Journal of Informatics Education and Research
ISSN: 1526-4726
Vol 4 Issue 3 (2024)

Role of AI (Artificial Intelligence) based Learning in Holistic Development of Higher Education Professionals: An Empirical Study

'Dr. Amit Kumar Bhanja
Assistant Professor (Senior Grade)
Department of Management,
School of Management Sciences, Varanasi.
Email id: akbhanja10@gmail.com

Dr. Annie Rosita
Head of Department-Nursing.
Fatima College of Health Sciences.

Prashant Mishra
Assistant professor
Department of Business Management
Allenhouse Institute of Management
Affiliated to AKTU, Lucknow
Email id -Prashantm@thebrim.co.in

Dr.Vinoth Kumar Chokkalingam,
Professor,
Department of English Language & Literature,
Navoi State Pedagogical Institute,Navoi,Uzbekistan
vinothelt@gmail.com

Abstract
Artificial Intelligence or AI is now an increasingly important factor in education sector, especially in the development of higher education professionals. This is because AI-based tools are now helping educators come up with new teaching strategies with personalized learning experiences and real-time feedback. With the help of these tools, teachers can adjust their methods to meet the different needs of students while also supporting their own professional growth. AI can automate routine tasks like grading and administration, freeing up more time for educators to focus on engaging with students and improving instructions. This paper argues that while AI presents challenges, its potential to bring professional development and reshape the educational sector makes it an essential tool in higher education. This paper will explore the opportunities and challenges AI presents in higher education and discuss its potential to support the holistic development of educators. With some understanding and optimization of AI, institutions can stay ahead in this competitive world and educators can give quality education. A sample of 219 was collected from professionals and teachers of higher education institutes. The factors that identify the Role of AI (Artificial Intelligence) based Learning in Holistic Development of Higher Education Professionals are Personalized Learning Experiences, Data-Driven Insights, Predictive Analytics for Decision-Making, and Collaborative Learning Platforms.

Keywords: Artificial Intelligence, Education, Higher Education, Holistic Development, Personalized Learning, Technology

Introduction

Artificial Intelligence (AI) has become an increasingly important tool in many sectors, and education is no exception to this. As educational systems are changing according to advancements around, AI-based learning presents an opportunity to support the professional development of educators. Higher education professionals, including faculty members and

administrators, are central to maintaining the quality of education in universities and colleges. However, the pace at which technological change is happening demands a growing need for these professionals to continuously develop new skills and adapt to new teaching and learning methods. AI, with its ability to personalize learning and automate processes, is expected to become a key enabler of this professional growth. AI is broadly defined as the simulation of human intelligence by machines, particularly in performing tasks such as problem-solving, learning, and decision-making. In the context of education, AI has begun to transform both administrative and instructional functions. The use of AI-driven tools, such as intelligent tutoring systems, adaptive and collaborative learning platforms, and virtual assistants can improve the quality of education. For higher education professionals, AI becomes a means to bring in new teaching strategies, improve student engagement, and streamline administrative tasks. This lets them focus more on pedagogical innovation and less on routine duties.

One of the primary ways in which AI can contribute to professional development is in training and skill-building processes for educators. AI-based applications are capable of creating individualized learning pathways, which allow teachers to upskill in specific areas according to their needs and professional goals (al-Zyoud, 2020). These pathways provide targeted learning experiences that are tailored to the unique requirements of each educator and this will ensure that they remain current in their field. For instance, AI can help educators improve both their technical and instructional skills by offering real-time feedback and resources tailored to their teaching methods. AI can also reduce the administrative burdens that often consume much of an educator's time, such as grading assignments, answering repetitive student queries, and managing class logistics. With the help of automation of these routine tasks, AI allows educators to spend more time on high-impact activities, such as student interaction and curriculum development. As Mollick and Mollick (2023) argue, AI-based systems can support evidence-based teaching strategies by providing instructors with the tools needed to implement practices that have been proven to enhance learning outcomes. These strategies include creating diverse examples for students, and it offers frequent low-stakes assessments, and administering diagnostic questions, all of which require considerable time and effort to execute manually. With AI taking over these responsibilities, educators can focus more on engaging with students, addressing their needs, and building a more interactive learning environment. AI can help teachers improve their teaching by analyzing student data to adjust lessons to each student's needs. This helps teachers grow professionally by continuously refining their methods. It can also be used to encourage collaboration by allowing educators to share resources and ideas globally. However, concerns about privacy and fears that AI might replace teachers need to be addressed. While AI can automate tasks, it cannot replace the personal connections teachers build with students. To benefit fully from AI, schools must use it to support, not replace, educators' important roles.

