

The Economic Efficiency of Inclusive Education: An Analysis of Human Capital Investment and Social Costs

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Article's history:

Received 25th of November, 2025; Revised 19th of December, 2025; Accepted 27th of December, 2025; Available online: 30th of December, 2025. Published as article in the Volume XX, Winter, Issue 4(90), Winter, December, 2025.

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Suggested citation:

Turlubekova M., Dauletova A., & Orynassarova Ye. (2025). The Economic Efficiency of Inclusive Education: An Analysis of Human Capital Investment and Social Costs. *Journal of Applied Economic Sciences*, Volume XX, Winter, 4(90), 957 – 974. [https://doi.org/10.57017/jaes.v20.4\(90\).18](https://doi.org/10.57017/jaes.v20.4(90).18)

Abstract:

The development of the inclusive education system in the Republic of Kazakhstan is a key component of national socio-economic policy, aimed at building high-quality human capital and reducing long-term social costs. The study addresses the growing number of children with special educational needs (SEN) and the need to improve the efficiency of public spending directed at reducing educational inequality. Inclusive education is viewed as a strategic investment capable of increasing employment, lowering social dependency, and contributing to sustainable economic growth.

The research assesses the economic efficiency of state support for inclusive education by examining the relationship between investments in infrastructure, personnel training, adaptive environments, and key demographic and social indicators. The methodological framework combines analysis of regulatory documents and strategic programs with statistical, correlation, and regression analyses.

Findings confirm the importance of public investment in infrastructure modernization and workforce development. A high concentration of children with musculoskeletal disorders, somatic illnesses, and intellectual disabilities was identified, requiring expanded resource centers and adaptive educational processes. Economically, investments in inclusive education reduce long-term social costs, mitigate social isolation, and improve labour market integration for children with SEN.

To enhance policy effectiveness, Kazakhstan should strengthen public administration, improve the legal framework, expand professional training, and foster interdepartmental cooperation among schools, health, and social services. Implementing early identification and support systems will further reduce social costs and promote sustainable, inclusive human capital development.

Keywords: inclusive education; economic efficiency; human capital; public investment; sustainable growth.

JEL Classification: I21; I28; J24; H52; D61.

Introduction

Inclusive education in Kazakhstan goes beyond a purely social agenda and is becoming an economic priority of public policy, as its quality and accessibility directly determine human capital accumulation, future productivity, employment, and the financial sustainability of society by reducing long-term social costs. The economic effectiveness of inclusive education is manifested in increased academic achievement, a reduced likelihood of future social dependence, increased economic activity among graduates, and reduced budget expenditures on social support, healthcare, and rehabilitation.

The relevance of the study is determined by three key objectives:

- demographic changes and the need to expand the participation of children with special educational needs (SEN) without compromising the quality of educational services;
- regional heterogeneity in the provision of infrastructure, personnel, digital services, and early support mechanisms;
- the need for effective budgeting, where each unit of public investment must demonstrate economic justification: increased educational success, increased likelihood of employment, and reduced transfers, social, and healthcare costs over the long term.

This study examines inclusive education as an investment project with measurable economic impacts, including a return on investment (ROI) through improved educational outcomes and subsequent employment of graduates, as well as a multiplier effect on local labour markets and the reduction of interregional and social gaps. The research's novelty lies in the economic and analytical operationalization of inclusive education. Specifically, an inclusive impact index was developed, linking the coverage and quality of services (the KPKP system, resource centers, networks of private centers, and comprehensive schools) with long-term economic impacts; a factor regression model was constructed assessing the contribution of human resources (support specialists, assistants, special education teachers), infrastructure, and digital components to learning outcomes and future labour market participation indicators; a comparative analysis of alternative forms of support (inclusive classes, resource centers, family-centered practices, telerehabilitation, and distance learning services) was conducted using a cost-benefit approach, enabling the identification of the most cost-effective strategies.

The practical significance of the study lies in the development of a set of tools applicable to both the Ministry of Labour and Social Protection and educational organizations. These tools include the creation of a regional deficit map, which facilitates the identification of priority investment areas, such as personnel, infrastructure, and digital services, while considering demographic and environmental factors. Additionally, the study proposes a program-oriented budgeting model based on key performance indicators (KPIs), including inclusive education coverage, the quality of educational outcomes, the efficiency of transitions between educational levels, and the proportion of completed digital educational and diagnostic services. Finally, it introduces a comprehensive package of regulatory measures aimed at ensuring interdepartmental data compatibility, integrating digital platforms for recording children with special educational needs, and establishing performance monitoring standards to enhance coordination and accountability within the education system.

Taken together, the proposed approach allows us to consider inclusive education as an economically justified strategy for accelerated growth of human capital, aimed at increasing labour productivity, improving social indicators, and ensuring sustainable socio-economic development of Kazakhstan.

