IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 8, June 2025
Impact Factor: 7.67

AI in Rajasthan Colleges: A Multifaceted Examination of Implementation Hurdles

Dr. Leena Bhatia[1] and Dr. Dhiraj Sharma[2]
Assistant Professor, Business Administration
Shri Kalyan Rajkiya Kanya Mahavidyalaya, Sikar, Rajasthan[1]
Assistant Accounts Officer, Jaipur Vidyut Vitaran Nigam Limited (A Rajasthan Govt. Undertaking), Jaipur[2]

Abstract: *The Research Paper is all about the hurdles in integration of Artificial Intelligence in Higher Education System of India. The researcher found three main classes of hurdles while implementation of AI based Adaptive learning management System; technological, infrastructural, and human. The research reveals that interest in AI and its potential benefits are not sufficient for practical implementation of AI in higher education system of Rajasthan. Specifically, lack of adequate infrastructure and deviation of perceived knowledge of academician than required, are primary hurdles in practical implementation of Adaptive learning management system.*

Keywords: AI based adaptive learning management system(LMS), technological hurdles, infrastructural hurdles, human hurdles, perceived knowledge

I. INTRODUCTION

This article is discussing all about the problems and barriers, that are generally been facing by the educational institutions of Rajasthan (Specifically Higher education institutes) in implementing AI based teaching environment. In this article, we categorized the hurdles, in three broad categories (1) technological, (2) infrastructural, and (3) human factors
However, Colleges and universities in India, are trying to understand the AI based learning management system and during this attempt, these institutions are facing some ever first challenges in regulating this system.

AI Tools and Techniques in Indian Education

To know the problems faced by the Rajasthan Higher Education system in implementing AI based LMS, it is imperative to interviewed with the AI tools and techniques prevailing in Rajasthan Higher Education system. Generally, these higher education institutions are outsourcing or using various prevalent AI platform, instead of developing their own system or software. Some of them, are as below:-

Platform	Key Features	Target Users
Mintbook, Moodle, Canvas LMS	Online and blended learning models, centralized access to eLearning resources, mobile compatibility	Schools and colleges
e-khool	AI-driven guidance, personalized learning paths	Coaching institutes, universities, colleges, and schools
Byju's, Vedantu	Personalized learning pathways based on individual student needs and learning styles	Students

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 8, June 2025
Impact Factor: 7.67

Platform	Key Features	Target Users
Labster, Quizizz	Interactive and immersive learning experiences, increased student engagement and motivation	Students
Paradiso LMS	User-friendly interface, compatibility with various content formats, supports small-scale and large-scale learning initiatives	Educators, trainers, organizations
Schoox	Automated skills mapping, microlearning content generation	Learners, admins
Absorb LMS	AI-powered content creation, learner recommendations	Learners

Besides above, the AI is being used as below for betterment of learning process:-

For Appraisal of skills, feedback and Review: - AI can imitate and interact with learner through algorithms and can appraise learners' skills and pace of learning and adjust learning path and syllabi through the various techniques namely Natural Language Processing(NLP) Techniques, Machine Learning (ML) Algorithms. On subsequent stage, AI can review and evaluate the learning outcomes of a learner and give feedback.

Correction System/Filling the knowledge gaps: In adaptive learning management system, AI can find the knowledge gaps in grasping the concept by a learner by following techniques :-

- Adaptive assessment
- Performance tracking and Analysis
- Natural Language Processing (NLP)
- Eye Tracking and Biometric Data
- Error Analysis

And can provide remedial solution to filling these gaps by

- Personalized learning path
- Remedial Content Suggestions
- Intelligent Tutorial System (ITS)

Automating Administration Tasks: - AI can automate repetative tasks with absolute accuracy. For example, in a live class, daily attendance takes by the teacher, do waste precious time of a teacher and students as well. Likewise, preparation of report card. AI can automate these processes and the time saved by this process, can be used for useful discussions.

