International Journal of Innovative Research and Scientific Studies, 8(6) 2025, pages: 2389-2398

IJIRSS
International Journal of Innovative Research & Scientific Studies

ISSN: 2617-6548

URL: www.ijirss.com

Artificial intelligence and the future of professions: Features of career guidance work with schoolchildren

Nizatil Temirkulova[1], Meiramgul Zhorokpayeva[2*], Natalya Benesh[3], Saule Zhubakova[1*], Saltanat Kamesheva[4]

[1]*L. N. Gumilyov Eurasian National University, Kazakhstan.*
[2]*Semey Medical University, Kazakhstan.*
[3]*Sarsen Amanzholov East Kazakhstan University, Kazakhstan.*
[4]*National Accreditation Center, Kazakhstan.*

Corresponding author: Meiramgul Zhorokpayeva (*Email: zhubakova.saule@mail.ru*)

Abstract

The purpose of this study is to examine the impact of artificial intelligence (AI) on the labor market and to explore its implications for career guidance among school students. The research aims to identify strategies for effectively integrating AI into career counseling practices in order to promote informed, flexible, and future-oriented career decisions in the context of rapid technological transformation. A mixed-method approach was employed, combining a theoretical review of psychological, pedagogical, and scientific literature with empirical research. The literature analysis refined the concepts of "career guidance" and "artificial intelligence" and identified disappearing and emerging professions shaped by AI-driven automation. To assess students' perspectives, an original questionnaire titled The Impact of AI on the Labor Market was developed. It explored perceptions of AI's influence on employment, awareness of key skills, and readiness for retraining. The empirical survey involved 133 high school students in Astana, Kazakhstan. The findings demonstrate limited awareness among students of AI-related opportunities and risks, as well as insufficient attention to the development of essential competencies such as creativity, soft skills, and critical thinking. While students acknowledged the inevitability of professional transformation, their preparedness for adaptation varied considerably. Conclusion. Integrating AI into career guidance is crucial to ensure that future generations acquire the competencies, flexibility, and resilience necessary to thrive in the era of digital transformation.

Keywords: Artificial intelligence, Career guidance, Digital transformation, Education, Soft skills, Future professions, Labor market.

DOI: 10.53894/ijirss.v8i6.10120
Funding: This study received no specific financial support.
History: Received: 21 July 2025 / **Revised:** 25 August 2025 / **Accepted:** 27 August 2025 / **Published:** 19 September 2025

Competing Interests: The authors declare that they have no competing interests.
Authors' Contributions: All authors contributed equally to the conception and design of the study. All authors have read and agreed to the published version of the manuscript.
Transparency: The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.
Institutional Review Board Statement: The study was conducted in full compliance with ethical standards and the principles outlined in the Declaration of Helsinki. Ethical approval was obtained from the Institutional Review Board of the L.N. Gumilyov Eurasian National University (approval protocol No. 3, dated 28.10.2024). Prior to participation, all respondents and their legal guardians were fully informed about the objectives, procedures, and potential risks of the research. Written informed consent was obtained from all participants and their legal representatives. Participation in the study was voluntary, and all participants retained the right to withdraw from the research at any stage without any consequences.
Publisher: Innovative Research Publishing

1. Introduction

Career guidance for school students is a set of measures aimed at supporting informed decision-making regarding future professions. It is not a one-time assessment but a long-term process involving self-analysis, exploration of career opportunities, and aligning individual abilities with labor market requirements. Effective career guidance ensures harmonious personal development and contributes to long-term professional success, preventing career dissatisfaction and enabling the realization of personal potential. According to the State Compulsory Standard of General Secondary Education, one of the key objectives is to promote professional self-determination of graduates in accordance with their interests and abilities [1].

In Kazakhstan, current career guidance practices are underdeveloped, lacking alignment with workforce policies [2] and failing to address the needs of students [3]. Organizing effective career guidance requires consideration of contemporary socio-economic trends [4] as well as specialized professional training through career development programs [5] or the introduction of targeted career guidance courses Sergeev [6]. Lee, et al. [7] suggests that online professional training may enhance career guidance activities [7].

The era of digitalization, particularly the rapid integration of artificial intelligence (AI) into various domains, necessitates careful professional decision-making, as the labor market is undergoing significant transformation. AI is developing at an unprecedented pace, with its impact on different sectors becoming increasingly evident. One of the most widely discussed issues is the potential replacement of certain professions by AI. Current AI relevance in the labor market is multifaceted and widely debated in both academic and public contexts, encompassing key aspects such as task automation [8-10] productivity enhancement [11] the creation and transformation of professions [12, 13] and employee well-being [14].

AI technologies are actively applied to automate repetitive tasks, freeing workers from monotonous labor in fields such as manufacturing, logistics, data processing, and customer service. As a result, some occupations are disappearing or undergoing transformation. For example, in 2023, the Indian company Dukaan replaced nearly 90% of its technical support staff with AI, significantly increasing profitability by reducing operational costs [15]. Similar trends are evident in companies such as Duolingo, Dropbox, Amazon, Google, and Microsoft, which have reduced staff due to AI implementation [16, 17].

