It is crucial to recognize and address these potential sources of

bias to ensure that the information provided by AI tools is balanced and accurate for all users.

- **Security and privacy.** AI relies on huge amounts of data processing; however, misuse or unauthorized access to information raises significant concerns regarding the privacy and security of students and other educational stakeholders [23,24,29,35]. Data protection is essential for maintaining institutional trust and ensuring that the integration of AI technologies into educational environments does not compromise ethical standards or privacy expectations.
- **Job displacement.** Concerns are growing over the potential for AI to lead to job displacement and diminish employment prospects for educators [38,118]. These worries come from the risk that AI technologies might automate roles traditionally held by educators, potentially leading to a significant shift in employment dynamics within the education sector [119,120]. Ensuring that the deployment of AI in education is aligned with human values and does not exacerbate social inequities becomes paramount in addressing these concerns, emphasizing the need for careful consideration of how AI impacts job security and the teaching profession.
- **Transparency and Accountability.** In the context of AI in education, transparency and accountability emerge as pivotal concerns [121,122]. Transparency ensures AI operations and outputs, like those from ChatGPT, are clear and reliable [121]. Accountability holds AI developers and users responsible for ethical use, emphasizing mechanisms to correct or prevent misinformation to uphold academic integrity [35,121]. These concerns are intertwined, as the generation of inaccurate information by AI tools not only tests trust in technology but also highlights the need for clear responsibility and corrective measures to ensure AI's beneficial use in education.
- **Equity and Inclusivity.** Despite the potential benefits that AIED offers more accessible learning opportunities, a strong concern emerged that AI could also amplify existing biases, disadvantaging certain groups [118,119]. To navigate this, AI tools must be implemented with care and an ethical framework, aimed at fostering inclusive learning environments [123]. Ensuring that AI's impact is uniformly positive and equitable across different student groups is imperative for its successful integration into higher education.
- **Dehumanization.** Loss of human interaction in the educational environment is a concern that affects the student's emotional and social development [120,124,125]. It is vital to maintain a focus on fostering human connections and empathy among educational stakeholders. The importance of interpersonal relationships in the educational process highlights the necessity for a human-in-the-loop methodology, where AI supports educators but does not replace them [118,125,126]. It is essential to ensure that AI technology enhances rather than diminishes the inherently human aspects of learning and teaching.
- **Surveillance.** Continuous monitoring of student behaviors through AI can create an atmosphere of mistrust and potentially hinder academic freedom [38,127]. Shifting the education system to a surveillance culture can detract from the learning experience, making education feel more like a high-stakes monitoring environment rather than a space for exploration and growth [59,128]. To prevent these problems, educational institutions should focus on using AI ethically, protect people's data, and talk openly about its role and effect.
- **Over-reliance on AI.** While AI can streamline tasks, there is a worry that over-reliance on technology could negatively affect interactions between educators and students. This could hinder the development of crucial skills like critical thinking and creativity [8,20]. As thoroughly discussed in the literature, AIED presents new opportunities for teaching, learning, and assessment, but it is essential to remember that education is primarily a human-centered activity, not a technology-centric solution [90]. Such over-reliance could block the nurturing of vital cognitive abilities

and innovation. It is imperative to navigate this concern thoughtfully to ensure AI's role in education is to enhance rather than reduce student intellectual development.

- **AI Anxiety.** The concerns surrounding the evolution of AI technologies, especially within the educational sector, stem from worries over job displacement and the fear of unpredictable outcomes [42]. AI anxiety is not just a passing concern but a substantial challenge that educators and policymakers must confront. The fear that AI could automate roles traditionally filled by educators and administrative staff raises questions about future employment prospects and the changing nature of work [10,42]. Therefore, a strategy that is as innovative as it is empathetic is required to harness AI's potential and ensure a future where technology and humanity sail in unison toward new horizons of learning [42].

It is important to mention that these concerns impact not only students but also higher education institutions and their other stakeholders. More studies are needed to discuss the impact of AI in the higher education context. Unaddressed biases could undermine an institution's reputation and contribute to societal inequalities. Ensuring privacy, security, and quality of education is crucial for overall educational integrity and credibility. Studies that discuss AIED from a social perspective are listed in Table 9.

Table 9. Papers that discuss AIED from a social perspective.

