



Collection and Analysis of Data to Identify the Level of Influence of Artificial Intelligence on Education in Kyrgyzstan

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Abstract

This research will explore how artificial intelligence (AI) technologies are transforming teaching and learning methods, their potential benefits, and the associated challenges. By examining the integration of AI in educational systems of Kyrgyzstan, this study seeks to provide insights into the changing landscape of education and its implications for students, educators, and institutions. The findings will contribute to a deeper understanding of AI's role in shaping the future of education.

Keywords: Artificial Intelligence, Artificial Intelligence in Education, Integration, Kyrgyzstan, Personalized Learning, Machine Learning

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List of Abbreviations

AI	Artificial Intelligence
ML	Machine Learning
AEID	Artificial Intelligence in Education
ITS	Intelligent Tutoring Systems
VR	Virtual Reality
AR	Augmented Reality
OECD	Organization for Economic Co-operation and Development

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Chapter 1

Introduction

Artificial Intelligence (AI) today is one of the most promising technologies. It operates using algorithms based on programming rules and their subsets of machine learning (ML), as well as various ML methods like deep learning. AI is rapidly transforming various aspects of human life, including education, raising important questions about its impact on teaching and performance. The integration of AI in educational institutions is changing the education paradigm and has significant implications for students, educators, and institutions. Understanding these implications is crucial as AI applications continue to grow.

Our research is aimed at a broad audience, including educators, educational decision makers, researchers, students and parents. We aim to offer information valuable to anyone interested in the future of education. An important aspect of the study is its ability to provide real recommendations that can be used to improve educational practices. Our contribution will be to understand how AI is changing education, and how best to use its potential to make education more effective and accessible.

AI has both advantages and disadvantages, and their evaluation depends on the context and the method of application. Table 1.1 provides a concise overview of the primary advantages and disadvantages associated with the integration of artificial intelligence in education (AEID).

TABLE 1.1: Advantages and Disadvantages of AI in Education

Advantages of AI	Disadvantages of AI
Personalized learning for each student	Dependence on technology and the internet
High speed and accuracy	Privacy issues
Reduction of human errors	Potential bias in algorithms
Predictive capabilities	Lack of creativity in AI
Reduced time for data analysis	Possibility of job displacement
Accessibility and convenience for students	Financial constraints for implementing AI
Process automation	

Integrating AI into education can transform learning and teaching methods by offering personalized experiences, accurate assessments, and targeted support. However, it's essential to address potential drawbacks and implement AI responsibly and ethically. Balancing its advantages and disadvantages is crucial for benefiting students and the education system.

1.1 Research Problem

The emergence of AI in education in Kyrgyzstan offers potential benefits but also raises significant concerns. While AI-based tools have the potential to improve the teaching and learning experience, its integration into educational systems raises serious questions and concerns. Thus, the central problem of the study is to comprehensively assess the level of impact of AI on education in Kyrgyzstan.

Artificial intelligence is a rapidly developing technology that has the potential to revolutionize education. Goksel and Bozkurt (2019) suggest that artificial intelligence in education can be used to accelerate personalized learning, support students with special needs, and predict and assess new skillsets. Powered by AI, technologies such as augmented and virtual reality (AR/VR) and robotics support the learning and engagement of students with health impairments and mental health issues (Vincent-Lancrin and Vlies, 2020). On the other hand, those who oppose the use of AEID have raised several legitimate concerns. There would be a huge communication gap between teachers and students if robots were used as part-time instructors during school hours rather than people because they couldn't interact socially with each other as people could (Careerera.com, 2021). When considering AI in the classroom, economic efficiency and job changes among teachers are crucial factors. AI also has the potential to become addictive. Students could lose interest in learning because they are more interested in AI devices, which is a disadvantage of artificial intelligence use for education purposes (Ullah, 2022). It reduces kids' ability to think critically and increases their reliance on technology rather than teaching them how to complete tasks independently (Careerera.com, 2021). Considering all these factors, we tend to be cautious when using AEID. While acknowledging its potential benefits, we must carefully address potential risks and ethical concerns. It's essential to ensure responsible and ethical use of AI, strategically integrating it into teaching methods. The ultimate aim should be to strike a balance between leveraging the advantages of AI and safeguarding students' privacy rights, thereby providing an optimal learning experience.

1.1.1 Research Questions

1. How will the integration of AI technologies impact student engagement, performance, and overall learning outcomes in the Kyrgyz education system?
2. What are the primary challenges hindering the effective implementation of AI in the education system of Kyrgyzstan?
3. How can AI technologies be effectively integrated into Kyrgyzstan's education system?

1.1.2 Objectives

1. To study the current use of AI in different educational institutions in Kyrgyzstan.
2. Assess the specific impact of AI on student engagement, performance, and learning outcomes within the context of Kyrgyzstan's education system.
3. Identify and analyze the main problems of AI implementation in the educational environment of Kyrgyzstan.
4. Propose ways to effectively integrate AI into education in Kyrgyzstan.

Chapter 2

Literature Review

2.1 Historical Overview of AI in Education

Artificial Intelligence in education, known as "Educational AI" or "AIED," began in the mid-20th century. In the 1950s and 1960s, pioneers like Herbert A. Simon and Allen Newell created programs to simulate human problem-solving, laying the foundation for future AI applications in education. During the 1970s and 1980s, intelligent tutoring systems (ITS) emerged. Notable early systems included Wilbur J. Frasier's "Student Modeling Project" and systems like SHERLOCK and ACT, which adapted instruction to individual learners. In the 1990s and 2000s, companies like Carnegie Learning and Knewton integrated AI into educational software to personalize learning experiences. Recently, AI adoption in education has expanded with advanced ML, natural language processing, and data analytics, leading to AI-driven learning platforms and automated assessment tools. This historical overview shows AI's evolution in education, from theoretical roots to practical applications in personalized learning and assessment. As AI advances, it promises to further transform education.

