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The specifics of developing the social intelligence of Oralman students with artificial intelligence

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ABSTRACT

This study examines the impact of an educational program based on artificial intelligence (AI) on improving social intelligence among Oralman students (a group of repatriates from among ethnic Kazakhs who faced unique integration problems in Kazakhstan). The main objective was to assess whether targeted interventions can effectively improve social skills that are crucial for successful social integration. The study involved 300 students aged 20 to 22 years, divided into experimental and control groups. Students participated in a six-month AI program designed to develop social intelligence using interactive tools and modeling. Pre-test and post-test assessments used the Tromso social intelligence scale (TSIS), focusing on areas such as social information processing, social skills, and social awareness. Following the intervention, the outcomes revealed that the experimental group had made notable progress in every area that was examined. Specifically, in this group, the overall score increased significantly from 59.37 to 82.33, and the average post-test scores climbed to 25.87 for social information processing, 27.33 for social skills, and 29.13 for social awareness. On the contrary, minimal changes observed in the scores of the control group emphasize the effectiveness of the AI-based program. The analysis of secondary data further confirmed the results: t-tests showed statistically significant differences in the post-test scores between the groups. The progress of the experimental group highlights the potential of AI-based educational tools in the development of basic social competencies, offering promising opportunities to support the integration of Oralman students into Kazakh society.

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1. INTRODUCTION

The integration of artificial intelligence (AI) technologies into education has opened up new horizons for improving learning experiences and outcomes. Among the various applications of AI in education, one of the most promising is its potential to improve social intelligence [1]. This aspect is especially relevant for a unique group of ethnic Kazakh repatriates, known as "Oralman" (or Kandas), who return to Kazakhstan from other countries. These individuals face the double challenge of adapting to a new educational and social environment while maintaining their cultural identity [2]. AI facilitates this transition by offering interactive learning experiences that can improve social skills and understanding. This role of AI attracts significant interest in the scientific community [3].

Social intelligence, defined as the ability to effectively navigate and function in complex social relationships and environments, is crucial for the successful integration of Oralman into Kazakh society. Social intelligence includes a range of competencies, such as empathy, social awareness, and the ability to engage in culturally acceptable communication [4]. For Oralman students in higher education institutions, the development of these skills is important not only for academic success, but also for professional and personal integration in their new homeland [5], [6]. Through interactive modeling and individual learning, AI technologies offer a new approach to the development of these competencies. AI-based educational tools can simulate social interactions and real-life scenarios, providing a safe and controlled environment for Oralman students where they can practice and advance their social skills [7], [8]. These simulations can be designed to reflect the cultural nuances and social dynamics of Kazakh society, thereby preparing students for interaction in the real world [2].

Moreover, AI can meet the needs of repatriated students in language learning, many of whom need additional support in mastering the Kazakh language or academic terminology [9]–[12]. Personalized learning platforms can adapt to each student's individual level of language proficiency and learning pace, making language acquisition and, consequently, social integration more effective [13]–[15]. This paper explores the hypothesis that the use of AI in higher education can significantly increase the social intelligence of Oralman students. It examines whether AI technologies can provide interactive learning that promotes a deeper understanding of human emotions, motivation, and behavior. By analyzing existing AI applications in education and their impact on the development of social skills, this study aims to shed light on the potential benefits and challenges of integrating AI into educational strategies for Oralman students. In addition, the paper seeks to contribute to a broader discourse on the role of technology in education, especially in the context of cultural and social adaptation.

2. LITERATURE REVIEW

Social intelligence includes the ability to effectively navigate social interactions, understand and manage one's own and other people's emotions, and engage in complex social reasoning [14], [16]. Repatriated students face the dual task of adapting to a new educational system and integrating into a society that is both familiar and alien. For these students, the development of social intelligence is crucial [17]. Research has demonstrated the effectiveness of AI in supporting the development of various components of social intelligence. Interactive technologies, including AI-based modeling and virtual environments, offer rich immersive experiences that can simulate real-world social interactions [9], [18]. These tools allow students to practice and improve social skills in a controlled and safe environment. For example, AI can provide scenarios that force students to interpret social cues, understand cultural norms, and engage in effective communication [10], [12]. However, the literature primarily focuses on the general population, paying less attention to the specific experiences and needs of repatriates or ethnic minorities returning to their ancestral homeland [11]. Moreover, the role of AI in language acquisition is especially relevant for Oralman students. Knowledge of the Kazakh language and understanding of local dialects and cultural nuances are essential for their social integration [13], [16]. AI-based language learning platforms offering personalized and adaptive learning experiences can accelerate achieving language proficiency, thereby contributing to better social integration [19]. But there is research on how these technologies can be optimized for cultural and linguistic adaptation among returnees [20], [21].