AI systems are capable of processing vast amounts of data, identifying patterns, and optimizing workflows, thereby increasing efficiency in production, marketing, and human resource management. However, concerns remain regarding unemployment risks associated with AI adoption, as evidenced by recent public sector layoffs in the UK and rising unemployment in the US IT sector in 2024.

Simultaneously, AI development generates new professions related to system development, deployment, and maintenance, including machine learning engineers, data scientists, AI architects, and AI ethics specialists. Existing professions are also evolving, requiring new competencies and AI literacy.

The central research question of this study is: *How does labor market transformation under the influence of AI affect students' career choices, and what should be the content of effective career guidance?*

The object of the study is career guidance for school students, while the subject is the specific application of AI in this domain and its potential impact on career choice. The purpose of this article is to identify promising directions for integrating AI into school career guidance to enable informed and adaptive professional decision-making in a rapidly changing labor market. The objectives include:

1. Analyzing existing career guidance methodologies;
2. Assessing AI's influence on professional transformation;
3. Determining AI's potential for personalized career guidance for students.

The structure of the article consists of the introduction, a literature review on modern career guidance approaches and AI's impact on the labor market, an analysis of AI opportunities and risks in school career counseling, survey results, and a conclusion with recommendations.

2. Literature Review

The first studies on the impact of artificial intelligence (AI) on the labor market and career choice began in the mid-20th century, when the term *artificial intelligence* was introduced into common use at the Dartmouth Conference by McCarthy, et al. [18]. Nine years later, H. A. Simon predicted that computers would soon be capable of performing most intellectual tasks [19].

During the 1980s and 1990s, a series of studies investigated the impact of AI and automation on labor markets. E. Berman et al. identified a growing demand for skilled labor driven by computerization and automation, along with a decline in routine manual tasks [20]. Similarly, Autor et al. analyzed the effects of robotics and information technologies, emphasizing the disappearance of low-skill jobs and the rising demand for specialists in programming, engineering, and technology management [21].

With the spread of the Internet and digital technologies, research began to focus on labor globalization and the emergence of 21st-century skills. F. Levy and R. J. Murnane demonstrated how computerization and automation reshape the employment structure, reinforcing demand for analytical and communication skills while reducing demand for routine labor [22].

Contemporary studies confirm that AI profoundly transforms labor markets: many routine functions are automated, while new professions requiring human qualities - creativity, complex problem-solving, ethics, and empathy - emerge [23]. This trend highlights the need for adapting career guidance practices toward the development of such competencies. Research by Microsoft indicates that professions based on interpersonal communication, caregiving, and fine motor skills remain relatively resilient to automation [24] providing a foundation for sustainable career trajectories.

Abraimova and Beldeubayeva [25] emphasize the potential of AI in career guidance through personalization, forecasting of in-demand professions, and adaptive systems, while also noting risks related to privacy, accessibility, and weak labor market alignment [25]. Similarly, Kolesova and Saraeva argue that analytics and machine learning accelerate the identification of students' aptitudes and interests, making career guidance more effective and inclusive [26].

A systematic review in *Smart Learning Environments* stresses that AI must provide individualized recommendations, mitigate algorithmic biases, and align with pedagogical values, complementing rather than replacing critical thinking and deep learning [27]. The psychological dimension is also crucial: a 2025 study in *BMC Psychology* found that attitudes toward AI and AI literacy mediate the relationship between career self-efficacy and job search anxiety, with literacy reducing anxiety and supporting adaptation to labor market changes [28].

In the United States, AI-powered platforms such as ESAI and the College Guidance Network assist with college selection, scholarships, and scheduling, partially replacing traditional counseling and enhancing accessibility [29].

The review demonstrates that AI in career guidance has vast potential - from personalized recommendations to psychological support and labor market preparation. Current research reinforces the idea that AI competencies, digital literacy, adaptability, informal learning, and human-centered technologies must become integral elements of school-based career guidance. However, effective integration requires careful attention to ethical considerations, inclusivity, literacy, and the development of critical, creative, and emotional skills.

3. Materials and Methods

This study employed a mixed-methods approach, combining qualitative and quantitative data collection and analysis techniques. The theoretical phase involved an in-depth review of existing scholarly and applied literature on career guidance for school students in the context of digital transformation, the application of artificial intelligence (AI) technologies, and automation processes. The sources included peer-reviewed journal articles, analytical reports from international organizations, statistical data, and relevant media publications highlighting AI development trends and transformations in the labor market.

The empirical phase aimed to explore students' attitudes towards AI and its role in the transformation of the labor market. For this purpose, the author developed a questionnaire entitled "The Impact of AI on the Labor Market", which consisted of both closed-ended and open-ended questions. The questionnaire was designed to assess respondents' awareness of AI technologies, their perception of the benefits and risks of automation, and their expectations regarding future changes in the professional sphere.

The survey was conducted in 2025 among school students in Astana. The total sample consisted of 133 respondents representing various upper secondary school age groups. The collected data were subjected to statistical and content analysis, enabling the identification of key trends in the perception of AI and the determination of priority directions for improving career guidance practices.

4. Results

4.1. Career Guidance Work with School Students

The organization of career guidance work with school students was based on global labor market trends influenced by the spread of artificial intelligence (AI). Lists of disappearing professions were compiled for this purpose.

4.1.1. Lists of Disappearing Professions

In the era of rapid technological progress, AI has begun to replace numerous professions that were previously considered integral to society. The following occupations are projected to be most susceptible to automation:

Table 1.
Disappearing Professions.