2.1.1 AI Applications in Education

ChatGPT - is a chatbot that provides a personalized learning experience, automates administrative tasks, and offers interactive support for both students and instructors. Explain Me Like I'm Five - is a neural network that can help explain complex things in a way that even children can understand. It uses deep learning to understand complex concepts and ideas. Teacherbot - helps teachers in creating lesson plans, exercises, and assignments, allowing for quick generation of educational content. MathGPT - is a neural network for solving math problems of varying difficulty to help students and teachers learn and explain math. Gamma AI - to automatically create presentations with infographics, tables and images to save teachers time. Gradescope - to simplify the process of administering and grading tests, which will reduce time spent reviewing papers and increase the accuracy of grades. Kandinsky - for creating images based on text descriptions. BlackBox is an artificial intelligence that helps in learning programming. It supports more than 20 programming languages, including Python, JavaScript, TypeScript, Go, and Ruby.

2.2 Artificial Intelligence in Education and schools

The study "Artificial Intelligence in Education and Schools" by Gocen and Aydemir (2020) from Harran University in Turkey explores the impact of AI on education using a phenomenological approach. It gathers opinions from 19 participants: 5 academics, 5 legal experts, 4 AI experts, and 5 teachers. The research was designed

as a phenomenological study, which is a qualitative research method. Qualitative research is preferred when it is desired to examine a problem or subject in depth (Creswell, 2013). Research with the aim of uncovering the ideas and the meanings of individuals is called phenomenological research (Yildirim and Simsek, 2008). Data collection included semi-structured interviews, both online and face-to-face. Participants discussed AI integration, future prospects, and implications. Content analysis identified key themes. Expected AI outcomes in education included advanced software, robot assistants, smart classrooms, individualized education, simulations, vocational guidance systems, attendance tools, unmanned systems, learning outcome detection, personal teaching tools, attention analysis, academic success detection, cloud-based learning, and curriculum editing. Drawbacks included mechanical thinking, loss of humanistic values, potential biases, data privacy concerns, reduced human intervention, and negative social effects. Benefits included personalized learning, accurate needs assessment, practical solutions to issues, reduced paperwork, improved education quality, efficient decision-making, effective teaching methods, smaller group training, and aiding policymakers. The final questions asked participants to rate AI in education as beneficial or problematic, giving a percentage for each. The results, shown in Table 2.1, reflect the perceived balance of benefits and drawbacks in AI integration.

Groups	Benefit Average (%)	Drawback Average (%)
Academicians	56.00	44.00
Law Personnel	72.20	27.80
Expert Engineers	95.00	5.00
Teachers	62.00	38.00
General	68.67	31.33

TABLE 2.1: Distribution of benefit - drawback percentages by groups

Participants generally viewed AI developments positively. Academicians weighed teaching benefits and harms mainly within their profession, while expert engineers believed AI would enhance quality and benefit education overall. In summary, participants viewed AI developments in education positively but also expressed concerns about potential drawbacks, emphasizing the need for a balanced and cautious approach to AI integration in education. The participants think there will be fewer places for teachers in schools and more places for robot assistants. Parallel to those observations, (Picciano, 2019) asserts that the majority of people with displaced jobs will be in white-collar and professional areas, such as teaching, law, medicine and the corporate sector. One of the fears most faced in the community about AI is the elimination of jobs. Picciano (2019) also hints that it is not AI or machines that will replace human work; rather, it is people with the ability to use smart machines or intelligent systems that will overpower those who do not. The study underscores the importance of interdisciplinary collaboration, ethical considerations, and data privacy safeguards as AI continues to evolve in the educational sector.

2.3 How K-12 Schools Are Embracing AI

In research conducted by Sahota (2023), the increasing adoption of AI in K-12 educational settings is examined, highlighting several key areas where AI is making significant impacts. The article provides case studies of various schools that have

integrated AI technologies to enhance personalized learning, improve administrative efficiency, and support teachers in delivering tailored educational experiences. The article highlights several key areas where AI is making a significant impact in education: **Personalized Learning Experiences:** AI systems analyze students' learning patterns to tailor educational content to individual needs. Tools like Carnegie Learning's MATHia provide personalized math instruction, adapting in real-time to each student's responses. The software was found to be effective in a study conducted across several schools in the U.S., where students using MATHia showed a 43% improvement in math problem-solving skills compared to those who didn't use the software. In a similar study by (VanLehn, 2019) it was demonstrated that students using AI-based tutoring systems outperformed their peers receiving traditional instruction, highlighting the potential of personalized learning in improving educational outcomes. **Enhancing Teacher Efficiency:** AI aids educators by automating tasks such as lesson preparation, grading, and student assessment. According to a study by Bryant, Heitz, Sanghvi, and Wagle (2020) from McKinsey & Company, effective use of AI can reduce the time teachers spend on these tasks by 20 to 30 percent, allowing them to focus more on direct student engagement. In a similar study, automated grading and assessment tools, such as Turnitin and Gradescope, have been shown to save educators time while maintaining consistency in grading (Chorzempa, 2020). **Curriculum Development and AI Literacy:** Schools are incorporating AI-related studies into their curricula to prepare students for future technological landscapes. For example, Montour School District in Pennsylvania uses AI tools to teach machine learning concepts, aiming to enhance students' AI literacy. **Administrative Efficiency:** AI streamlines routine administrative tasks, such as scheduling and managing student inquiries. Georgia State University's implementation of the AI chatbot "Pounce" successfully handled over 200,000 questions in its first year, significantly reducing the administrative workload. While AI offers significant benefits in K-12 education, its implementation poses several challenges. These include ensuring data privacy and security, equitable access to AI technologies, and developing AI literacy among teachers and students. Addressing these issues is crucial for the ethical and effective integration of AI in education. AI is poised to revolutionize K-12 education by enabling personalized, efficient, and future-oriented learning experiences. Despite the challenges, the potential benefits of AI in enhancing educational outcomes make it an indispensable tool for the future of education.