Literature Review

AI helps educators manage administrative tasks like grading, giving them more time for lesson planning and engaging with students. Chen et al. (2020) note that AI tools streamline these tasks, and this will let teachers focus on activities that enhance learning. With less time spent on repetitive duties, educators can invest more in developing innovative teaching methods. As AI improves the efficiency of administrative processes, it also supports teachers in dedicating more effort toward improving classroom instruction. This results in stronger student-teacher interactions.
Personalized learning experiences that benefit both students and educators is also a benefit of AI. According to Bucea-Manea-Țoniș et al. (2022), these tools create tailored educational materials and facilitate instant feedback. It helps teachers adjust their teaching to fit each student's needs. This flexibility can also refine their teaching strategies and align them with diverse classroom requirements. It's a process that not only aids student learning but also supports teachers in continually improving their instructional approaches based on data-driven insights.
Jamal (2023) discussed how AI revolutionizes teacher training by creating adaptive learning environments. These programs adjust to teachers' individual learning preferences, with feedback that helps them develop new skills efficiently. There is also a warning that AI implementation must address ethical concerns like privacy and potential biases. While AI has significant benefits in professional development, institutions need to ensure that it is applied responsibly. This balance is key to maximizing AI's advantages in teacher education while safeguarding ethical standards.
AI improves decision-making for educators with the help of precise assessment tools. Hooda et al. (2022) highlight the effectiveness of AI algorithms, such as I-FCN, in providing accurate student assessments, surpassing traditional methods. Teachers can use this to adapt their teaching strategies quickly, and this will make sure they meet students' needs more

effectively. Immediate insights will lead to timely adjustments in instruction, which will further result in better learning outcomes. AI thus can help educators refine their teaching based on reliable, real-time data.

There is also a promotion of cognitive growth by encouraging creativity and problem-solving skills. Tools provided by AI enable educators to adapt to global educational trends, encouraging experimentation with new teaching techniques and the analysis of their outcomes. This process drives educators to think critically and adapt their methods to a constantly evolving educational landscape. These AI tools push educators to remain innovative in their teaching, ensuring they meet modern educational demands (Zabelina & Spiryagina, 2021).

AI supports leadership and curriculum development, providing educators with essential data-driven info. Teachers can step into leadership roles more easily when routine tasks are automated, and this makes space for greater focus on instructional leadership. Ghamrawi et al. (2023) emphasize how this frees educators to concentrate on designing personalized learning experiences and making strategic decisions about their curricula. The combination of automation and useful ideas gives teachers the confidence to lead in the classroom and shape better learning environments.

Emotional intelligence and reflective practices are also influences by AI use. AI helps teachers better understand their own emotional responses while building positive relationships with students. AI tools can build personalized learning paths that encourage self-reflection, a critical component of professional growth. This reflective practice is integral for educators to evaluate their teaching strategies and adapt to the emotional needs of the classroom. AI promotes emotional intelligence, giving teachers a chance to reflect on their methods and improve. The Intelligent-TPACK framework stresses the need for a balance of technological, pedagogical, and ethical skills to properly use AI in the classroom (Celik, 2023). These skills encourage teachers to critically examine their role and recognize AI as a support tool rather than a replacement. AI is full of opportunities for educators to build emotional connections with students. Verna et al. (2019) also describe how AI encourages ongoing self-reflection, leading to improved teaching strategies. AI-based feedback systems provide real-time insights, and this helps educators assess their effectiveness and identify areas for improvement. This not only sharpens instructional methods but also deepens self-awareness in interactions with students. As a result, educators grow both professionally and emotionally, and also grow their ability to create positive learning environments.