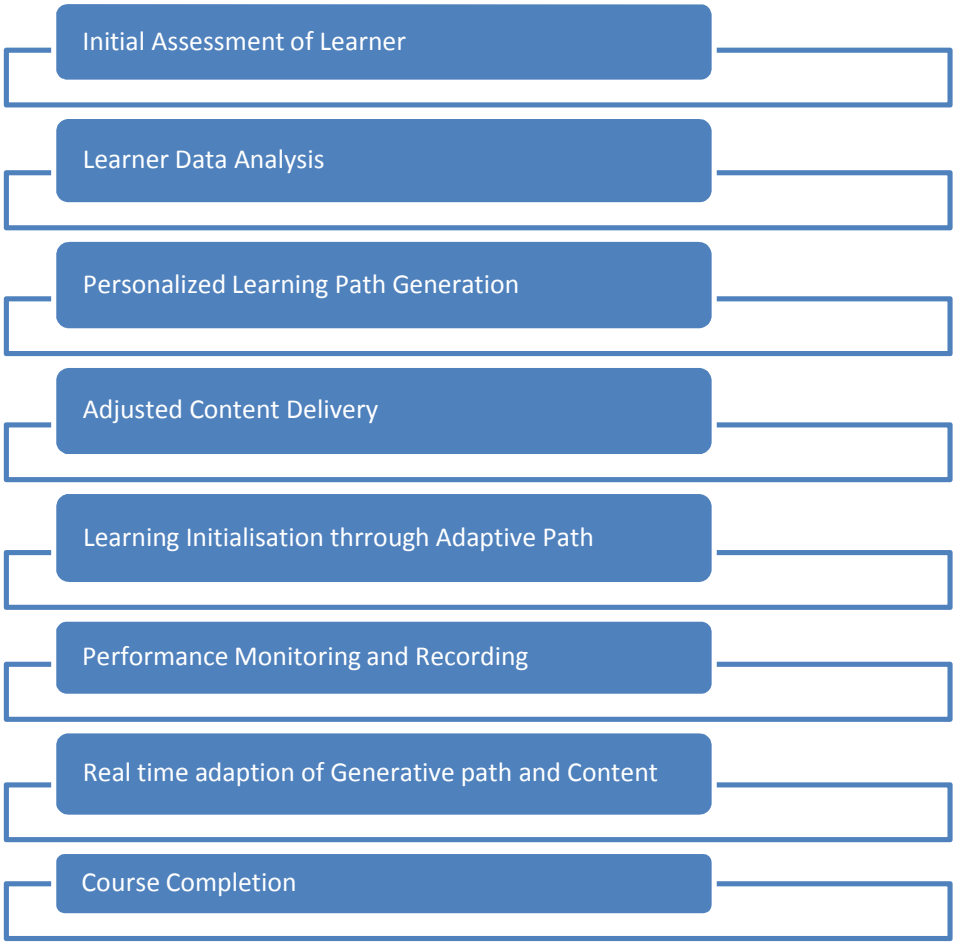
Content curation: - Curation is the process of selecting, sorting and presenting the pre-determined data set and information. AI can do these tasks in very short of time span and can arrange this content as per personal need of each student.

Predictive analytics: Predictive analytics is the declaration of possibility of an outcome based on the historical data. Predictive analytics do not provide any guarantee regarding any outcomes but it can calculate possibilities to occur an event. In adaptive learning, AI does use the student's past data to predict future failure areas and by this we can work on that specified area for best result.

These uses are merely some illustrations of AI in education. Uses areas can be vast as per personalized need of student that also be assessed by the AI itself. A successful implementation of AI in education is totally depends on data provides to algorithm, therefore, one should very careful while training the algorithm. It saves the mechanism from biasness.

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 8, June 2025
Impact Factor: 7.67

Procedural Flow Chart of Adaptive Learning Management System



Technological Integration in India's National Education Policy (NEP) 2020

India's National Education Policy 2020 will be a guiding document to achieve the sustainable goal in Indian Educational Framework. This policy emphasizing critical thinking and innovations unlike rote learning given in conventional learning. This policy is essentially focusing on technical integration in education system and learning process by which the coming generation of youth will be able to cop-up with globalised demand of tech-ready human force. NEP 2020 agree and advocates for technical inclusion education system for:

Creating a Holistic Learning Environment: It endeavors to steer learning via an educational philosophy that accentuates holistic development.

Promoting Regional Languages: Technology can be employed for the development of e-courses and virtual laboratories in regional languages, thereby enhancing the accessibility of education.

Equitable Access to Technology: NEP 2020 accentuates the significance of investment in open public digital infrastructure to guarantee that all learners have access to technological resources.

Transforming Higher Education: The policy envisages a paradigm shift towards learner-centric pedagogy in higher education, with technology assuming a pivotal function in the facilitation of this transformation.

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 8, June 2025
Impact Factor: 7.67

Higher Education Growth and Faculty Landscape in Rajasthan

There is a great growth in higher education sector of Rajasthan after independence. Presently, there are 11 state universities and 7 deemed universities in Rajasthan, against 13 institutions at the time of independence.