Chapter 3

Methodology

The data was collected using a questionnaire distributed to teachers, students, and schoolchildren from a variety of educational institutions in Kyrgyzstan, including both private and public institutions. The main objective was to assess the level of influence of artificial intelligence (AI) on education in the country. The questionnaire helped to get a clear idea of how artificial intelligence currently affects educational practice and its potential consequences in the future. All the answers received are considered in the data analysis.

3.1 Collected Data

Type of data: Primary Data

The primary data is collected through an online questionnaire created using Google Forms. The questionnaire included 12 questions covering various aspects of the perception and use of AI in the educational environment.

The survey was conducted among participants from different educational institutions including teachers, students and school students in Kyrgyzstan. The total number of respondents was 100 people. The survey was conducted in Russian language to ensure accessibility and understanding among all participants.

3.2 Data Analysis

We analyzed the survey data using descriptive statistical methods. The purpose was to gain a deeper understanding of the relationships and patterns within the collected data. The study utilized both qualitative and quantitative methods. The qualitative method provided an in-depth understanding of the respondents' views, opinions and experiences regarding the impact of AI in education, while the quantitative method provided statistics, percentages and insight into the quantitative aspects of respondents' reactions to questions about the use of AI in education. These methods helped us to obtain the results for which we made the main conclusion.

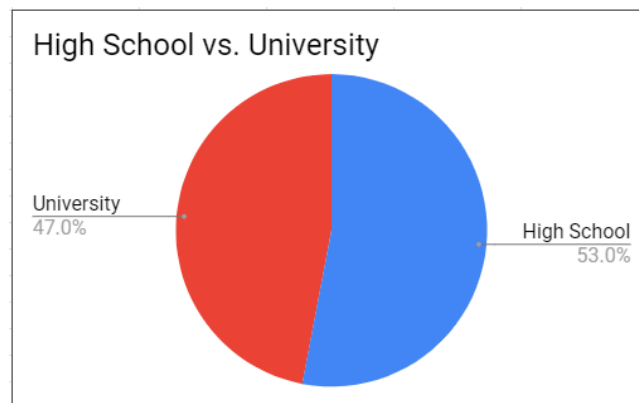
Chapter 4

Results

The results of the survey were as follows:

The diagram (Fig. 4.1) shows a balanced distribution of respondents: 53% from high school and 47% from university. This suggests the survey effectively captured perspectives from both educational levels, ensuring a comprehensive understanding of AI's impact on education.

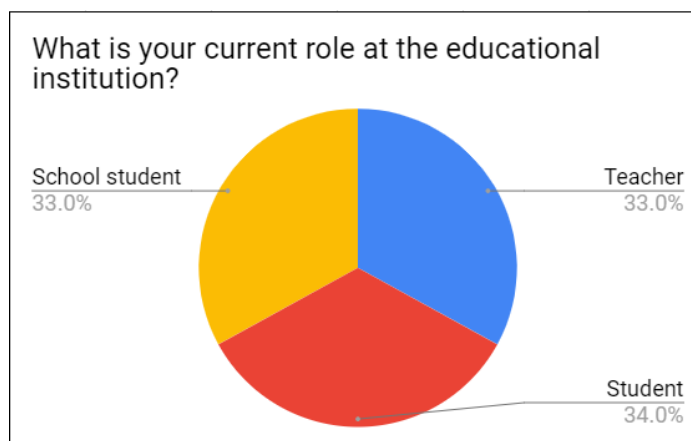
FIGURE 4.1: The distribution among respondents by educational level



Source: Developed by author

The pie chart (Fig. 4.2) shows three segments: schoolchildren (33%), students (34%), and teachers (33%). This balanced representation ensures an objective analysis of the educational process, minimizing bias and considering diverse viewpoints.

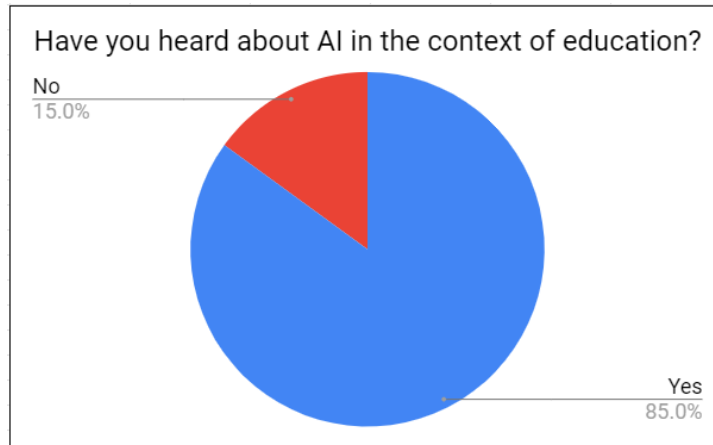
FIGURE 4.2: Current role in an educational institution



Source: Developed by author

Interestingly, a significant portion of the participants (85%) reported having heard about AI in the context of education (Fig. 4.3). This indicates participants' general awareness of AI technologies.