The ethical implications of using artificial intelligence, especially with regard to privacy, data security, and the possibility of bias, are well-studied aspects [22]. While these issues are crucial for all students, they take on additional significance for Oralman students, who may be particularly vulnerable due to their transitional status. Discussions around equal access to AI technologies and digital inequality further highlight the existing socio-economic barriers. These barriers can affect the effective use of AI to enhance social intelligence [23]. The literature calls for a more inclusive approach to the introduction of technology in education. However, there is a lack of recommendations on specific strategies to address the unique challenges faced by repatriates [24], [25].

Artificial intelligence has promising potential in supporting the development of social skills. Nevertheless, there is gap in the context of cultural and educational integration for ethnic repatriates such as Oralman [26]. Most studies do not address how AI can be adapted to meet the specific needs of this group, whose experiences of migration, cultural reintegration, and adaptation are unique challenges and learning opportunities [27], [28]. Thus, although the literature provides a solid foundation for the potential of AI to enhance social intelligence, it lacks a focused study of ethnic repatriates. This paper attempts to address this gap by exploring the role of AI in supporting and facilitating the social and educational integration of Oralman students in Kazakhstan. Through this focus, the manuscript contributes to a more detailed understanding of how AI can facilitate the complex process of cultural adaptation and social intelligence

development. The study offers ideas that can serve as a basis for future research and practice in this field of educational technologies.

2.1. Problem statement

In the context of globalization and intensification of migration flows, the integration of ethnic repatriates to the homeland of their ancestors poses serious educational and social problems. The most important aspect of their integration is social intelligence. It includes the ability to understand and solve complex social issues, recognize and interpret emotional signals, and effectively participate in interpersonal communication [26], [29]. Given the potential of AI technologies to improve learning outcomes, there is an urgent need to study their impact on the social intelligence of Oralman students at higher education institutions. The main purpose of this study is to evaluate the effectiveness of AI technologies in improving the social intelligence of Kazakh repatriates at higher educational institutions of Kazakhstan. This task involves exploring how AI-based educational tools and methodologies can facilitate their adaptation and integration into the academic and social structure of the country. According to this goal, the research objectives are the following:

i) Create two separate randomized groups of Oralman students for the study: an experimental group receiving AI-assisted education aimed at improving social intelligence, and a control group using traditional teaching methods without including AI technologies.
ii) Develop and implement a comprehensive program that uses AI technologies to develop social intelligence in the experimental group.
iii) Conduct a systematic assessment to determine the effectiveness of an AI-based program in improving the social intelligence repatriates.

3. METHOD

When evaluating the effectiveness of a program designed to enhance social intelligence, the Tromso social intelligence scale (TSIS) served as the main assessment tool. This tool carefully measures the main components of social intelligence across three different indicators. TSIS consists of 21 items evenly distributed across the scales [30]. The participants evaluate each item on a 7-point Likert scale, which allows for a detailed assessment of their abilities in various areas of social intelligence. The first indicator focuses on social information processing, assessing the ability to analyze and interpret social information, including recognizing nonverbal signals and understanding complex social situations. The second indicator, social skills, evaluates the ability to effectively participate in social interactions, manage conflicts, and maintain relationships, emphasizing the practical application of social understanding in real-world settings. The third and final indicator, social awareness, measures the ability to empathize and recognize the emotions and intentions of others.

This study used a Russian-language adaptation of the TSIS due to the lack of a Kazakh-language version. This decision rests on the need to use a reliable and scientifically based tool to assess social intelligence among Oralman students in Kazakhstan. Another important reason was the linguistic and cultural context of the participants, who mainly come from post-Soviet countries, such as Uzbekistan, China, Turkmenistan, Russia, and Kyrgyzstan [28].

