SIRJODL: Volume 6 Issue 2 July 2025
ISSN 2582-9009

AI Tools in Online Learning: Usage Patterns and Adoption Drivers

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Abstract

This study focused on the use of AI-enabled pedagogical approaches in distance education. Utilizing descriptive and analytical qualitative research methodology, survey data for 163 participant responses (students, faculty, staff, and administrator) were collected and analyzed to support a review of the use of institutionally provided AI tools in relation to usage, perceptions by role, adoption motivators, and intended ongoing practices. The data analyses revealed that reducing instructor workload was the main reason participants reported as motivations for adopting AI technology, while they also acknowledged significant differences in the interactions that participants had with AI based on their professional role. Plagiarism detection software appeared to be the mostly commonly used AI tool for participants in this study while advanced use of AI technology, including intelligent tutoring systems or AI tools to support adaptive learning, was minimal. In summary, the results of this study point to the necessity for professional

development focused on improving AI literacy, the need for recurring ethical oversight in relation to AI uses in educational contexts, and encouraging the equitable access to AI technology for all learners.

KEYWORDS

Artificial Intelligence, Distance Education, Adaptive Learning, AI Adoption, Teaching Technologies, Intelligent Tutoring Systems.

Introduction

Artificial Intelligence (AI) in distance education (DE) has the potential to revolutionize the possibilities for significant change while presenting challenges that will impact the nature of learning in the ecology for a long time to come. The opportunities to improve personalization of learning, increase educational efficiencies, and provide timely feedback to students, all through the use of AI is promising. In distance education modalities that rely heavily on digital infrastructures, AI usage comes at a good time considering that the technology-based processes and technology-based expectations (for Machine Learning ML and Deep Learning DL) support AI technologies. Further, the customization afforded by AI's adaptive algorithms not only facilitate learner personalization in the modification of educational content but increased learner engagement and academic achievement outcomes (Vieira et al., 2024; Franqueira et al., 2024). AI tools will automate the discrete instructors pre and post task related education actions, tremendously reducing round-the-clock instructors' workloads so that instructors may concentrate on higher-order teaching and assessing while still meaningfully assess (in-course/ongoing) (Sá et al., 2024). Predictive analytics will allow instructors to timely, intervene with students learning and engagement who are most at-risk for failing to earn academic credit, as well as help mitigate retention challenges down the road (Pedra et al., 2024).

Several potential barriers come with employing AI in distant education today. For AI to be successfully employed into current distance education practices, an adequate technological foundation is required, which is already lacking uniformity across most institutions (Franqueira et

al., 2024). Pragmatically, ethical concerns around data privacy and the use of students' data will almost always exist when employing any electronic means of communication (Pedra et al., 2024), and there is also an insufficient level of training for many educators on how to use AI appropriately in their courses (Sá et al., 2024; Tuczyński, 2024). The proliferation of the use of AI is perhaps going to be a bridge too far in the people-oriented aspects of teaching (their adaptability will come quicker) and in many cases we should think about adopting a general use of technology to manage what it adds to all educators, rather than replacing the educator. If there is a clear use for technology (Tuczyński, 2024). While there is much and plentiful research available globally, as demonstrated in the literature review, on the theoretical possibilities for AI in Education, there appears to be considerably less research that examines these educators, students and administrators' perspectives-how they see AI, what their adoption motivations are, and their knowledge or awareness of the potential roles AI could play in distant education. This study will help confront these challenges by examining the demographic description of Distance Education students', students' perception of AI, most commonly used tools, and the factors motivating its adoption. The findings of this research matter because they could inform educational organizations and policy decisions specifically to guide effectively. The findings offered more useful fact-based evidence on what created value for distance education stakeholders, using the responsible utilization of AI in distance education. AI in distance education (like reducing instructor burdens and increased learning outcomes), and what advocacy to use to position AI in distance education. Also, the study uncovered a significant range of understanding about AI depending on the role of person completing the survey, which highlights the importance of creating targeted trainings to mitigate knowledge gaps. Furthermore, knowing there is limited usage of advanced AI tools such as tools that run focused intelligent tutoring systems for advanced learners, the research also noted opportunities for expanding technology that may provide more learning advances. Lastly, while ethical concerns and outcomes, as well as privacy were ranked as less important by respondents, nevertheless, they were included in the study for creating trust in AI systems. The value of this study will contribute to implementing an inclusive, responsible and effective framework for

consideration for AI in distance education, and the equitable benefit of AI will only be beneficial to all involved.