Occupation Category	Examples	AI Capabilities	Reason for Susceptibility
Data Entry & Information Processing	Administrative assistants, secretaries	Processing emails, scheduling meetings, generating reports, answering customer inquiries, database management	Repetitive and structured tasks
Simple Manufacturing Tasks	Assembly workers, CNC machine operators	Automated welding, painting, assembly	Monotonous, hazardous, and repetitive
Routine Analysis	Financial analysts, accountants	Data entry, error detection, report generation, financial risk analysis	Standardized operations and large-volume data processing
Image Recognition Professions	Radiologists, pathologists (partially)	Automated image-based diagnostics	Pattern recognition and classification
Transportation Professions (partially)	Logistics specialists, truck/taxi drivers	Autonomous driving, freight optimization	Can be more efficient and safe under specific conditions
Customer Service Professions (partially)	Sales consultants, call center operators	Personalized recommendations, chatbots, voice assistants	Standardized and repetitive inquiries

In the accounting sector, the adoption of AI for automating bookkeeping and data processing further reduces the demand for traditional accountants. Machines are capable of executing routine operations more rapidly and with fewer errors than human workers.

In journalism, automated systems can generate news based on data, leading to a reduced demand for correspondents and editors. Graphic designers also face pressure from AI, which offers automated solutions for creating visual content, sometimes narrowing and specializing the scope of human work.

Among disappearing professions, taxi drivers are notable, as the development of self-driving cars is significantly transforming the transportation market.

- Thus, artificial intelligence not only transforms work processes but also prompts reflection on the future of professions that may eventually become rare. Professions likely to disappear over time include:
- Telephone operators - call-handling automation renders this profession unnecessary.
- Cashiers - self-service systems and electronic payments reduce the need for human cashiers.
- Copywriters and rewriters - AI is capable of independently generating texts.

However, despite the threats associated with job replacement, it is important to note the positive aspects of AI integration into workflows. AI can improve quality and increase efficiency by freeing people from routine tasks, allowing them to focus on more creative and strategic aspects. For instance, accountants can devote more time to analyzing financial data, while journalists can engage in in-depth investigations and critical event analysis.

AI also contributes to the development of certain economic sectors and enhances professions such as medical diagnosticians, who use ChatGPT to analyze medical test results - X-rays, laboratory data, and functional diagnostics - enabling more accurate diagnoses and treatment planning. Engineers benefit from AI in designing devices and systems, though solving professional problems still requires specialists themselves. Lawyers use AI to conduct precise analysis and search large volumes of information, case law, and potential risks in litigation strategies, while preserving confidentiality, avoiding data leaks, and providing legal consultations via chatbots to save time.

AI does not replace all aspects of a profession, only certain tasks. Human factors - creativity, critical thinking, and emotional intelligence - remain essential.

New professions related to AI development, maintenance, and application are also emerging. Job replacement does not occur instantly but gradually, depending on the industry, the nature of tasks, and the availability of technology. Humans and AI can work together, complementing each other and increasing overall efficiency.

Overall, AI is transforming the labor market, and adapting to these changes is a key factor for future professional success. It is essential to develop skills that AI cannot yet replace - creativity, critical thinking, emotional intelligence, adaptability, and lifelong learning.

4.2. Lists of Emerging Professions

With the advancement of Artificial Intelligence (AI), the labor market is undergoing significant changes, leading to the emergence of new professions. Analysis of job search platforms such as HeadHunter (hh.kz), SuperJob (superjob.kz), Rabota.ru, Zarplata.kz, Enbek.kz, LinkedIn, Indeed, Glassdoor, Monster, Stepstone, Eurojobs, and XING has shown a growing demand for specialists capable of developing, maintaining, and managing AI systems. For instance, the profession of “Data Engineer” is becoming increasingly relevant, as it requires expertise in big data analysis and the creation of

machine learning algorithms. This includes specialists in machine learning, data scientists, data processing engineers, and AI ethics experts.

A Machine Learning Engineer is a highly qualified professional responsible for developing algorithms, training, and deploying machine learning models. This role requires strong knowledge of mathematics, statistics, and programming (Python, R), as well as familiarity with machine learning frameworks and libraries such as TensorFlow and PyTorch. Responsibilities include defining tasks, collecting and processing data, selecting appropriate algorithms, optimizing models, testing, debugging, and integrating them into existing systems. Machine learning engineers often collaborate closely with data scientists and other technical experts to ensure seamless model integration. Ensuring the quality and efficiency of developed models requires extensive testing and optimization. Additionally, they must be able to visualize and present research results to stakeholders, requiring advanced communication skills.

Data Scientists develop tools for solving financial and business-related problems by building machine learning models based on data analysis. They must possess skills in statistics, machine learning, and programming to generate actionable insights that support strategic decision-making. The demand for data scientists is increasing across various industries - from manufacturing to commerce [30].

The responsibilities of these specialists are diverse and include collecting, processing, and analyzing large volumes of data using various methods and tools. Their functions also involve developing predictive models, visualizing data, and presenting analysis results to stakeholders. In addition, they work closely with other professionals to ensure data integration and optimize business processes.

