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Ethical Considerations in Using Artificial Intelligence to Improve Teaching and Learning

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Abstract

One way that AI could improve the educational experience is by making it more individualized and efficient. However, there are a number of ethical concerns that have to be addressed as a result of this accomplishment. This study discusses some of the major ethical challenges posed by AI in the classroom, as well as some potential answers to those problems. The use of AI in the classroom raises serious questions about data privacy and security. Massive volumes of student data are collected and analyzed by AI systems, necessitating robust security measures. Clear communication and informed permission regarding data handling are crucial in solving these privacy issues. Another ethical problem with AI is the potential for discrimination and prejudice. As a result of inherent biases in their training data, AI systems may unfairly disadvantage specific demographics of students. Concerns about bias and unfairness in AI-powered learning technologies persist. Decisions made by AI must be explicable and open to scrutiny. Understanding how AI systems create recommendations and assessments is important for students, teachers, and leaders. Both trust and responsibility in the classroom benefit from more openness. The ethical implications of AI for educators and the field as a whole also need to be considered. Technology should complement teachers rather than replace them. The usage of AI and the training of educators are essential to this shift. The goal of this study is to study the impact of ethical issues factors by using AI in T&L & to identify the impact of AI Factors on T&L (Teaching & Learning)..

Keywords: *Artificial Intelligence, AI, Teaching, Learning, Education*

Introduction

The incorporation of artificial intelligence (AI) into the realm of education presents the potential to revolutionize pedagogical practices, rendering them more individualized and streamlined. Nevertheless, this progress also brings forth a variety of ethical problems that necessitate cautious navigation. This research paper offers a comprehensive examination of the ethical considerations linked to the implementation of artificial intelligence (AI) in the field of education. It emphasizes significant concerns and provides valuable perspectives on how to

effectively tackle these difficulties. The integration of artificial intelligence (AI) in the field of education gives rise to noteworthy apprehensions pertaining to the safeguarding of data privacy and security (Shimp, L. S., 2020).

Robust protection methods are necessary in order to prevent breaches and misuse of the extensive student data that is collected and processed by AI systems. The incorporation of informed consent and transparency in data management plays a pivotal role in addressing and alleviating privacy concerns. One further prominent ethical dilemma is to the inherent possibility of bias and discrimination inside artificial intelligence (AI) algorithms. Artificial intelligence (AI) systems have the potential to reinforce and perpetuate pre-existing biases that are inherent in the training data they are provided. This can lead to the creation of unequal chances for different groups of students. The persistent problem lies in the maintenance of equity and the prevention of discrimination within educational technologies powered by artificial intelligence.

The importance of transparency and explainability in the decision-making processes of artificial intelligence cannot be overstated. It is vital for students, educators, and administrators to possess a comprehensive comprehension of the underlying processes employed by AI systems in order to generate their recommendations or make conclusions. The promotion of openness within the educational system facilitates the development of trust and accountability. Furthermore, it is imperative to acknowledge the ethical ramifications associated with the influence of artificial intelligence on educators and the field of teaching. It is imperative to strike a balance in the utilization of AI, ensuring that it functions as a supplementary tool for educators rather than a complete replacement. The primary components of this transformation involve teacher training and the acceptance of artificial intelligence (AI) technologies.

Research Methodology

The descriptive research approach was used in this study to examine the framed objectives. The study's main focus was on the moral issues surrounding the use of AI to enhance instruction. The majority of the data used in this study came from primary and secondary sources. These secondary data sources included the research-relevant thesis, published paper, and other sources. Furthermore, relevant data was taken out of the structured questionnaire that institutions filled out. Data summarization and characterization techniques are part of descriptive statistics. It offers fundamental details about the dataset, including data distribution, metrics of dispersion (variance, standard deviation), and measures of central tendency (mean, median).

Objective of the study

- To study the impact of ethical issues factors by using AI in T&L
- To identify the impact of AI Factors on T&L (Teaching & Learning).

