

An Analysis of Integration of Artificial Intelligence in Higher Studies

Revista Review Index Journal of
Multidisciplinary | e-ISSN: 2583-0031
Double-blind peer-reviewed | Refereed
Quarterly Online Journal
4(1) 44-54, 2024
©The Author(s) 2024
DOI: 10.31305/rrijm2024.v04.n01.006
<https://rrijm.com/>



Date of Publication: 31 Mar, 2024

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Abstract: Artificial intelligence (AI) technologies are changing teaching, learning, administrative procedures, and student support services as they are progressively incorporated into different parts of the higher education ecosystem (Ocaña-Fernández, Valenzuela-Fernández, & Garro-Aburto, 2019). By boosting research efforts, expanding teaching and learning opportunities, increasing administrative effectiveness, and encouraging inclusion and accessibility, AI is revolutionizing higher education. (Saaida, 2023). To optimize AI's potential benefits for students, teachers, and the larger academic community, higher education institutions must welcome innovation, adjust to technological changes, and assure ethical and responsible usage of AI (Guan, Mou, & Jiang, 2020). So, this paper tries to analyse the historical development of AI and its' role in developing the whole teaching learning process of higher education with the help of exhaustive literature review a qualitative approach of research.

Keywords: Artificial Intelligence, AI, Integration, Higher Education, Innovation, Transformation

1 | INTRODUCTION

Artificial Intelligence (AI) is being incorporated into more and more aspects of our lives in a time of fast technological growth (YuShen, Miao, Leung, Lesser & Yang, 2018). From enhancing productivity in industries to revolutionizing healthcare and transportation, AI's impact is profound and far-reaching. However, its potential to shape the future extends beyond professional realms; it holds immense promise in transforming education, particularly among students. This study investigates the development and adoption of AI for the purpose of education by students and their institutions in higher studies.

As digital natives, today's students are inherently comfortable with technology. Incorporating AI education into their learning experiences not only aligns with their digital fluency but also equips them with essential skills for navigating an AI-driven world. By fostering a deeper understanding of AI

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concepts, students can harness its power to solve complex problems, innovate, and drive societal progress. Moreover, embracing AI education cultivates critical thinking, creativity, and adaptability skills indispensable for thriving in an ever-evolving job market (Aithal & Maiya, 2023). By immersing students in AI-related projects and activities, educators can nurture their curiosity and instill a growth mindset, preparing them to tackle future challenges with confidence.

Despite its transformative potential, the adoption of AI education among students is not without hurdles. Issues such as access to resources, teacher preparedness, and ethical considerations must be addressed to ensure equitable participation and responsible AI usage. Moreover, as AI continues to evolve, educational institutions must adapt their curricula and teaching methodologies to stay relevant and effective. The use of AI in higher education is a paradigm shift in how we approach teaching and learning, not just a passing fad. AI has the power to transform education and better equip students for the challenges of the future. It can analyze enormous volumes of data, tailor learning experiences, and help with complex problem-solving.

Taking these factors into account, the goal of a research project had been identified to investigate the various aspects of incorporating AI into higher education, with a particular emphasis on student uptake (Chan, 2023). This study tries to offer important insights that can guide educational policies, instructional tactics, and technical implementations by exploring the advantages, difficulties, and ethical issues related to the integration of AI technologies. We can create a future where AI is a tool for creativity, inclusivity, and sustainable development by encouraging students to have a culture of AI literacy and empowerment.

AI is automating tasks in the knowledge economy, which is changing industries and society as a whole. Artificial Intelligence is upending and changing a number of conventional professions, from the advancement of health to writing and editing. AI's influence in the ed-tech sector is growing. According to a Business Today survey, by 2024, 47% of learning management products will include AI capabilities. This is a result of AI-powered technologies being widely adopted, which make creative and efficient learning solutions possible. It has been found in the studies that AI is changing education in India and other areas of the world, which is changing how recruiters, career counselors, educators, and students live and study. It is revolutionizing higher education in India, particularly in the form of adaptive learning systems that are individualized to meet the individual needs of each student. AI is increasing accessibility and inclusivity, which is tearing down obstacles to education and can offer specialized assistance, such as text-to-speech, speech-to-text, and adaptive content, to students with disabilities (Chhillar & Aguilera, 2022). This guarantees that a greater variety of students, irrespective of their physical or cognitive capacities, have access to higher education.