Title	Year
The Ethical Implications of Using Generative Chatbots in Higher Education [117]	2024
Shaping New Norms for AI [118].	2024
Evaluating the Social Impact of Generative AI Systems in Systems and Society [38]	2023
Influence of Artificial Intelligence in Education on Adolescents' Social Adaptability: The Mediatory Role of Social Support [119]	2023
The Social life of AI in Education [129]	2023
Open AI in Education, the Responsible and Ethical Use of ChatGPT Towards Lifelong Learning [130]	2023
A Systematic Review on Artificial Intelligence in Education (AIE) with a focus on Ethics and Ethical Constraints [59]	2022
Evaluating Artificial Intelligence in Education for the Next Generation [123].	2021
Artificial Intelligence and Its Implications in Higher Education [120].	2019

6. Discussion

Over the past three decades, AI has engaged in ongoing discussions about its potential applications in academia. More recently the discussion has increased its intensity and specialty after the release of ChatGPT. Indeed, the availability of generative AI as a ready-to-use tool has generated mixed perceptions among educational stakeholders. Some of them perceive it as a progressive step towards the future of education and research [24,35,72], while others express alarming concerns about potential risks and negative impact on educational quality and performance [9,10,19]. Therefore, in this crucial step, it is important to discuss the different perceptions and carefully assess possible social impact.

As thoroughly discussed in the literature [8,10,24,70], AI-powered tools offer transformative opportunities across various aspects of education. For the aspect of learning, AI boosts individualized experiences through adjustments to student needs, preferences, and learning pace [16]. In the teaching process, AI provides educators with information that is going to be useful with performance and the signs of engagement of the students to make the instructions that can meet learners' needs [131]. AI also may provide innovations in the form of assessments, which could be more adaptive for better testing to check understanding and skills at the student level [132].

However, alongside the potential benefits, there are significant concerns regarding the integration of AI into educational practices. One major fear is the potential for AI to undermine the development of critical thinking and problem-solving skills [104]. If students rely too heavily on AI technology for answers and solutions, it may devalue the real purpose of education. Accordingly, there is a clear need for more engaging and diverse ways to assess and evaluate students, especially after the emergence of generative AI tools. Many institutions are reconsidering the benefits of traditional assessments like oral exams and pen-and-paper tests [133,134]. These methods require students to actively participate, fostering critical thinking and personal expression more than written tasks that could be simply generated by AI. This shift toward traditional and varied assessment forms including in-class activities, presentations, and projects aims to deeply engage students and appreciate their unique voices. Additionally, as suggested by Rudolph and others [133], adding peer evaluations and the “teach-back” method into the education process promotes a learning environment where all student’s talents are recognized and developed, away from the shadow of AI-generated content.

Consequently, there is a pressing need for more comprehensive discussions on the deployment and implications of AI in higher education settings. As mentioned in a recent systematic literature review [70], more research and discussion on AIED is needed, and they should not only address the technological and pedagogical aspects but also deeply consider the ethical, legal, and social dimensions of AI use. Engaging faculty, students, administrators, policymakers, and the broader community in these discussions can ensure that the deployment of AI technologies aligns with educational values and goals, including equity, inclusivity, and academic integrity [8,70]. Such dialogues can also explore how AI can be used to enhance personalized learning, support academic research, and improve administrative processes, while safeguarding against potential pitfalls like data privacy breaches, bias amplification, and the erosion of the human elements of education.

Therefore, adopting a sociotechnical approach to AI integration is essential for leveraging its potential benefits responsibly. Furthermore, it will help to design strategies that mitigate possible risks in AI tools.

6.1. Identified Gaps

As we navigate the transformative potentials and challenges of AI in education, it becomes significant to address key gaps that have emerged in this discourse. The identified gaps in the literature are summarized in Table 10.

Table 10. Summary of major research gaps.

Research Gap	Reference
G1 Limited Understanding of AI Applications.	[10,18,29,42,90,135]
G2 Insufficient Empirical Assessment.	[3,12,23,59]
G3 Unclear Ethical Implications.	[12,14,29,136]
G4 Lack of Comprehensive Ethical Frameworks.	[5,10,56,59,70]
G5 Difficulty in Assessing AI Readiness.	[8,17]
G6 Insufficient Theories and Models.	[8,12,35,56]
G7 Contradictory Predictions on Collateral Effects.	[3,137]
G8 Need for a Sociotechnical Perspective.	[74,138,139]
G9 Industry–Academia Collaboration Gap.	[12,13]

The education system’s response depends not only on AI itself but also on how it is perceived [72]. A stakeholder-centric approach allows a more comprehensive understanding. However, the majority of papers in the literature focus on students and teachers. Perceptions of other stakeholders, such as nonacademic staff, policymakers, industry part-

ners, and accrediting agencies, are not always properly investigated. Bridging such a gap may contribute to a more successful implementation.