Despite its benefits, integrating AI into higher education faces challenges like ethical issues, technical barriers, and necessary institutional changes. One main concern is the ethical implications of AI in education, particularly in decision-making and personalized learning (Zawacki-Richter et al., 2019). Issues such as data privacy, algorithmic bias, and the potential reduction of human autonomy are major factors that need critical reflection. Institutions must ensure that AI is used responsibly and in alignment with educational goals.

Another significant challenge in adopting AI in education is the differing views between students and educators. While students appreciate AI's ability to personalize learning and improve feedback, many educators remain cautious. Some teachers worry about AI's impact on critical thinking and the accuracy of AI-generated data, while others fear losing the human connection with students (Olawale & Mutongoza, 2024). These varying perceptions highlight the need for ongoing conversations and training. Bridging the gap between student enthusiasm and educator skepticism will help ensure AI is used effectively. Without sufficient understanding, teachers will struggle to fully benefit from the advantages AI can bring to the classroom.

Ethical concerns regarding privacy and data security are important when integrating AI tools like facial recognition and chatbots too. Al-Zahrani and Alasmari (2024) highlight that these tools, if not managed properly, could compromise sensitive information. Institutions must implement strict safeguards to ensure data protection while using AI systems. Comprehensive ethical frameworks are essential for balancing AI's benefits and risks, ensuring safe and responsible use in education. Technical challenges slow down AI adoption in education. Many educators lack the skills to effectively use AI tools in their teaching. Zawacki-Richter et al. (2019) note that most AI research focuses on computer science and STEM, and this leaves other disciplines behind. This gap in training makes educators hesitant to use AI, as they feel unprepared. This combination of ethical awareness and technical knowledge will help teachers to make informed decisions in their classrooms.

In emerging economies like India, Jaiswal and Arun (2021) describe how AI-powered tools such as personalized and collaborative learning platforms and adaptive assessments are helping educators deliver customized lessons by giving deep analysis of student performance. However, many advanced AI tools remain underused. Integrating technologies like facial

recognition and natural language processing can make education sector better. Continued innovation and AI adoption are essential for creating more efficient learning environments in developing countries, as it leads to improved educational outcomes.

AI adoption in higher education is growing, with a change in focus in research leadership from the U.S. to China. Crompton and Burke (2023) identified five key AI applications: assessment, predicting student outcomes, providing student assistance, intelligent tutoring, and managing learning processes. These applications help improve learning and make administrative tasks easier. At the same time, there is still limited research on the long-term impact of AI tools like ChatGPT. More studies are needed to understand how these tools can be better employed across different contexts and in what ways can educators use AI to improve learning experiences and outcomes for students.

In science education, student engagement and understanding is made better with AI's influence. Almasri (2024) highlights AI's use in creating quizzes, assessing student work, and predicting performance. These tools are well-received by teachers and students. A challenge to this process was the inconsistent AI performance across different subjects presents challenge and some models also struggle to adapt to complex topics, making them less effective in certain educational settings. Adapting AI tools to specific contexts and continuously evaluating their effectiveness are key to ensuring that they meet the diverse needs of students and teachers, especially in subjects like science.

AI is definitely bringing big changes to higher education, and this comes with both opportunities and challenges. It helps make learning more personalized, improves administrative tasks, and encourages new ideas, which is changing how universities operate. There are also few difficulties with how AI is implemented, like how consistent it is, and how well it works in different settings. As AI keeps advancing, schools need to invest in research, infrastructure, and training for educators. This will help them use AI effectively to benefit both students and teachers, making education better for everyone.