1. Research Background

Buchner et al. (2021) analyse the extent to which progress in inclusive education in European countries is truly "equal for all," paying particular attention to students with intellectual disabilities. By comparing national practices with the principles of the UN Convention on the Rights of Persons with Disabilities (CRPD), the authors demonstrate that the formal adoption of inclusive norms is not always accompanied by the actual availability of high-quality support in educational institutions. Thus, the study provides a macro-level framework for the issue, highlighting the gap between political declarations and the practical implementation of inclusion.

At the micro level, this issue receives empirical support in a systematic review by Dell'Anna et al. (2020), which summarizes data on the impact of inclusive education on the academic, social, and psychological outcomes of students with moderate, severe, and complex disabilities. The authors emphasize that the positive effects of inclusion do not manifest automatically, but rather in the presence of certain conditions, primarily related to the quality of pedagogical support and the adaptation of the educational environment. Teachers' attitudes serve as the link between institutional frameworks and educational outcomes. In this context, Magyar et al. (2020) study demonstrates how teachers perceive inclusive education for children with special educational needs, identifying a range of expectations, doubts, and practical barriers. The findings link the success of inclusion to personnel and organizational factors, such as professional competencies, teaching load, resource availability, and the availability of interdisciplinary support.

This approach is further developed in the work of Urton et al. (2023), who explain teachers' willingness to implement inclusive practices through the lens of the theory of planned behaviour (TPB). The authors demonstrate that teachers' intention to act is determined not only by their personal attitudes toward inclusion but also by subjective norms of the educational environment, as well as the perceived level of control and support, emphasizing the importance of managerial and institutional conditions. Woolfson (2025) brings a critical perspective to the discussion, raising the issue of the gap between the ideal of inclusive education and the actual possibilities of its implementation. The author demonstrates that, without sufficient resources, training, and systemic support, inclusion risks becoming a formal practice that increases the burden on schools and families rather than creating sustainable conditions for the education of children with special needs.

Building on this idea, Wray et al. (2022), based on a systematic review, identified key factors influencing teacher self-efficacy in inclusive education settings, including professional training, teaching experience, support from the administration and team, access to resources, and a positive school climate. These findings are quantitatively confirmed in a meta-analysis by Yada et al. (2022), which found that increased teacher self-efficacy is closely associated with the development of positive attitudes toward inclusion and a willingness to work with children with special needs. The theoretical basis for integrating these empirical findings is provided by Zaks (2023), who argues for a shift from a medical model of disability to a normalization model. This approach shifts the focus from the student's "deficit" to the removal of barriers in the educational environment and increased participation, allowing the success of inclusive education to be assessed not only through academic achievement but also through the level of social inclusion and accessibility.

In recent years, the proportion of students with special educational needs enrolled in inclusive classes in secondary schools has increased (Williamson et al., 2020). This trend is particularly relevant for Kazakhstan, as expanding inclusive education directly impacts the development of human capital for future generations and the reduction of long-term social costs (medical, rehabilitation, social benefits, and lost productivity).

Despite progress, research shows that students with special educational needs (SEN) are still more likely to end up in special education institutions at the secondary level, reducing their potential to develop 21st century skills and limiting their future economic prospects. However, students with special educational needs are still more likely to be placed in special classes or schools in secondary schools than in primary schools. Since the publication of the Salamanca Statement in 1994, a significant amount of research has been conducted on the issue of inclusive education. However, there is a lack of progress, requiring a critical look at this area without neglecting the successes achieved (Nilholm, 2021; Holzer & Moser, 2025).

Implementing inclusive education in secondary schools appears to be a more challenging task than implementing it in primary schools. According to Woodcock & Jones (2020), the scope for flexibility, adaptability, or differentiation required for inclusive practice may be limited by "a regime governed by timetables and teacher time" what increases the cost of implementation and requires a rethinking of budgeting mechanisms. There is an interesting difference between the results of inclusive education research conducted in the United States and Europe. American studies, often based on large-scale national testing, report mostly positive effects, while

European studies with smaller samples tend to report more neutral effects (Szumski et al., 2022). This confirms that the cost-effectiveness of inclusive education depends on the scale of investment, availability of resources and quality of support.

Inclusive education has gained worldwide popularity in the education of students with various disabilities, but is particularly controversial for students with intellectual disabilities due to their unique needs, where the most important ones are the development of social, vocational and life skills necessary to facilitate their transition to adulthood (Hornby, 2024). Hallahane et al. (2023) presents a comprehensive interdisciplinary approach in their publications, combining pedagogical, psychological, sociological, and medical aspects of working with students with both disabilities and high intellectual or creative abilities. Particular attention is paid to evidence-based practices, teaching and support methods whose effectiveness has been confirmed by empirical research. Research shows that inclusion, when adequately supported, reduces future public costs associated with social support and unemployment, while increasing the economic independence of graduates.