The reliability of the methodology was thoroughly tested using Cronbach's alpha (a statistical indicator of internal consistency or reliability of a psychometric instrument). The reliability coefficient of TSIS in this study was 0.897, which indicates a high level of internal consistency between the items of the scale. This high reliability indicator highlights the reliability of the Russian-language adaptation of TSIS in terms of reflecting the multifaceted aspects of social intelligence. In addition, the coefficient guarantees the reliability of the results obtained with this assessment tool in the context of the study.

The TSIS in this article facilitated a detailed assessment of the impact of ChatGPT interventions on social intelligence. Moreover, it helped highlight the multifaceted nature of social intelligence itself. Using this scale, the research aims to obtain reliable and meaningful data on the effectiveness of AI technologies in developing the necessary social skills and awareness. This approach can provide valuable information about the potential of AI as a tool for personal and social development.

A six-month AI-based program designed to enhance social intelligence among Oralman students was an exciting and comprehensive educational experience. The program used advanced AI technologies to develop key social intelligence competencies. It consisted of six modules, each dedicated to a specific aspect of social intelligence, offering a structured but flexible learning environment. Classes took place twice a week; each session lasted about 90 minutes. Table 1 presents the contents of the modules.

Table 1. Six-month AI-based social intelligence development program for Oralman

Month	Objective	Activities
Month 1	Familiarizing with AI and the basics of social intelligence	Interactive workshops on AI; Introduction to social intelligence through AI-powered simulations.
Month 2	Developing the ability to identify and understand emotions	Use AI-based emotion recognition software; Role-playing games with AI.
Month 3	Improving communication skills	AI-driven language learning apps; AI-mediated communication scenarios.
Month 4	Cultivating empathy and the ability to understand different perspectives	Interactive storytelling with AI; Virtual reality experiences.
Month 5	Developing strategies for conflict resolution	AI-simulated scenarios for conflict resolution; Group projects on social interventions.
Month 6	Integration and project work	Teams work on AI-assisted projects; Final presentations incorporating AI analysis.

3.1. Research design

The study's structure was a quasi-experimental design. It used a pre-test and post-test to assess the impact of the AI-based social intelligence development program on Oralman students at higher education institutions. The participants were Oralman students randomly selected using a stratified random sample to ensure a representative distribution across various faculties and years of study. Randomization utilized a computerized random number generator to distribute participants into two groups. The main task of this stage was to achieve equivalence between the groups in terms of pre-test indicators. This approach mitigated any potential systematic selection bias and provided control over interfering variables. The experimental group participated in a six-month program that used advanced AI tools, including emotion recognition software, AI-based language learning applications, VR environments, and interactive chatbots. These tools allowed the students to perform exercises on empathy and perspective perception, as well as participate in role-playing social scenarios. The control group did not receive any intervention and followed their standard training program.

The TSIS was applied to both groups before the start of the program (pre-test) and after its completion (post-test) to measure changes in social intelligence. TSIS gave a comprehensive assessment on three subscales: social information processing, social skills, and social awareness. For six months, the progress of the experimental group was monitored and, if necessary, support was provided to ensure active interaction with AI tools. The data collected during the pre-test and post-test on TSIS were analyzed to determine the impact of the AI-based program on the social intelligence of the experimental group compared to the control group.

3.2. Ethical issues

The research on using AI to strengthen social intelligence among Oralman students carefully followed ethical principles. These principles ensured the integrity of the research and the well-being of all participants. Prior to the start of the study, the authors requested and obtained the ethical approval of the relevant institutional supervisory board, which carefully checked the study for compliance with the ethical standards of research. Confidentiality was of paramount importance: personal data was anonymized, securely stored, and protected from unauthorized access. Only the research team had access to the data for analysis. The study observed strict data protection laws, ensuring that all participants' information was encrypted and processed with the utmost care. The study adhered to a no-harm principle to ensure that AI interventions would not harm participants. All the involved AI tools were thoroughly tested for safety and suitability. Any potential psychological risks were considered in advance with the help of available support and analysis. Throughout the study, maintaining high ethical standards was the main task. It was mandatory to respect and protect the rights and well-being of all participants during the research process.