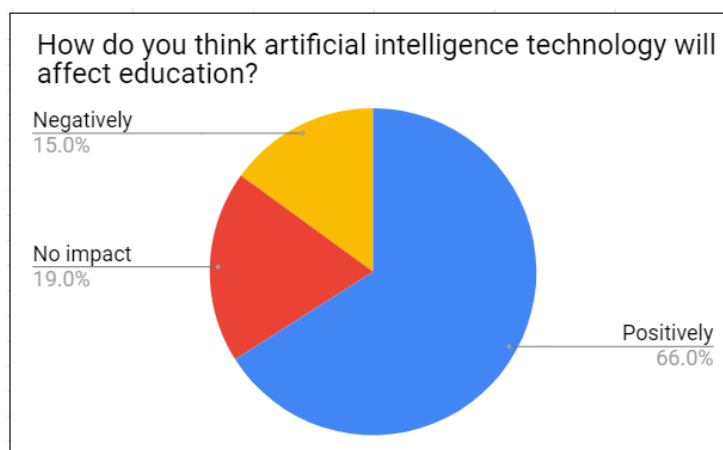
FIGURE 4.3: Awareness of AI in the context of education



Source: Developed by author

The diagram (Fig. 4.4) shows respondents' perceptions of AI technology's impact on education. About 66% believe AI will have a positive effect, 15% foresee a negative impact, and 19% think it will have no significant impact. This distribution suggests prevailing optimism about AI's potential benefits in education, though some have concerns about its drawbacks.

FIGURE 4.4: Anticipated impact of AI on education

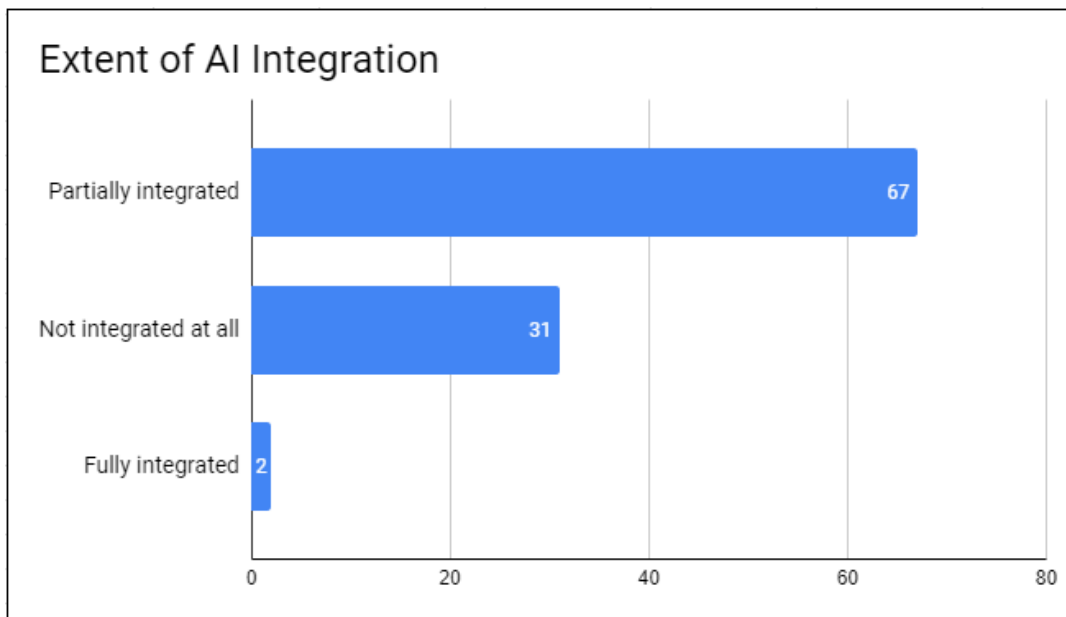


Source: Developed by author

The diagram (Fig.4.5) shows respondents' views on AI integration in their educational institutions. 67% see it as partially integrated, 31% as not integrated at all, and only 2% as fully integrated. This distribution underscores a prevalent sentiment that AI technologies have not yet reached full utilization in education, with a majority indicating partial integration.

Based on the participants' responses (Fig.4.6), AI-based tools or applications identified in the educational environment include: adaptive learning platforms 31%, automated grading and feedback systems 44%, educational games with AI 41%, student support chatbots 37%, creating presentations using neural networks 35%, and

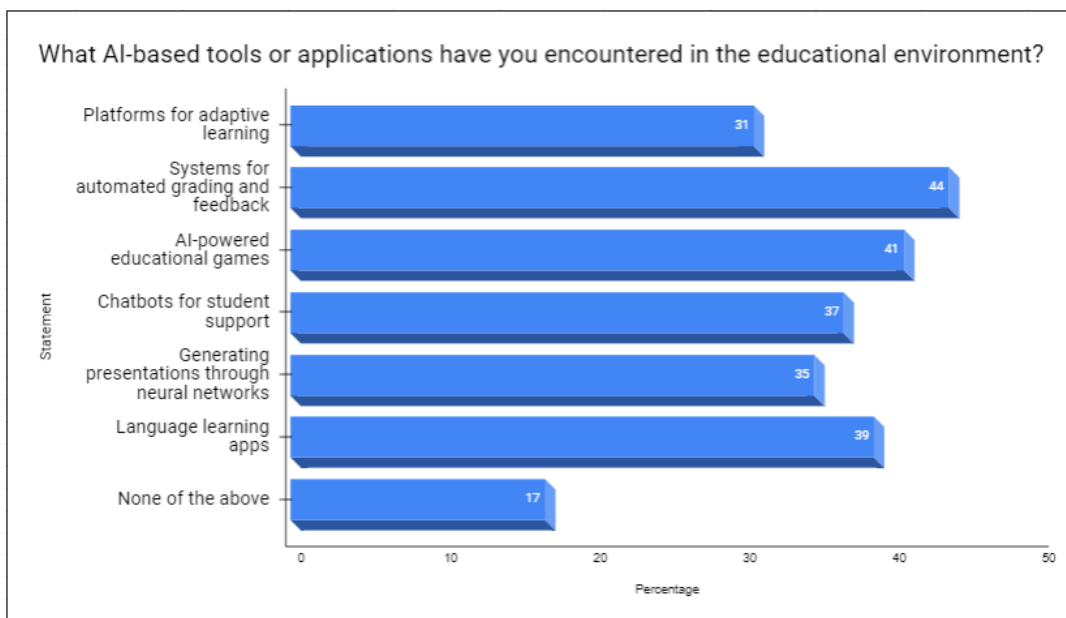
FIGURE 4.5: Current AI Integration in Educational Institutions