The movement supporting the inclusion of all children with special educational needs or disabilities has become a controversial issue worldwide (Jungjohann et al., 2023). There are numerous studies that have shown that IE has its benefits in terms of cognitive, social and emotional development of students, arguing that IE provides more opportunities for the development of social, emotional and behavioural skills not only in children who need additional support, but also in children with typical development (Molina Roldán et al., 2021), (van Kessel et al., 2021; Sedláčková & Kantor, 2021). The results of some studies show that students who have not experienced problems have a positive attitude, positive beliefs and a willingness to accept students with disabilities, along with a positive attitude towards learning together with them, which is a very important factor for successful inclusion (Alnahdi & Schwab, 2021). Many argue that, in line with the strategic goals of the international educational process, the implementation of the IE requires a set of fundamental changes and modifications aimed at promoting anti-discrimination policies, creating an inclusive society, and improving the quality of education for all children in accordance with a wide range of their educational needs.

International research highlights that the transition to an economically sustainable inclusive system requires comprehensive changes: modernizing policies, redistributing resources, introducing digital and immersive technologies, upgrading teacher qualifications, and standardizing monitoring standards (Shevlin & Banks, 2021). The rapid pace of demographic change in the European education system has placed acute pressure on the resource allocation processes that support the provision of funding for children with special needs in recent decades. Resources are allocated based on the profile of the school, eliminating the need for a disability diagnosis (Tsedisio & Burmistrova, 2020). Research consistently highlights the role of school context and composition in shaping the identification of different types of funding for children with SEN, based on the child's needs rather than on the traditional diagnostic label, which significantly influences the effectiveness of budget allocation.

Many studies have noted the challenges in implementing inclusive practices (Nilholm, 2021) and believe that there is a lack of knowledge to create effective inclusive classrooms (Crispel & Kasperski, 2021). Thirty years after the Salamanca Statement, clear definitions of inclusion are still needed (UNESCO, 2020). The introduction of information and communication technologies into society in general and immersive technologies in particular plays an important role in the educational field, including because they facilitate the integration of students with special educational needs (Checa-Domene et al., 2024).

According to Article 24 of the Convention, paragraph 1, "States Parties recognize the right of persons with disabilities to education. With a view to realizing this right without discrimination and on the basis of equal opportunity, States Parties shall ensure inclusive education at all levels and lifelong learning...". Moreover, when speaking about access to education, this also means access to general higher education, vocational training, adult education, and lifelong learning without discrimination and on an equal basis with others. This is not actually true, as data indicate that there are certain problems with inclusive education for children with disabilities.

The adoption of the UN Convention on the Rights of Persons with Disabilities (in particular, Article 24) was an important step for the international community in affirming the right to education for all without exception. This document established universal standards, ensuring inclusive education at all levels, from pre-school to higher education, including lifelong learning. However, cross-country comparisons show that the implementation of these principles in the CIS countries, including Kazakhstan, is uneven. Some countries have successfully implemented "Accessible Environment" programs aimed at creating barrier-free infrastructure and developing inclusive schools, while in others, such measures are fragmented and lack a systemic approach.

In Kazakhstan, positive growth in the number of children enrolled in inclusive education has been observed in recent years; however, this growth is not always accompanied by an improvement in the quality of educational conditions. Key challenges include:

- insufficient material and technical resources for educational institutions, especially in the regions;
- a shortage of teachers and specialists trained to work with children with various disabilities;
- limited access to vocational and higher education for graduates of inclusive schools;
- insufficient interdepartmental coordination between the education, healthcare, and social protection systems;
- persistent stigma and barriers to perception among society and school communities. Thus, even with the presence of normative guarantees and political declarations, inclusive education remains more of a goal than a truly achieved practice.

Despite Kazakhstan's accession to the UN Convention on the Rights of Persons with Disabilities and the enshrinement of the principles of equal access to education, implementation of Article 24 of the Convention remains incomplete. In practice, access to quality inclusive education remains limited, particularly for children with severe disabilities and those living in rural areas. This highlights a gap between international commitments and the actual implementation of state policy, resulting in unequal educational opportunities and a low level of integration of children with special educational needs into the general educational system. To bring Kazakhstan closer to the standards enshrined in the UN Convention, a rethinking of the state strategy for inclusive education is necessary, a transition from formal recognition to practical implementation. This requires increased funding for "Accessible Environment" programs and ensuring accessibility of educational infrastructure; systematic training of personnel and the development of inclusive competencies for teachers; the implementation of interdepartmental mechanisms to support children with special educational needs from preschool to professional level; raising public awareness and fostering a positive attitude toward inclusion.

In other words, inclusive education should be viewed not as a standalone social program, but as a strategic element of social modernization, promoting equality of opportunity, social justice, and the country's human capital. A shortcoming of inclusive education policy is the fact that, although the aforementioned legislative documents contain references to inclusion, their provisions appear vague and do not establish external mechanisms for implementing inclusiveness. In Kazakhstani discourse, the concept of inclusive excellence is still being studied and institutionalized. However, researchers most often speak of revising and changing the process of training specialists in the care and education of children with special educational needs in schools.

