

Unlocking the Potential of Open and Distance Learning with Artificial Intelligence

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Abstract—The integration of Artificial Intelligence (AI) in the field of education presents a vast array of possibilities, particularly for Open and Distance Learning (ODL) institutions. AI offers various ways for open universities to tackle challenges in areas such as learning, teaching effectiveness, and the advantages and limitations of computer-based systems in education, which are crucial for ODL institutions that heavily rely on human-machine interactions. Indira Gandhi Open University in India, has been utilizing information and communication technologies (ICTs), including AI, to enhance its operations and services for the past seven years. Although AI has not yet been fully implemented in education, IGNOU recognizes its potential to improve quality, pedagogy, and the overall teaching and learning experience. The purpose of this study is to explore how AI can be utilized in ODL institutions, with a focus on expert systems for program advising, automated class scheduling, assignment grading, plagiarism detection, learner retention and adaptation to diverse needs and backgrounds, property maintenance, and security. IGNOU is optimistic that AI has the potential to bring about a significant and positive transformation in ODL and shape the future of open and distance learners.

Keywords— AI, ODL, ICTs, IGNOU.

I. Introduction

The use of technology in education has a long history. Open and Distance Learning (ODL) started as simple correspondence courses through the mail, then progressed to TV and radio broadcasts. Today, it encompasses the complex and seemingly limitless realm of the internet. With the emergence of a new generation of tech-savvy working professionals and the growing demand for advanced information, technology is expected to be a driving force in the continued growth and development of ODL (Casey, 2008).

The integration of technology in education has affected the way courses are taught and educational services are delivered. With increasing importance of human-machine interactions in ODL, there is growing recognition of a paradigm shift towards Machine-Assisted Learning (Schmidt, Cottier, and Choquet, 2004).

ODL institutions have the potential to enhance the teaching and learning experience through the implementation of technology, specifically AI. The personalization, adaptability, customization, and interactivity provided by AI will cater to the demands of learners seeking a "just in time, just enough, and just for me" learning experience (Bamberger, 2004). The focus will shift from showcasing what the computer can do to understanding the needs and activities of the learner (Schmidt, Cottier, and Choquet, 2004).

ODL institutions need to embrace the potential of AI in

providing a personalized, student-centered, and self-directed learning approach. With the advancements in technology, AI can be integrated into ODL in various ways, leading educational technologists to be optimistic about its future application. Moving away from a standard, one-size-fits-all approach is crucial and AI is seen as an essential tool to achieve this goal.

The definition of AI is "the intelligence of machines and the branch of computer science aimed at creating it" (Wikipedia). It's also considered as "the study of the design of intelligent agents" (Poole, Mackworth and Goebel, 1998). In education, it refers to "computer software that mimics human intelligence" (Stahl, Koschmann and Suthers, 2006). AI can be used in various aspects of ODL such as course management, learning management systems, support services, and university operations. At Indira Gandhi Open University (IGNOU), AI is believed to be a crucial factor in improving the ODL experience.

Indira Gandhi Open University (IGNOU), established in 1985, is a globally recognized institution that offers 281 academic programs, incorporating a blended pedagogical approach that involves online learning, self-managed learning, and face-to-face tutorials conducted at 67 IGNOU regional centres. This paper aims to showcase Indira Gandhi Open University (IGNOU) perspective on AI as a versatile tool that can be employed not only to enhance its academic offerings and educational materials but also to bolster security measures, manage physical infrastructure, and above all, cater to the diverse needs and

characteristics of its learners. Therefore, this paper endeavors to provide insights into how AI can complement and improve the ODL experience at Indira Gandhi Open University (IGNOU).

II. Incorporating AI in ODL

The integration of AI, computational intelligence, computer support for learning, and other ICTs in education has facilitated a shift from a one-size-fits-all approach to a more personalized and learner-centered approach. By leveraging AI, education technologists aim to add adaptable, human-like features to online and distance learning environments. The ODL system has transformed from a purely technical orientation to a socio-technical one, moving from replacing human activity to augmenting it. (Schmidt, Cottier, and Choquet, 2004; Santos et al, 2007).

Therefore, in this paper, we aim to explore different ways in which AI could be applied in an online distance learning (ODL) setting, including: using AI as an expert system for program advising, automating class scheduling, grading assignments, detecting plagiarism, personalizing education for diverse learners, managing physical assets, and enhancing security measures.

Expert system for programme advising.

In this paper, we would like to highlight a challenge faced by prospective students at Indira Gandhi Open University (IGNOU), which is selecting the appropriate program. The university offers wide range of programs across five faculties. The current process for program selection involves seeking advice from university consultants and staff, but it has been found to be tedious and repetitive in nature.

An expert advice system incorporating AI could solve the issue of tedious and repetitive program selection currently faced by prospective learners at IGNOU. The system could ask basic questions regarding the learner's education background, career goals, interests, and skills to make personalized program recommendations. The AI-backed system could enhance the accuracy of program suggestions and benefit each new learner. Ultimately, the learner can seek additional guidance from a human academic advisor.