The specific nature of a data scientist's work requires staying up to date with the latest technologies and trends in data analysis. Continuous learning and adaptation to changing market demands are an integral part of their professional activity. This dynamic makes the role of a data scientist both engaging and highly demanding.

A data processing engineer is a specialist with unique skills necessary for analyzing and transforming large volumes of information. The core functions of this profession include developing data processing methods, creating algorithms to extract useful information, and optimizing data storage processes. Data processing engineers are also responsible for cleaning and preparing data for further analysis, enabling organizations to achieve more accurate results.

Their duties range from collaborating with business analysts to identify needs to implementing innovative solutions that improve company efficiency. Continuous learning and adaptation to new technologies are essential, as the market evolves rapidly.

The demand for data processing engineers in the labor market continues to grow. With the increasing volumes of data generated in various sectors, such specialists are becoming key figures for the successful operation of companies in the digital economy.

Furthermore, as the application of AI expands, there is a growing need for "Ethics Analysts" who assess AI's impact on society and help companies comply with ethical standards. They ensure the ethical use of AI, prevent bias, and mitigate undesirable consequences. This profession requires knowledge in ethics, philosophy, social sciences, and AI. An ethics analyst evaluates potential risks and consequences of AI implementation, develops recommendations for ethical usage, ensures compliance with ethical standards, and conducts audits.

Another naturally emerging profession is "AI Interaction Specialist," whose role is to create intuitive user interfaces and facilitate seamless interaction between humans and machines.

There are also new roles such as the "AI Trainer," who trains models based on specific datasets [31] and the "AI Project Manager," who manages teams working on the integration of AI into business processes [32]. Thus, technologies continue to transform not only approaches to work but also the very content of professions.

In addition to the aforementioned professions, there is a growing need for "Cybersecurity Specialists" focused on protecting AI systems from potential threats and attacks. As AI becomes increasingly integrated into various aspects of business, ensuring data security is becoming critically important. These specialists develop strategies to safeguard confidential information and prevent data breaches.

There is also rising demand for "AI Data Analysts," who interpret AI-generated results and make predictions based on analytics. Their skills help companies better understand how to leverage AI to improve efficiency and optimize processes.

Positions related to education are also emerging, such as the "AI Educator," who trains students and professionals in artificial intelligence technologies.

Another in-demand profession is the Deep Learning Engineer, who specializes in developing and applying complex neural networks. This role requires advanced knowledge in mathematics, programming, and a deep understanding of neural network architectures. A Deep Learning Engineer develops and studies deep neural networks, optimizes their architectures, researches new training methods, and integrates them into systems.

A new profession - the AI Architect - designs and implements an organization's AI strategy. This specialist must have a deep understanding of business, technology, and AI. They identify business needs, select appropriate AI solutions, develop system architectures, ensure compatibility with existing infrastructure, and manage development and deployment.

Some categories of AI-related professions also apply to specific industries. For example, data analysts in healthcare, finance, and other sectors use AI to analyze data and identify patterns within their domains. Their responsibilities include developing and implementing machine learning models for prediction, diagnostics, and service personalization.

Another example is the Robotics/Automation Specialist, who develops and implements robots and automated systems powered by AI. They design, develop, configure, and maintain robots, integrating them into production processes.

These specialists contribute to the development of a new generation of experts essential for the continued advancement of the industry. Thus, the labor market is adapting to innovations, creating new opportunities for career growth.

However, this new reality also demands adaptation and transformation in education and workforce training. Professions that require creativity, emotional intelligence, and human interaction will be in greater demand than ever before. Companies will increasingly seek employees capable of working in teams and finding unconventional solutions.

It is also important to consider the ethical aspects of AI use and its impact on society. A balance must be established between technology and humanity, preserving the value of human labor and creativity in the context of rapid technological progress. Unlocking new horizons of opportunity could be the key to the successful coexistence of humans and machines.

It should be noted that many existing professions will also be transformed and adapted to the new opportunities provided by AI. For example, accountants may use AI to automate tasks, while doctors can apply it to the analysis of medical images. Thus, AI development will lead both to the emergence of new roles and to the transformation of existing ones. For visualization, see the table of new professions (Table 2).

Table 2.
Classification of Emerging AI-Related Professions.

