ISSN–2278-5655

AMIERJ Aarhat Multidisciplinary International Education Research Journal

Volume–XIII, Issues– I / C Jan – Feb, 2024

OPEN ACCESS Original Research Article

ANALYTIC HIERARCHY PROCESS (AHP) - EVALUATION OF ARTIFICIAL INTELLIGENCE INTEGRATION IN EDUCATION FOR ENHANCING WORKFORCE

*** Dr. Florence Noah Christian**

** Senior Lecturer, Regenesys Business School.*

Abstract

The field of Artificial Intelligence (AI) has indeed experienced rapid growth and development, particularly with advancements in technology. Over the years, there has been significant progress in AI research, algorithms, and applications, leading to the integration of AI technologies in various industries and aspects of daily life. The growth of computing power, the availability of large datasets, and improvements in machine learning techniques have contributed to the expansion of AI capabilities, making it one of the most dynamic and impactful fields in modern technology. The spread of its application is seen across various domains and now in the education sector also. As the global economy undergoes rapid technological advancements, the role of AI in education becomes increasingly in preparing students for the demands of the future workforce. This research paper aims to provide concepts related to AI, a few components of AI in education and evaluation of the integration of artificial intelligence (AI) in educational using the Analytic Hierarchy Process (AHP) methodology. This study employs AHP to analyze and prioritize various aspects of AI integration in education, including ethical considerations, curriculum enhancement and personalized learning experiences.

***Keywords**: Analytic Hierarchy Process (AHP), Artificial Intelligence (AI), Education, Integration, criteria, weight*

Introduction:

Artificial intelligence (AI) refers to the development of computer systems that can perform tasks that typically require human intelligence. These tasks include learning, reasoning, problem-solving, perception, speech recognition, and language understanding. AI technologies aim to simulate intelligent behavior and improve the efficiency and effectiveness of various processes. In recent years, the intersection of AI and education has garnered increasing attention due to its potential to revolutionize traditional pedagogical approaches. As technological innovations continue to reshape industries, it becomes imperative to understand how AI integration can enhance educational practices and align them with the evolving needs of the global workforce. The rapid advancement of technology in the global economy necessitates an in-depth exploration of the role of artificial intelligence (AI) in education. This paper aims to evaluate and analyze the impact of AI on making education for enhancing workforce.

Research Objectives

1) To identify key components of AI integration in educational.
2) To evaluate the considerations associated with AI in education for better workforce.

Research Methodology:

Secondary data: Data is collected from various research papers, articles, reports and books.

Tool used:

The researcher employs the Analytic Hierarchy Process

ISSN–2278-5655

AMIERJ Aarhat Multidisciplinary International Education Research Journal

Volume–XIII, Issues– I / C Jan – Feb, 2024

OPEN ACCESS Original Research Article

(AHP) as a decision-making tool to systematically evaluate the prioritized criteria and alternatives of AI integration in education.

Limitations :

Due to lack of time only the weightage is studied by making use of secondary data

Key components of AI integration in education:

Identifying the key components of AI integration in educational involves understanding the various elements that contribute to the successful incorporation of artificial intelligence technologies. Few of the key components are

1) AI-Powered Educational Software: Integration of AI-driven software that supports various educational activities, such as tutoring, assessments, and adaptive learning platforms.
2) Learning Management Systems (LMS) with AI Features: Utilizing Learning Management Systems enhanced by AI to manage and organize educational content, assignments, and student progress.
3) Adaptive Learning Platforms: Implementing platforms that use AI algorithms to adapt learning content based on individual student performance and preferences.
4) Intelligent Tutoring Systems (ITS): Deploying AI-based tutoring systems that provide personalized feedback, guidance, and support to students, adapting to their individual learning needs.
5) Data Analytics Infrastructure: Establishing robust data analytics systems to collect, analyze, and interpret educational data for insights into student performance, engagement, and learning patterns.
6) Natural Language Processing (NLP) Tools: Incorporating NLP technologies to analyze and understand natural language, facilitating applications such as language learning and automated grading of written assignments.
7) Virtual and Augmented Reality (VR/AR): Integration of VR/AR technologies with AI capabilities to create immersive and interactive learning experiences.
8) Chatbots and Virtual Assistants: Implementing AI-driven chatbots and virtual assistants to provide instant support, answer queries, and facilitate communication within educational platforms.
9) Predictive Analytics for Early Intervention: Utilizing predictive analytics to identify students at risk of academic challenges, enabling timely interventions to support their learning journey.
10) Automated Grading and Assessment: Incorporating AI algorithms for automated grading and assessment of assignments, quizzes, and exams, providing timely and consistent feedback.
11) Personalized Learning Paths: Designing educational programs that offer personalized learning paths based on AI analysis of individual student strengths, weaknesses, and learning preferences.
12) Gamification and Simulation: Integrating AI-enhanced gamification and simulation tools to create engaging and interactive learning experiences, promoting active participation and experiential learning.
13) Ethical AI Considerations: Addressing ethical considerations related to AI in education, including transparency, privacy, and bias mitigation, to ensure responsible and fair implementation.
14) Teacher Professional Development Programs: Providing professional development programs for educators to enhance their AI literacy, teaching them how to effectively integrate and utilize AI tools in the classroom.