The Commissionerate of college education is regulatory and responsible body in higher education sector of Rajasthan. There are 4500 teaching staff including Assistant Professor/Associate Professor/Professor/Librarians in government as well as private colleges in Rajasthan. As far as school education concerned, 3,90,871 teaching staff in government sector and 3,26,490 teaching staff are presently employing. However, despite of above employed numbers, there are 60% vacancies in state funded universities that is a significant number for need of quality education.

Infrastructure Requirement for AI in Education

For effectively implementation of AI in education, it is necessary that the institution should be equipped with the vigorous hardware, software and internet availability. In Rajasthan, this required infrastructure is biggest challenge in implementation of adaptive learning through AI.

AI mechanism for implementation of adaptive learning is required below mentioned component: -

High Performance Computing: - A handsome amount of computational power of CPU is imperative for AI workloads, specifically for deep learning task. However, CPU can handle fundamental AI works, while deep learning tasks can be well performed only by GPU (Graphics Processing Unit). GPU can perform deep learning task way faster than CPU. For example, depending on the specific AI tasks and scale of implementation, different types of GPUs are recommended: NVIDIA's T4; A10, A100 and H100.

Specialized Hardware: AI infrastructure often includes specialized hardware like GPUs and TPUs (Tensor Processing Units) to provide parallel processing capabilities and speed up machine learning tasks. GPUs are particularly well-suited for the matrix and vector computations common in AI tasks.

Data Storage and Management The first thing is to keep your data storage and management system safe while it handles the volume and complex. At the same time we need efficient solutions, including ways of warehousing such vast new resources as those generated by educational analytics. Different types of data must be managed. This is a far cry from managing the paperwork involved in education except that it's the kind of “paperwork” the computer can't handle alone since it has many dimensions.

- Building the software stack: In order for an AI application to operate smoothly and effectively, it will require a full software system. Included in this [all-singing, all-dancing] package are libraries of machine learning tools and frameworks (such as TensorFlow, PyTorch, Scikit-learn), programming languages (Python), or even distributed computing platforms (Apache Spark, Hadoop). With this software stack, developers have the means to write code and run applications in an environment specifically geared toward AI software development. They also get facilities for maintaining stack libraries.
- Networking: The AI infrastructure inevitably includes numerous subnets and clusters linked amorphously together by high-performance networks. The bandwidth, or capacity to process data, must be high enough for This is recomputed automatically when the total bandwidth used cuts across entire industry sectors in different countries.

Factors Hindering AI Adoption in Rajasthan Colleges and Universities

Infrastructural Constraints: As stated earlier, the Adaptive learning through AI in Higher education requires an adequate amount of infrastructure. This infrastructural need included hardware requirement and software requirement.

Most of the colleges in Rajasthan, specifically government colleges are lacking with basic requirement of IT infrastructure. However, fulfilment of basic requirement of IT infrastructure, does not comply the requirement of effective implementation of adaptive learning system. The basic computer system cannot handle the machine learning task.

However, Engineering colleges and private sector owned colleges are encompassing that required number of infrastructural needs but the number of engineering colleges in Rajasthan are not in such sufficient number that effect the hypothetical need of research.

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429 Volume 5, Issue 8, June 2025 Impact Factor: 7.67

Perceived Level of Knowledge Among Faculty

Due to inherent nature of learning of academicians, faculties are showing their interest in AI and their tools in higher education, but for teaching a stream one should possess a perceived level of knowledge in that specific branch. It is the primary factor that hinders the application of AI in education in full swing in Rajasthan's Higher education system. Encompassing a perceived level of knowledge of AI and its tools, is proving an important hindrance in implementation of AI in higher education systems in Rajasthan. This is as important as the infrastructural needs.

Various study shows that academicians serving in Indian Higher Education having a moderate level of knowledge of AI integration in higher education system that is lesser than the required perceive level of knowledge. The knowledge plays a driver's role and infrastructure needs plays a Car's Role. While a well feature loaded car is desired for great driving experience however, driver is essential for each type of car.

Skills are more humanise than the knowledge. Use of AI is becoming a skill set due to the inherent nature of machine learning. AI works on prompts given by human. Merely possessing a knowledge of a branch can not replace the requirement of skill set in a branch. Knowledge become a skill set if it regularly practised in day to day working.

Researches are showing that faculties are lacking to training of how to use AI knowledge in their day-to-day teaching practice.