Category	Profession	Examples	Brief Description	AI Capabilities	Key Competencies
AI Development	Machine Learning Engineer	Recommendation systems, speech recognition	Designs and implements machine learning models within company products	Automated data analysis, forecasting, intelligent services	Mathematics, statistics, Python/R, TensorFlow, PyTorch, model optimization
Data Analytics	Data Scientist	Customer behavior analysis, demand forecasting	Analyzes data and builds predictive models to support decision-making	Insight generation, automated processing of large datasets	Statistics, machine learning, SQL, data visualization, business analytics
Data Processing	Data Engineer	Data warehouses, ETL processes	Develops methods for data processing and optimizes data storage	Data preparation for AI, computational efficiency	SQL, ETL, data cleaning, data processing algorithms
AI Ethics	AI Ethics Analyst	Algorithm audits, bias prevention	Assesses the societal impact of AI and develops ethical recommendations	Bias mitigation, ensuring transparency	Ethics, philosophy, social sciences, AI auditing
UX and Interfaces	AI Interaction Specialist	Voice assistants, chatbots	Designs user-friendly interfaces for human–AI interaction	Personalization, simplifying AI use	UX/UI design, psychology, AI technology knowledge
AI Training	AI Trainer	Chatbot configuration, training recognition systems	Trains models on domain-specific datasets	Improved AI accuracy, task-specific adaptation	Machine learning, data annotation, domain expertise
Project Management	AI Project Manager	AI integration into CRM systems	Manages teams implementing AI solutions	Coordination of AI integration into business processes	Project management, Agile, AI knowledge, communication
Cybersecurity	AI Cybersecurity Specialist	AI system protection against hacking	Ensures the security of AI systems and their data	Attack prevention, data confidentiality protection	Information security, cryptography, AI
AI Analytics	AI Data Analyst	AI forecast analysis, model performance evaluation	Interprets AI outputs and performance metrics	Business optimization through predictive analytics	Analytics, data visualization, statistics, AI
Education	AI Educator	Machine learning courses, corporate training	Trains students and professionals in AI technologies	Large-scale AI skills dissemination	Pedagogy, AI, programming
Deep Learning	Deep Learning Engineer	Neural networks for CV or NLP	Designs and optimizes deep neural network architectures	Image, speech, and text processing	Neural networks, Python, model research, optimization
AI Architecture	AI Architect	Corporate AI strategy development	Plans AI architecture and implementation strategy	AI integration into business models	Business analysis, system architecture, AI
Sector-	Industry AI	Medical	Applies AI for sector-	Diagnostics,	Domain expertise,

Specific Analytics	Data Analyst	analytics, finance	specific data analysis	forecasting, optimization	AI, data analytics
Robotics	Robotics/Automation Specialist	Industrial robots, service robotics	Designs and implements AI-powered robots	Process automation, efficiency improvement	Mechanics, electronics, programming, AI

In organizing career guidance activities, we were particularly interested in learning students' views on how AI influences the labor market and professions. The survey involved 133 school students from Astana. We designed an original questionnaire titled *"The Impact of AI on Professions"*, which consisted of five questions:

1. How do you feel about the introduction of AI into various fields of activity?
2. Which professions, in your opinion, are most at risk of being replaced by AI? (name three professions)
3. Do you think AI can improve the quality of work in your future profession?
4. Which skills, in your opinion, will be the most important in the future to remain competitive in the labor market? (Name at least three)
5. Your wishes regarding the professions of the future.

The survey was conducted via Google Forms, and the following results were obtained. In response to the first question, 37.6% of students answered "rather positively" about the introduction of AI, 27.8% were neutral, 27.1% responded "very positively," 4.5% "rather negatively," and 3% "very negatively." A more visual representation is shown in Figure 1.

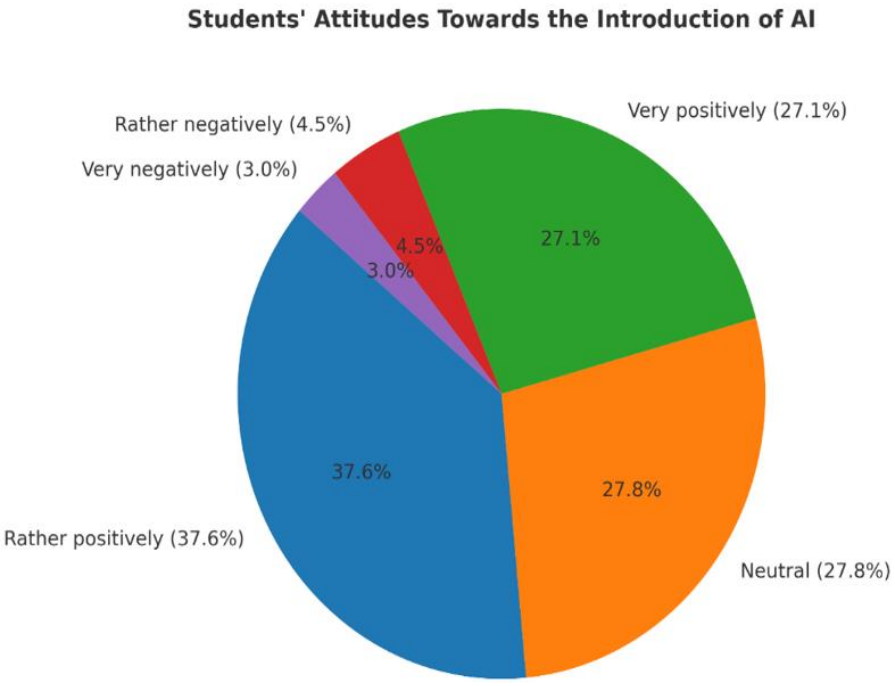

Figure 1.
How do you feel about the introduction of AI into various fields of activity?.

As shown in the chart, school students are aware of modern trends in societal development and the positive impact of AI on all its spheres.

In response to the second question, students listed professions most at risk of being replaced by AI: cashiers, call center operators, accountants, waiters, copywriters, consultants, programmers, managers, salespeople, security guards, and translators. These are indeed the professions we also believe will lose relevance in the near future. However, some creative professions were also mentioned, such as designer, architect, and teacher, indicating that there are students who do not fully understand the role of AI in our lives and believe it can replace everything — a view we do not share.