Literature Review

Artificial Intelligence (AI)-driven pedagogical frameworks are defined as technology-enhanced frameworks for teaching and learning in the usages of machine learning, natural language processing and predictive analytics approaches to learner engagement, assessment and personalization in digital learning. In distance education, pedagogical frameworks have shifted the instructional design paradigm to encompass adaptive learning systems, intelligent tutoring systems, timely feedback, and increasingly personalized learning to meet the challenges of scale, variability of learners and retention and persistence (Mukkala et al., 2025). With the shift to online learning as an architectural aspect of distance learning, we still need to understand comprehensively how AI could address and systematically transform pedagogy to build equitable, personalized and scalable learning systems. Machine learning systems, specifically, use reinforcement learning algorithms that offer instant corrective feedback, consistent with behaviorist approaches to stimulus-response learning (Sarfaraj, 2025). Intelligent tutoring systems and chatbots are operationalizing problem solving and conversational dialogues, in support of constructivist approaches to knowledge-building (Mungai et al., 2024). AI-based predictive analytics and virtual assistants are supporting learning networks and connectivist learning theories about distributed learning in the digital ecosystem (Akintola, 2024). Intelligent tutoring systems (ITS) supported with conversational AI and diagnostic modelling capabilities offering specific personalized interventions for learners can develop learner autonomy and motivation (Sarfaraj, 2024). ChatGPT-based intelligent tutoring systems have made positive early strides, particularly in language learning environment development and writing skills, but scaling and learning outcomes relating to real-time assessment and feedback remain a challenge (Sumanasekara, 2025). Adaptive educational systems, such as DreamBox and Knewton, are capable of modifying the learning pathway taken by students to increase acquisition and retention of skills and knowledge (Akintola, 2024). Directly linked to the usage of generative AI is the use of automated assessment

and feedback provided by AI systems, which can be individualized to support higher-order thinking skills (Torre & Libbrecht, 2024). Machine learning models can identify students at risk of withdrawal and suggest actionable interventions to improve retention in distance education (Moore & Tsay, 2024). Chatbots add another level of interactivity to the LMS, and can offer on-demand support in real-time, reducing cognitive load and reinforcing personalized learning models to enhance gamification (Mungai et al, 2024) . Adaptive AI supports individual learning pathways and promotes self-regulated learning (Akintola, 2024). Emotion aware tutoring systems and gamified chatbots engage learners, engendering greater levels of motivation, engagement, and participation (Urbaite, 2025). Instructors shift roles from lectures to facilitation and mentorship roles while students are expected to assume greater responsibility for their own learning, and adapt dynamically to learning requirements & needs (Islam & Amiri, 2025). AI could offer insights into LMS-generated learning analytics that risk unauthorized use of student learning data (Mukkala et al., 2025). Given the cultural and linguistic biases in AI tools, marginalized populations may be less likely to benefit from AI tools (Ahmed & Elmahdi, 2025). Technology delivery systems and high-tech infrastructure to access the internet must be standardized to avoid ongoing linearly inequitable delivery of educational access (Islam & Amiri, 2025). Many educators remain fearful of adopting AI because of the fear education will become dehumanized (Torre & Libbrecht, 2024.) Only a handful of studies can demonstrate substantial evidence to prove learning outcomes over the long-haul due to adapting AI systems (Moore & Tsay, 2024). Very little evidence exists on collaborative teaching models that demonstrate the sharing of instructional labour between AI technology and a human instructor (Sumanasekara, 2025). Many systems focus on rote learning, not creativity and critical thinking (Torre & Libbrecht, 2024). AI frameworks are an innovation of teaching and learning in online distance learning as they present opportunities to personalize learning, deliver feedback in real time, and make data-informed decisions. At the same time, ethical issues, digital inequity, and need for human-centered models exist. In order for AI to be a true innovator in teaching and learning in online education, there must be an equilibrium between technology, equity, and pedagogy.

