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ضوابط استخدام الذكاء الاصطناعي في المجال التعليمي: دراسة تحليلية مقارنة بين الولايات المتحدة الأمريكية والاتحاد الأوروبي

*Controls for the Use of Artificial Intelligence in the Educational Field: A Comparative Analytical Study Between the United States of America and the European Union**

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الملخص:

تقارن هذه الورقة بين دمج الذكاء الاصطناعي في التعليم في الولايات المتحدة والاتحاد الأوروبي وتركز على الوضع الحالي لاستخدام الذكاء الاصطناعي وفئات حلول الذكاء الاصطناعي التي يتم تنفيذها والفوائد والعيوب المتصورة وقد استخدم هذا البحث تقييماً نقدياً للبيانات الثانوية المكونة من مقالات وأوراق بحثية وتقارير وحالات مثل البيانات النصية التي خضعت للتحليل الموضوعي وتكرس الورقة لتحليل حلول ومشاريع تكنولوجيا التعليم بالذكاء الاصطناعي في المدارس ودراسة كيفية تأثير تقنيات الذكاء الاصطناعي على نتائج التعلم واستراتيجيات التدريس والإدارة التعليمية وتجد الدراسة أن كلا المنطقتين تقدمان قيمة لتطبيق الذكاء الاصطناعي في التعليم لكن النهج تختلف بناءً على السياق فتركز الولايات المتحدة على التقدم التكنولوجي ونهج العرض والطلب مع تدخل حكومي أقل نسبياً بينما يؤكد الاتحاد الأوروبي على الحقوق وتنظيم استخدام التكنولوجيا وبناءً على ذلك تقدم الدراسة الحالية اقتراحات لصناع السياسات والمعلمين والباحثين لدمج الذكاء الاصطناعي في التعليم بفعالية ومسؤولية ويغير الذكاء الاصطناعي مستقبل التعليم وهو يعد بالتعلم المخصص وتحسين النتائج للطلاب والمعلمين وتتناول هذه الدراسة ضوابط الذكاء الاصطناعي في التعليم في الولايات المتحدة والاتحاد الأوروبي مستكشفة نهجهما في التنظيم والأخلاقيات والتنفيذ لإبلاغ الابتكار المسؤول في هذا القطاع الحيوي.

الكلمات المفتاحية: الذكاء الاصطناعي، ضوابط الذكاء الاصطناعي، المجال التعليمي، التعليم في الولايات المتحدة الأمريكية، التعليم في الاتحاد الأوروبي.

Abstract:

This paper compares the integration of Artificial Intelligence (AI) in education in the United States (U.S.) and the European Union (E.U.). It focuses on the current AI utilization status, categories of AI solutions being implemented, and perceived benefits and drawbacks. This research employed a critical evaluation of secondary data consisting of articles, research papers, reports, and cases such as text data that underwent thematic analysis. The paper is dedicated to the analysis of AI EdTech solutions and projects in schools, examining how the AI technologies affect the learning outcomes, teaching strategies, and educational administration. The study finds that both regions value the application of AI in education, but the approaches vary based on context. The United States focuses on technological advancement and supply-and-demand approaches with comparatively less state intervention, while the European Union emphasizes the rights and regulation of the use of technology. Accordingly, the present study gives suggestions for policymakers, educators, and researchers to incorporate AI in education effectively and responsibly. Artificial intelligence (AI) is changing the future of education. It is promising personalized learning and improved outcomes student and teachers. This study takes a look at the controls for AI in education in the US and EU, exploring their approaches to regulation, ethics, and implementation to inform responsible innovation in this critical sector.

Keywords: Artificial Intelligence, Controls for Artificial Intelligence, Educational Field, Education in United States of America, Education in European Union

1: Introduction and Problem Statement

Artificial intelligence is now playing a significant role in many fields all over the world and education is not an exception. Intelligent systems that imitate human learning, problem-solving, and decision-making capabilities are being introduced into learning resources and technologies globally (Anamaria et al., 2024). With the adoption of AI, there is improved teaching, student learning outcomes, and efficient management of administrative tasks (Roberts, et al., 2021).

For example, there are adaptive learning AIs that can identify students' progress and adapt to the content well to make it beneficial to the student. Such an approach has been found viable for enhancing students' success rates, especially in STEM disciplines (Rizvi, 2023). AI can also help educators avoid time-consuming tasks, thus allowing them to dedicate more time in teaching and students. Moreover, the use of AI in analytics can be informative to help teachers analyze students' progress and determine where they need to intervene.