Source: Developed by author

language learning apps 39%. This indicates significant adoption of artificial intelligence technologies in education to enhance the learning experience, assessment processes, and student engagement.

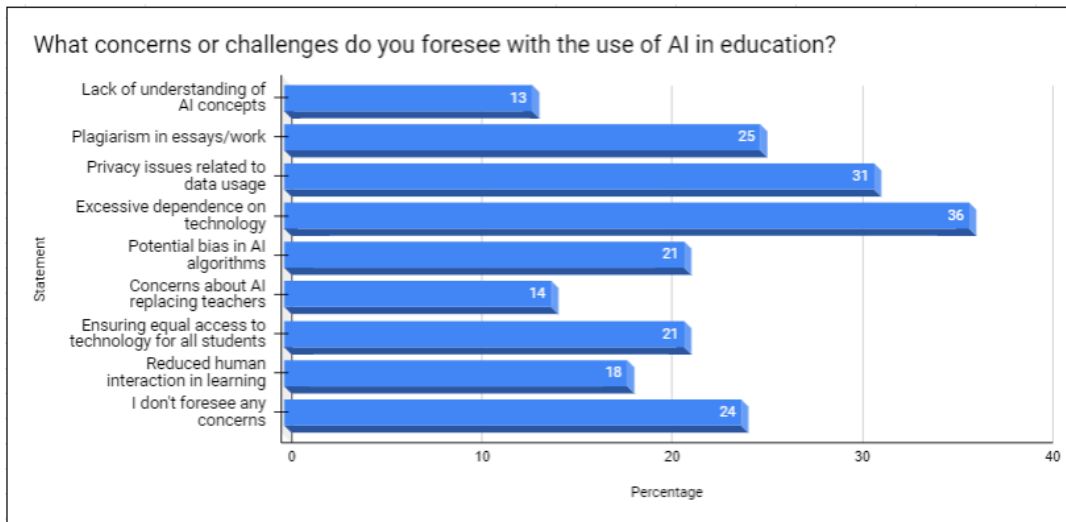
FIGURE 4.6: AI-based Tools/Applications Encountered in Educational Environment



Source: Developed by author

Survey results show concerns about AI in education: 36% worry about excessive dependence on technology, 31% about data privacy, and 21% about bias in algorithms, 25% fear plagiarism, 14% teacher replacement, 13% worry about misunderstanding AI, another 21% about tech access equity, 18% fear reduced human interaction, while 24% see no issues. (Fig.4.7)

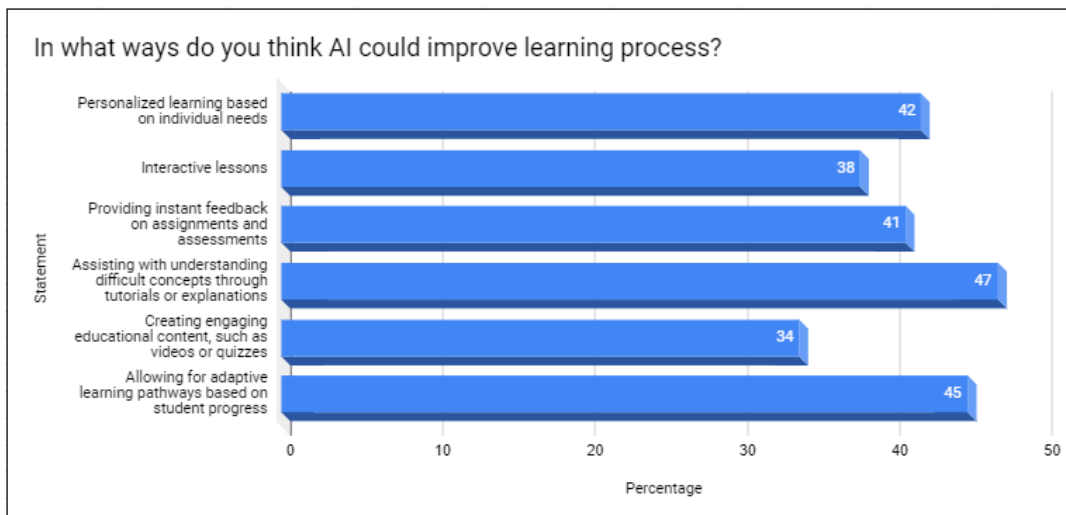
FIGURE 4.7: Concerns and Challenges related to AIED



Source: Developed by author

The survey indicates that respondents believe AI can enhance education through personalized learning 42%, interactive lessons 38%, instant feedback 41%, assistance with complex concepts 47%, creation of engaging content 34%, and adaptive learning 45%. This reflects a consensus on AI's potential to optimize learning experiences across various dimensions.(Fig.4.8)