Automated scheduling of classes.

Indira Gandhi Open University (IGNOU) has roughly 4 lakhs learners at various levels and stages of study enroll in the University's offering 281 programs. Additionally, the University employs about 3,500 part-time tutors. Managing such a large number of learners and courses, along with the scheduling of classes, can be challenging and prone to difficulties, both for the learners and the University administrators. Despite using basic computer programming, Indira Gandhi Open University (IGNOU) believes AI could further streamline the process and improve the scheduling procedure.

An intelligent pedagogic agent can be integrated into IGNOU's myLMS. This agent would be designed as a personal timetable scheduler, utilizing AI's problem-solving and planning capabilities. By gathering the learner's individual data, the agent acts as an assistant, streamlining necessary information to assist with decision-making tasks. Automating class scheduling with this AI-powered agent ensures seamless coordination, avoiding any scheduling conflicts.

Marking of assignments.

Throughout their studies at IGNOU, learners are evaluated using a combination of continuous assessment (such as assignments and mid-term exams) and final exams. The success of learners, particularly in exams, is a key measure of a university's success and reflects the effectiveness of its tutors, classes, and courses. Typically, during a semester, learners are expected to complete between one to three assignments, based on the number of courses they are enrolled in. Tutors must then grade the assignments and offer constructive feedback to the learners.

However, there's a problem of quality and standardization in the grading of assignments, which is a challenge due to the overwhelming number of assignments submitted by 3,500 active tutors and 4 lakhs active learners during a single semester. This, along with the differences in skill, attention, and experience of the tutors, can impact the overall quality of the assessment methods. Additionally, disparities in assignment scores and grading techniques between tutors and learning centers have been observed by IGNOU, thereby highlighting the need for improved standardization.

IGNOU recognizes that a random approach to marking assignments can provide a general overview of tutor marking practices.

Another possibility is to incorporate AI in the process, by allowing machines to automatically grade assignments that are submitted electronically by learners.

An online interface can be utilized to establish grading criteria, with the option to assign marks, provide comments, and impose penalties for errors specified for each criterion. This AI system can then scan the learner's work for answers and points, providing consistent and high-quality grading.

Additionally, the system can be programmed to deliver personalized feedback to each learner via email.

Implementing this system in ODL, where electronic submissions are prevalent, would be advantageous in maintaining consistency and quality in marking and feedback to learners.

Plagiarism detection.

The abundance of information available on the internet can both benefit and harm education. While the web offers students vast opportunities to expand their knowledge, it also provides the means for them to engage in plagiarism when completing assignments and dissertations.

Plagiarism.org, the world's first online plagiarism detection service, has identified various types of plagiarism frequently used by students, including "The Ghost Writer" (submitting someone else's work verbatim as their own) and "The Photocopy" (copying large amounts of text from one source without modification). In essence, students often engage in excessive "copying and pasting."

Such behavior not only reflects one's personal values, but also undermines the reputation of the university.

To detect plagiarism, two methods are available: attribute counting and structure-based detection. The latter is more commonly used for detecting code plagiarism, while both can detect general document plagiarism. Commercial anti-plagiarism systems, such as Turnitin and iThenticate, are accessible online. iThenticate is for corporate use, while Turnitin is for educational institutions and can be integrated into their CMS or LMS. These systems aim to address the use of unoriginal material from various sources like the web, magazines, journals, etc.

Plagiarism detection using AI is possible through a web-based application similar to a search engine. The system searches for patterns or matches in available databases and archives, producing statistical reports that can be analyzed by tutors or lecturers. Implementing such a system in a university like IGNOU would contribute to quality assurance and serve as a warning to students to avoid plagiarism in their studies.

III. Retaining learners and adapting to their diverse needs and backgrounds

Retaining students is a significant challenge for ODL institutions. Balancing multiple responsibilities and feeling isolated can lead to low motivation and high dropout rates. Diversity also plays a role, with factors like prior education, work experience, socio-economic status, and cultural and gender differences affecting learning approaches. High attrition not only impacts the University's revenue, but also hinders national human capital development. To address this, it's crucial to understand the learner's needs and predict the impact of technological techniques on learning (Schmidt, Cottier and Choquet, 2004). Questions such as what learners are doing within the learning environment and how they utilize available technology for learning need to be answered. Additionally, learners want more control over both their learning process and content (Schmidt, Cottier and Choquet, 2004).

To improve learner success and reduce failure rates in ODL institutions, understanding the needs and diversity of students is crucial. Analyzing the reasons behind high drop-out rates is necessary to help prevent it. Introducing two computer-assisted methods, developing user models and using intelligent pedagogic agents, can aid in understanding failure and retaining learners. User models, utilizing AI algorithms and performance indicators, can

predict the performance of high-risk learners and allow tutors to take proactive steps to help retain them. This "early warning and reaction system" offers tutors a chance to provide necessary support before exams, thereby reducing the risk of failure. (Sources: Hadzilacos, Kalles, and Pierrakeas, 2008)

The definition of "Intelligent pedagogic agents" according to Jafari (2002) is a collection of software tools connected with other apps and databases operating within one or multiple computer environments. They can be integrated into the CMS or LMS of the University, performing various tasks such as scheduling classes for learners, monitoring progress and participation, overseeing message boards, and sending reminders through email, thereby reducing the manual workload for instructors/tutors in managing course activities. The functions of these agents, as outlined by Gregg (2007), are illustrated in Figure 1.