Therefore, it can be concluded that the practical training and hands on experience may enhance the chances of successful implementation of AI in higher education system.

Curriculum design

The state universities are responsible for curriculum creation and regulation thereof for higher education institutions under their jurisdiction. Existing curriculum for degree courses is not included the AI curriculum as a form part of their courses. If corresponding artificial intelligence to their stream, is included in the curriculum of degree courses as a form part, then the both pillar for effective implementation of adaptive learning i.e. Infrastructure and required perceived knowledge will automatically be fostered by the Curriculum.

Benefits of AI in Education

- **Personalized Learning:-** Adaptive learning management system starts with assessing of the learner's pace by interacting with the learner and designing the learning path as per the learner's pace so assessed. Personalised learning is the product of AI implementation of AI in education system. By the help of personalised learning, every student may get personal attention from his teacher/ educator. On the other edge of the rope, the teacher may get personalised data of every student as per performance of the student.
- **Improved Efficiency: -** The AI implementation in learning management system, can save the time of educators, by automating repetitive functions like grading, and feedback systems. This saved time can be used by the educator for more focused teaching and may help to improve the productivity of a teacher.
- **Enhanced Engagement: -** The Integration of AI enhances the engagement of students. Study material can effectively present to the learners by the help of AI Assisted tools. Learner's continuous engagement is key benefit of Personalised learning.
- **Data-Driven Insights:-** In adaptive learning management system, AI interact with the learner, analyse the patterns of response and learning pace. By this process, AI marks the specified areas where the learner is feeling uncomfortable and struggling in response. AI provides instructional feedback to the learner for improving his lacking areas.
- **Enhanced Information Management:** Learning personalization, real-time data analysis, and optimization of education resources are three core areas where AI can facilitate the educator for better information management.
- **Development of Smart Learning Systems:** AI can be employed to develop smart learning systems that can change content and teaching strategies dynamically to suit the students' needs and learning styles.

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429 Volume 5, Issue 8, June 2025 Impact Factor: 7.67

- **Enhance Content Accessibility:** AI has the capability to enhance content accessibility for students with disabilities, e.g., visually challenged students, by text-to-speech conversion, creating alternative formats such as braille, and making content available in various languages.
- **Encouragement of Active and Self-Regulated Learning:** AI can encourage active learning, self-regulated learning, and adaptive learning experiences across different learning environments

Side Effects of AI in Education

- **Biasness**: - The outcome of machine learning is totally depend upon the data feed initially to algorithm and process of data feed is an humanise process. Therefore, we can't be denied from the fear of biasness during adaptive learning management system
- **Over-reliance on AI** :- AI has capabilities to automate repetitive task that mitigate the administrative burden of educator. It may increase dependency upon the AI and may reduce the efficiency of the educator.

Hypothesis Evaluation

Based on the research findings, we can evaluate the hypotheses presented:

- **Ho1: Technological factor and infrastructure don't hinder the application of AI learning management system in colleges of Rajasthan.** This hypothesis has been rejected. This research and other researches showed that successful implementation of adaptive leaning management system is primarily depends upon the infrastructure available in institution.
- **Ho2: Knowledge of AI teaching tools and adaptive learning management system among the faculties does not hinder the implementation of AI learning management system in colleges of Rajasthan.** This hypothesis is also rejected. The research suggests that while awareness of AI tools may be present, a lack of practical training and confidence among faculty can hinder the effective implementation of AI-based teaching methodologies.

II. CONCLUSION

The integration of AI in education will prove a mile stone in Rajasthan's colleges and even in entire education system of Rajasthan. This integration is offering personalised learning, improved efficiency, greater engagement, enhanced content accessibility. However, the hurdles like robust infrastructure, perceived knowledge and lack of hand on training are preventing successful implementation of adaptive learning management system. Development of AI infrastructure will attract a handsome amount of budget in Rajasthan's Government colleges. It can be implemented by the inclusion of yearly budget of Rajasthan Government. On the other hands, hands on training to academician is as important as robust infrastructure. While, this research shows that academicians have a good amount of knowledge of AI implementation in education system, however, hands on training is must for academician. It can easily be done by the conferences, seminars and training session by the government and Regulatory Universities. It is also come in to cognition during this research that integration of AI curriculum in university syllabus will foster the successful implementation of AI.