Research Design

The study follows a **descriptive and analytical research design** to understand the perception, usage, and impact of AI tools in distance education. Primary data was collected using a structured questionnaire from respondents engaged in online or distance learning.

Sampling Design

- **Sampling Method**: Non-probability convenience sampling
- **Sample Size**: 163 respondents from various roles (students, educators, administrators, and others)
- **Area of Study**: Participants with exposure to distance education

Data Collection Method

Data was collected through a structured online questionnaire divided into five sections: Demographics, Familiarity & Usage of AI, Perception of AI in Teaching, Ethical Concerns, and Behavioural Intentions.

Tools Used for Analysis

- **Percentage Analysis**: For demographic and tool usage patterns
- **Garrett Ranking Technique**: To rank factors influencing AI adoption
- **ANOVA (Analysis of Variance)**: To test differences in AI perception across roles
- **Chi-Square Test**: To test associations between role and AI familiarity

Limitations of The Study

- The study's use of non-probability convenience sampling restricts how well we can apply the results to other groups of people.

- The researchers collected data through an online survey with set questions getting self-reported answers at one point in time. Surveys like this can lead to biased responses.

Analysis

Table 1: Demographic Profile of the Respondents

Category	*Variable*	*Frequency*	*Percent*
AGE	18-24	40	24.5
	25-34	49	30.1
	35-44	18	11.0
	45 and above	34	20.9
	Below 18	22	13.5
	Total	**163**	**100.0**
GENDER	Female	68	41.7
	Male	95	58.3
	Total	**163**	**100.0**
EDUCATION	Diploma	37	22.7
	Doctorate	48	29.4
	High School	29	17.8
	Postgraduate	19	11.7
	Undergraduate	30	18.4
	Total	**163**	**100.0**
ROLE	Academic Administrator	40	24.5
	Educator	33	20.2
	Other	53	32.5
	Student	37	22.7
	Total	**163**	**100.0**

EXPERIENCE	Less than 1 year	34	20.9
	1-3 years	44	27.0
	4-6 years	34	20.9
	More than 6 years	51	31.3
	Total	163	100.0

Source: Primary Data

Interpretation

This table summarizes the demographic profile of the 163 survey respondents. The largest age group represented is 25-34 years old (30.1%), followed by 18-24 years old (24.5%), indicating a generally younger participant base, though a significant portion (20.9%) is 45 and above. The gender distribution shows a majority of male respondents (58.3%) compared to female respondents (41.7%). In terms of educational background, a notable proportion hold Doctorate degrees (29.4%), while Postgraduate degrees are the least common (11.7%). Regarding their role in distance education, the "Other" category forms the largest group (32.5%), followed by Academic Administrators (24.5%), suggesting a diverse professional background among participants beyond typical student or educator roles. Finally, the respondents exhibit varied experience with distance learning, with the highest proportion having "More than 6 years" of experience (31.3%), indicating a good representation of individuals with extensive involvement in the field.

Table 2: Garrett Ranking Analysis – Factors Encouraging AI Adoption in Distance Education

Factor	Total Garrett Score	Rank
Reduced Instructor Workload	9440	1
Improved Learning Outcomes	9128	2
Better Engagement	9056	3
Cost Effectiveness	9032	4
Data Security & Privacy	8984	5

Source: Primary Data

Interpretation

The Garrett Ranking Analysis indicates that Reduced Instructor Workload is perceived as the most crucial factor encouraging AI adoption in distance education, closely followed by Improved Learning Outcomes. Better Engagement holds a mid-tier position, while Cost Effectiveness and notably, Data Security & Privacy, are considered less significant drivers for AI integration.

Table 3: AI-Driven Tools Used in Distance Education

AI-Driven Tool Experienced/Used	Number of Respondents	Percentage
AI-based plagiarism detection	110	73.3%
Adaptive learning platforms	85	56.7%
Virtual teaching assistants/chatbots	81	54.0%
AI-based automated assessment/grading	45	30.0%
Intelligent tutoring systems	23	15.3%

Source: Primary Data

Interpretation

AI-based plagiarism detection is the most common tool in distance education (73.3% use it). Adaptive learning (56.7%) and chatbots (54.0%) are also widely used, focusing on personalized learning and student support. However, advanced AI tools like automated grading (30.0%) and intelligent tutoring systems (15.3%) are used much less often.