For the third question, 38.3% of students responded that AI might improve the quality of their future profession, 53.4% answered affirmatively, and only 8.3% said "no." The results are presented in Figure 2.

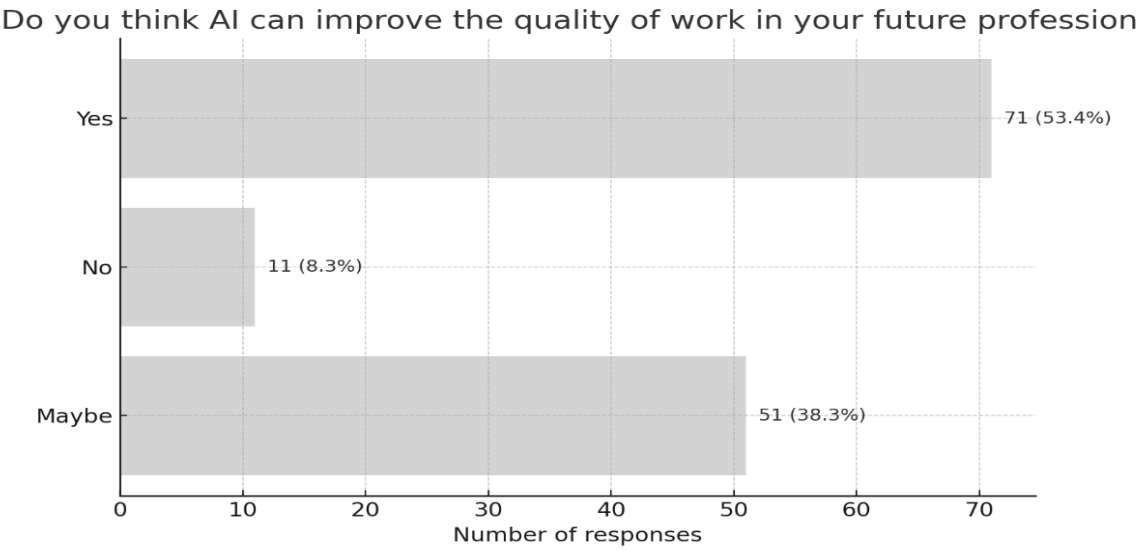

Figure 2.
Do you think AI can improve the quality of work in your future profession?.

Among the skills that will be important in the future, students named adaptability, creativity, teamwork, critical thinking, stress tolerance, diligence, a drive for self-education, leadership, and IT skills. Among their wishes, students emphasized the need for high-quality development of AI in various fields, the importance of remembering that a human being generates original ideas that AI can use as a template, the ability to remain resilient, and the need to learn to think critically so that technologies ensure safety. Two responses deserve special attention: *be creative, AI facilitates work but should not always be relied upon*, and *choose professions that combine technology and creativity, require critical thinking and human interaction*. They also stressed the importance of developing flexibility, digital skills, and the ability to learn - the future belongs to those who can adapt! These results highlight the need to include AI-related topics in career guidance programs, enabling students to make informed career choices in a rapidly changing labor market.

5. Discussion

The findings of this study align with existing literature emphasizing the transformative impact of artificial intelligence on the labor market and the growing need to adapt career guidance systems to these changes. Prior research (e.g., [33, 34]) has consistently highlighted that AI adoption leads not only to the automation of repetitive tasks but also to the creation of entirely new professions, requiring updated skill sets. The results obtained from Astana school students confirm this trend, showing both optimism regarding the potential of AI and apprehension about job displacement.

The positive attitudes towards AI reported by most respondents mirror findings from studies in other countries [35, 36]) where students perceive AI as an opportunity rather than a threat. However, the relatively limited understanding of its concrete applications in the professional sphere indicates a persistent information gap, as also noted by Ahmad, et al. [37]. This gap can hinder students' ability to make well-informed career decisions in a rapidly evolving labor market.

Another significant observation is the influence of AI developments on career preferences. A shift towards technology-oriented fields and occupations less susceptible to automation reflects global patterns documented by the World Economic Forum [38]. Nevertheless, the low percentage of students who received AI-related career counseling (29%) reveals that existing school guidance programs are not sufficiently addressing future labor market realities.

These results suggest that integrating AI-related knowledge into career education is essential to prepare students for emerging professional demands. This could involve revising curricula, providing training for career counselors, and fostering partnerships between educational institutions and technology sectors. By doing so, schools can help students not only adapt to but also actively shape the AI-driven future of work.

This study provides novel insights into the relationship between artificial intelligence and career guidance by addressing aspects not sufficiently examined in prior research. Unlike most existing studies that have concentrated on data from the United States, Europe, or global samples, the present findings focus on the perceptions of school students in Kazakhstan, thereby contributing empirical evidence from Central Asia to the international discourse. Moreover, while previous research has predominantly targeted university students or the adult workforce, this study highlights attitudes among school students, an age group where career orientations are still forming.

Another distinctive contribution lies in the methodological approach. Whereas earlier works have largely been theoretical or macroeconomic in nature, the present study employs an empirical survey-based design. This makes it possible to capture direct attitudes toward artificial intelligence and its perceived influence on future career choices. Furthermore, the analysis combines two interconnected dimensions—the impact of AI on the labor market and its reflection in career guidance practices within schools—an intersection rarely explored in earlier literature.