Hypothesis of the study

H1: There is no strong impact of AI Factors on T&L (Teaching & Learning).

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Review Literature

Addressing ethical considerations is an essential part of implementing AI in educational settings. According to Zawacki-Richter et al. (2019), while integrating AI systems in the classroom, it is essential to take into consideration issues of privacy, bias, openness, and accountability. Artificial intelligence has the potential to make education more accessible for students who have disabilities. According to Burgstahler (2015), it is able to give capabilities such as text-to-speech, which helps to make education more accessible to everyone. Learning experiences that are more immersive can be provided by AI when paired with VR and AR. According to Wu et al. (2013), these technologies have the potential to simplify difficult topics and make them more interesting to pupils. Students can receive immediate feedback and direction from Intelligent Tutoring Systems (ITS), which are powered by AI. According to VanLehn (2011), these systems are developed to assist students in a variety of

topic areas by adapting to the learners' level of knowledge acquisition. Personalization of instruction is one of the primary ways that artificial intelligence (AI) improves education. According to Vasquez et al.'s research from 2020, the program is able to modify the curriculum, as well as the pace and the content of the lessons. The data collected from students and their learning activities are analyzed by AI algorithms, which then deliver individualized recommendations and coursework. In the field of education, artificial intelligence (AI) and data analytics make it possible for institutions to track the development of students, identify those who are at danger, and make decisions based on the data. According to Arnold (2018), this strategy has been implemented to boost student retention as well as graduation rates. Systems based on AI have the potential to give adaptive content, which adjusts the level of difficulty based on how well students are doing. According to Hamari et al. (2014), gamification features like badges and awards make education more interesting and encourage continued participation.

How artificial intelligence helps to improve teaching and learning

Artificial intelligence (AI) has the potential to significantly improve teaching and learning in various ways.

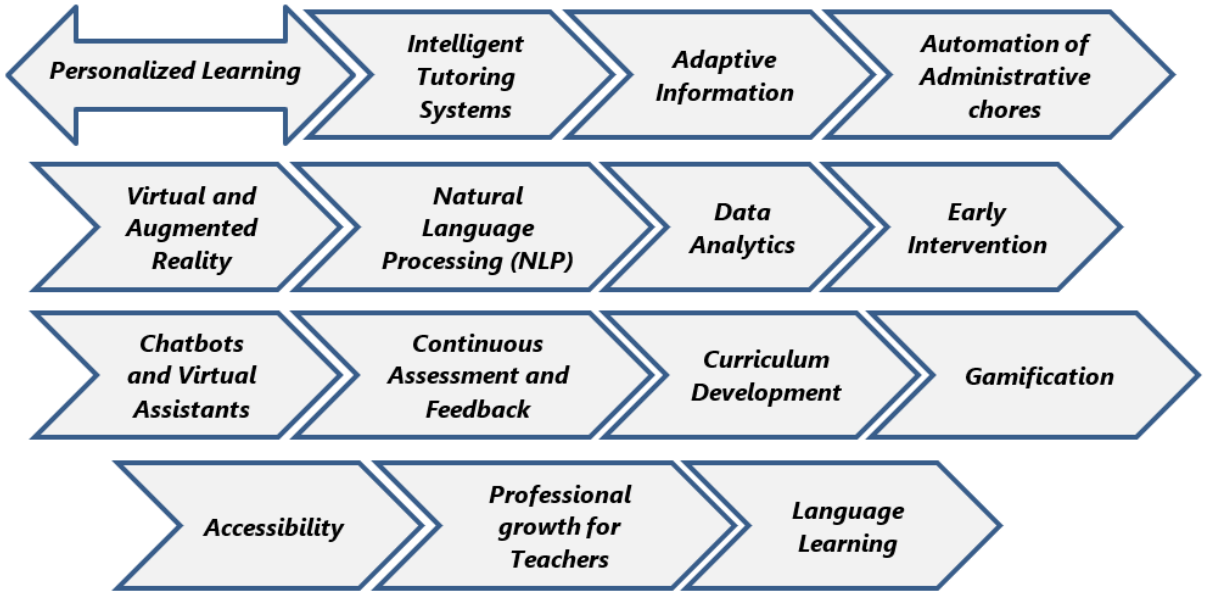

Figure 1: Key Components of AI to improve teaching and learning

Here are several ways AI can be applied to enhance educational processes:

Personalized Learning: Learning that is tailored to you Artificial intelligence has the potential to tailor educational experiences for pupils by evaluating their skills, learning preferences, and academic success. It is able to offer individualized content and activities to cater to specific requirements, making it possible for each student to study at their own pace (Patra., et.al., 2018).

Intelligent Tutoring Systems: Intelligent tutoring systems that are powered by artificial intelligence are able to provide students with real-time feedback and guidance. Students can get assistance with some subjects from these systems, which also provide answers to inquiries and explanations as necessary.

Adaptive information: Artificial intelligence has the ability to change the level of difficulty of educational information based on how well a student is doing, ensuring that they are challenged in an appropriate manner while preventing them from being either overwhelmed or bored.

Automation of Administrative chores: Artificial intelligence has the potential to automate a variety of administrative chores for educators and educational institutions, including grading assignments, keeping student

records, and scheduling classes. This frees up the teachers' time to concentrate more on the classroom and less on the paperwork (Dembla, N., 2019).

Virtual and Augmented Reality: Artificial intelligence has the potential to improve learning environments by utilizing virtual and augmented reality. Complex ideas can be rendered more understandable and interesting through the use of interactive environments and immersive simulations.

Natural Language Processing (NLP): Technologies that use NLP can make it easier to learn a new language by giving instant translations, grammatical corrections, and coaching on how to pronounce words. They are also able to assist with the analysis of writings and make suggestions for further development.

Data Analytics: Artificial intelligence is capable of analyzing massive volumes of data to spot patterns and trends in student performance. This information can assist educators in making decisions that are data-driven, which will improve pedagogical practices and curricula (Sahoo., et.al., 2023).

Early Intervention: Artificial intelligence can identify pupils who are at danger by studying their performance and the patterns of their behavior. Once identified, students who are having difficulty can benefit from early interventions and assistance from their teachers and authorities.

Chatbots and Virtual Assistants: Educational institutions can utilize chatbots and virtual assistants to provide students with prompt responses to frequently asked questions, offer them help on course enrollment, and aid with administrative queries.

Continuous Assessment and Feedback: Artificial intelligence (AI) systems are able to carry out continuous evaluations and provide quick feedback on assignments and examinations. Students are able to monitor their own progress and make adjustments as a result of this.

Curriculum Development: AI may assist in the development and updating of educational content by finding gaps in the curriculum, proposing appropriate resources, and ensuring that contents remain current. This can be accomplished through the use of AI.

Gamification: Artificial intelligence can be used to help build gamified learning experiences, which make education more entertaining and engaging for students. Students can be motivated to participate actively in class activities by using gamification components such as prizes, badges, and competitions.

Accessibility: Artificial intelligence has the potential to increase accessibility for students with impairments by offering capabilities like as text-to-speech, speech-to-text, and other forms of assistive technology.

Professional growth for Teachers: Artificial intelligence can help support the growth of teachers by providing insights into good teaching methods, supplying materials, and assisting in the design of lessons.

Language Learning: Language learning apps and platforms that are powered by AI may provide learners from all over the world with immersive experiences, correct their pronunciation, and offer language training.

Problems in AI to improve T&L

There are several obstacles and problems that must be overcome before artificial intelligence (AI) can be successfully used in the classroom.