A systematic understanding of international trends allows us to conclude that the economic effectiveness of inclusive education depends on a combination of financial, human resources, infrastructure, and digital factors. Kazakhstan needs to consider the differences between support models, correlate their social outcomes with costs, and develop a strategy where inclusive education serves as an investment driver for human capital rather than an expense item.

International experience shows that countries that consistently invest in inclusive education infrastructure, training, digital technologies, early diagnosis, and family support demonstrate higher levels of human capital accumulation and lower long-term social costs. Inclusive educational environments positively impact children's cognitive and socio-emotional development, contribute to improved educational outcomes, and develop soft skills

critical for participation in the knowledge economy.

This study examines inclusive education as an investment project in which government investments in educational infrastructure, training of support specialists, resource centers, and digital services are transformed into economic returns. Particular attention is paid to analysing the social costs of non-inclusion, including lost human capital, additional social support costs, and limited labour market participation. Ultimately, it is emphasized that inclusive education is an economically rational strategy capable of enhancing a country's competitiveness, ensuring sustainable growth in human capital, and reducing long-term budgetary obligations. An effectively built inclusive education system contributes to the development of a more productive, stable, and socially oriented society.

2. Analysis and Research Results

Inclusion is not only a social obligation of the state but also a significant economic tool for human capital development. Investments in creating an accessible educational environment, training specialists, and implementing modern technologies provide long-term benefits for society, reducing future social costs, expanding economic opportunities for citizens, and creating a more productive workforce. This framework demonstrates how consistent implementation of state inclusion initiatives can transform the education of children with special educational needs into an economically significant strategy aimed at strengthening human capital, increasing social resilience, and reducing the future financial burden on the state (Figure 1).

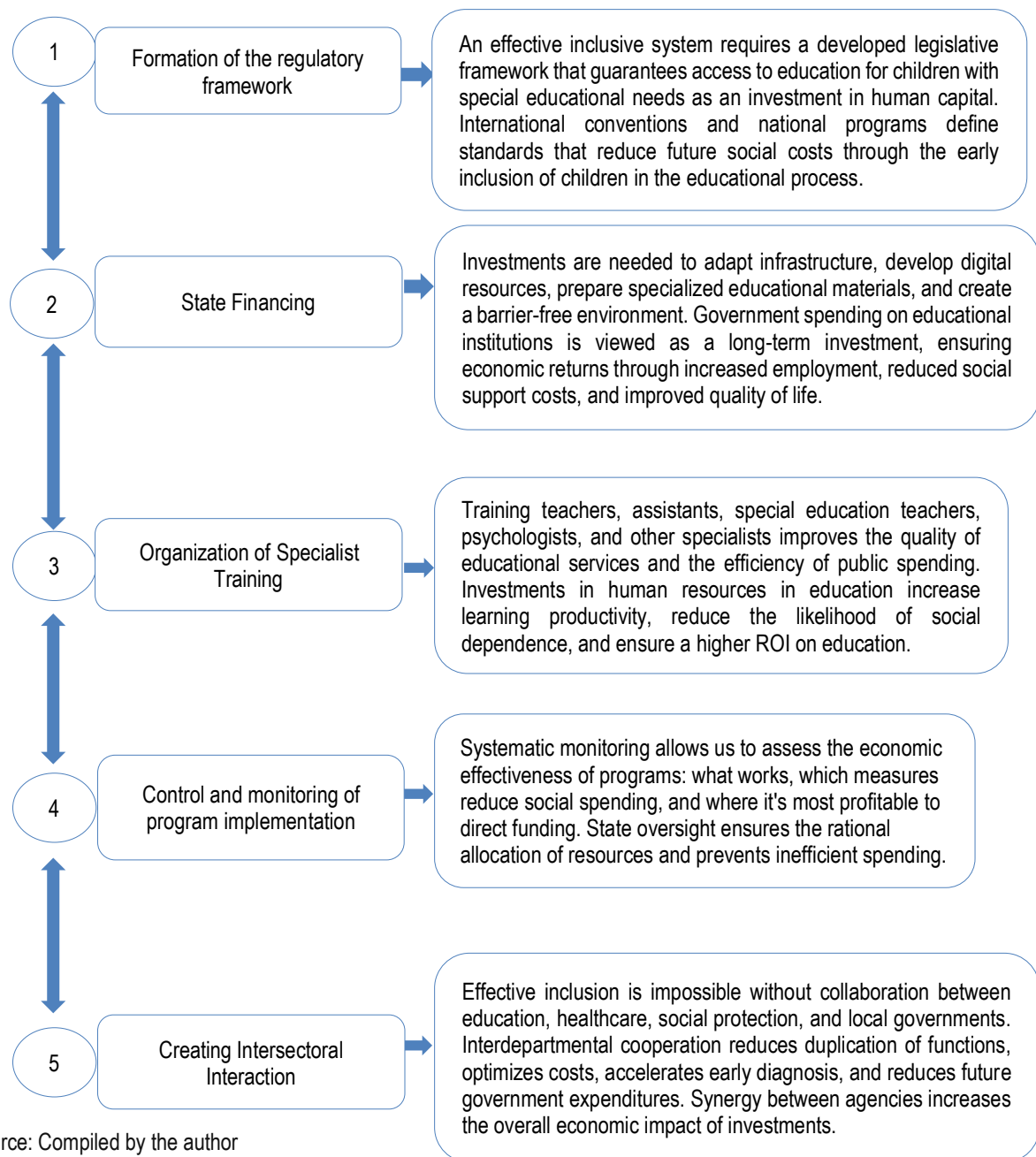
Each of these elements forms an interconnected investment chain that contributes to the overall efficiency and sustainability of the inclusive education system. This chain reduces long-term social costs, enhances the development of human capital, and improves the employability of graduates with special educational needs. At the same time, it lessens the burden on healthcare and social protection systems and ensures measurable economic returns for the state, reinforcing the strategic value of investing in inclusive education.