A study found to explore the complex environment of AI integration in higher education, looking at the potential, difficulties, and moral issues that come with this paradigm change (Singh, 2023). This study intends to provide educators, policymakers, and stakeholders involved in influencing the future of learning with essential insights by clarifying the current level of AI application in academia and projecting its future trajectory. But there are obstacles and moral issues associated with integrating AI in education. Data privacy, algorithmic bias, and the depersonalization of learning are just a few of the issues that highlight the necessity for careful consideration, legislation, and moral standards to guarantee that AI technologies be applied fairly and ethically. Furthermore, the digital divide makes already-existing gaps in access to opportunities and resources made possible by AI worse, which raises concerns about social justice, equity, and access in the context of AI-driven education.

In light of this, a study found to investigate the complex ramifications of AI integration in education, looking at the potential, difficulties, and moral dilemmas that come with this technological transformation (Singh, 2023). The purpose of this study is to enlighten stakeholders, educators, and

policymakers about the transformative potential of AI and its implications for the future of learning by clarifying the current level of AI adoption in educational settings and projecting its future path. Hence, we can leverage the revolutionary power of AI to create a more egalitarian, accessible, and learner-centric educational ecosystem for future generations by adopting a human-centered strategy that places a high value on cooperation, inclusivity, and ethical stewardship.

2 | OBJECTIVE

Two-fold objectives of this study are -

1. To explore the historical development of AI in higher studies.
2. To identify the role of AI in developing the whole philosophy of learning process in higher studies.

3 | RESEARCH QUESTION

RQ1: How AI has been evolved in higher studies?

RQ2: What is the role of AI in developing the whole teaching learning process of higher studies?

4 | METHODOLOGY

For analysing the objective of this study an exhaustive literature review has been taken in to consideration. The whole review of literature has been done exhaustively by following the *Laplume et al.'s* (2008) paper selection approach, using the *Harzing's* (2011) journal quality list to select journal papers by observing its impact factors (Srivastava, Gupta, Singh, & Srivastava, 2017).

5 | ANALYSIS AND INTERPRETATION

Analysis - 1

RQ1: How AI has been evolved in higher studies?

Evolution of AI in Higher studies -

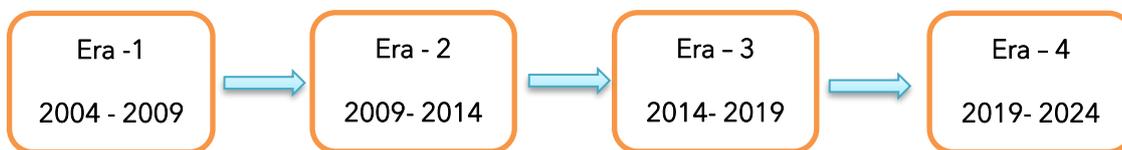
Four major research paradigm shifts have been recognized in accordance with the evolving role of AI technology in education, according to a study that explores the history of research evolution in the field of AI technology in education. The popularity of remote learning led to a rise in research outputs in the areas of online education design and implementation in schools between 2000 and 2009. Under this line of inquiry, virtual reality (VR) surfaced as a subtheme as a tool for bringing lifelike experiences into the classroom (Guan, Mou, & Jiang 2020). According to a study, two parallel lines of inquiry must be pursued in order to have an impact on education within the next twenty five years (Roll, & Wylie 2016). One is an evolutionary process that emphasizes incorporating new technologies and domains, working with instructors, and emphasizing current classroom methods and other is a novel approach in which we make the case for integrating our technologies into students' daily lives in order to assist their communities, aspirations, cultures, and practices. A research gives an idea that educators and decision-makers are the root of the history of artificial intelligence in education (Pham & Sampson 2022) and to close the gap between artificial intelligence and education, research and development in teacher preparation and the philosophy of technology in education are desperately needed. An intriguing model that has significantly aided in the advancement of AI in higher education was discovered during review of the literature. The Technology Acceptance Model (TAM) is a well-known model.

Technology Acceptance Model (TAM) -

It was discovered in a study that examined how users accepted information technology, particularly when it incorporated artificial intelligence (AI), as well as how valuable and simple it seemed to them (Davis, 1989). The whole study has discussed the seminal work on TAM, which has been widely used to study technology adoption, including AI, among various groups, including students.