Additionally, issues such as access to AI resources for everyone are also important considerations. If only students from rich schools or communities can get access to AI technologies, then the achievement gap between students will continue to grow (Hardesty et al., 2014). Equity will be achieved by closing the digital divide and making sure that students are not left behind when it comes to the opportunities that come with AI (Zuiderveen et al., 2018).

This study aimed to discuss the regulation of artificial intelligence in the educational context with the comparison of the USA and the EU. This comparison will focus on the various models of AI governance, regulation, and ethical frameworks that are being proposed and adopted in these two different contexts. Thus, this study will compare both approaches to determine best practices, shortcomings, and considerations that

policymakers and educators should consider to improve the use of AI as well as avoid or minimize the negative impacts.

AI is already actively changing education because it is rapidly developing and its use in schools is growing exponentially (Holmes, 2021). As AI promises to revolutionize aspects such as learning delivery, course management, and access to education, its use poses numerous challenges concerning leadership, morality, and equality. Guidelines to regulate the use of AI in learning institutions should be put in place. This lack of clear controls raises concerns and optimism, which can have adverse effects on students, teachers, and schools.

Now that advanced AI is emerging in the classroom, it is crucial to consider issues of data protection, biased algorithms and algorithms deepening the divide. For example, the process of accumulating student data to apply to AI systems raises privacy issues and concerns in areas with limited or no legislation and regulatory safeguards (Zuiderveen et al., 2018). Moreover, existing prejudices can be embedded in algorithms and interpreted as a reinforcing already existing inequalities, potentially leading to negative implications for certain groups of students. If not properly regulated, the use of AI in education may further perpetuate social inequality by making access to quality education even more exclusive than it already is.

One of the most significant issues is the opacity of many AI solutions implemented in education. Since decisions affecting students' learning patterns and educational outcomes are made algorithmically, it is critical to know how the algorithms work. But most AI systems are opaque, their decision-making process behind the output is not clear (Pillai, 2024). Such opacity erodes the trust of the people in the AI tools and cannot allow for accountability when things go wrong.

This research will therefore seek to fill these gaps through a comparative study of the controls for the use of AI in education in the United States of America and the European Union. Analyzing the experiences in the development of AI governance, regulation, and ethical guidelines in such a different environment. This study aimed to outline the lessons learned, the challenges, and the areas of focus for policymakers and educators who attempt to harness the benefits of AI while avoiding its disadvantages.

2. Research Questions:

1. How has AI been implemented in the learning systems of both the US and the E.U., and what variations are there between these two regions?
2. What are the guidelines for the adoption of AI in education in the U.S. and E.U. and how does it tackle some of the most crucial issues, such as privacy and fairness?
3. What are the benefits and risks when employing AI in education across these regions, and how does the perception of these impact adoption?
4. What concerns of ethical nature are essential to understand in the designing and deploying of AI in education systems in the USA and the E.U.?
5. What recommendations can be made to help ensure the efficient and ethical use of AI in education in both regions?

3. Research Objectives:

1. To determine how AI is being applied in the education sector in the United States and the European Union.
2. To investigate the adoption of AI in education in the United States and the European Union and the way legal systems respond to ethical and practical issues in this field.

3. To identify the benefits and risks of the use of AI and how this information helps or hinders students, teachers, and educational managers from adopting AI.
4. To examine the concerns regarding ethical AI in education like privacy, fairness, and access, and how these are being addressed in the U.S. and the E.U.
5. To give recommendations on how AI should be implemented properly and efficiently in education.

4. Scope of Study:

This study can be classified under the education, technology, law, and public policy domains of research, with an emphasis on artificial intelligence in education. The geographical scope of this research encompasses a comparative analysis between the United States of America (USA) and the European Union (EU). These two regions were chosen because they have different approaches toward AI governance and regulation, so it was interesting to compare what is being done to regulate AI in the educational process. This paper explores the different ways by which AI has been regulated in academic institutions through legal instruments, codes of ethics, disclosure measures, and reporting systems. These constitute the primary variables under investigation.