Objective

To identify "Role of AI (Artificial Intelligence) based Learning in Holistic Development of Higher Education Professionals"

Study's Methodology

219 respondents are considered for this study which was collected from professionals and teachers of higher education institutes. Random sampling method was used to collect data and examined by "Explanatory Factor Analysis" for results.

Findings of the Study

Below table shows demographic details of participants it shows that male participants are 51.14%, and female participants are 48.86%. Looking at the age of the participants, 35.16% were between 30 to 35 years of age, 28.77% were between 35 to 40, and 36.07% were above 40 years of age. With regards to Type of Institutes, 46.12% were from Government institutes, 26.03% were from Private institutes, and 27.85% were from Foreign institutes.

Details of Participants

Variable	Participants	% age
Gender of Participants		
Male	112	51.14%
Female	107	48.86%

Total	**219**	**100**
Age in years		
30 to 35	77	35.16%
35 to 40	63	28.77%
Above 40	79	36.07%
Total	**219**	**100**
Type of Institutes		
Government institutes	101	46.12%
Private institutes	57	26.03%
Foreign institutes	61	27.85%
Total	**219**	**100**

"Factor Analysis"

"KMO and Bartlett's Test"

"Kaiser-Meyer-Olkin Measure of Sampling Adequacy"		.764
"Bartlett's Test of Sphericity"	"Approx. Chi-Square"	3642.387
	df	91
	Significance	.000

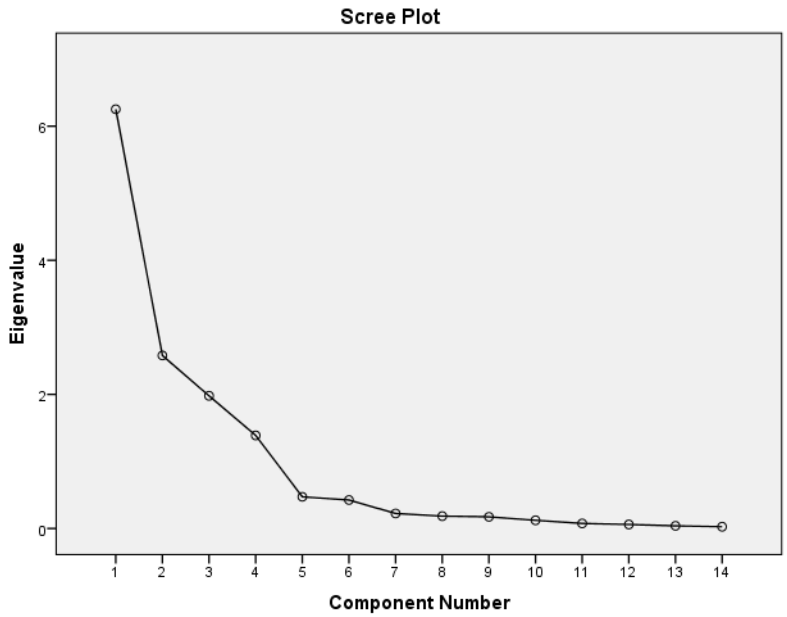
"KMO and Bartlett's Test", value of KMO is .764

"Total Variance Explained"

"Component"	"Initial Eigenvalues"			"Rotation Sums of Squared Loadings"		
	"Total"	"% Of Variance"	"Cumulative %"	"Total"	"% Of Variance"	"Cumulative %"
1.	6.253	44.663	44.663	**3.761**	26.867	26.867
2.	2.580	18.431	63.094	**3.676**	26.259	53.125
3.	1.979	14.134	77.228	**2.455**	17.538	70.663
4.	1.388	9.912	87.140	**2.307**	16.477	**87.140**
5.	.472	3.371	90.511			
6.	.425	3.034	93.545			
7.	.224	1.599	95.145			
8.	.184	1.315	96.460			
9.	.174	1.242	97.702			

10.	.122	.869	98.571			
11.	.075	.534	99.105			
12.	.060	.426	99.530			
13.	.039	.279	99.809			
14.	.027	.191	100.000			

All the four factors are making contribution in explaining total 87.140% of variance. The variance explained by Personalized Learning Experiences is 26.867%, Data-Driven Insights is 26.259%, Predictive Analytics for Decision-Making is 17.538%, and Collaborative Learning Platforms is 16.477%.