A unified perspective on user acceptance of IT is covered in a different study (Venkatesh, et al. 2003). In addition to identifying new aspects including social impact and enabling environments that affect technology adoption, this study extended the TAM. In a study that focuses on factors influencing AI adoption specifically in educational contexts, the technology acceptance model was used to predict factors affecting the adoption of artificial intelligence in education. The study highlighted the significance of perceived usefulness and ease of use in this regard. (Alshurideh, et al. 2020). A study has examined TAM for work-related tasks utilizing e-learning, and it used TAM as a foundation for speculating about the implications of these factors on the use of e-learning (Masrom 2007). The whole study was based on three purposes. Initially, this study could assist in determining whether users or learners would prefer to adopt e-learning or the other way around. Secondly, this research will contribute to the identification of the key variables that account for the intention to engage in e-learning. An attempt is made to determine the relationship between the adoption of e-learning and attitudes such as perceived utility and simplicity of use. And third, this is one of the first studies to apply the technological acceptance model to e-learning. A modified TAM model, comprising six constructs—instructor characteristics, computer self-efficacy, course design, perceived utility, perceived ease of use, and intention to use—was used in a study to examine students' acceptance of e-learning in higher education (Ibrahim, Leng, Yusoff, Samy, Masrom & Rizman, 2017). According to a study, TAM and all of its variations constitute a reliable model for supporting the evaluation of various learning systems (Granić, & Marangunić, 2019). Perceived utility and simplicity of use, two of TAM's primary criteria, have been shown to be antecedent factors influencing adoption of technology-assisted learning. A study's goal is to paint a picture of the university's effective e-learning deployment based on user acceptability. The degree of future technological utilization can be predicted by user acceptability (Napitupulu, Simarmata, Abdillah, Setiawan, Ahmar, Rahim & Erliana, 2017).

Eras of Development of different forms of AI Tools -



Eras of Development of different forms of AI Tools (Source - Scholar)

In the process of development of AI our critical analysis has observed the development of AI tools from year 2004. The story of development tells that initially Evernote, Google Scholar and Copyscape came in 2004 then Zotero in 2006, Mendeley in 2007, Grammarly and Wolfram Alpha in 2009, Duolingo in 2011, Socratic, Notion, Canva and Cognii in 2013, TutorAI, Gradescope, Stepwise Math and Squirrel AI in 2014, OpenAI in 2015, Otter.ai 2016, QuillBot 2017. Now the years 2022 and 2023 has also marked their presence in the phase of development of AI tools like Perplexity and Krutrim AI respectively.

In our critical analysis we found the trend that five AI tools majorly focused on that ai tools which are trend in students or they have many online users. So, on the basis of research and AI tools finding there are four tools that focused more on students in higher education.

Development of AI Tools in Different Era -

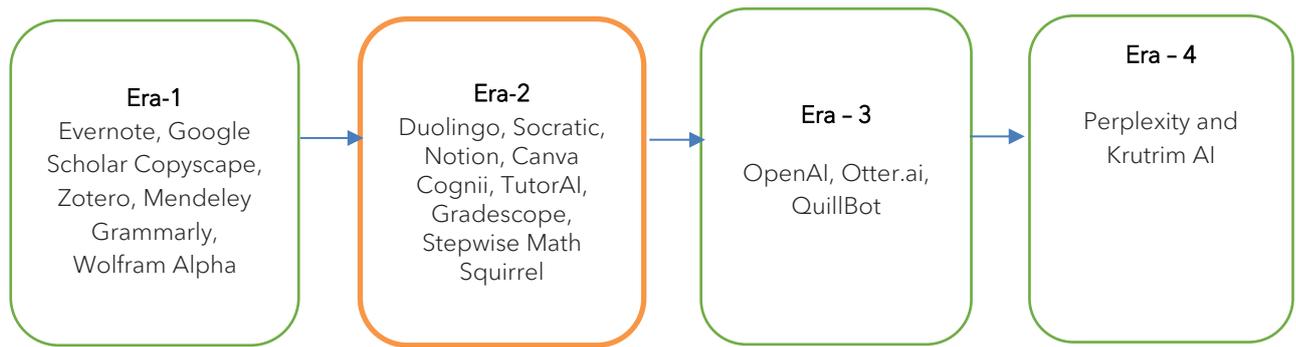


Fig.2 AI in Different Era
(Source - Author)