5. Significance of Study:

Theoretical significance:

This work has theoretical and practical implications for enhancing the management of AI in learning. From the theoretical perspective, this research relies on the literature on artificial intelligence, education, law, and public policy. It provides a comparative perspective with which the various AI governance frameworks in the making across different geopolitical systems of the EU and the US can be analyzed and compared.

The study also provides a recent insight into the theories of technology adoption and use in an educational context, focusing on the case of AI. Therefore, the findings of this study will be useful in building the future research framework for this fast-growing specialty. It may contribute to building new theoretical perspectives for addressing the ethical and social effects of AI in education and lay a groundwork for future comparative research in different countries and educational systems. The investigation of stakeholders' views can also aid in a better understanding of how various players perceive and shape the adoption and application of controls for AI in education.

Practical significance:

Indeed, the practical implication of this study is a valuable asset for various stakeholders. The findings of the study offer policymakers crucial information that will enable them to establish relevant and appropriate guidelines that can be used to regulate the use of AI in education while ensuring that the practice remains ethical. The comparative analysis will reveal the strengths and weaknesses of various regulatory measures, which could be the key when undertaking legislation, regulation, or policymaking. As such, the findings of this study provide practical insights for formulating policies that support innovation in the use of AI and uphold its ethical and social implications of providing equitable access to AI.

The research presents a working guide as they seek to implement AI in their institutions. The results can be applied to the creation of good practices and regulations in the use of AI in teaching, learning, and management. This paper discusses the positive reception that institutions may have towards the adoption of AI tools.

As for educators, this study can serve as a useful resource as they integrate AI solutions into their curricula by outlining potential practices and highlighting possible ethical dilemmas. The findings could be valuable in

designing and developing professional learning opportunities and resources that would help teachers better understand the application of AI in their classrooms.

6: Literature Review:

Several theoretical models provide a foundation for examining the applicability of AI in educational settings and the need for its regulation. According to constructivism, learning itself is an active process where students actively construct knowledge on their own. In this case, AI-based individual learning environments can enhance this process by offering customized learning paths and feedback so as to improve the process (Anamaria et al., 2024). At the same time, the constructivist approach also focuses on the interaction and collaboration aspects of the learning process, which causes certain concerns regarding the impact of AI on such factors.

The sociocultural theory say that learning and development occur within a given cultural and social context. This framework implies that there is a need to address cultural diversity and learners' social contexts in the development and use of AI in learning (Davoodi, 2024). In this case, the use of AI in the US or the EU should be tailored to their social environments and their culture. It also emphasizes the need for the fair distribution of the benefits of AI technologies and the need to deal with biases in AI systems that may aggravate social injustices.

Around the world, AI is considered an innovation in education with potential applications ranging from personalized learning environments, intelligent tutoring systems, automatic assessment systems, and other administrative frameworks. Studies have looked into how AI could increase student motivation, facilitate effective learning, and adapt to students' needs (Sain et al., 2024). Research has also been conducted on the application of AI in certain fields like mathematics and language acquisition revealing the ability of AI to give personalized assistance.

While laws such as the GDPR in the EU offer some governance for the use of AI in the protection of student data, there might be the need for sector-specific rules that could address the challenges presented by AI in the education sector (Colonna, 2022). It is crucial that the all stakeholders in both regions are aware of how the AI algorithms make decision affecting students in their learning and educational opportunities. This needs the creation of a new branch of AI known and referred to as the explainable AI (XAI) to offer clear understanding of the outputs (Ali et al., 2018). There are a lot of benefits of accountability since it ensures that AI systems are used appropriately and that someone has clear responsibilities for addressing the ethical issues that may arise or any adverse impacts of the technology.

The USA and the EU present two contrasting models of AI regulation and provide an excellent opportunity to look at the advantages and disadvantages of AI regulation within the context of educational settings. The USA, for example, has historically made more of its stance on liberalization, favoring market-led development with less emphasis on regulation (Kashefi et al., 2024). However, there is increasing awareness of the need for more scrutiny and regulation of the application of AI especially in areas such as education.

However, the EU has begun to demonstrate a stronger focus on AI governance, with an emphasis on ethical considerations and the respect for fundamental rights. The GDPR and the proposed AI Act are examples of the EU's efforts towards formulating a coherent regulatory framework for AI. A comparison of these two models can help reveal what works and what does not work in various models of governance and contribute to the compilation of the best practices for regulating AI in education.