Bates, Kabudi, and Holme [10,19,140] mentioned the need for empirical studies in real settings to meet educational needs and goals. Furthermore, a recent literature review [140] pointed out a big gap between AI potential and its adoption in education. A recent empirical study conducted by A.W. Ou and others [75] about the usage of AI tools in language learning showed a high level of student engagement in such technology. The findings of this study have provided a piece of empirical evidence on how students utilize AI tools not only as a language aid but also as pedagogical agents by providing them with required guidance and suggestions for academic writing. However, this study focuses only on students' perception as the main stakeholders in the education system, while there are other stakeholders that need to be empirically assessed. This is in the context of perception not always being balanced.

The work in [8,12] highlighted a lack of specific educational perspectives. This gap is especially concerning, as it probably reflects an approach potentially unconnected to pedagogical theories and models [141]. AIED is still a largely experimental context, with a relatively limited level of integration. Consequently, there is a need for more contextual analysis to align potentialities with educational goals and pedagogical principles.

Furthermore, the increasing use of AI in education has raised significant ethical and social concerns. Bates [19] reiterates the importance of a more sociotechnical approach, and Bond [70] emphasizes ethical and social implications in higher education. Accordingly, efforts to navigate these challenges are essential for realizing the full potential of AI in higher education.

The UNESCO guide [142] on AI in higher education addresses the transformative potential of ChatGPT and AI technologies for enhancing teaching, learning, research, administration, and community engagement within higher education institutions. It provided a possible mainstream to better deal with ethical and social aspects, academic integrity, accessibility, and strategic adaptation to effectively leverage AI. It also calls for response strategies to the constant advancement of AI, emphasizing the need for more research and a consequently informed approach to harness the potential of AI in the educational system.

Therefore, generating policies and guidelines that govern the use of AI in educational settings is essential. At this time, there is neither a general agreement nor a governing authority that can effectively assess the social impact of any AI system [38]. In this time of fast-paced change, where social changes are just as important as technological ones, universities need to set strong policies and a consequent research agenda that includes AI in a strictly sociotechnological meaning. Bearman and Zhang [12,72] mentioned a critical and urgent demand for collaborative efforts from all stakeholders to establish ethical frameworks.

In addition, the lack of clear predictions about AI's impact on job opportunities in education highlights a need for a deeper understanding to ensure its use doesn't unfairly affect employment. On one hand, the predictions around reducing employment rates have been thoroughly discussed as a major concern. [10,12]. In contrast, as stated in Gartner's report [137], AI could generate more job opportunities than it eliminates. Therefore, considering these contradictory predictions is crucial to understanding the factual concerns around AI's impact on employment, ensuring that it is aligned with human values and does not lead to social inequities [139].

Moreover, the gap in research on the synergy between academia and industry in AI adoption reveals a disconnect in aligning educational outcomes with workforce needs [12,13]. This highlights the necessity for more studies that examine how these sectors can collaboratively ensure that skills taught in educational institutions meet the evolving demands of the job market.

Another gap in the literature highlights an urgent call for frameworks that encompass both the technical efficiency and the ethical dimensions of AI in education [74,138]. By emphasizing a more sociotechnical perspective, AI-based systems may not only be advanced educational solutions but also protected against negative consequences that

could undermine societal values and human dignity [139]. This approach demands a collaborative effort across disciplines to ensure that AI serves as a tool for empowerment and inclusivity, rather than a source of ethical dilemmas and social disparities in the higher education landscape.

Lastly, assessing the readiness of educational institutions for AI integration highlights a crucial gap in the literature [8,17]. This gap not only affects the strategic planning and resource allocation necessary for AI adoption but also the broader capability of institutions to adapt to technological advancements. Enhancing readiness evaluation methods is essential for ensuring that educational entities are fully prepared to leverage AI's potential, fostering a more seamless and successful integration of AI into educational practices.

In the next subsections, we propose an overview of the review results with a statistical focus and a summary of the major identified related challenges of AIED.