Evernote to Krutrim AI -

Our critical tells that Max Lytvyn, Alex Shevchenko, and Dmytro Lider founded Grammarly in 2009 and began its development. Their mission was to improve people's writing and communication skills. A group of academics, scientists, and businesspeople launched SimilarOpen Ai and ChatGPT in 2015 and 2022, respectively; some of the more well-known founders are Sam Altman, Greg Brockman, Peter Thiel, and Elon Musk. Mr. Andy Konwinski, Denis Yarats, Johnny Ho, and Aravind Srinivas established Perplexity AI in 2022. Srinivas is the CEO of Perplexity and was previously employed at OpenAI. Mr. Bhavish Aggarwal, an Indian entrepreneur, and Krishnamurthy Venugopala launched Krutrim Ai in 2023.

Alhaboby et al. (2021) conducted a study aimed at comprehending the perspectives of students regarding artificial intelligence and its utilization in higher education. A study that looked at how students felt about artificial intelligence in higher education highlighted the importance of user-centered design and assistance. It has also examined how AI use in higher education has been introduced. It has been discovered that in recent years, the use of artificial intelligence (AI) technology in higher education has increased. Artificial Intelligence (AI) presents exciting potential to revolutionize a number of higher education-related areas as academic institutions look for new and creative ways to improve teaching and learning. According to a study, ChatGPT increased motivation and prompted more questions while enhancing group involvement and collaboration during process-driven problem-based learning (PDPBL) (Hamid, Zulkifli, Naimat, Yacob, & Ng 2023). However, several students had trouble comprehending the material provided by ChatGPT and questioned its validity. Despite these challenges, most students saw ChatGPT's potential to eventually replace traditional information-seeking methods. Although the study's findings indicate that AI is generally well-received, there is cause for concern regarding the technology's quick development and its effects on humanity. A study tells more knowledge about AI advancements, in particular, has a big impact on people's opinions of the technology's effects on people and society, both positively and negatively (Jeffrey, 2020).

Researches on Different AI Tools in different Eras -

ERA - 1 (2004 - 2009)

According to a study, Evernote assists colleagues in the classroom with preparation for presentations and demonstrations (Korzaan & Lawrence, 2016) and The Evernote AI tool's contribution to the advancement of the entire teaching and learning process has been assessed in this study. A study looked at how students perceived using Grammarly and how teachers responded to their writing. It also aimed to determine whether the students' perceptions are influenced by their level of English ability. The students' degree of English proficiency had no bearing on how they perceived using Grammarly or responding to teacher criticism. Both high and low English proficiency students responded favorably to

teacher comments and the use of Grammarly Cahyono and Fahmi, 2021). The purpose of the study was to find out how the students felt about using Grammarly to write their undergraduate theses. According to this study, students responded favorably to using Grammarly to help them review and edit their thesis writing. The study's conclusions demonstrated the Grammarly application's many advantages, including its helpful function, time-saving feedback for students when they check their grammar, and clarity. However, Grammarly has several drawbacks, including the inability to identify the tenses that students have used, the inability for students to receive feedback in the form of a file, and the cost of accessing all of Grammarly's premium capabilities (Fitria, Sabarun, & Miftah, 2022).

ERA - 2 (2010 - 2015)

According to a study, "Canva for Education" significantly enhanced students' ability to write procedure texts (Widodo, Yappi and Fauziyah, 2023; Yundayani, Susilawati, & Chairunnisa, 2019). The way that students perceived the usage of "Canva for Education" in the writing process text had a number of positive effects on their ability to write, and they were excited about using the platform to study. The purpose of the study is to find out how Canva affects students' writing abilities. The findings demonstrated that, in comparison to the control group, students in the experimental group made a considerably smaller amount of writing errors, supporting Canva's beneficial impact on students' writing abilities.

ERA - 3 (2016 - 2020)

The purpose of a study was to evaluate students' ability to use Quillbot to write creative, error-free scientific papers in English ((Nurmayanti & Suryadi, 2023). This study was conducted in three phases, which were planned, carried out in order, and evaluated (using student surveys). The purpose of this experiment was to see if utilizing Quillbot would reduce the amount of plagiarism that students did. Nevertheless, students should review the tool to make sure that the referenced articles' meaning is consistent. Based on survey results supplied through Google Forms, students found the software beneficial for paraphrasing material without altering its content. According to a survey, students who use AI-powered writing tools like Quillbot, especially for academic writing, report producing essays of a high caliber (Kurniati & Fithriani, 2022).