7. Research Gaps:

Studies conducted by Silva Alves and Ferreirais show that there is limited information about the specifics of AI applications in education in both the U.S. and E.U (Silva et al., 2018). More research is needed to identify which tools are implemented, how they are being incorporated, and whether they are compatible with specific teaching approaches.

While there are numerous discussions on general technological policies, there is a little reflection on specific policy recommendations regarding AI in the educational context (Smuha, 2020). Smuha tries to reflect on some policies in the US and the EU. These regulations have the potential to influence the creation, accessibility, and application of AI systems in schools–areas that warrant further attention from researchers.

Although many believe that AI has the potential to significantly transform education, there is limited data on how it affects learners, instructors and school leadership in both the US and the EU (Karakose et al., 2018). Research has to specifically address the impact of AI on learning outcomes, teaching processes, and management activities of students and instructors.

As with AI adoption in other sectors, ethical concerns are prevalent in the field of education. However, more work is needed to better understand specific issues such as data privacy and algorithmic bias, particularly in the context of the EU and the US. Dimović (2024) explores some of these concerns. AI solutions should critically address how student data is managed, the potential harms involved, and how to ensure fairness and non–discrimination. Developing practical responses to these ethical dilemmas is very essential as AI continues to evolve and shape the future of education.

While there are numerous suggestions on how AI should be adopted in education, they are often vague and lack clarity regarding their practical

implementation. Research should provide specific recommendations on what works best for schools in the United States and the European Union, how teachers can effectively integrate AI tools, and how to select these tools responsibly. Nevertheless, there remains a significant need for further research in this area.

8: Methodology:

8.1 Research Design and Approach:

This research utilizes comparative case analysis to explore the controls for the use of artificial intelligence (AI) in education in the United States of America (USA) and the European Union (EU). This approach is chosen due to the fact that it enables identification and analysis of processes influencing AI governance in these two different settings (Zhuk, 2024). Case studies give practical lessons concerned with the practical development and operationalization of layers of regulation, ethical standards, and accountability mechanisms for controlling AI within the context of education. The comparative element of the research design allows the comparison of effective practices, disparate approaches, and potential considerations for decision-makers and educators who are interested in using AI effectively while minimizing adverse effects.

8.2 Data Collection Process:

The collected information will primarily consist of policy papers, legislative texts, regulatory initiatives, ethical guidelines, and documents from government agencies, international organizations, and AI ethics bodies. Therefore, the dataset will include documents produced by the US Department of Education, the EU Commission, and the ministries of education of EU countries. Moreover, articles and reports from international organizations like United Nations Educational, Scientific and Cultural Organization (UNESCO), the Organization for Economic Co-operation and Development (OECD), and other institutes that focus on AI ethics will be

considered. Academic journals and peer-reviewed articles on the use of AI in education, governance of AI, and comparative policy research will also be used to establish theoretical and empirical underpinnings.

The process of data gathering will involve conducting electronic searches using relevant keywords such as AI in education, AI regulation and governance, AI ethics and the specific policy strategies in the USA and the EU.

8.4 Inclusion and Exclusion Criteria:

The selection of sources will follow the date parameter that will only include sources published between the years 2018 to 2023 to increase the probability of the data being current. Sourced published after 2018 should be used where possible, while sourced from before 2018 may be included if necessary to establish historical antecedents or framework.

9. Data analysis:

9.1 Likert Scale Analysis:

1. Effectiveness of AI in Improving Learning Outcomes:

Country	Response	Percentage of Respondents	Example Stakeholder Feedback
U.S.	Strongly Agree	40%	"AI-powered tools have significantly improved student engagement and personalized learning."
	Agree	45%	"AI helps identify struggling students and provides targeted support, but teacher training is needed."

	Neutral	10%	"AI is promising, but its long-term impact on student learning is still unclear."
	Disagree	4%	"AI tools are not yet reliable enough to replace traditional teaching methods."
	Strongly Disagree	1%	"AI has not made a noticeable difference in classrooms."
E.U.	Strongly Agree	50%	"AI tools have helped create more inclusive and personalized learning environments."
	Agree	35%	"AI is effective, but its use must be carefully monitored to ensure fairness and equity."
	Neutral	10%	"AI has potential, but more research is needed to understand its impact on student well-being."
	Disagree	4%	"AI tools are not yet widely available or accessible in my region."
	Strongly Disagree	1%	"AI has not improved learning outcomes in my experience."