The economic effectiveness of inclusive education is determined by the extent to which invested resources are transformed into positive socioeconomic outcomes: improved academic achievement, development of life and professional skills, increased employment probability, and reduced dependence on state social programs. In this context, not only the volume of investment is important, but also its strategic distribution across the regulatory, infrastructural, human resources, and information and digital components of the system.

To assess and improve the effectiveness of public investments, it is necessary to consider the interrelationships between key management elements: the development of a regulatory framework, public funding, personnel training, quality control of program implementation, and interdepartmental coordination. These elements form the investment framework for inclusive education, ensuring the rational use of resources and maximizing long-term returns.

According to the data presented in Figure 1, both indicators demonstrate an overall upward trend throughout the observed period, although the dynamics of growth are uneven. In most years, the growth rates remain within a moderate range of approximately 4%–6%, reflecting gradual and relatively stable expansion in the number of registered persons with disabilities and children covered by inclusive education (Figure 2). However, a pronounced acceleration is observed in 2022, when the growth rate reaches 10.1%. This sharp increase is most likely attributable not only to real demographic changes, but also to significant improvements in diagnostic practices, reporting procedures, and administrative registration systems, which enhanced the identification and formal recognition of children with special educational needs.

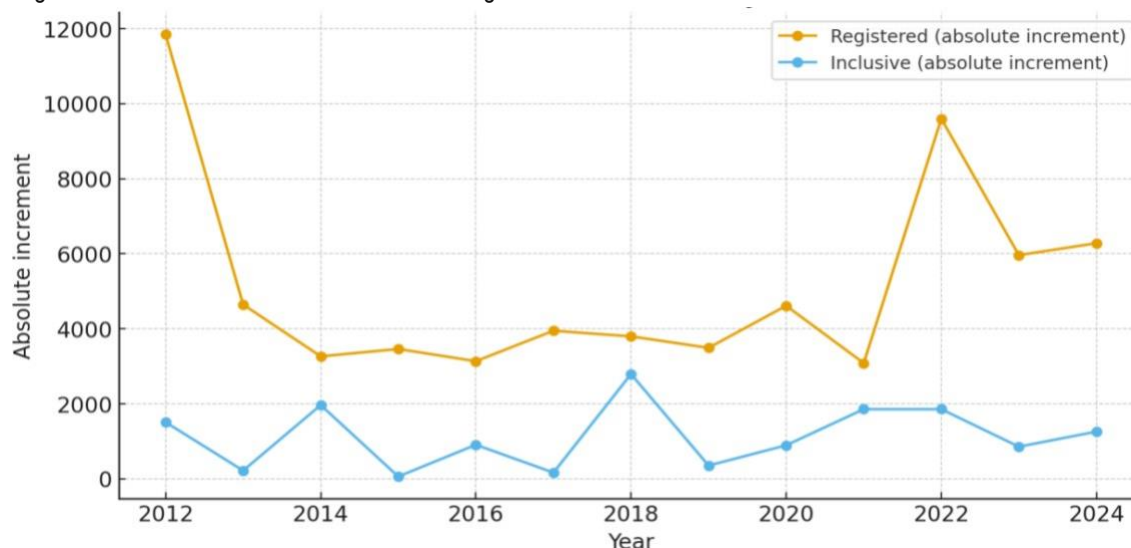
Figure 1: Consistent implementation of state inclusion initiatives



Source: Compiled by the author

From an economic perspective, the trends depicted in Figure 2 underscore the importance of targeted public investment and institutional reforms. Expanding inclusive education coverage is not only a social objective but also an economically efficient strategy, as delayed or absent educational inclusion increases long-term social costs related to dependency, unemployment, and social exclusion.