ERA - 4 (2020 - 2023)

A study explores the effects of AI chatbots, with a particular focus on OpenAI's ChatGPT, on Higher Education Institutions (Hesham, Dempere, Modugu and Ramasamy, 2023). With the rapid advancement of AI, this study investigates how AI chatbots affect Higher Education Institutions (HEIs). An investigation aims to predict the future effects of ChatGPT and related technologies on scholarly inquiry, academic assistance, and pedagogy, highlighting both the advantages and disadvantages of these tools (Aithal, & Aithal, 2023). This research aims to educate educators, institutions, and researchers about the transformative opportunities and ethical considerations associated with the integration of AI-driven chatbots and language models in higher education and research settings by analyzing current implementations and projecting future possibilities. An examination of ChatGPT looks into its history, operation, and effects on many academic disciplines (Kalla, & Smith, 2023). It looks into ChatGPT's capabilities and limits in addition to its benefits and drawbacks. Along with its possible uses for researchers and scholars, it also covers ChatGPT's effects on jobs, cyber security, customer service, software development, and academia.

It has been observed in the report of Mr. Aryaman Gupta of Business Standard dated Mar 29 2024 that, Krutrim is investing heavily in the proper training of its models, using factual and relevant data sets to mitigate inaccuracies and more than ten Indian languages are presently supported by Krutrim, including English, Hindi, Tamil, Bengali, Marathi, Kannada, Gujarati, and Hinglish. (<https://www.business-standard.com>).

RQ2: What is the role of AI in developing the whole teaching learning process of higher studies?

For the purpose of analysing this objective we have found the three major factors which are really responsible for the holistic development of the whole teaching and learning process of higher education which are as follows -

- Factor - 1 Student and Student Community
- Factor - 2 Teacher and Teaching Community
- Factor - 3 Higher Education Institutions

So, in this part of analysis we have analyzed the role of AI in the development of all factors of higher education one by one in the following manner -

Analysis of Factor - 1**Role of AI in the Development of Student and Student Community**

This study examines students' perceptions of AI technologies in educational settings, including their attitudes towards AI-driven learning platforms and their expectations for AI integration in higher education. It also highlights how students enrolled in full-time business management programs perceive the use of AI in business schools (Kumar & Raman, 2022).

According to a study's findings, students are willing to continue their studies in AI despite having little training and inadequate understanding of the subject (Almaraz-López, Almaraz-Menéndez & López-Esteban, 2023). The findings of this study support the idea that AI education should be enhanced and expanded, particularly by highlighting practical applications and the true limitations of the technology, to enable students to utilize AI responsibly and with confidence in the workplace. According to a survey, students who took part in the study had favorable opinions about the usage of AI technology in writing classes (Sumakul, Hamied & Sukyadi, 2022). They said that the AI they were using could guide them through the writing process, help them comprehend the theoretical ideas, and teach them the language and syntax they would need for their work and indicates that students may benefit from AI technology given these favorable perceptions.

Analysis of Factor - 2**Role of AI in the Advancement of Teachers and Teaching Community**

A study is to trace the uses of AI applications and analyse the perception of teachers towards the AI applications in education sector. The study also shows that Artificial Intelligence applications help teachers in saving their time and energy facilitating skill development and innovative teaching and learning. The review indicates that modern technology on teaching could be embraced to enhance knowledge in this present competitive world. Because of the swift rise in its application, educators and students must possess a fundamental grasp of AI and the data it uses in order to interact with it constructively, critically, and to the fullest extent possible. (Sheeba, 2022). According to a study, educators and learners alike require a deeper comprehension of the ways in which the use of AI might enhance their individual capacities for instruction and learning (Sangapu, 2018). It also found that making the best use of this technology could result in improved outcomes. The majority of participants said that using robots to teach instead of humans could only worsen the current educational system and that artificial intelligence (AI) should only supplement traditional instruction in a few select cases. Compared to students, teachers are more able to adjust to the advances in technology. In addition to identifying the dimensions of AI applications and exploring factors influencing the adoption of AI in higher education processes, this study looks into the role of AI in higher education in Indian universities and creates a framework for stakeholders in the higher education sector to adopt AI applications. A research can help with understanding the possible advantages and difficulties of integrating AI in

education, as well as serve as a guide for strategic planning and decision-making linked to this integration. (Sharma, Singh, Sharma, & Kapoor, 2024).

