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## **Responsible Artificial Intelligence Adoption in Open and Distance Education: Opportunities, Risks, and an Institutional Framework**

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### **Abstract**

Artificial intelligence (AI), especially generative AI, is increasingly influencing higher education by transforming teaching, learner support, digital content development, administration, and research. In open and distance education, AI can improve service responsiveness, automate repetitive tasks, enhance digital learning materials, and support data-informed decision-making. However, AI adoption also raises concerns related to privacy, misinformation, academic integrity, copyright, and institutional readiness. This paper analyzes the opportunities

and challenges of AI in open and distance education and proposes a practical framework for responsible implementation. Using a design-oriented analytical approach, the study develops an institutional model consisting of five layers: infrastructure and data security, official knowledge and digital learning resources, shared AI services, AI-enabled applications, and governance with ethics and evaluation. The paper argues that AI should be deployed as a human-centered support system rather than a substitute for educators or administrators.

**Keywords:** Artificial Intelligence, Generative AI, Distance Education, Digital Learning Resources, AI Governance, Educational Technology

### **1. Introduction**

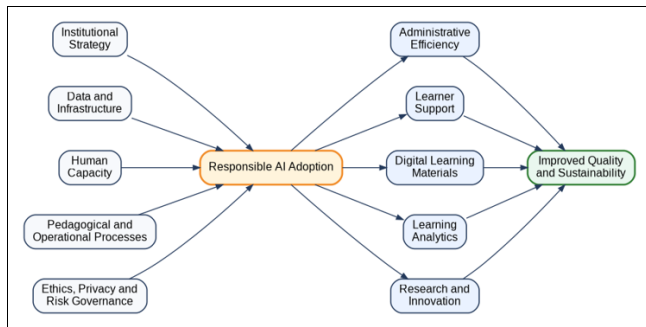
Artificial intelligence is becoming a key driver of change in higher education. Unlike conventional digital tools, AI can generate content, analyze large datasets, support conversational interaction, identify learning patterns, and assist decision-making. These capabilities are particularly valuable in open and distance education, where institutions must support geographically distributed learners through digital platforms and large-scale online services.

AI offers several advantages in this context. It can help automate routine administrative work, provide 24/7 learner support, assist in the development of digital learning materials, and support early identification of learners at risk of poor progress. At the same time, AI adoption must be handled carefully because it may introduce risks related to data privacy, inaccurate outputs, bias, academic misconduct, and overdependence on external technology providers.

This paper synthesizes these opportunities and challenges and proposes a concise institutional framework for responsible AI adoption in open and distance education. The framework is developed from institutional analysis and aligned with international recommendations on ethical, human-centered AI in education <sup>[1-4]</sup>.

### **2. Conceptual Basis for AI Adoption**

Responsible AI adoption in education should be understood as an institutional capability rather than a purely technical issue. It depends on the interaction among strategy, data infrastructure, human capacity, operational processes, and ethical governance. Fig 1 illustrates the conceptual framework of responsible AI adoption.



Source: Developed by the authors based on institutional analysis and international guidance on AI in education [1, 2, 3].

Fig 1: Conceptual framework for AI adoption in open and distance education

As shown in Fig 1, AI creates value only when institutional strategy, governance, data readiness, and human capability are developed together. This perspective is consistent with UNESCO's human-centered approach and NIST's AI risk management principles [1, 3].

### 3. Opportunities and Challenges of AI in Open and Distance Education

#### 3.1 Opportunities

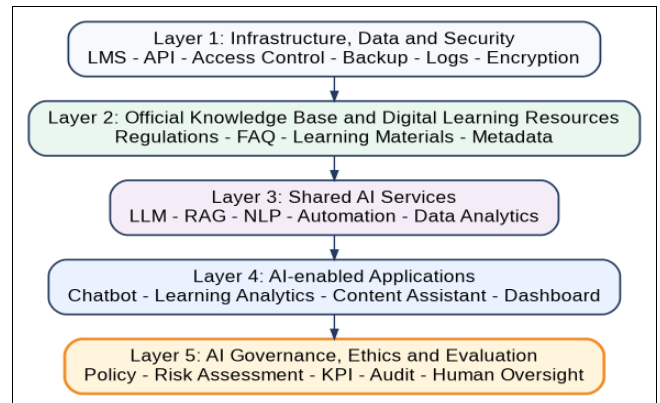
AI can create four major benefits in open and distance education. First, it can improve administrative efficiency by assisting with drafting notices, summarizing reports, classifying learner requests, and organizing information flows. Second, AI can strengthen learner support through chatbots, FAQ systems, deadline reminders, and personalized academic guidance. Third, AI can support digital learning material development by generating content outlines, lesson scripts, summaries, quizzes, subtitles, and metadata. Fourth, AI can enable learning analytics and early intervention by identifying students with low participation, delayed submission, or poor performance patterns.