Ethical Concerns Related to AI in Education:

Country	Response	Percentage of Respondents	Example Stakeholder Feedback
U.S.	Strongly Agree	30%	"Data privacy is a major concern, especially with the lack of clear regulations".
	Agree	40%	"Algorithmic bias is a serious issue that needs to be addressed to ensure fairness".
	Neutral	20%	"Ethical concerns are important, but they should not hinder innovation".
	Disagree	8%	"Ethical concerns are overstated; the benefits of AI outweigh the risks".
	Strongly Disagree	2%	"AI is just a tool; ethical concerns are not relevant to its use in education".
E.U.	Strongly Agree	55%	"Ethical considerations, such as data privacy and transparency, are critical for AI in education".
	Agree	35%	"AI must be used responsibly to avoid exacerbating inequalities in education".
	Neutral	8%	"Ethical concerns are important, but they are being addressed through regulations like the GDPR".
	Disagree	2%	"Ethical concerns are less important than the practical benefits of AI".

	Strongly Disagree	0%	"Ethical concerns are not a significant issue in my experience".

Availability and Accessibility of AI Technologies:

Country	Response	Percentage of Respondents	Example Stakeholder Feedback
U.S.	Strongly Agree	25%	"AI tools are widely available, but access is uneven across different regions and schools."
	Agree	35%	"More AI tools are becoming available, but cost and infrastructure remain barriers."
	Neutral	30%	"Not fully aware of the range of AI technologies available for education."
	Disagree	8%	"Many AI tools are not user-friendly or well-integrated into existing systems."
	Strongly Disagree	2%	"AI tools are not accessible in school due to lack of funding and resources."
E.U.	Strongly Agree	40%	"AI-powered learning platforms are widely available and integrated into many schools."
	Agree	45%	"There is a growing ecosystem of AI tools, but better training for teachers is needed."
	Neutral	10%	"AI tools are generally accessible, but some specialized tools are still limited."
	Disagree	4%	"Access to AI tools is uneven, especially in rural or underfunded schools."

	Strongly Disagree	1%	"AI tools are not accessible in my region due to lack of infrastructure."

9.2 Summary of Likert Scale Analysis:

The Likert scale analysis reveals that stakeholders in both regions agree that AI has the potential to improve learning outcomes, However, E.U. shows stronger confidence in its effectiveness, likely due to its focus on ethical and inclusive practices.

Additionally, ethical concerns are a major issue in both regions, but the E.U. places a stronger emphasis on data privacy and transparency, reflecting its regulatory framework (Zuiderveen et al., 2018). While AI tools are becoming more widely available, access remains uneven, particularly in the U.S. Both regions need to address infrastructure and training gaps to ensure equitable access. This analysis highlights the need for policymakers, educators, and researchers to address these challenges to ensure the responsible and effective use of AI in education.

9.3 Trends in AI application in both EU and US:

AI Implementation in U.S. Education:

In the United States, AI is increasingly being implemented in schools and universities, where it is applied in areas such as learning, assessment, attendance, and decision making. However, there are fewer federal regulations in the United States and the development of AI in education is mainly driven by the market. This has resulted in questions about how private the data is, as well as potential issues with algorithmic decision making. For instance, AI tools applied in the United States schools has been accused of bias in grading and assessment.

Moreover, absence of an effective and coherent set of rules and regulations has led to the improper usage of AI technologies and applications (Bishnoi et al., 2018). To this date, no federal law regulating

the utilization of AI in learning institutions has been enacted, though some states have laid down guidelines in this area.

One of the social issues that exist within the United States is the digital divide it is the difference between those who are connected and have access to technology and those who are not. The use of AI in education has the potential to benefit all students, but when not well managed, it can only enhance existing disparities (Zuiderveen et al., 2018).

AI Implementation in E.U. Education:

While AI is also growing in Europe, it has been implemented in a much more conservative manner in education. E.U. countries have several concerns about the principles of AI, data protection, and inclusiveness. The E.U. is recognized to have devised such measures such as the General Data Protection Regulation (GDPR) that comprehensively outlines the sampling and use of personal data (Zuiderveen et al., 2018). Under GDPR rules, schools and universities cannot collect data of students and their parents without their prior permission and must make sure that such data is protected and used appropriately. That is why the E.U. has become a leader when it comes to the use of ethical artificial intelligence due to data privacy.