Analysis of Factor - 3

Role of AI in the Development of HEI

A study discusses important topics, such as research bases' positions on AI and ML in higher education and their best practices for utilizing students' expertise (Kuleto, Ilić, Dumangiu, Ranković, Martins, Păun, & Mihoreanu, 2021). Regression analysis was the final method used to assess the outcomes. The findings showed that AI and ML are crucial technologies that improve learning, mostly through the abilities of students, cooperative learning in higher education institutions, and easily accessible research environments. A study looks at teachers' perspectives on the role AI plays in sustainable instruction at higher education institutions (Devi, & Roy, 2023). The training and learning fields of late have adopted new methods. Thus, prospects for education to become easily available both within and outside of the classroom are made possible by artificial intelligence (AI). AI is a growing development that has a lot of commercial potential in the education industry given the demands of the modern world. So, with the above analysis of available literature our study came to a conclusion that AI plays a pivotal role in the development of higher education institutions across various aspects:

1. **Personalized Learning:** Learning routes and materials can be tailored to each student's needs by using AI algorithms to assess student data and determine their learning preferences, strengths, and styles. This raises learning results and increases student engagement (Pataranutaporn, Danry, Leong, Punpongsanon, Novy, Maes & Sra, 2021).
2. **Data Analysis and Predictive Analytics:** AI can analyze enormous volumes of data to find patterns and trends, assisting organizations in making defensible choices about student admissions, course offerings, resource allocation, and retention tactics. Additionally, early intervention and identification of kids at danger of dropping out are made possible by predictive analytics (Liebowitz, 2020)
3. **Automating Administrative Tasks:** Automating regular administrative chores like scheduling, grading, and student inquiries is possible with AI-powered solutions. This allows academics and staff to devote more time to important tasks like teaching, research, and student mentoring (Alyammahi, 2020).
4. **Enhanced Teaching and Research:** With the aid of AI tools, educators may develop engaging and dynamic learning environments that make use of augmented reality (AR), virtual reality (VR), and simulation software. Artificial Intelligence speeds up research by facilitating data analysis, literature reviews, and hypothesis formulation (Tan, 2023).
5. **Improving Accessibility and Inclusivity:** By enabling real-time captioning and translation, delivering individualized support services, and giving alternate learning material formats, AI-driven systems can improve accessibility for students with impairments (Almufareh, Tehsin, Humayun & Kausar, 2023).
6. **Adaptive Assessment:** AI has the potential to completely transform assessment techniques by developing adaptive assessments that change in complexity in response to student performance, delivering instant feedback, and pointing out areas in which students need more help (González-Calatayud, Prendes-Espinosa & Roig-Vila, 2021).
7. **Curriculum Development:** In order to ensure that graduates have the skills necessary for future employment, AI algorithms may assess industry trends, job market demands, and emerging technologies. This allows them to inform the construction of relevant and up-to-date curricula (Pedro, Subosa, Rivas & Valverde, 2019).

8. **Virtual Assistants and Chatbots:** AI-powered chatbots and virtual assistants can offer staff, instructors, and students round-the-clock assistance by responding to inquiries, offering advice, and connecting users to pertinent information and services. (Dhawan & Batra, 2020).

6 | CONCLUSION

Exhaustive review and analysis of this study explains that the integration of AI in higher studies is transforming teaching, learning, and knowledge engagement. It is a paradigm shift that will change higher education. Institutions can improve administrative workflows, tailor learning experiences, and expand the boundaries of research by utilizing AI technologies. However, ethical considerations must be carefully considered, educators and technologists must continue to collaborate, and a commitment to guaranteeing fair access and inclusion for all students is necessary for successful integration. It is crucial that we embrace innovation responsibly as we investigate the potential applications of AI in higher education, keeping in mind the need to improve education's relevance, quality, and accessibility in a world that is changing quickly.

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How Cite this article?

Mishra, K., & Srivastava, A. K. (2024). An Analysis of Integration of Artificial Intelligence in Higher Studies. *Revista Review Index Journal of Multidisciplinary*, 4(1), 44-54. <https://doi.org/10.31305/rrijm2024.v04.n01.006>