The results also demonstrate practical implications for education. The predominantly optimistic perception of AI among students suggests a favorable basis for shaping career guidance programs toward digital and technology-oriented professions. At the same time, the limited awareness of applied uses of AI highlights a need to revise curricula and

strengthen counseling practices. Addressing this information gap may support students in making more informed decisions and prepare them for emerging labor market requirements.

From a scientific perspective, the study enriches global debates on the transformation of labor markets under the influence of artificial intelligence. The results confirm previously observed trends while refining them by revealing a combination of positive expectations and concerns among students in Kazakhstan. This regional perspective expands opportunities for cross-country comparisons and contributes to interdisciplinary research at the intersection of pedagogy, psychology, economics, and information technology.

6. Conclusion

It is becoming obvious that artificial intelligence is transforming the labor market, creating new opportunities and at the same time requiring adaptation. In this regard, career guidance work with schoolchildren is becoming critically important. It is necessary to shift the focus from outdated professions to the development of flexible skills: critical thinking, creativity, communication and the ability to adapt. It is important to introduce into the educational process the practice of using AI tools to analyze the labor market and identify promising areas. Career guidance should be a continuous process, starting from early school age, to help students consciously choose an educational trajectory and prepare for future professions in which humans and artificial intelligence will successfully cooperate. Investing in the development of these core competencies among young people is an investment in a sustainable and prosperous future.

This study examined school students' perceptions of artificial intelligence and its influence on the future labor market, as well as the role of career guidance in preparing them for upcoming changes. The results indicate that:

- Most students are aware of AI technologies and hold a generally positive attitude towards their integration into various sectors.
- A significant proportion express concerns about job displacement, particularly in routine occupations.
- AI developments have already influenced career preferences, with many students gravitating towards technology-oriented and creative fields.
- There is a notable gap in the provision of AI-related career guidance, with only 29% of respondents reporting exposure to such information at school.

The results of the research can be used in various fields, lists of disappearing and new professions can be used in career guidance work with schoolchildren, in the vocational education system - to develop new educational programs for training specialists.

6.1. Limitations

The study was limited to students from Astana, which may restrict the generalizability of findings to other regions or countries. Additionally, the survey relied on self-reported data, which may be subject to bias in respondents' perceptions and recall. The relatively small sample size (133 students) also limits the statistical power of the analysis.

Future studies should expand the geographic scope of the sample and include comparative analyses across different socio-economic and cultural contexts. Longitudinal research would help track changes in students' perceptions over time as AI technologies evolve. Moreover, further investigation into the effectiveness of AI-integrated career counseling programs could provide valuable insights for educational policymakers and practitioners.

References

[1] State Compulsory Standard of General Secondary Education, *Order of the minister of education of the Republic of Kazakhstan*. Kazakhstan: State Compulsory Standards of Education, 2022.

[2] E. Pilyugina and M. Ivanova, "Relevance of career guidance work in educational institutions," *Young Scientist,* vol. 15, no. 149, pp. 619-623, 2017.

[3] T. M. Siaev and Z. Abdyarakunova, "Peculiarities of career guidance work in schools of Kyrgyzstan," *Actual Problems of Humanities and Natural Sciences,* vol. 11, no. 3, pp. 1-5, 2016.

[4] N. V. Shvetsova, "Modern methods and technologies for supporting career guidance in schools," *Molodoy Ucheny,* vol. 44, no. 386, pp. 202–205, 2021.

[5] A. Webster-Wright, "Reframing professional development through understanding authentic professional learning," *Review of Educational Research,* vol. 79, no. 2, pp. 702-739, 2009. https://doi.org/10.3102/0034654308330970

[6] I. S. Sergeev, "Educational career guidance and school career guidance: Coincidence in space, divergence in meanings," *Innovative Scientific Modern Academic Research Trajectory,* vol. 4, no. 15, pp. 11–48, 2023.

[7] J. Lee, T. Sanders, D. Antczak, R. Parker, and M. Noetel, "Influences on user engagement in online professional learning: A narrative synthesis and meta-analysis," *Review of Educational Research,* vol. 91, no. 4, pp. 518-576, 2021. https://doi.org/10.3102/0034654321997918

[8] D. H. Autor, "Why are there still so many jobs? The history and future of workplace automation," *Journal of Economic Perspectives,* vol. 29, no. 3, pp. 3-30, 2015. https://doi.org/10.1257/jep.29.3.3

[9] C. B. Frey and M. A. Osborne, "The future of employment: How susceptible are jobs to computerisation?," *Technological Forecasting and Social Change,* vol. 114, pp. 254-280, 2017. https://doi.org/10.1016/j.techfore.2016.08.019

[10] O. V. Zlobina, "Projected impact of generative artificial intelligence technologies on the labor market," *Bulletin of the Altai Academy of Economics and Law,* vol. 8, no. 2, pp. 162–166, 2023. https://doi.org/10.17513/vaael.2951

[11] I. M. Aliev, "The impact of artificial intelligence technologies on the labor market in Russia," *Journal of Legal and Economic Studies,* vol. 4, pp. 7-12, 2019. https://doi.org/10.26163/GIEF.2019.18.73.001