3.3. Limitations

First, the dependence of intervention on technology means that students who previously had limited use of AI tools may have faced a steeper learning curve. This aspect potentially affected their participation in the program and the results measured by the TSIS. Secondly, the design of the study included a control group that did not receive AI-based intervention. This group continued its standard curriculum, which could vary for each participant and potentially immeasurably affect the level of their social intelligence. Moreover, a quasi-experimental plan cannot fully account for all the interfering variables that can affect social intelligence, such as social interactions outside the classroom or personal learning. The use of TSIS, although comprehensive, provides only a snapshot of the participants' abilities in the field of social intelligence. The self-reporting scale can lead to bias, as students may respond based on perceived social desirability rather

than actual skill level. In addition, TSIS does not cover the long-term retention of social intelligence skills, which makes it difficult to determine the long-term impact of a program. Finally, the six-month duration of the program, although significant, may be insufficient for some participants to fully integrate and apply complex social intelligence skills in their daily lives. Longer-term follow-up actions are required to assess the sustainability of the observed improvements. Recognizing these limitations is crucial for the accurate interpretation of the research results and guiding future research. Future studies can broaden this research and further explore the role of AI in the development of social intelligence.

3.4. Participants

The participants of this study made up a sample of students aged 20 to 22 years studying at higher educational institutions in Astana and Pavlodar. All of them were ethnic Kazakhs who took advantage of the repatriation program to receive higher education. A total of about 300 students were recruited to form experimental and control groups through on-campus advertising, referrals, and classroom announcements. Interested students were screened to meet age criteria, and then they received necessary information about the research purpose, the nature of the intervention, and their participation. The researchers made efforts to balance the two groups in terms of demographic variables (such as gender, academic specialty, and year of study), minimizing potential interfering effects. This study employed a large and demographically balanced sample to obtain strong results regarding significant differences between groups. These results can provide valuable information about the effectiveness of AI programs in social intelligence development among young people.

3.5. Data analysis

The data analysis stage of this study utilized the SPSS statistical package to perform comprehensive statistical assessments. At the end of the social intelligence program based on AI, data on the pre-test and post-test on the TSIS were carefully processed and entered into SPSS for analysis. The main statistical approach included comparing the pre-test and post-test results of experimental and control groups to assess the impact of the AI-based intervention. Descriptive statistics provided an overview of the main trends and variability in the dataset. To assess the differences in social intelligence indicators before and after the intervention within each group, paired sample t-tests were conducted. These tests assessed the effect of the program over time for the experimental group. To compare the results of the experimental group with the results of the control group, the study applied independent sample t-tests. This analysis determined whether changes in social intelligence scores were significantly different between groups. Therefore, it was possible to evaluate the effectiveness of AI-based interventions.

4. RESULTS AND DISCUSSION

Table 2 provides a comprehensive overview of the primary analysis. The scores are segmented according to three key parameters of social intelligence, as measured by the TSIS: social information processing, social skills, and social awareness. In addition, the table presents the overall cumulative score.

Table 2. The average values on the TSIS depending on the type of group

	Experimental group				Control group			
	Mean	N	Standard deviation	Median	Mean	N	Standard deviation	Median
Social information processing pretest	19.193	150	4.1461	20.000	18.967	150	4.5663	19.000
Social skills pretest	19.72	150	3.338	20.00	19.26	150	3.414	19.00
Social awareness pretest	20.45	150	4.461	20.00	20.35	150	4.743	20.00
Total score pretest	59.37	150	7.098	59.00	58.58	150	7.352	59.00
Social information processing posttest	25.87	150	4.848	25.50	18.63	150	4.207	18.50
Social skills posttest	27.33	150	6.033	27.00	19.99	150	3.413	20.00
Social awareness posttest	29.13	150	4.779	29.00	19.37	150	3.600	19.00
Total score posttest	82.33	150	8.832	83.00	57.98	150	6.391	58.00

Prior to the intervention (pre-test), the average scores in both groups were markedly similar, suggesting an equivalent level of social intelligence at the beginning of the study. The experimental group had an average score of 19.193 for social information processing, 19.72 for social skills, and 20.45 for social awareness. As a result, the total score of this group on the pre-test was 59.37. For comparison, the average scores of the control group were slightly lower: 18.967 for social information processing, 19.26 for social skills, and 20.35 for social awareness, resulting in a total score of 58.58. Standard deviations and average scores at this stage of pre-testing closely correlated between the two groups, indicating a homogeneous distribution of social levels intelligence among the participants.