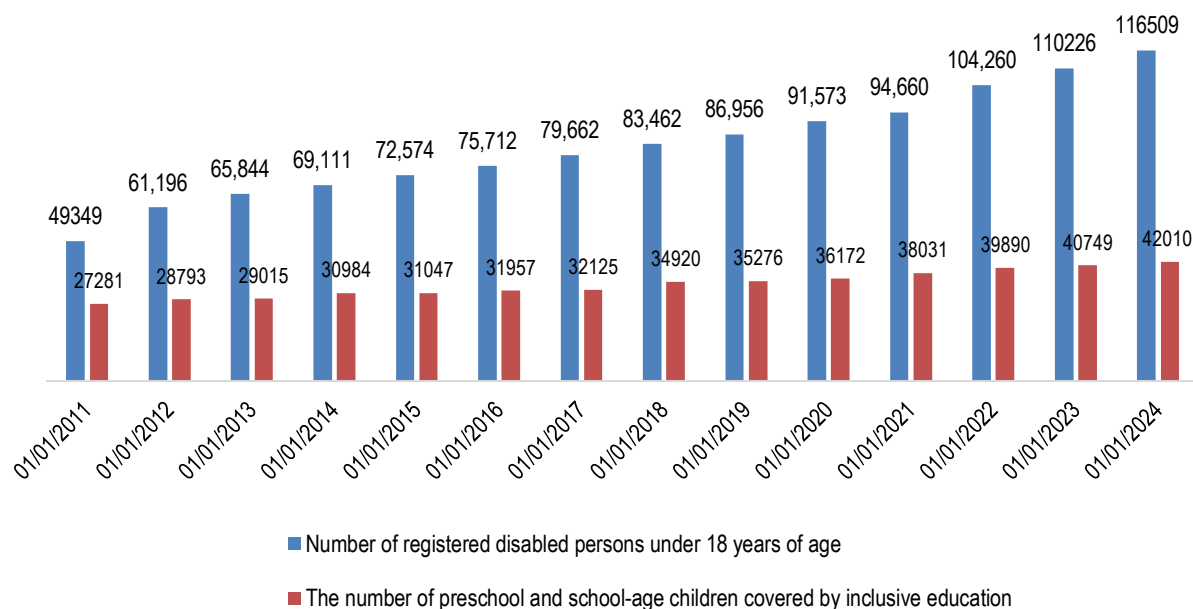
Figure 2: Growth rates of indicators characterizing the level of educational institutions in Kazakhstan



Source: Compiled by the authors based on calculations

According to statistics, the number of registered disabled people in the Republic of Kazakhstan and children covered by the IO indicates that a fairly large number of parents of disabled children do not consider it necessary to develop, much less educate, their child (Figure 3).

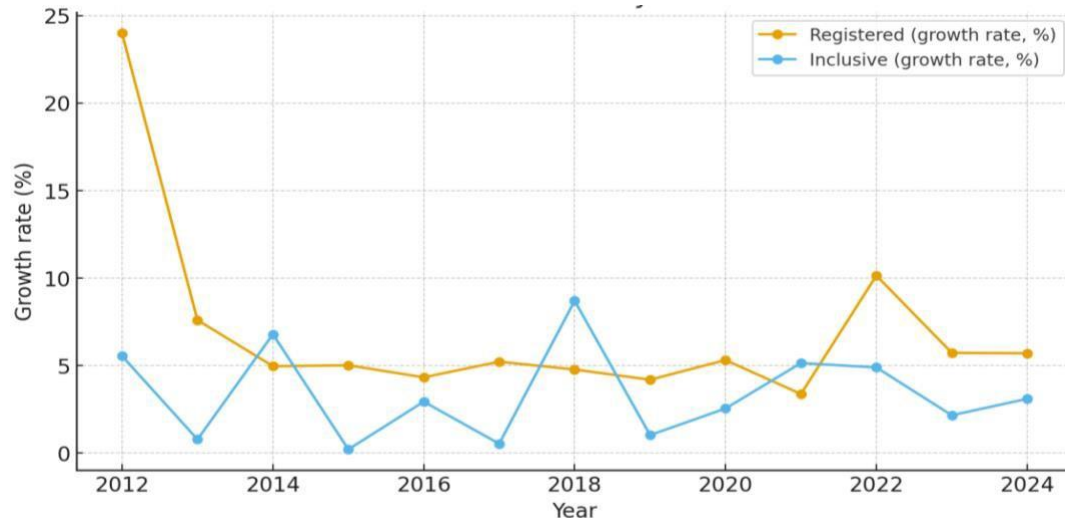
Figure 3: Indicators characterizing the level of IO in Kazakhstan, people



Source: compiled by the authors according to <https://www.stat.gov.kz>

The growth is less uniform; the most pronounced growth was observed in 2014 (6.8%) and 2018 (8.7%), which can be associated with the intensification of government programs to develop an inclusive environment (Figure 4).

Figure 4. Growth rates of indicators characterizing the level of educational institutions in Kazakhstan



Source: Compiled by the author based on calculations

A summary table of growth rates and increases in the indicators under consideration characterizing the level of educational institutions in Kazakhstan is presented in Table 1.