REFERENCES

[1]. Learning Management System Software in India | Mintbook, accessed on December 27, 2024, https://mintbook.com/blog/learning-management-system-software-india/

[2]. Top 10 learning management system in India boosted with AI - e-khool LMS Software, accessed on December 27, 2024, https://ekhool.com/blogs/top-10-learning-management-system-in-india-boosted-with-ai

[3]. How to Harness AI in Schools: Opportunities and Challenges Ahead - INDIAai, accessed on December 27, 2024, https://indiaai.gov.in/article/how-to-harness-ai-in-schools-opportunities-and-challenges-ahead

[4]. Top 10 AI Based LMS In India for 2024, accessed on December 27, 2024, https://www.paradisosolutions.com/blog/top-ai-based-lms-in-india/

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 8, June 2025
Impact Factor: 7.67

[5]. Top LMS Platforms With The Best AI Tools For Training And Education In 2024, accessed on December 27, 2024, https://elearningindustry.com/best-ai-tools-for-training-and-education-top-lms-platforms

[6]. 11 AI LMS for AI-Powered Learning - WorkRamp, accessed on December 27, 2024, https://www.workramp.com/blog/ai-lms/

[7]. AI-Based Learning Platform: Examples, Features, and Top LMS on the Market - Deel, accessed on December 27, 2024, https://www.deel.com/blog/ai-based-lms/

[8]. Developing an AI-based Learning Management System - Apriorit, accessed on December 27, 2024, https://www.apriorit.com/dev-blog/757-ai-for-lms

[9]. NEP 2020 and Technology Integration in Schools: Enhancing Digital Learning | LearnQoch, accessed on December 27, 2024, https://www.learnqoch.com/nep-2020-and-technology-integration-in-schools-enhancing-digital-learning/

[10]. NEP's Transformational Vision: Embracing Digital Technology for Holistic Education, accessed on December 27, 2024, https://education.economictimes.indiatimes.com/news/emerging-technologies/neps-transformational-vision-embracing-digital-technology-for-holistic-education/102499453

[11]. INTEGRATION OF TECHNOLOGY IN EDUCATION IN NEP-2020 - SREE CHAITANYA MAHAVIDYALAYA, accessed on December 27, 2024, https://sreechaitanyamahavidyalaya.in/e-journal/journal/journalbkend/paper_list/Sonali_roy_ch_ghosh.pdf

[12]. (PDF) "Transforming Higher Education: Exploring the Impact of NEP 2020 Implementation in India" - ResearchGate, accessed on December 27, 2024, https://www.researchgate.net/publication/375672448_Transforming_Higher_Education_Exploring_the_Impact_of_NEP_2020_Implementation_in_India

[13]. EMPOWERING EDUCATION: INTRODUCING TECHNOLOGY IN THE CLASSROOM FOR NEP 2020 IN NORTH-EAST INDIA - NagaEd, accessed on December 27, 2024, https://www.nagaed.com/introduce-technology-classroom-nep-2020/

[14]. higher education in rajasthan, accessed on December 27, 2024, https://collegeeducation.rajasthan.gov.in/httpdocs/eprc.htm

[15]. Department of College Education - HTE Rajasthan, accessed on December 27, 2024, https://hte.rajasthan.gov.in/dept/dce/about-us.php

[16]. Latest School Teachers Statistics in India - Ezyschooling, accessed on December 27, 2024, https://ezyschooling.com/parenting/expert/school-teachers-statistics-in-india

[17]. Faculty Shortage: Rajasthan Universities Struggle with 60% Vacancies in Teaching Posts | Jaipur News - Times of India, accessed on December 27, 2024, https://timesofindia.indiatimes.com/city/jaipur/rajasthan-universities-struggle-with-60-vacancies-in-teaching-posts/articleshow/109849425.cms

[18]. India - teachers in universities and colleges by state 2015 - Statista, accessed on December 27, 2024, https://www.statista.com/statistics/617519/teachers-in-universities-and-colleges-by-state-and-union-territory-india/

[19]. What are the infrastructure requirements for Artificial Intelligence? - Leaseweb Blog, accessed on December 27, 2024, https://blog.leaseweb.com/2019/07/04/infrastructure-requirements-ai/

[20]. AI Infrastructure: Tutorial & Best Practices - Nexla, accessed on December 27, 2024, https://nexla.com/ai-infrastructure/

[21]. What is ai infrastructure? | IBM, accessed on December 27, 2024, https://www.ibm.com/think/topics/ai-infrastructure

[22]. AI Infrastructure: 5 Key Components & Building Your AI Stack - Run:ai, accessed on December 27, 2024, https://www.run.ai/guides/machine-learning-engineering/ai-infrastructure