After the intervention (post-test), the experimental group demonstrated noticeable improvements in all measured areas of social intelligence. Their average scores increased to 25.87 for social information processing, 27.33 for social skills, and 29.13 for social awareness, with the total score reaching 82.33. This dramatic improvement contrasts with the post-test results of the control group. The control group's indicators remained relatively unchanged or even slightly decreased, as evidenced by a decrease in their total score to 57.98. The standard deviations at the post-test stage reflect a wider range of results in the experimental group, probably due to the different effects of the intervention on some participants. Moreover, median scores that mitigate the impact of outliers confirm the observed increase in scores, indicating a real shift towards higher social intelligence in the experimental group.

The data analysis demonstrates that the AI-based program contributed to a significant improvement in social intelligence among the participants of the experimental group. This result contrasts with the stagnant or minimally altered indicators of the control group, emphasizing the value of the intervention. The experimental group demonstrated increased total scores, as well as higher standard deviations and stable average scores at the post-test stage. These results underline the success of the program in improving social intelligence indicators among a diverse pool of participants.

Table 3 presents the secondary analysis presented. It compares the results of pre-test and post-test between the experimental and control groups. The analysis uses Levene's test for equality of variances and the t-test for equality of means. This procedure clarifies the statistical significance of the differences observed in social intelligence indicators measured on the TSIS.

Table 3. Statistical analysis of pre-test and post-test scores for social intelligence development: comparing the experimental and control groups

		Levene's test for equality of variances		t-test for equality of means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean difference	The root-mean-square error of the difference	95% confidence interval for the difference	
									Lower	Upper
Social information processing pretest	Eva	1.689	.195	.450	298	.653	.2267	.5036	-.7644	1.2177
	Evn			.450	295.266	.653	.2267	.5036	-.7644	1.2178
Social skills pretest	Eva	.457	.500	1.180	298	.239	.460	.390	-.307	1.227
	Evn			1.180	297.848	.239	.460	.390	-.307	1.227
Social awareness pretest	Eva	1.814	.179	.188	298	.851	.100	.532	-.946	1.146
	Evn			.188	296.885	.851	.100	.532	-.946	1.146
Total score pretest	Eva	.086	.769	.943	298	.347	.787	.834	-.855	2.429
	Evn			.943	297.631	.347	.787	.834	-.855	2.429
Social information processing posttest	Eva	2.565	.110	13.815	298	.000	7.240	.524	6.209	8.271
	Evn			13.815	292.208	.000	7.240	.524	6.209	8.271
Social skills posttest	Eva	64.493	.000	12.981	298	.000	7.347	.566	6.233	8.460
	Evn			12.981	235.523	.000	7.347	.566	6.232	8.462
Social awareness posttest	Eva	25.571	.000	19.992	298	.000	9.767	.489	8.805	10.728
	Evn			19.992	276.899	.000	9.767	.489	8.805	10.728
Total score posttest	Eva	17.377	.000	27.361	298	.000	24.353	.890	22.602	26.105
	Evn			27.361	271.460	.000	24.353	.890	22.601	26.106

Eva=Equal variances assumed; Evn=Equal variances not assumed

Levene's test showed that for most variables, equal variances are assumed between the groups. This fact suggests that the data were evenly distributed across both groups. Therefore, it was possible to directly apply the t-test for the equality of means. The post-test results demonstrate a different trend. The experimental group made significant improvements in social information processing, social skills, social awareness, and the total score, as evidenced by highly significant t-test results ($p<0.000$ for all post-test comparisons). The average differences between the scores were especially large in the post-test: the average values of the experimental group were significantly higher than those of the control group. The differences ranged from 7.24 points on social information processing to 24.353 points in total score, highlighting the significant impact of the AI-based program on improving social intelligence. At the same time, 95% confidence intervals for these differences once again confirms the reliability of these data, showing positive intervals well above zero. This result emphasizes the effectiveness of the intervention. Thus, although the groups were initially comparable in terms of social intelligence, the experimental group showed significant improvements after participating in the AI-based educational program. These results highlight the potential of AI tools in contributing to a significant increase in social intelligence among young people from among Kazakh repatriates. The obtained data offer valuable information about innovative educational practices.