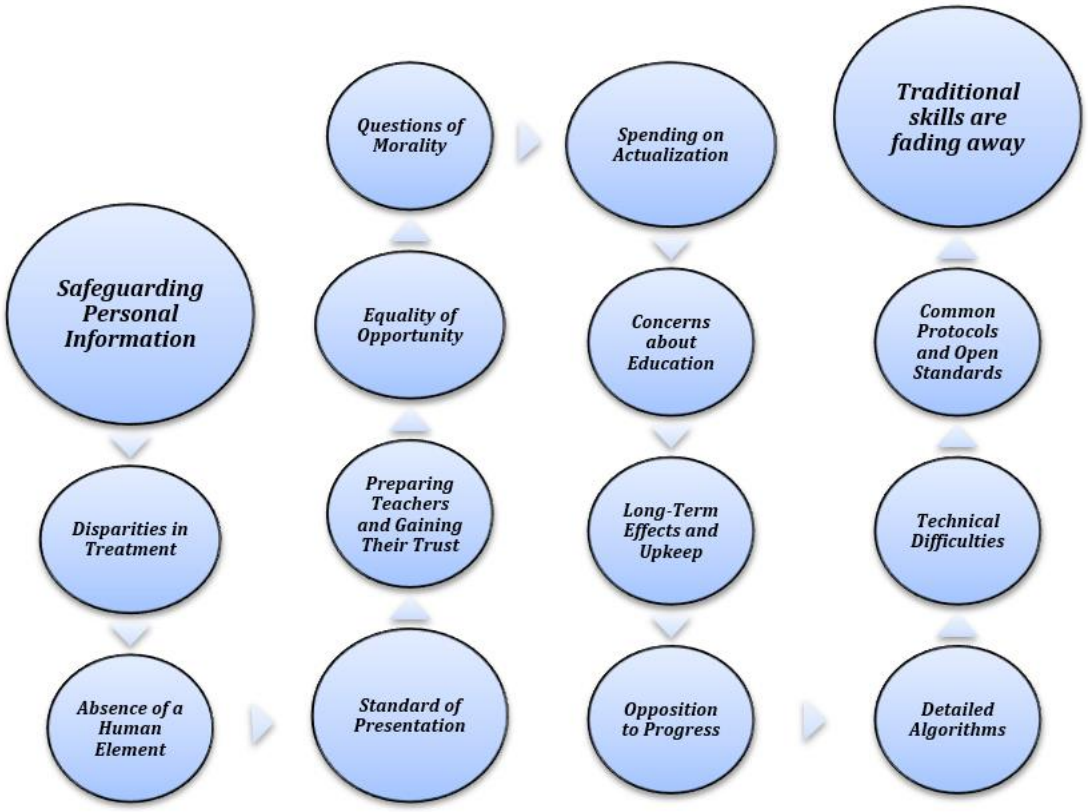

Figure 2: Problems in AI to improve T&L

Some of the major concerns are as follows:

1. Privacy and security issues arise while collecting and analyzing student data. There is a substantial difficulty in preventing the misuse of data and protecting private information.
2. Unfair results may be produced by AI systems because of the inherent biases in the data they are trained on. Eliminating prejudice from AI systems is a difficult challenge.
3. The overuse of AI in the classroom has the potential to weaken the bonds of trust and respect between instructors and their pupils.
4. The reliability and precision of AI-generated suggestions for classroom study vary widely. It is essential that the educational standards of the information provided by AI systems be met.
5. There may be a lack of skilled educators who can make good use of AI tools in the classroom. It can be difficult to get people to accept AI and incorporate it into established ways of teaching.
6. Unfortunately, not all students have access to computers and the internet, which are prerequisites for AI-based education. This contributes to inequality in the access to education.
7. Issues of openness, accountability, and data ownership must be carefully considered for the ethical use of AI in the classroom.
8. Costs associated with integrating AI into the classroom could be prohibitive for some educational institutions.
9. It is crucial to coordinate AI teaching resources with proven methods. Ineffectiveness can result from implementing AI without first addressing educational theory.