ScreePlot

"Rotated Component Matrix"

S. No.	Statements	Factor Loading	Factor Reliability
	Personalized Learning Experiences		**.953**
1.	AI analyzes data on individual learning patterns, preferences	.952	
2.	AI analyzes performances to personalize educational experiences	.893	
3.	Tailored approach helps educators and professionals focus on areas needing improvement	.862	
4.	AI holistic development enhances overall competence	.861	
	Data-Driven Insights		**.965**

1.	Analyzes vast amounts of data to provide actionable insights into learning outcomes	.957	
2.	Professionals can leverage these insights to refine their teaching strategies	.916	
3.	Tutors can tailor their learning paths to achieve better outcomes	.906	
4.	Professionals can improve their instructional approaches	.895	
	Predictive Analytics for Decision-Making		**.875**
1.	Predictive analytics capabilities help higher education institutions anticipate trends	.913	
2.	AI's predictive analytics capabilities identify areas for improvement	.841	
3.	AI's predictive analytics make data-driven decisions to enhance educational outcomes	.803	
	Collaborative Learning Platforms		**.827**
1.	AI facilitates collaborative learning through virtual classrooms	.925	
2.	This collaborative environment encourages knowledge sharing	.921	
3.	Collaborative learning platforms encourages problem-solving skills among professionals	.653	

Factors and the associated variables

The first factor of the study is Personalized Learning Experiences, the variables it includes are AI analyzes data on individual learning patterns, preferences, AI analyzes performances to personalize educational experiences, Tailored approach helps educators and professionals focus on areas needing improvement, and AI holistic development enhances overall competence. Data-Driven Insights is the second factor, it has variables like Analyzes vast amounts of data to provide actionable insights into learning outcomes, Professionals can leverage these insights to refine their teaching strategies, Tutors can tailor their learning paths to achieve better outcomes, and Professionals can improve their instructional approaches. Third factor is Predictive Analytics for Decision-Making, it includes variable like Predictive analytics capabilities help higher education institutions anticipate trends, AI's predictive analytics capabilities identify areas for improvement, and AI's predictive analytics make data-driven decisions to enhance educational outcomes. Last and fourth factor is Collaborative Learning Platforms, its variables are AI facilitates collaborative learning through virtual classrooms, this collaborative environment encourages knowledge sharing, and Collaborative learning platforms encourages problem-solving skills among professionals.

“Reliability Statistics”

“Cronbach's Alpha”	“Number of Items”
.894	14

Total reliability of 14 items that includes variables for Role of AI (Artificial Intelligence) based Learning in Holistic Development of Higher Education Professionals is 0.894

Conclusion

AI-based learning is now becoming an indispensable part in the professional development of educators in higher education. It goes beyond automating tasks and personalizing lessons as it also helps teachers grow in their skills, thinking, and emotional intelligence. But for AI to completley benefit education, schools must address the challenges that come with it too. Educators should be well-prepared to use AI responsibly, and make sure it supports their teaching without replacing the important human connections they have with students. While AI can improve efficiency and teaching methods, it must always work alongside teachers, not in place of them. Like any technological advancement, the real potential of AI in education will be achieved when it is thoughtfully integrated. This will also make educators adapt better in today's digital world. Schools that adopt AI with care will create better learning environments and help both students and educators succeed. The factors that identify the Role of AI (Artificial Intelligence) based Learning in Holistic Development of Higher Education Professionals are Personalized Learning Experiences, Data-Driven Insights, Predictive Analytics for Decision-Making, and Collaborative Learning Platforms.