The study analyzed the effect of an (AI)-based program on social intelligence among Oralman students. The analysis revealed significant improvements in social intelligence after the intervention. This article is consistent with the broader context of efforts aimed at the adaptation and integration of the Oralman population into Kazakh society. At the same time, it presents a new approach to the use of technology in the processes of educational and social integration. Compared to similar studies examining educational interventions to improve social skills, this study highlights the unique potential of AI tools. Previous research has typically focused on traditional teaching methods or the use of digital platforms without the complex personalized feedback mechanisms inherent in AI technologies [27], [31], [32]. The current study suggests that an interactive and adaptive AI learning environment can offer more effective means for developing complex social competencies. This conclusion coincides with other studies addressing the adaptation and development of social intelligence in students [33]–[35].

The integration of AI into educational strategies for Oralman students is also in line with broader initiatives focused on their successful integration into Kazakh society [36]–[38]. The adaptation of the Oralman population is a multifaceted problem that covers linguistic, cultural, and social aspects. Education, especially social intelligence programs, play a crucial role in facilitating these adaptive processes [39], [40]. By improving communication skills, empathy, and social awareness, AI-based programs can significantly contribute to smoother integration. AI makes it possible to develop a sense of belonging and competence in social interactions in a new social context.

Moreover, the results contribute to the general knowledge about the use of AI in education, especially for minorities and migrants [17], [41]–[43]. The study emphasizes the need for targeted educational programs that meet their specific needs. The results demonstrate how AI can support the adaptation and integration of such groups. Using AI to teach social intelligence also implies a scalable model, which is possible to adapt for other populations facing similar integration challenges. Thus, the paper offers insights into the broader applicability of AI-based technological interventions.

However, it is important to contextualize these results within the limitations and the characteristics of the Oralman population. The successful application of AI-based programs to develop social intelligence among students Oralman emphasizes the importance of cultural sensitivity and individuality in educational technologies. In future research, it is necessary to further explore how AI and other digital tools can be optimized for the diverse needs of Oralman and other groups undergoing adaptation processes. It is crucial to ensure that technology serves as a bridge to integration rather than a barrier.

Thus, this study complements the growing evidence of AI's potential in the field of education. In addition, the study positions these technological tools as essential components of a broader strategy for adapting and integrating Oralman into Kazakh society. The positive results indicate the need for further research and investment in educational programs based on AI. The findings underline the value of the mentioned efforts in meeting the complex needs of the transitional population.

5. CONCLUSION

This study looked at how well an AI-based curriculum worked to raise Oralman students' social IQ. As a result, it provides compelling evidence of the significant benefits associated with integrating technology into educational activities. Using the TSIS for both pre-test and post-test assessments, the study shows marked improvements in the experimental group that participated in the AI program, as opposed to the control group that did not receive the intervention. These results highlight the potential of AI tools to develop critical social skills, including social information processing, social skills, and social awareness. These skills are essential for effective interpersonal interaction and integration into a broader social context. The considerable increase in the post-test results of the experimental group highlights the capability of AI-based programs to offer a personalized interactive learning experience, which is impossible with traditional learning methods. This finding suggests that AI can play a key role in meeting the unique educational needs of populations such as Kazakh repatriates who face specific integration challenges. It indicates the need to include AI-based tools in educational programs.

In conclusion, the positive impact of the AI-based social intelligence program on Oralman students confirms the effectiveness of incorporating technology into educational strategies. Additionally, it provides insight into scalable and innovative solutions facilitating the integration of minorities and migrants. The findings necessitate further study of the use of AI in educational institutions. The research seeks to use AI's potential to bridge cultural and social gaps, thereby enriching the learning experience of different groups of students.

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