Table 1. Growth rates of educational indicators in Kazakhstan

Year	Registered children	Absolute increase	Growth rate, %	Covered by the IE	Absolute increase	Growth rate, %
2011	49,349	-	-	27,281	-	-
2012	61,196	11,847	24,01	28,793	1,512	5,54
2013	65,844	4,648	7,60	29,015	222	0,77
2014	69,111	3,267	4,96	30,984	1,969	6,79
2015	72,574	3,463	5,01	31,047	63	0,20
2016	75,712	3,138	4,32	31,957	910	2,93
2017	79,662	3,950	5,22	32,125	168	0,53
2018	83 462	3,800	4,77	34,920	2,795	8,70
2019	86,956	3,494	4,19	35,276	356	1,02
2020	91,573	4,617	5,31	36,172	896	2,54
2021	94,660	3,087	3,37	38,031	1,859	5,14
2022	104,260	9,600	10,14	39,890	1,859	4,89
2023	110,226	5,966	5,72	40,749	859	2,15
2024	116,509	6,283	5,70	42,010	1,261	3,09

Source: compiled by the authors

The increase in the number of registered children is accompanied by a moderate but lagging increase in coverage, suggesting the need for further expansion of infrastructure and human resources for inclusive education. Based on the presented data, the author conducted a regression analysis, the results of which are presented in Table 2.

Table 2: Results of regression analysis

Parameter	Regression coefficient (β)	Standard error of the coefficient	t-Statistic	p_value	Lower limit of the confidence interval	Upper limit of the confidence interval
const	14,025.92	910.7196	15,40092	2,87E-09	12,041.63	16,010.21
registered_u18	0.242777	0.010717	22,65403	3,24E-11	0,219427	0,266127

Source: compiled by the authors.

The linear regression equation is as follows:

$$Y = \alpha + \beta X, \quad (1)$$

An increase in the number of registered children per person is associated, on average, with an increase in coverage by ~0.243 children. This is equivalent to +1,000 registered children +≈243 covered children, all other things being equal. The growth of the registered target group is accompanied by a comparable increase in actual coverage. For capacity and budget planning, a simple standard ratio of ~0.24 can be used: for every 100 additional registered children, places for approximately 24 children in inclusive services must be provided (plus resources for trend growth and regional differences).

With a linear relationship, an increase in the number of registered children leads to a predicted increase in inclusive education coverage; the confidence intervals are quite narrow, indicating a stable model. To identify the dynamics and nature of the relationship between time and the level of inclusive education coverage, a regression analysis was conducted using a linear model (Table 3 and Table 4).

Table 3: Regression Y ~ Year

Parameter	Regression coefficient (β)	Standard error of the coefficient	t-Statistic	p_value	Lower limit of the confidence interval	Upper limit of the confidence interval
const	-2,220,890	93,525.12	-23.7465	1,86E-11	-2,424,664	-2,017,116
year	1,117.745	46.35684	24.11176	1,56E-11	1,016.742	1,218.748

Source: compiled by the authors Table 4: Multiple regression

Table 4: Multiple regression

Parameter	Regression coefficient (β)	Standard error of coefficient	t-Statistic	p_value	Lower limit of confidence interval	Upper limit of confidence interval
const	-1,248,185	592,019.8	-2.10835	0.058745	-2,551,212	54,842.03
registered_u18	0.106967	0.064391	1.661205	0.124877	-0.03476	0.248692
Year	631.214	296.0606	2.132043	0.056379	-20.411	1,282.839

Source: compiled by the authors

The obtained regression coefficients demonstrate a strong, stable, and statistically significant positive relationship between time and the indicator representing the coverage of inclusive education in Kazakhstan. The coefficient for the “year” variable, equal to 1,117.745, indicates that the number of students covered by inclusive education programs increases on average by approximately 1,118 units per year. This result suggests a consistent and sustainable upward trend in the development of inclusive education during the analysed period. The t-statistic value of 24.11 and the very low p-value (1.56E-11) confirm the high statistical significance of the relationship, indicating that the likelihood of this result occurring by chance is extremely small. Moreover, the narrow confidence interval [1,016.742; 1,218.748] demonstrates the precision and robustness of the estimated parameter, underscoring the model’s reliability and predictive strength.

Overall, these findings provide empirical evidence that state policies and targeted investments in inclusive education have produced measurable and sustained progress. The continuous growth in coverage reflects both the effectiveness of institutional reforms and the increasing capacity of educational systems to accommodate children with special educational needs. From a broader perspective, this upward dynamic has positive economic and social implications: it contributes to the formation of inclusive human capital, enhances the future employability of individuals with special educational needs, and reduces the long-term social costs associated with welfare dependency and social exclusion. Thus, inclusive education emerges not only as a social priority but also as a strategic economic investment in Kazakhstan’s sustainable development.

To assess which specification best describes the change in inclusive education coverage, three linear models were compared: one with a single explanatory factor, "number of registered children" (Registered), one with a time factor (Year), and a combined model including both. The comparison was performed using the determination statistics (R^2 and adjusted R^2), as well as the information criteria AIC and BIC, which allow us to take into account not only the quality of the approximation, but also the "cost" of adding additional variables with a small sample size ($n = 14$) (Table 5).