#### 3.2 Challenges

Despite these benefits, several risks must be addressed. Learner information is sensitive and must not be uploaded to uncontrolled public AI tools. Generative AI can provide fluent but incorrect answers. Both students and teachers may misuse AI in assignments, assessments, or research. Staff and learners also differ significantly in digital and AI literacy. In addition, institutions may become overly reliant on commercial AI platforms. To address these issues, AI should be introduced through a structured institutional model.

### 4. Five-Layer Institutional Framework

The proposed framework consists of five connected layers. These layers clarify how technology, data, knowledge sources, operational applications, and governance should be combined for responsible AI implementation.



Source: Developed by the authors from the proposed institutional AI implementation model

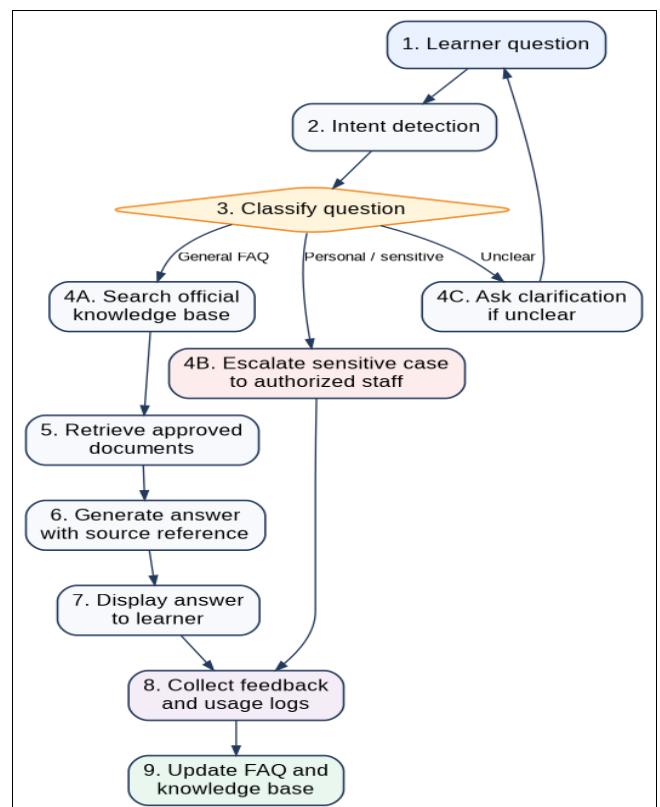
Fig 2: Five-layer architecture for responsible AI implementation

The first layer provides technical infrastructure, security, and data governance. The second layer organizes official knowledge and digital learning resources. The third layer includes shared AI capabilities such as large language models, retrieval-augmented generation, and document automation. The fourth layer contains specific applications for learner support, reporting, analytics, and content creation. The fifth layer ensures governance, ethics, performance evaluation, and risk management.

### 5. Key AI Workflows

#### 5.1 Retrieval-Augmented Chatbot for Learner Support

A chatbot is one of the most feasible applications for open and distance education. However, it should not answer solely from general model knowledge. Instead, it should retrieve information from approved institutional sources.



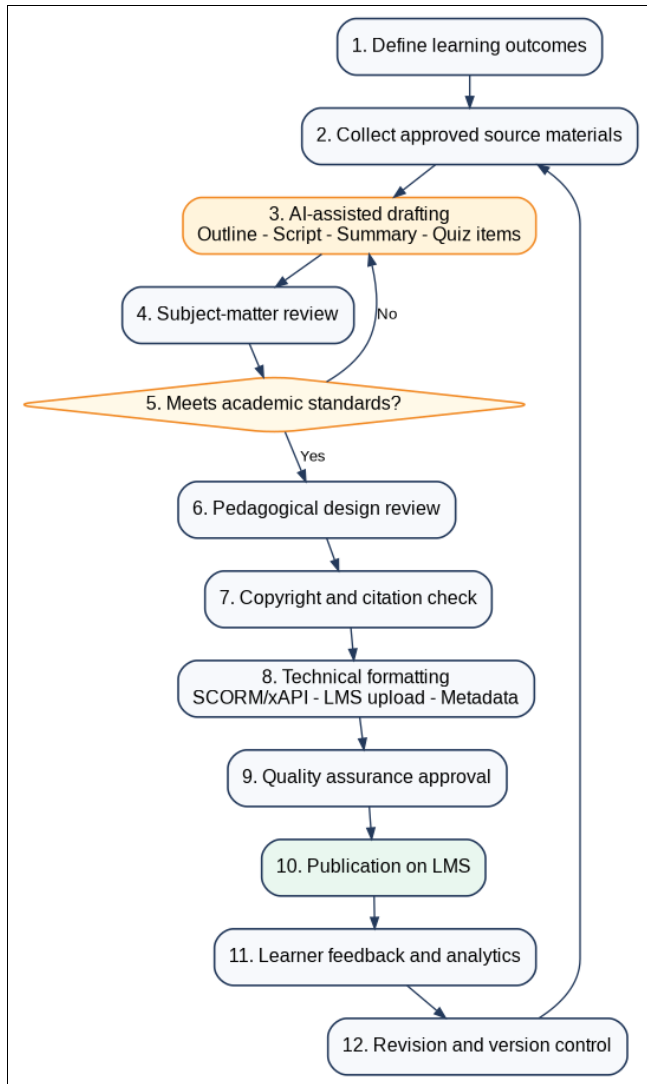
Source: Developed by the authors based on the proposed learner support model [2].