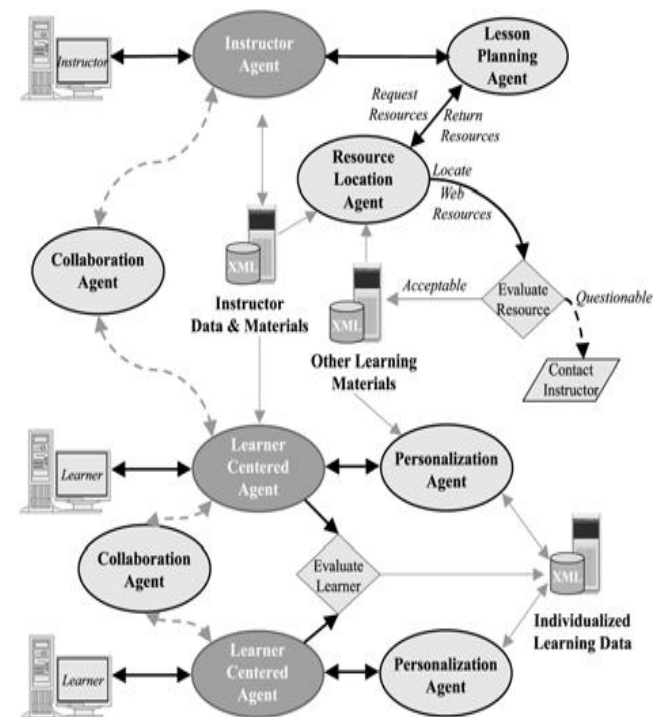


Figure 1: A proposed architecture of intelligent agents in e-learning.

Source: Gregg, 2007.

The role of intelligent pedagogic agents goes beyond just automated tasks. They can also serve as learning companions, simulating social interaction in the virtual learning environment (Kim and Baylor, 2006). AI researchers are exploring ways to utilize these agents to enhance feedback and interaction, making their future in educational applications promising (Garrett and Roberts, 2004). Intelligent agents in education and ODL can have cognitive abilities, act as intermediaries between individuals and programs, function as smart assistants, take the form of anthropomorphic characters, and mimic human mental states (cited in Garrett and Roberts, 2004).

Intelligent agents can also play a motivational role in retaining learners and promoting diversity. By recognizing

patterns in a learner's study habits, the agent can be designed to work with the learner and aid the learning process through personalized feedback. The agent can be made to act as a supportive partner or friend, showing interest in the learner's progress, boosting enthusiasm and making learning more enjoyable. It can also offer feedback to prevent frustration and maintain the learner's interest. The agent can serve as an expert, tutor, mentor or learning companion in the virtual learning environment (Kim and Baylor, 2006).

To ensure a positive learning experience for students, it is crucial for the University to regularly maintain the 67 nationwide learning regional centers that serve both administrative and educational purposes. These centers typically include general facilities, office spaces, classrooms, computer labs, and libraries. It is essential that these infrastructures are kept in good condition to provide a suitable environment for learners, regardless of their location.

The maintenance of IGNOU's 67 regional learning centers across the nation, equipped with administrative and learning amenities like offices, classrooms, labs, and libraries, can be challenging, particularly with energy consumption and managing air-conditioning, security, and electrical devices. However, AI and automation can simplify maintenance tasks and make the centers "smart spaces" with interactive and integrated devices that can adapt to the environment. By different machine learning methodologies, the facilities can be monitored and managed remotely and intelligently, ensuring their quality and promoting smart energy usage to reduce expenses and conserve the environment.

In terms of security, IGNOU not only needs to ensure the safety of its buildings and offices but also secure its examination process. There have been incidents of cheating in exams, like impersonation and use of prohibited aids. AI can play a role here by providing information security and preventing unauthorized access to confidential information. Additionally, biometric technologies like retinal scans and fingerprinting can be employed during exams to confirm the identity of test-takers. Although this may seem extreme in an educational setting, it will add to the transparency and security of the examination administration.

IV. Conclusion

Schmidt, Cottier, and Choquet (2004) highlight the potential of AI in ODL due to its ability to mimic human intelligence and solve complex problems. They believe that the diversification of AI has allowed for machines to reason like humans and for humans to teach machines to teach humans. AI is seen as an essential part of ODL development to address issues of security, quality assurance, and enhance personalized learning experiences.

Although the integration of AI in education may seem futuristic, the authors note that the internet was once thought impossible. In the future, AI-powered pedagogic agents could become a common feature in ODL systems, including IGNOU's myLMS, to make learning more fun.

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