FIGURE 4.8: Enhancement of Learning Experience

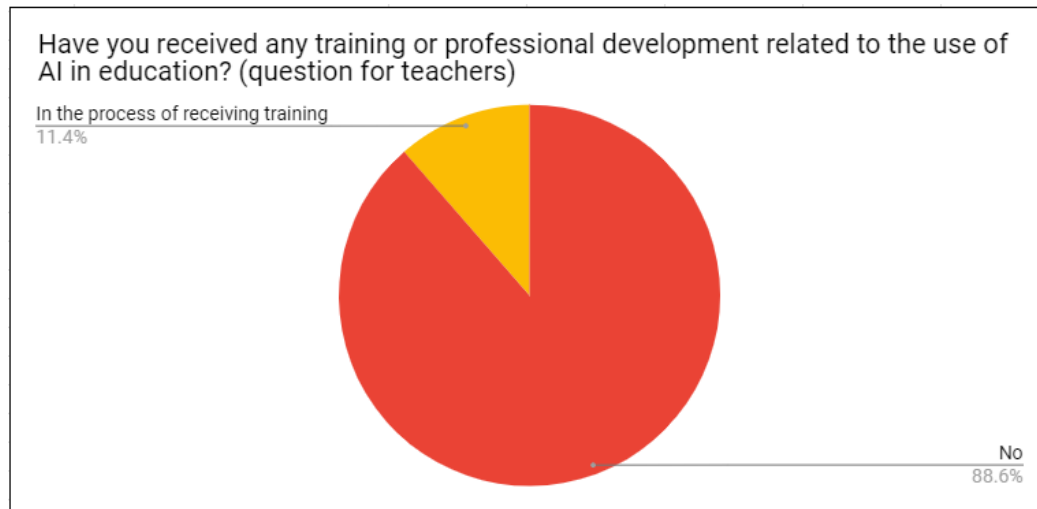


Source: Developed by author

Analysis of the diagram (Fig.4.9) reveals that 88.6% of teachers have not received any AI-related training or professional development, while 11.4% are currently in the process of receiving such training.

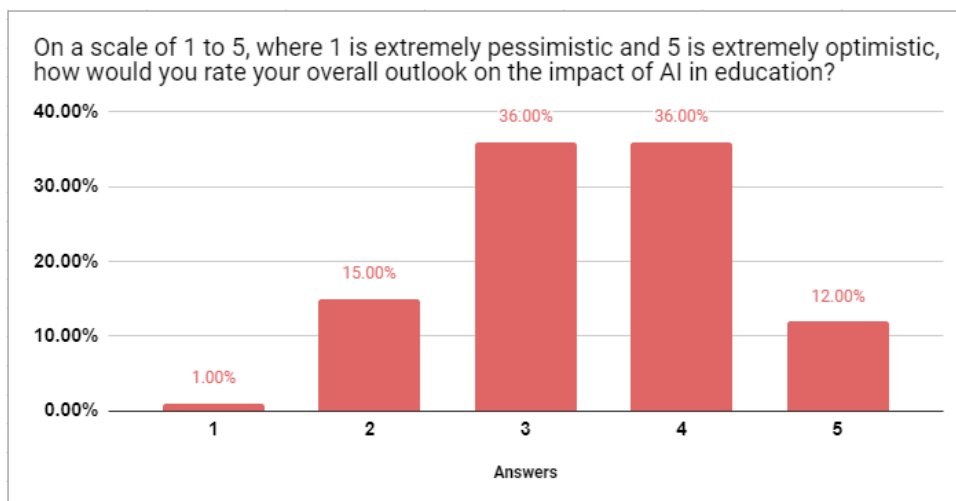
Respondents rated the impact of AI in education on a scale of 1 to 5. The distribution shows a significant portion of respondents 36% expressing a neutral stance (rated 3), suggesting a balanced outlook. Another 36% rate their view as positive (rated 4), 15% rate their view as pessimistic (rated 2) and 12% were extremely optimistic (rated 5). This distribution reflects diverse opinions, with a majority holding a neutral position. (Fig.4.10)

FIGURE 4.9: Teacher training in the use of AI in education



Source: Developed by author

FIGURE 4.10: Overall Outlook on AI in Education



Source: Developed by author

To conduct an assessment of the impact of AI integration, respondents were asked the following question: "How will the integration of AI technologies impact student engagement, student performance, and overall learning outcomes?" with the options "Significantly decrease", "Decrease", "No Change", "Increase", "Significantly increase". (Fig.4.11)

The table 4.1 shows a scale for measuring the impact of AI integration on education, that varies from 2 (-) to +2