Fig 3: Retrieval-augmented chatbot workflow for learner support

This workflow improves response speed while reducing the risk of misinformation. Sensitive issues such as tuition, academic status, and personal records should always be transferred to authorized staff.

### 5.2 AI-Supported Digital Learning Material Development

Digital learning resources are essential in distance education, and AI can substantially improve productivity in this area. Still, human validation remains mandatory.



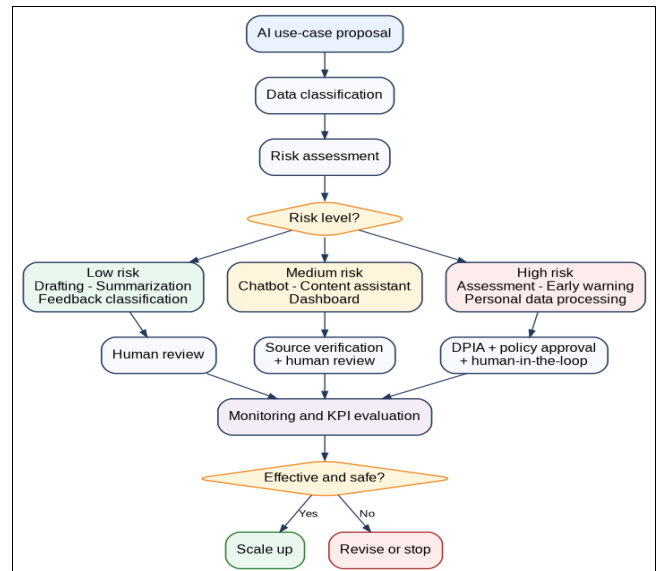
**Source:** Developed by the authors based on the digital learning material production workflow.

**Fig 4:** AI-supported digital learning material development process

This process ensures that AI-generated materials are reviewed for academic accuracy, pedagogical appropriateness, copyright compliance, and technical compatibility before publication.

### 6. Risk-Based Implementation

Not all AI use cases should be implemented in the same way. A risk-based approach helps institutions prioritize safe and practical adoption.



**Source:** Developed by the authors based on institutional use-case classification and AI risk management principles [3].

**Fig 5:** AI risk-based implementation matrix

Low-risk use cases such as administrative drafting and report summarization can be piloted early. Medium-risk applications such as chatbots and content assistants require controlled implementation. High-risk applications, especially those involving assessment or personal data, require strict approval, impact assessment, and human oversight.

### 7. Phased Roadmap for Adoption

AI should be adopted gradually. A phased model allows institutions to test solutions, monitor risks, and improve governance over time.



**Source:** Developed by the authors from the proposed implementation roadmap.

**Fig 6:** Phased roadmap for AI adoption in open and distance education

This roadmap begins with readiness assessment and small-scale pilots before progressing to integration, standardization, and long-term sustainability.

### 8. Discussion

The analysis shows that AI can bring major benefits to open and distance education, but only if institutions adopt it in a structured and responsible way. The real value of AI lies not in replacing human professionals, but in augmenting their capacity. Administrators can work more efficiently, learners can receive faster support, instructors can develop content more productively, and managers can access better evidence for decision-making.

At the same time, AI must not be introduced without governance. The proposed five-layer framework, chatbot workflow, risk matrix, and implementation roadmap

together provide a practical approach for institutions seeking to adopt AI safely and effectively. A gradual, risk-based, human-centered approach is therefore more appropriate than uncontrolled technology-driven experimentation.

## 9. Conclusion

AI has strong potential to improve open and distance education through better learner support, more efficient administration, enhanced digital learning resources, and more intelligent use of data. However, these benefits can only be realized when institutions also address privacy, ethics, academic integrity, governance, and staff capacity.

This paper proposes a concise institutional framework for responsible AI adoption. The framework emphasizes five integrated layers, a retrieval-based chatbot model, AI-supported content development, risk-based implementation, and phased deployment. In this way, AI can become a sustainable capability that strengthens educational quality and institutional effectiveness rather than a source of unmanaged risk.

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