[23]. How to Get Infrastructure Requirements for Artificial Intelligence Right - Wipro, accessed on December 27, 2024, https://www.wipro.com/analytics/how-to-get-infrastructure-requirements-for-artificial-intelligence-right/

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 8, June 2025
Impact Factor: 7.67

[24]. (PDF) Assessing the Knowledge and Perception of Artificial Intelligence for Teaching and Research among Lecturers in the Faculties of Arts in Nigeria - ResearchGate, accessed on December 27, 2024, https://www.researchgate.net/publication/381092991_Assessing_the_Knowledge_and_Perception_of_Artificial_Intelligence_for_Teaching_and_Research_among_Lecturers_in_the_Faculties_of_Arts_in_Nigeria

[25]. Assessment of Knowledge, Perceptions, and Challenges on the Use of Artificial Intelligence Tools among Academic Fraternity - ResearchGate, accessed on December 27, 2024, https://www.researchgate.net/publication/382463883_Assessment_of_Knowledge_Perceptions_and_Challenges_on_the_Use_of_Artificial_Intelligence_Tools_among_Academic_Fraternity

[26]. The impact of artificial intelligence on learner–instructor interaction in online learning - PMC, accessed on December 27, 2024, https://pmc.ncbi.nlm.nih.gov/articles/PMC8545464/

[27]. Incorporating Artificial Intelligence Into The Classroom: An Examination Of Benefits, Challenges, And Best Practices - eLearning Industry, accessed on December 27, 2024, https://elearningindustry.com/incorporating-artificial-intelligence-into-classroom-examination-benefits-challenges-and-best-practices

[28]. Challenges of Implementing AI in Education | BookBaker, accessed on December 27, 2024, https://www.bookbaker.com/en/v/The-Use-of-Artificial-Intelligence-in-Higher-Education-Challenges-of-Implementing-AI-in-Education/8afdedb6-a78b-4c2e-8783-f01bc749e803/17

[29]. JITE:Research - Inhibiting and Motivating Factors Influencing Teachers' Adoption of AI-Based Teaching and Learning Solutions: Prioritization Using Analytic Hierarchy Process - Informing Science Institute, accessed on December 27, 2024, https://www.informingscience.org/Publications/4640

[30]. 10 Advantages & Disadvantages of Artificial Intelligence in Education - Digiexam, accessed on December 27, 2024, https://www.digiexam.com/blog/advantages-and-disadvantages-of-artificial-intelligence-in-education

[31]. Unveiling the shadows: Beyond the hype of AI in education - PMC - PubMed Central, accessed on December 27, 2024, https://pmc.ncbi.nlm.nih.gov/articles/PMC11087970/

[32]. An explanatory study of factors influencing engagement in AI education at the K-12 Level: an extension of the classic TAM model, accessed on December 27, 2024, https://pmc.ncbi.nlm.nih.gov/articles/PMC11183040/

[33]. Behind the Scenes of Adaptive Learning: A Scoping Review of Teachers' Perspectives on the Use of Adaptive Learning Technologies - MDPI, accessed on December 27, 2024, https://www.mdpi.com/2227-7102/14/12/1413

[34]. What are the Benefits and Risks of Artificial Intelligence in Education? - eSchool News, accessed on December 27, 2024, https://www.eschoolnews.com/digital-learning/2024/02/05/what-are-the-benefits-and-risks-of-artificial-intelligence-in-education/

[35]. How to Navigate AI in Education: Benefits, Challenges, and Use Cases - Nomtek, accessed on December 27, 2024, https://www.nomtek.com/blog/ai-in-education

[36]. Teacher's Perceptions of Using an Artificial Intelligence-Based Educational Tool for Scientific Writing - Frontiers, accessed on December 27, 2024, https://www.frontiersin.org/journals/education/articles/10.3389/feduc.2022.755914/full

[37]. AI-powered LMS: Benefits, Cons, and Best Practices | KeenEthics, accessed on December 27, 2024, https://keenethics.com/blog/ai-based-learning-management-system

[38]. Impact of Artificial Intelligence on Learning Management Systems: A Bibliometric Review, accessed on December 27, 2024, https://www.mdpi.com/2414-4088/8/9/75

[39]. Artificial Intelligence and the Future of Teaching and Learning (PDF) - U.S. Department of Education, accessed on December 27, 2024, https://www.ed.gov/sites/ed/files/documents/ai-report/ai-report.pdf