ISSN–2278-5655

AMIERJ Aarhat Multidisciplinary International Education Research Journal

Volume–XIII, Issues– I / C Jan – Feb, 2024

OPEN ACCESS Original Research Article

15) Collaborative Platforms and Social Learning: Implementing collaborative platforms with AI features that facilitate social learning, group projects, and peer collaboration.
16) Continuous Monitoring and Improvement: Establishing mechanisms for continuous monitoring of AI applications in educational settings, allowing for iterative improvements based on feedback and performance analysis.

Conclusion: Identifying and integrating these key components by applying them can contribute to the successful adoption of AI in education, ultimately enhancing the learning experience for students and supporting educators also to build up a better workforce in the future.

Analytical Hierarchy Process (AHP)

1. AHP stands for Analytic Hierarchy Process, and it is a decision-making methodology developed by Thomas L. Saaty. AHP is a structured and systematic approach to solving complex problems by breaking them down into a hierarchical structure of criteria, sub-criteria, and alternatives. It is particularly useful when dealing with multi-criteria decision-making scenarios.

2. Steps in Analytical Hierarchy Process (AHP)

1. Criteria Identification: Three criteria's Ethics under Ethical consideration, Load of curriculum under Curriculum enhancement and educational goal under personalized learning are considered for the study.
2. Select the Expert Panel: Formation of an expert panel comprising educators, AI specialists, and stakeholders in the education sector.
3. Pairwise Comparisons: Conducting pairwise comparisons to elicit expert judgments on the relative importance of identified criteria.
4. Consistency Checks: Implementing consistency checks to ensure the reliability of expert judgments.
5. Weight Assignment: Calculation of weights for each criterion based on expert judgments.
6. Alternative Evaluation: Assessment of alternative AI integration strategies against the prioritized criteria.
7. Sensitivity Analysis: Conducting sensitivity analysis to examine the robustness of the results.

3. Working: To prioritize the best aspect using AHP

1. Consider the Saaty Scale

1	Equal importance
3	Moderate importance
5	Strong importance
7	Very strong importance
9	Extreme importance
2,4,6,8	Intermediate
1/3, 1/5, 1/7, 1/9	Value for inverse comparison

Using the scale of relative importance for AHP the questions can be asked such as

1. How important is curriculum enhancement with respect to personalized learning?
2. How important is personalized learning with respect to ethical consideration?

2. Step 1: Pairwise comparison matrix

	Ethics	Load of curriculum	Educational goals
Ethics	1	7	3
Load of curriculum	1/7	1	1/9
Educational goals	1/3	9	1

ISSN–2278-5655

AMIERJ Aarhat Multidisciplinary International Education Research Journal

Volume–XIII, Issues– I / C Jan – Feb, 2024

OPEN ACCESS Original Research Article

Converting the fraction to decimal and sum of each column is calculated

	Ethics	Load of curriculum	Educational goals
Ethics	1	7	3
Load of curriculum	0.1429	1	0.1111
Educational goals	0.3333	9	1
Sum	1.4762	17	4.1111

Step 2: Normalized Pairwise matrix

To normalize divide every cell by its column total

	Ethics	Load of curriculum	Educational goals
Ethics	0.6803	0.4118	0.7299
Load of curriculum	0.0972	0.0588	0.0270
Educational goals	0.2268	0.5294	0.2433

Now we can see that the column total is 1. Hence it is normalized.

Criteria weight is the row total divided by number of criteria

	Ethics	Load of curriculum	Educational goals	Criteria Weight
Ethics	0.6803	0.4118	0.7299	0.6073
Load of curriculum	0.0972	0.0588	0.0270	0.0610
Educational goals	0.2268	0.5294	0.2433	0.3332

Step 3: To calculate the consistency

Multiply the column and the criteria weight of the pairwise matrix before normalization

Criteria weight	0.6073	0.0610	0.3332
	Ethics	Load of curriculum	Educational goals
Ethics	1	7	3
Load of curriculum	0.1429	1	0.1111
Educational goals	0.3333	9	1

After multiplication the matrix is given below

Criteria weight	0.6073	0.0610	0.3332
Ethics	0.6073	0.4270	0.9996
Load of curriculum	0.0868	0.0610	0.0370
Educational goals	0.2024	0.5490	0.3332

	Ethics	Load of curriculum	Educational goals	Weighted sum value	Criteria Weight	Ratio =Weighted Sum value/Critria weight
Ethics	0.6073	0.4270	0.9996	2.0339	0.6073	3.0490
Load of curriculum	0.0868	0.0610	0.0370	0.1848	0.0610	3.0285
Educational goals	0.2024	0.5490	0.3332	1.0846	0.3332	3.1556