6.2. Challenges of AIED

In the rapidly evolving domain of educational technology, AI stands out with its transformative potential to redefine the paradigms of the educational system. The AI market, especially in education, is expected to keep growing on a global scale [143]. Therefore, it is crucial to discuss the associated challenges of AI adoption.

The transition towards AI-enhanced education requires careful planning and collaboration across sectors to ensure that technological advancements serve to support and enrich the educational experience, rather than diminishing the essential role of human elements of teaching and learning. Such technology comes with complexities that necessitate a strategic approach to its adoption. Beyond the fascination of AI capabilities, many challenges should be considered for a flexible and effective implementation, which include the following:

- *Cost and Scalability.* AI technologies need significant investments in infrastructure and ongoing costs pose a problem, especially for financially constrained institutions [10,143]. This issue not only limits access to advanced educational tools but could also widen the educational gap globally. Wealthier nations can provide personalized learning through AI, whereas poorer countries might lag behind [142,143]. This disparity risks creating a divided education system where AI benefits are not shared equally, exacerbating educational inequalities worldwide [10,143].
- *Lack of Actionable Guidelines.* The absence of clear guidelines for integrating AI in education leaves educators without a straightforward strategy for its ethical and effective use in pedagogy [15,70,143]. This situation causes difficulty in the selection and integration of the right and ethical AI tools. A collective initiative is essential to create updated, comprehensive guidelines that enable the responsible incorporation of AI into educational frameworks [15,70,143].
- *Limited AI Expertise.* The deficiency in AI expertise spans across the entire educational ecosystem, affecting not just educators but all stakeholders within higher education. This widespread gap in knowledge and proficiency hinders the effective integration and utilization of AI technologies across teaching, learning, and administrative processes [8,35,143]. Educators, as a prime example, face significant challenges in embedding AI tools into their curricula and teaching methodologies, highlighting the urgency for broader training and resources. Addressing this comprehensive need for AI literacy and skills development is crucial for leveraging AI's potential to innovate and enhance the higher education experience for all stakeholders involved.
- *Data Governance.* In an AI-powered education, employing a strong data governance framework is challenging. It involves the careful management of data rules, maintaining high data quality, setting clear access guidelines, and monitoring the data's entire lifecycle [10,56]. This approach is key to protecting data's integrity and making them useful, helping to use AI effectively in education.

6.3. Current Limitations and Future Direction

Due to the diverse scope of AI technology discussions in educational settings, our review faces several limitations that can be summarized as follows:

- The review is limited by the lack of exhaustiveness in the exploration of AI's impact on higher education from a social perspective.
- There is a lack of a holistic view in current studies, which hinders the understanding of AI's multifaceted effects on higher education systems.
- AI's impact on academic research within higher education institutions has not been explicitly addressed, leaving a limitation in this review.
- Keeping pace with the constantly evolving nature of AI technology was a challenge, making it difficult to comprehensively assess its implications in higher educational settings.
- Due to the lack of clarity in the literature regarding ethical frameworks, the investigation into current ethical practices in the use of AI within higher education was complicated.

Future studies should focus on a more exhaustive and holistic scope with respect to the implications of AI. In addition, paying more attention to AI's impact on academic research could be a significant future contribution within the higher educational context. Additionally, the urgent need to develop a standardized ethical framework must be a future direction, which can assist institutions with the complexity of AI integration.

7. Conclusions

AI holds great potential for revolutionizing the higher education system. However, it is essential to approach its integration together with a clear understanding of its social implications. In this paper, we look at higher education as a system and comprehensively examine major recent contributions from multiple perspectives, looking at the main stakeholders. The findings highlight the need for expansive studies that exceed the traditional focus on teachers and students, encompassing other stakeholders. Consequently, the system should be analyzed as a whole to shape its future in order to ensure that it aligns with social and academic values, needs, and concerns. Additionally, understanding the perceptions of the different stakeholders may contribute to further assessing social readiness.

The ethical and social landscape of AIED requires clearer guidelines to ensure a safe and trustworthy adoption. Accordingly, a holistic sociotechnical perspective is crucial to developing AI systems aligned with both technical and ethical considerations. Undertaking research to confront these gaps will enable informed policies and practices that facilitate the responsible and effective integration of AI in higher education.

Despite its holistic character, the major limitation of this work is the lack of consideration for scientific research, which is one of the key concepts in higher education. It could be the object of future work.

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