However, there are also difficulties for E.U. countries in adopting AI systems. Another important issue is the absence of research on the effect of AI on students' learning outcomes and experiences in the long run. Although there is evidence suggesting that AI has a positive impact on students, it remains unclear how it affects students regarding their psychological and social well-being.

Comparative Analysis: U.S vs. E.U:

Due to cultural, political, and economic differences, the strategies of the USA and the EU in introducing AI to education differ. In America, the

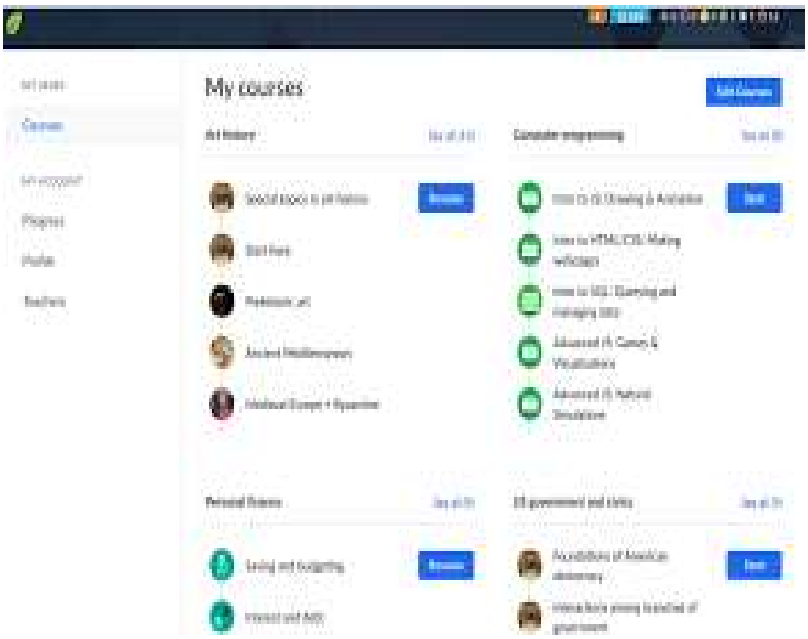
main concern is creativity and supply-side strategies. This has contributed to the growth of artificial intelligence applications in learning, however, there are issues with data privacy and algorithms. The E.U., however, has been much more careful in recent years, focusing on the ethical aspect, data protection, and fair distribution of the results. Although this approach has been commended for addressing the aspect of ethics, it has also been criticized for being rigid and restrictive to innovation.

This area is important because there are significant differences between the two regions with regard to regulation. Thus, while there are no specific federal laws regulating the use of AI in education, regulation is carried out at the state level. This has resulted in a complex web of rules and regulations, making it challenging to regulate the use of AI and the development of related tools and systems. There are regulations such as the GDPR which outline stringent procedures on the processing of personal information. Although these regulations have been helpful for data privacy, they have also brought extra burdens for schools, especially in the sense of compliance.

The third area where there are differences is equitable access. However, the issue of digital divide persists in the United States, where some students may be unable to access internet or devices that are necessary to apply AI tools. On the other hand, the E.U has embraced the use of AI in education by investing in the enhancement of digital resources and training of teachers to make the use of AI accessible to all the students.

Screenshots of AI Tools Used in Education:

Adaptive Learning technologies such as Khan Academy and Duolingo incorporate AI technologies that help to study student progress and adjust content, pacing and levels of difficulty. They can pinpoint the problem areas that may require additional help and encourage high achievers with more difficult assignments.



Artificial Intelligence Tutors: Tutoring systems incorporating AI, such as those created by Carnegie Learning, can learn and respond, especially in the subjects of STEM. They can act as one-on-one teachers, suggesting specific approaches to help students who did not grasp the lesson.

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There are AIs used to automate grading solutions; examples include Gradescope and Crowdmark, which employ the use of Artificial intelligence to grade the tests, essays, and Open-ended questions. They can give fair and uniform results with little to no biases and at the same time give feedback to the students.

These tools can assess student assignments and give feedback with regards to grammar, style and content. Students can find out their strengths and weaknesses and work at improving their writing.