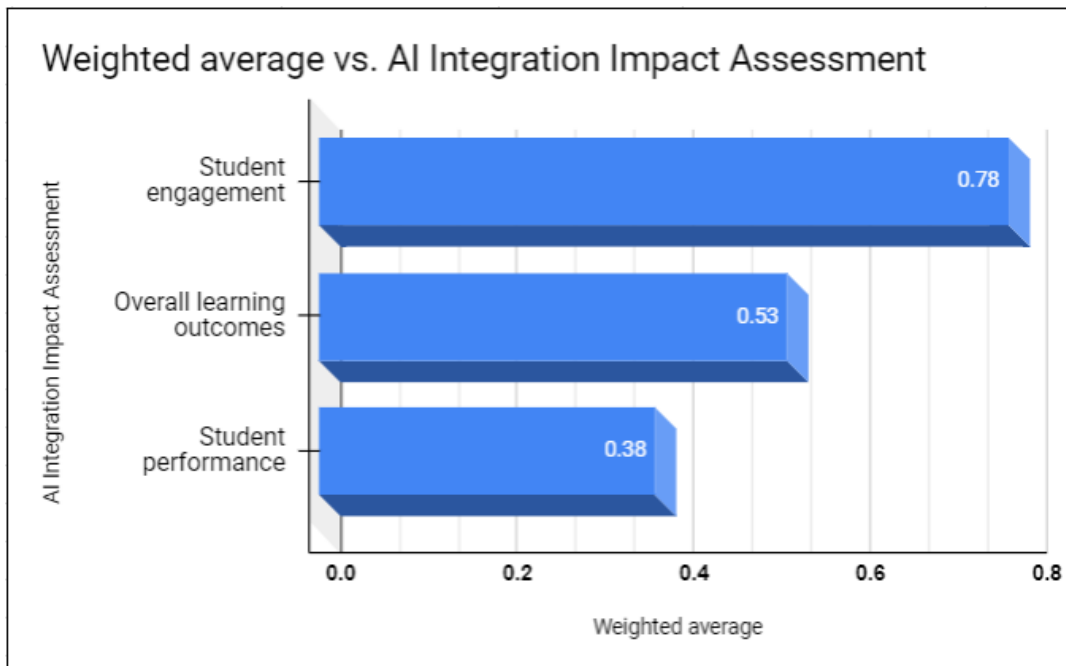
- 1.2 - 2 is significantly increase
- 0.4 (-) 1.2 is increase
- -0.2 (-) +0.4 is no change
- -1.2 (-) +0.4 is significantly decrease
- -2 (-) -1.2 is decrease

TABLE 4.1: Assessment of AI integration impact from responses

AI Integration Impact Assessment	Significantly decrease (-2)	Decrease (-1)	No Change (0)	Increase (1)	Significantly increase (2)	Weighted average
Student engagement	2	10	16	52	20	0.78
Student performance	5	20	21	40	14	0.38
Overall learning outcomes	3	15	19	52	11	0.53
						0.5633333333

Source: Developed by author

FIGURE 4.11: The impact of AI on student engagement, student performance, and overall learning outcomes



Source: Developed by author

According to the results of the table 4.1, the weighted average for student engagement is 0.78, which falls into the "increase" category (0.4 - 1.2). This indicates that students are likely to become more engaged with their studies due to AI integration. The use of AI could be making lessons more interactive and personalized, leading to higher levels of interest and participation among students.

The weighted average for overall learning outcomes is 0.53, which also falls in the range of 0.4 to 1.2. This suggests an increase in overall learning outcomes as a result of AI integration.

The impact on student performance, with a weighted average of 0.38, falls within the upper range of the "no change" category (-0.2 to +0.4). While AI integration has not significantly improved student performance, it has not had a negative effect

either. This neutral response may indicate that while some improvements are seen, they are not yet substantial.

To assess the impact of AI integration on administrative tasks and communication, respondents were asked the following question: "Please determine how artificial intelligence will impact administrative tasks and communication" with the options "Significantly deteriorated", "Deteriorated", "No significant change", "Improved", "Significantly improved" for:

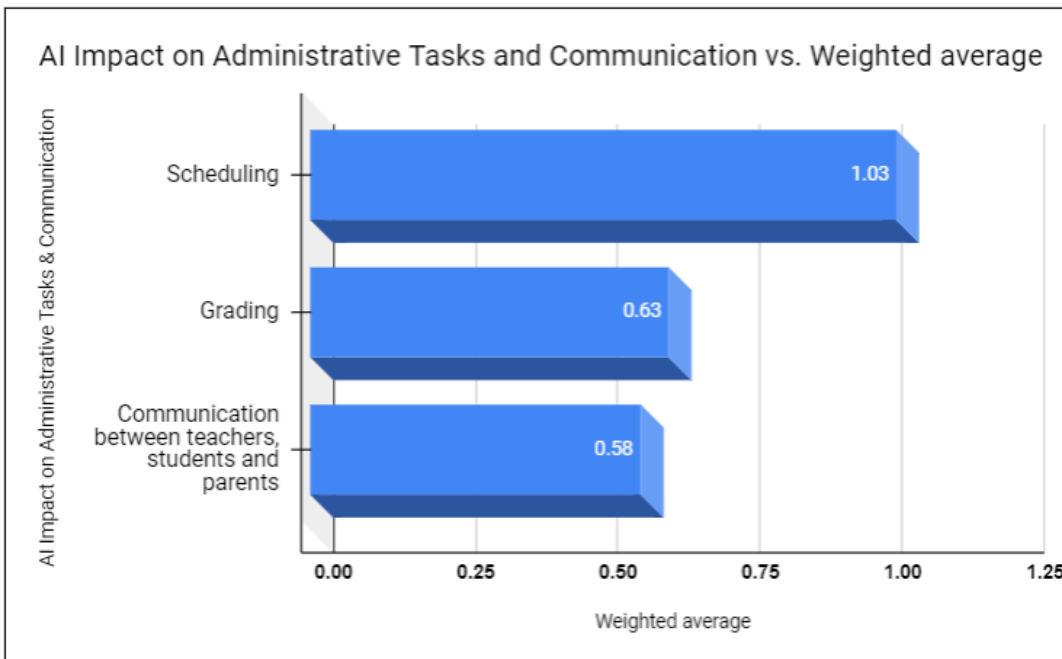
- grading
- scheduling
- communication between teachers, students, and parents. (Fig.4.12)

TABLE 4.2: The impact of AI on administrative tasks and communication

AI Impact on Administrative Tasks and Communication	Significantly deteriorated (-2)	Deteriorated (-1)	No significant change (0)	Improved (1)	Significantly improved (2)	Weighted average
Grading	0	14	24	47	15	0.63
Scheduling	0	4	14	57	25	1.03
Communication between teachers, students and parents	0	7	44	33	16	0.58
						0.7466666667