HYPOTHESIS 1:

H_0 (Null): There is no significant difference in AI perception between students, educators, and administrators.

Table 4: ANOVA

ANOVA					
	Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
Between Groups	19.359	3	6.453	.328	.805
Within Groups	3129.917	159	19.685		
Total	3149.276	162			

Source: Primary Data

Interpretation

Since the p-value (0.805) is much greater than the common significance level of 0.05 we fail to reject the null hypothesis. There is no significant difference in AI perception among students, educators, administrators, and those in the "Other" role within distance education. This suggests that, despite their different roles, these groups tend to have a similar overall level of perception regarding AI in distance education.

HYPOTHESIS 2:

H_0 (Null): There is no statistically significant association between an individual's 'Role in Distance Education' and their 'Familiarity with AI'.

Table 5: Chi-Square Tests

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	29.245	9	.001
Likelihood Ratio	33.527	9	.000
N of Valid Cases	163		

Source: Primary Data

Interpretation

Since the p-value (Asymptotic Significance = <.001) is much less than the conventional significance level of 0.05 (or even 0.01), we reject the null hypothesis. This means that there is a statistically significant association between an individual's 'Role in Distance Education' and their 'Familiarity with AI'. In practical terms, this suggests that the level of AI familiarity is not the same across different roles within distance education; certain roles may be more or less familiar with AI compared to others.

Major Fındıngs

1. Demographic Profile of Respondents

- Largest age group: 25–34 years (30.1%) – indicating a younger participant base
- 58.3% of respondents are male
- A significant portion (29.4%) hold Doctorate degrees
- Roles are diverse: Academic Administrators (24.5%), Educators (20.2%), Students (22.7%), and Others (32.5%)
- 31.3% of respondents have more than 6 years of experience in distance education

2. Garrett Ranking – Factors Encouraging AI Adoption

- Top-ranked factor: Reduced Instructor Workload
- Followed by Improved Learning Outcomes and Better Engagement
- Cost Effectiveness and Data Security & Privacy ranked lower, suggesting lesser concern

3. AI Tools Used in Distance Education

- **Most used tool:** AI-based plagiarism detection (73.3%)
- **Other popular tools:** Adaptive learning platforms (56.7%)**,** Chatbots/Virtual TAs (54.0%)
- **Less used tools:** Automated grading (30%)**,** Intelligent tutoring systems (15.3%)

4. Hypothesis Testing

Hypothesis 1: Difference in AI Perception Across Roles

- **ANOVA p-value = 0.805 → Fail to reject null hypothesis**

- **Conclusion**: No significant difference in AI perception between students, educators, administrators, and others

Hypothesis 2: Association Between Role & AI Familiarity

- **Chi-square p-value = 0.001 → Reject null hypothesis**
- **Conclusion**: Significant association between role and familiarity with AI – familiarity varies with professional role

5. Other Findings

- Over **31% of respondents** have more than **6 years of distance learning experience**.
- Over **50% of respondents** use **adaptive learning platforms** and **virtual assistants**, indicating a strong preference for **personalized learning experiences** and **real-time interaction support**.
- With **73.3%** usage, plagiarism detection tools are almost **standard practice** in distance education settings.
- Only **15.3% of respondents** reported experience with ITS, suggesting these tools are still in **early stages of implementation** or are **available in niche settings** only.

Suggestıons

1. Encourage broader exposure to AI tools, especially among less familiar roles (e.g., students or administrators).
2. Prioritize AI tools that reduce instructor workload, as this is the most valued benefit.
3. Promote adaptive learning and virtual assistants, which have shown strong adoption and potential for engagement.
4. Address concerns around data security and ethics, even if they rank lower, to ensure trust in AI systems.

5. Invest in training programs to equalize familiarity levels across all roles in distance education.

Conclusıon

This research shows how AI can change distance education for the better. It can cut down on teaching work, boost learning results, and keep students involved through smart systems and chatbots. While tools that spot copied work are used the most more advanced AI systems like smart tutoring aren't used as much. How people see AI doesn't change based on their job, but how well they know AI does point to a gap in exposure and training across different work groups. These findings make it clear that we need to bring AI in and build up everyone's skills in digital learning spaces.

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