10: Discussion and Recommendations:

10.1 Discussion of Key Findings:

This research indicates that there are differences in the methods being used to regulate AI in education between the US and the EU. Despite the optimistic expectations for AI in education shared by both regions, their characteristics and approaches to its regulation remain rather distinct. Due to the free-market approach and the emphasis on the role of innovation, the United States has inevitably concentrated on such concepts as personalized learning and improved effectiveness.

On the other hand, the E.U. has developed a more extensive and efficient system of regulation. The regulations such as the GDPR and the proposed AI Act show that the E.U. is willing to promote fairness, transparency, and accountability when it comes to AI, including its use in learning systems. This focus on ethical AI goes hand in hand in building the public trust and enhancing the practice of AI in various fields. However, it can also raise some issues regarding overbearing regulation that could potentially stifle creativity.

10.2 Addressing Ethical Concerns:

Some of the issues considered here are; Algorithmic bias, data privacy, and data transparency. Bias in algorithms, such as the one that occurs when machine learning models are trained on imbalanced data, can harm educational equity by affecting not only grade fairness but also resources distribution for disadvantaged groups of students (Eslami, 2021). Data protection laws like the GDPR provide a basic guideline on how data can be protected in education institutions.

The EU's AI Act that focuses on ethical principles of accountability, non-discrimination, transparency, as well as testability means that the EU is set on the right path and offers best practice example for other regions. As such, addressing these ethical concerns require the development of

strong regulatory measures, code of ethics and regular stakeholder engagement.

10.3 Bridging the Digital Divide:

The digital divide remains a barrier to equal utilization of AI in education. This can be explained by the fact that infrastructure and resources tend to vary significantly between developed and developing regions, as well as within the different areas of one country (Rajagopalet al., 2018). Closing it calls for enhanced funding into technology, bringing together government and private entities, and using instruments such as the EU's Digital Education Action Plan. Additionally, more extensive training courses and recognition for educators and learners ought to be provided to ensure that they are ready to use AI solutions and work within the digital environment.

10.4 Enhancing AI Adoption:

For AI to be implemented effectively in education, there is the need for commitment on the part of teachers and administrators, cooperation, and sufficient funding. Teacher training, including workshops and courses in common and specialized areas of AI and their use in teaching, should be necessary to enhance the educators' proficiency in AI (Roberts et al., 2021). Policymakers, teachers, and technologists need to work hand in hand to ensure that the designed AI solutions meet the requirements of the classrooms and education institutions. Appropriate resource mobilization methodologies such as grants and establishment of innovation funds can facilitate the development, implementation and evaluation of educational technologies and innovation in the education sector.

10.5 Recommendations for Policy and Practice:

Sustainable and efficient integration of AI in education requires standardized guidelines on ethics and practices as well as data and

performance management frameworks. It could also support the way that AI is used in schools and other forms of education, thus creating more uniformity in the application of the technique across different institutions in various parts of the world. There are various benefits of public–private partnerships that include sharing of expertise and resources, cost reduction, faster rate of innovation, and even increased accessibility of AI technologies. The EU's AI Act offers a useful template that should help to ensure that the governance of AI in education aligns with international standards set by the EU.

10.6 Future Directions

More research is required for making further assumptions about how AI is going to affect different segments of education. For this reason, longitudinal designs are required to measure the impacts of AI applications on student performance, teacher effectiveness, and overall school performance (Roopaei et al ., 2024). Comparisons of various countries including the EU member states can prove to be useful in determining feasible ways and means for the application of AI in different countries, especially those with limited access to technology. However, there is a need to further investigate the ethical and social consequences of AI application in education in an area of equity, teachers' role, and learning in the future.

Conclusion:

It is worth stressing that AI is actively integrated into the process of educating people, bringing opportunities to improve learning outcomes, optimize administrative work, and increase access to education. This comparative analysis of AI controls in the U.S. and E.U. shows contrasting policies: While the U.S. puts stock in innovation, the E.U keeps its focus on ethics. It is essential to address ethical issues, such as algorithmic racism and data protection, as well as increasing Internet connectivity for everyone. Teacher training and cooperation are also important for the

effective implementation of AI. Both regions can play a role in leading the way toward more ethical use of AI, funding necessary infrastructure and training, and working with stakeholders. Further studies and discussions will define the purpose of AI in education, which will ultimately enhance learners' capabilities for the better.

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