Source: Developed by author

FIGURE 4.12: The impact of AI on administrative tasks and communication within educational settings



Source: Developed by author

According to the results of the table 4.2, we obtained a weighted average of the following factors:

- The weighted average of 1.03 indicates that respondents generally anticipate that AI will improve scheduling processes. A majority (57%) expect AI to improve scheduling, while 25% believe AI will significantly improve this task. These expectations suggest that AI tools are perceived to be effective in automating and optimizing scheduling tasks, leading to increased efficiency and reduced administrative burdens.
- Regarding grading, the weighted average of 0.63 indicates that respondents hold moderate expectations about AI's impact. Nearly half (47%) expect improvements, while 15% anticipate significant improvements. However, 24% foresee no significant change, and 14% predict deterioration. These mixed expectations suggest that while AI is anticipated to bring efficiencies in grading, there are concerns about potential challenges, such as accuracy and fairness of AI grading systems.
- In terms of communication, the weighted average of 0.58 reflects moderate expectations. One-third of respondents (33%) expect AI to improve communication, while 16% anticipate significant improvements. However, the largest group (44%) foresees no significant change, indicating that while AI tools may enhance communication, the extent of their impact may vary, and some traditional communication challenges might persist.

4.1 Final Thoughts

In conclusion, the survey results reflect a generally positive perception of AI's potential in education among the students and teachers in educational institutions. While there is a sense of optimism regarding the positive impact on learning experiences, concerns about proper integration, teacher training, and ethical considerations highlight the need for a thoughtful and collaborative approach. The findings from this survey contribute valuable insights for educators, administrators, and policymakers aiming to integrate AI technologies effectively in educational settings.

Chapter 5

Discussion of the results

5.1 Comparison with similar studies

An important aspect for evaluating the results of our study is the comparison with the results of other similar studies. Let's look at two examples:

Gocen and Aydemir (2020) conducted a study focusing on the utilization of AI in the Turkish educational system. Their findings highlighted AI's potential to enhance personalized learning experiences, provide substantial support for students with special needs, and predict emerging skill requirements.

In a study by Sahota (2023), which focused on the implementation of AI in K-12 schools in the U.S., she found that the main benefits of AI include improved student achievement and reduced teacher workload.

5.1.1 Comparison of results

Both studies reported a positive impact of AI on the educational process. Our study also revealed that 66% of respondents believe that AI will have a positive impact on education. While Sahota (2023) notes the successful implementation of AI in K-12 schools in the U.S., our study revealed that only 2% of respondents in Kyrgyzstan believe that AI is fully integrated into educational institutions.

5.2 Problems of implementing AI in education in Kyrgyzstan

Our research has identified several key issues that hinder the implementation of AI in educational processes in Kyrgyzstan: Lack of teacher training, the majority of teachers (85.7%) have not received training on the use of AI in education. This indicates a significant training gap. Ethical and legal issues, issues of data privacy and potential bias of AI algorithms are of concern to respondents. 35% of respondents cited data privacy concerns and 12.5% cited potential bias in algorithms. Technical Infrastructure, lack of adequate technical resources and equipment is also a significant barrier. Many educational institutions do not have sufficient resources to effectively implement AI technologies. Resistance to change, some teachers and administrative staff may be skeptical of adopting new technologies due to lack of understanding or fear of change. Economic barriers, limited financial resources make it difficult to procure and implement AI technologies and to conduct the necessary training programs.

Chapter 6

Conclusions and Recommendations

6.1 Conclusion

The purpose of this study was to comprehensively assess the impact of artificial intelligence on education in Kyrgyzstan, taking into account both its potential benefits and challenges. Through a comparative analysis with similar studies and an examination of the integration of AI in educational institutions in Kyrgyzstan, several key findings were identified. The findings indicate a generally positive perception of the potential of artificial intelligence in education among students and teachers in Kyrgyzstan. However, several challenges hinder the effective implementation of AI in educational institutions. These include lack of teacher training, ethical considerations, insufficient technical infrastructure, resistance to change, and economic barriers. Despite these challenges, there is optimism about AI's ability to improve personalized learning experiences, increase administrative efficiency, and support students with diverse learning needs. Importantly, careful consideration of ethics, privacy, and equity issues is critical to ensuring responsible integration of AI in education. By systematically addressing these issues, Kyrgyzstan can pave the way for the effective integration of AI into its education system.

6.2 Recommendations

Based on the research problem and the results obtained, we suggest the following recommendations for effective integration of AI in education in Kyrgyzstan: 1. Provide schools with computers and the Internet, which is the foundation for AI integration. 2. Conduct courses and trainings for teachers so that they know how to use computers and the Internet in teaching. 3. Use AI to automate homework and test grading, allowing teachers to focus on more creative tasks. 4. Develop and distribute digital educational materials such as textbooks and online courses adaptable to students' proficiency levels. 5. Enhance education accessibility in Kyrgyzstan by offering free online courses and webinars to students in remote areas. Additionally, translate and adapt international educational materials into Kyrgyz and Russian. 6. Partnerships with IT companies. Collaborate with local and international IT companies to develop and implement educational AI solutions. 7. Financing. To provide funding for AI implementation projects in schools and universities. This thesis contributes to the growing body of literature on AI in education and provides practical recommendations for the responsible implementation of AI technologies in Kyrgyzstan's education system. In addition, future research should explore the long-term impact of AI on student learning outcomes, effectiveness of implemented strategies, and evolution of AI technologies in educational settings. Continuous dialogue between educators, policymakers, AI developers, and stakeholders is essential for adaptive strategies that align with evolving educational needs.

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