10. AI algorithms are notoriously complex, making it difficult for teachers to comprehend how the system arrives at its conclusions.
11. Institutionalized resistance to change is a frequent issue in schools. It's possible that educators and students will be hesitant to embrace AI tools.
12. Educational institutions may face a logistical problem in ensuring the long-term viability and maintenance of AI systems
13. When AI is used extensively, technical problems, system breakdowns, or network challenges might interrupt the learning process.
14. Compatibility concerns between various AI systems and educational software might arise from a lack of standards and interoperability.
15. Traditional abilities like handwriting, mental arithmetic, and library research may suffer from an overemphasis on technology-driven learning.

Table 1: Impact of AI to Improve T&L (Teaching & Learning)

Dependent Variable: AI_T&L				
Method: Least Squares				
Sample: 80				
Included observations: 10				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
Algorithmic Bias, Fairness & Ethical AI Curriculum	6.620027	4.052441	4.521094	0.0324
Transparency and Explainability, Privacy and Data Security	4.926897	2.009924	5.940018	0.0302
Accountability & Data Ownership, Informed consent and accessibility	6.010426	2.014681	5.137615	0.0428
Autonomy, Human Interaction, Collaboration and Ethical Guidelines	- 5.201261	-3.070228	-5.732631	0.0145
Long-Term Effects & Ethical Review Boards	8.321679	3.051582	4.208281	0.0268
R-squared	0.824461	Mean dependent var		0.000489
Adjusted R-squared	0.782617	S.D. dependent var		0.341521
S.E. of regression	0.092714	Log likelihood		7.633536
Sum squared resid	0.081268	F-statistic		15.35191
		Prob(F-statistic)		0.006989

Interpretation: When utilizing artificial intelligence to enhance teaching and learning, ethical issues must be taken into serious account. To fully utilize AI in education and safeguard the rights and welfare of both instructors and pupils, it is imperative that these ethical issues be addressed. The field of artificial intelligence in education is always changing, so it is important to create and update ethical norms and policies accordingly. The goal of the study is to find out how AI factors affect teaching and learning. The study's meticulous collection and use of survey data allowed for a cross-sectional analysis to thoroughly evaluate the influence of these moral considerations on the enhancement of T&L, with the performance being evaluated using the panel least squares approach.

Findings of the study

i. AI systems in the classroom frequently gather a lot of student data, including academic and personal data. It is essential to guarantee the security and privacy of sensitive data.

ii. Before their data is utilized, students and their guardians must give their informed consent and be made aware of the data collection procedures.

iii. Biases from the data used to train AI systems may be inherited by them. This may lead to unfair consequences that disadvantage particular student groups. It is important to work toward reducing bias in AI algorithms.

iv. All students should receive equal results from AI systems, regardless of their background, gender, ethnicity, or other traits.

v. AI systems ought to be understandable and transparent. To trust the technology, administrators, teachers, and students must comprehend how AI-driven judgments are made.

vi. There should be a distinct chain of responsibility when AI systems are employed for decision-making or grading. Who is in charge of the decisions and output of the system should be obvious.

vii. AI shouldn't take the role of humans in the classroom totally. Artificial intelligence (AI) should be used as a supplementary tool rather than to replace teachers because human connection and the function of teachers are crucial to learning

viii. Make sure that all students, including those with disabilities, can utilize AI-driven tools and platforms. To make sure that nobody is left behind, accessibility requirements need to be respected.

ix. Think about how AI-driven education will affect students' creativity, critical thinking abilities, and emotional health in the long run. Over-reliance on AI could lead to unexpected outcomes.

x. Don't overprofiling or categorize kids according to the evaluations and suggestions provided by AI. Maintaining student variety and personalization should coexist in harmony.

xi. Define control and ownership of data clearly. Access to and control over their educational data should be granted to students and their guardians.

xii. Incorporate instruction on the moral application of AI into the curriculum to assist students in comprehending the implications of technology and their rights.

xiii. Institutions should make sure AI systems follow moral guidelines and stay in line with learning objectives by regularly assessing and modifying them.

xiv. The development and observance of ethical standards for AI usage in education should be the joint effort of legislators, educational institutions, and AI developers.

xv. To assess the application and effects of AI in education and make sure it conforms with ethical norms, establish ethics review committees.