[12] E. A. Mikheev, "Artificial intelligence technologies: Features and impact on the labor market in Russia," *Financial and Economic Analytics,* vol. 8, no. 2, pp. 126–130, 2023. https://doi.org/10.17513/vaael.2951

[13] A. Urunov and I. Rodina, "The impact of artificial intelligence and Internet technologies on the national labor market," *Fundamentalnye issledovaniya,* no. 1, pp. 138–142, 2018. https://doi.org/10.17513/fr.42064
[14] R. E. Cramarenco, M. I. Burcă-Voicu, and D. C. Dabija, "The impact of artificial intelligence (AI) on employees' skills and well-being in global labor markets: A systematic review," *Oeconomia Copernicana,* vol. 14, no. 3, pp. 731-767, 2023. https://doi.org/10.24136/oc.2023.022
[15] C-News, *Company owner replaces all employees with ai bot: "It's 100 times smarter and 100 times cheaper*. India: C-News, 2023.
[16] Yagoo!News, *Duolingo to cut 10% of contractors as it embraces AI*. India: Yagoo!News, 2024.
[17] Forbes, *Everyone's fired: How google and microsoft are laying off people and what it might lead to*. United States: Forbes, 2023.
[18] J. McCarthy, M. L. Minsky, N. Rochester, and C. E. Shannon, "A proposal for the dartmouth summer research project on artificial intelligence, august 31, 1955," *AI Magazine,* vol. 27, no. 4, p. 12, 2006. https://doi.org/10.1609/aimag.v27i4.1904
[19] H. A. Simon, *The shape of automation*. New York: Harper & Row, 1965.
[20] E. Berman, J. Bound, and Z. Griliches, "Changes in the demand for skilled labor within US manufacturing: evidence from the annual survey of manufactures," *The Quarterly Journal of Economics,* vol. 109, no. 2, pp. 367-397, 1994. https://doi.org/10.2307/2118467
[21] D. H. Autor, L. F. Katz, and A. B. Krueger, "Computing inequality: Have computers changed the labor market?," *Quarterly Journal of Economics,* vol. 113, no. 4, pp. 1169–1214, 1998.
[22] F. Levy and R. J. Murnane, *The new division of labor: How computers are creating the next job market*. New York: Russell Sage Foundation, 2004.
[23] A. A. Salakhunov, "Artificial intelligence and the future of the labor market: Challenges, opportunities, and prospects," *Bulletin of Science,* vol. 7, no. 64, pp. 50–55, 2023.
[24] The Times of India, *40 jobs AI can't touch in 2025, says Microsoft Research: Is your career on the list?* India: The Times of India, 2025.
[25] D. S. Abraimova and Z. T. Beldeubayeva, "Artificial intelligence in career guidance: Current issues and future prospects," *Foundations of Artificial Intelligence in Education and Research: International Experience,* vol. 2, pp. 1660–1670, 2024. https://doi.org/10.63034/esr-357
[26] A. S. Kolesova and O. N. Saraeva, "Prospects for the application of artificial intelligence in guidance counseling," *Creative Economy,* vol. 17, no. 7, pp. 2475–2490, 2023. https://doi.org/10.18334/ce.17.7.118351
[27] M. Y. Mustafa *et al.*, "A systematic review of literature reviews on artificial intelligence in education (AIED): A roadmap to a future research agenda," *Smart Learning Environments,* vol. 11, no. 1, p. 59, 2024. https://doi.org/10.1186/s40561-024-00350-5
[28] R. Li and J. Lin, "Mediating effect of AI attitudes and AI literacy on the relationship between career self-efficacy and job-seeking anxiety " *BMC Psychology,* vol. 13, no. 454, pp. 1-17, 2025 https://doi.org/10.1186/s40359-025-02757-2
[29] The Times, *AI can be game changer for careers advice*. India: The Times, 2024.
[30] Coursera, "What is a data scientist? Salary, skills, and how to become one," Retrieved: https://coursera.org/share/879cb4a0d6cb45fc917340b7e46171df, 2025.
[31] Skillbox Media, *AI trainer: A big guide to a new profession*. India: Skillbox Media, 2024.
[32] G. Saimagambetova, *Changing the role of managers in the context of digitalization of business processes*. USA: Science and Education Issues, 2025.
[33] J. E. Bessen, "AI and jobs: The role of demand," Retrieved: https://www.nber.org/system/files/working_papers/w24235/w24235.pdf, 2018.
[34] A. McAfee and E. Brynjolfsson, "Machine, platform, crowd: Harnessing our digital future," Retrieved: https://books.google.kz/books/about/Machine_Platform_Crowd_Harnessing_Our_Di.html?id=zh1DDQAAQBAJ&redir_esc=y ,2017.
[35] S. Makridakis, "The forthcoming artificial intelligence (AI) revolution: Its impact on society and firms," *Futures,* vol. 90, pp. 46–60, 2017.
[36] OECD, *AI and the future of skills: Capabilities and assessments*. France: OECD, 2021.
[37] T. Ahmad, R. S. Al-Maroof, and K. Alhumaid, "Exploring students' perceptions of artificial intelligence in education: A case study," *Education and Information Technologies,* vol. 27, no. 4, pp. 4973–4996, 2022.
[38] World Economic Forum, *Future of jobs report 2023*. Geneva, Switzerland: World Economic Forum, 2023.