ISSN–2278-5655

AMIERJ Aarhat Multidisciplinary International Education Research Journal

Volume–XIII, Issues– I / C Jan – Feb, 2024

OPEN ACCESS Original Research Article

Step 4: To find the consistency of the matrix

max = (3.0490+3.0285+3.1556)/3 = 3.0777

Consistency Index C.I $= \frac{\text{max} - n}{n - 1}$

$= (3.0777-3)/(3-1) = 0.038852$

Step 5: To find the consistency ratio

Random index table upto 10 criteria

Matrix size	1	2	3	4	5	6	7	8	9	10
Random consistency index	0	0	0.58	0.9	1.12	1.24	1.32	1.41	1.45	1.49

Source: https://www.researchgate.net/figure/Random-Index-RI-Saaty-1980_tbl2_323905554

Random index for n=3 is 0.58

Consistency Ratio = Consistency Index / Random Index = 0.038852 / 0.58 = 0.067

Consistency Ratio = 0.067 < 0.10

We can assume that the matrix is reasonably consistent. Decision making can be made continued with these weights.

The consistency test serves the purpose of mitigating the negative impact of deviations from actual conditions, ensuring that the decision results are both accurate and reliable.

Conclusion: It is observed that the weighted given to ethics is 60.73 %, load of curriculum is 6% and educational goal is 33.32%

Final Conclusion:

Curriculum enhancement, concerning the burden of curriculum load, often sees the addition of substantial content in educational systems. While this aspect is crucial, it might be ranked third in this context due to the common occurrence of adding content without ensuring its proper application. It should focus on adapting educational content to the changing landscape by incorporating AI-related topics, which will help students enhance their skills for a better workforce. Ethical considerations and personalized learning play roles in guiding and shaping curriculum changes. Ethical considerations weighed more than personalized learning which focuses on educational goals. This is because ethics plays a crucial role in establishing trust, reducing biases, and protecting the privacy and rights of students and educators. Next in line is Personalized Learning, which, though highly significant, is placed just below ethical considerations. Personalized Learning directly addresses individual student needs, enhancing the learning experience, but it operates within the broader framework shaped by ethical considerations. Integrating the said key components by applying them also can contribute to the successful adoption of AI in education which will lead to a better workforce. The conclusion will offer insights for educational policymakers, institutions, and educators to make informed decisions regarding the adoption and implementation of AI in education. Additionally, the study will highlight areas for further research and development in enhancing the synergy between AI and education to meet the challenges of the evolving global workforce.

References:

Göksel, N., & Bozkurt, A. (2019). (PDF) Artificial Intelligence in Education: Current Insights and Future Perspectives. ResearchGate.

ISSN–2278-5655

AMIERJ Aarhat Multidisciplinary International Education Research Journal

Volume–XIII, Issues– I / C Jan – Feb, 2024

OPEN ACCESS Original Research Article

https://www.researchgate.net/publication/332704741_Artificial_Intelligence_in_Education_Current_Insights_and_Future_Perspectives

Adams, R. L. (n.d.). 10 Powerful Examples Of Artificial Intelligence In Use Today. Forbes. Retrieved January 31, 2024, from https://www.forbes.com/sites/robertadams/2017/01/10/10-powerful-examples-of-artificial-intelligence-in-use-today/#3c7c80df420d

Seo, K., Tang, J., Roll, I., Fels, S., & Yoon, D. (2021). The impact of artificial intelligence on learner–instructor interaction in online learning. International Journal of Educational Technology in Higher Education, 18(1). https://doi.org/10.1186/s41239-021-00292-9

Chen, L., Chen, P., & Lin, Z. (2020). Artificial Intelligence in Education: a Review. IEEE Access, 8(2169-3536), 75264–75278. https://doi.org/10.1109/ACCESS.2020.2988510

Zhang, K., & Aslan, A. B. (2021). AI technologies for education: Recent research & future directions. Computers and Education: Artificial Intelligence, 2(100025), 100025. https://doi.org/10.1016/j.caeai.2021.100025 Ferguson, R. (2019). Ethical Challenges for Learning Analytics. Journal of Learning Analytics, 6(3), 25–30. https://eric.ed.gov/?id=EJ1237573

Bhanu, N. (August 1st, 2023) How AI can revolutionise education in India. The Times of India. https://timesofindia.indiatimes.com/blogs/voices/how-ai-can-revolutionise-education-in-india/

Analytic Hierarchy Process (AHP). (n.d.). Www.youtube.com. https://www.youtube.com/watch?v=J4T70o8gjlk&list=PLFsDe5VTL0GNqwwRzZKoitVnWgHIG9jjr

Cite This Article:

Dr. Christian F.N. (2024). *Analytic Hierarchy Process (AHP) - Evaluation of Artificial Intelligence Integration in Education for enhancing Workforce. In Aarhat Multidisciplinary International Education Research Journal: Vol. XIII (Number I, pp. 74–79).* ***AMIERJ.*** *https://doi.org/10.5281/zenodo.10657902*