Conclusion

Notwithstanding the potential transformative impact of artificial intelligence on the educational system, several ethical and privacy concerns persist that necessitate human oversight to ensure that the technology operates in the best interests of both students and instructors. Additionally, cautious consideration should be given to the integration of AI into educational environments so as to maximize its potential benefits and minimize any potential drawbacks. The resolution to the challenges at hand can be found in the judicious and strategic implementation of AI within educational settings. We require professional development for educators, ethical standards, and an emphasis on equity and accessibility to guarantee that AI enhances learning and instruction without introducing new challenges or disparities. In conclusion, as AI continues to transform the educational landscape, it is crucial to comprehend and address the ethical implications. The ethical responsibilities of the

teaching community can be maintained while the educational community leverages the potential of AI by placing emphasis on privacy, impartiality, transparency, and the human element. To effectively tackle these ethical considerations associated with the implementation of AI in education, a collaborative effort among educational institutions, policymakers, technology developers, and educators is necessary. In addition to establishing ethical guidelines and policies, ensuring that AI serves the best interests of students and upholds educational values requires periodic evaluations and revisions.

References

[1] Arnold, K. E. (2018). Using analytics for improving student retention and graduation rates. New Directions for Institutional Research, 2018(177), 75-85.

[2] Burgstahler, S. (2015). Universal design in higher education: From principles to practice. Harvard Education Press.

[3] Dembla, N. (2019). Impact of Artificial Intelligence on E- Commerce. Kaav International Journal of Economics, Commerce & Business Management, 6(1), 56-63.

[4] Hamari, J., Koivisto, J., & Sarsa, H. (2014). Does gamification work?--a literature review of empirical studies on gamification. 2014 47th Hawaii international conference on system sciences.

[5] Patra, J. P., Sethia, N., & Gupta, P. (2018). Home Assistant Using Artificial Intelligence. Kaav International Journal of Economics, Commerce & Business Management, 5(2), 40-43.

[6] Shimp, L. S. (2020). Review of Major Areas of Application of Machine Learning in Finance –A Theoretical Study. Kaav International Journal of Economics, Commerce & Business Management, 7(4), 89-93.

[7] Sahoo, D. R., & Chauhan, M. (2023). Changing Landscape of Artificial Intelligence on Indian Corporate Sectors and Governance: Special Reference to SMEs. Kaav International Journal of Law, Finance & Industrial Relations, 10(1), 1-9. https://doi.org/https://doi.org/10.52458/23492589.2023.v10.iss1.kp.a1

[8] Vasquez, F., Vargas, R. S., & Pérez, J. S. (2020). Artificial intelligence in education: A critical review of innovations. The European Journal of Open, Distance and E-Learning, 23(2), 98-113.

[9] VanLehn, K. (2011). The relative effectiveness of human tutoring, intelligent tutoring systems, and other tutoring systems. Educational Psychologist, 46(4), 197-221.

[10] Wu, H. K., Lee, S. W. Y., Chang, H. Y., & Liang, J. C. (2013). Current status, opportunities and challenges of augmented reality in education. Computers & Education, 62, 41-49.

[11] Zawacki-Richter, O., Marín, V. I., Bond, M., & Gouverneur, F. (2019). Systematic review of research on artificial intelligence applications in higher education – where are the educators? International Journal of Educational Technology in Higher Education, 16(1), 39.