References

1. Al-Zahrani, A. M., & Alasmari, T. M. (2024). Exploring the impact of artificial intelligence on higher education: The dynamics of ethical, social, and educational implications. *Humanities & Social Sciences Communications*, *11*(1). https://doi.org/10.1057/s41599-024-03432-4
2. al-Zyoud, H. M. M. (2020). The Role of Artificial Intelligence in Teacher Professional Development. *Universal Journal of Educational Research*, *8*(11B), 6263–6272. https://doi.org/10.13189/ujer.2020.082265
3. Almasri, F. (2024). Exploring the Impact of Artificial Intelligence in Teaching and Learning of Science: A Systematic Review of Empirical Research. *Research in Science Education*, *54*. https://doi.org/10.1007/s11165-024-10176-3
4. Bucea-Manea-Țoniș, R., Kuleto, V., Gudei, S. C. D., Lianu, C., Lianu, C., Ilić, M. P., & Păun, D. (2022). Artificial Intelligence Potential in Higher Education Institutions Enhanced Learning Environment in Romania and Serbia. *Sustainability*, *14*(10), 5842. https://doi.org/10.3390/su14105842
5. Celik, I. (2023). Towards Intelligent-TPACK: An empirical study on teachers' professional knowledge to ethically integrate artificial intelligence (AI)-based tools into education. *Computers in Human Behavior*, *138*(138), 107468. https://doi.org/10.1016/j.chb.2022.107468
6. Chen, L., Chen, P., & Lin, Z. (2020). Artificial Intelligence in Education: a Review. *IEEE Access*, *8*(8), 75264–75278. https://doi.org/10.1109/ACCESS.2020.2988510
7. Crompton, H., & Burke, D. (2023). Artificial Intelligence in Higher education: the State of the Field. *International Journal of Educational Technology in Higher Education*, *20*(1), 1–22. https://doi.org/10.1186/s41239-023-00392-8
8. Ghamrawi, N., Shal, T., & Ghamrawi, N. A. R. (2023). Exploring the impact of AI on teacher leadership: regressing or expanding? *Education and Information Technologies*, *29*. https://doi.org/10.1007/s10639-023-12174-w
9. Hooda, M., Rana, C., Dahiya, O., Rizwan, A., & Hossain, M. S. (2022). Artificial Intelligence for Assessment and Feedback to Enhance Student Success in Higher Education. *Mathematical Problems in Engineering*, *2022*, 1–19. https://doi.org/10.1155/2022/5215722
10. Jaiswal, A., & Arun, C. (2021). Potential of Artificial Intelligence for transformation of the education system in India. *International Journal of Education and Development Using Information and Communication Technology (IJEDICT)*, *17*(1), 142–158.
11. Jamal, A. (2023). The Role of Artificial Intelligence (AI) in Teacher Education: Opportunities & Challenges. *International Journal of Research and Analytical Reviews (*, *10*(1), 139–146.
12. Mollick, E. R., & Mollick, L. (2023). Using AI to Implement Effective Teaching Strategies in Classrooms: Five Strategies, Including Prompts. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.4391243

13. Olawale, B. E., & Mutongoza, B. H. (2024). Artificial intelligence: An empirical survey of student and staff perspectives. *Interdisciplinary Journal of Education Research*, *6*(s1), 1–14. https://doi.org/10.38140/ijer-2024.vol6.s1.04
14. Verna, I., Antonucci, G., & Venditti, M. (2019). Holistic approach to higher education and artificial intelligence. Social implications. *Ratio Sociologica*, *12*(1), 17–36.
15. Zabelina, T., & Spiryagina, E. (2021). Teachers' professional growth as a condition for improving the quality of higher education in the context of global and Bologna dimensions. *SHS Web of Conferences*, *99*, 01039–01039. https://doi.org/10.1051/shsconf/20219901039
16. Zawacki-Richter, O., Marín, V. I., Bond, M., & Gouverneur, F. (2019). Systematic review of research on artificial intelligence applications in higher education – where are the educators? *International Journal of Educational Technology in Higher Education*, *16*(1), 1–27. https://doi.org/10.1186/s41239-019-0171-0