Table 5. Comparison of models

Model	R^2	Adj_ R^2	AIC	BIC	n
Y ~ Registered	0.977152	0.975248	226.6792	227.9573	14
Y ~ Year	0.979777	0.978091	224.9706	226.2487	14
Y ~ Registered + Year	0.983833	0.980893	223.8368	225.7540	14

Source: compiled by the authors

According to the data presented in Table 5, a comparison shows that, given the current data, the best specification is a model with two explanatory variables (Y ~ Registered + Year): it yields the highest explained variance and also has the lowest AIC and BIC, meaning it remains optimal even after accounting for complexity. Single-factor models can be used as simpler and more interpretable options, but they are slightly inferior in accuracy; this is especially critical when forecasting is involved and error minimization is required on a small sample.

The analysis results presented in Table 6 allow us to assess the extent to which the indicator changes over time (year) and how this affects the coverage, as well as determine the stability of the identified relationship.

Table 6: Forecast scenarios (based on the current linear model)

Forecast scenario	Year	The value of the independent variable (predictor)	Predicted value of the dependent variable	Lower limit of the predictive interval	Upper limit of the predictive interval
+3% YoY	2025	120,004.2700	43,160.21650	41,273.79605	45,046.64
+3% YoY	2026	123,604.3981	44,034.24533	42,107.80594	45,960.68
+5% YoY	2025	122,334.4500	43,725.93096	41,813.93454	45,637.93
+5% YoY	2026	128,451.1725	45,210.93139	43,226.26169	47,195.60

Source: compiled by the authors

Regression analysis revealed that the increase in the number of registered children over time is accompanied by a statistically significant and predictable increase in inclusive education coverage. Narrow confidence intervals indicate the high robustness of the model and its potential for predicting future trends in the development of the inclusive education system.

The statistical results demonstrate a steady increase in both the number of registered children with disabilities and inclusive education coverage. However, these trends alone do not eliminate the causes of the increased detection rate. Some cases may be due not only to improved registration and expansion of inclusive infrastructure but also to unfavourable environmental conditions.

An analysis of the factors influencing inclusive education is necessary to improve the effectiveness of the education system. Key factors include:

- government policy and regulatory support, which determine the conditions for implementing inclusion;
- funding, which ensures accessible infrastructure, staff training, and the development of adapted programs;
- the quality of policy implementation, including flexible teaching methods and teacher support;
- the professional competence of teachers, which is the foundation for successful work with children with special educational needs;
- parent and community involvement, which creates a supportive social environment;

- environmental and ecological conditions, which influence the successful integration of children with special educational needs.

The combination of these factors complicates the inclusion of children with special educational needs (SEN) and highlights the need for systemic measures to expand family support, improve specialist qualifications, and increase funding for inclusive education programs (Annex A). The presented data show an annual increase in the number of children not covered by developmental education, indicating persistent gaps in accessibility. An analysis of the data in Annex A also reveals a variable level of benefits available to children with disabilities (“+”/“–”), largely influenced by the degree of regional industrialization, which negatively affects both environmental conditions and public health.

The correlation analysis demonstrates a moderate positive relationship ($r \approx 0.64$) between the number of children with disabilities and the number of recipients of social benefits at the national level, suggesting a generally consistent alignment between demographic dynamics and social funding. However, regional disparities remain significant, as illustrated in Table 7, where funding responses and inclusion outcomes differ markedly across regions.

Table 7: Result of correlation analysis

№	Region	Pearson correlation (r) between children with disabilities and benefit recipients	Nature of the connection
1	Kazakhstan	0,64	Moderate positive
2	Almaty	0,18	Weak positive
3	Karaganda	-0,72	Strong negative
4	Turkestan	0,48	Moderate positive
5	Astana city	0,91	Very strong positive

Source: compiled by the authors

These results highlight the need to align regional policies, improve mechanisms for registering children with special needs, and increase the targeting of social benefits. In terms of the economic effectiveness of inclusive education, the identified disparities indicate that investments in social support for children with disabilities are distributed unevenly and do not always correlate with the actual number of those in need. This reduces the overall effectiveness of public investments and requires stronger interagency coordination, the implementation of digital monitoring systems, and the development of more flexible funding models tailored to the region's actual needs.

Financial difficulties can significantly limit the ability of families with children with disabilities to secure additional services necessary for their child's full participation in the educational process. These include expenses for transportation, specialized services, therapy, and educational materials, which are not always covered by state funding. Insufficient state funding for children with disabilities and children with limited resources leads to a shortage of specialized educational institutions, correctional centers, professionally trained teachers, and necessary educational materials, creating barriers to ensuring equal access to quality education for all children. These data highlight the importance of ongoing monitoring and analysis to adapt policies to regional and national trends, ensuring comprehensive and equitable support for children with disabilities. Therefore, it is necessary to strengthen legislative protection of the rights of children whose condition is caused by environmental factors, including mechanisms for early detection and medical and pedagogical rehabilitation (Table 8).

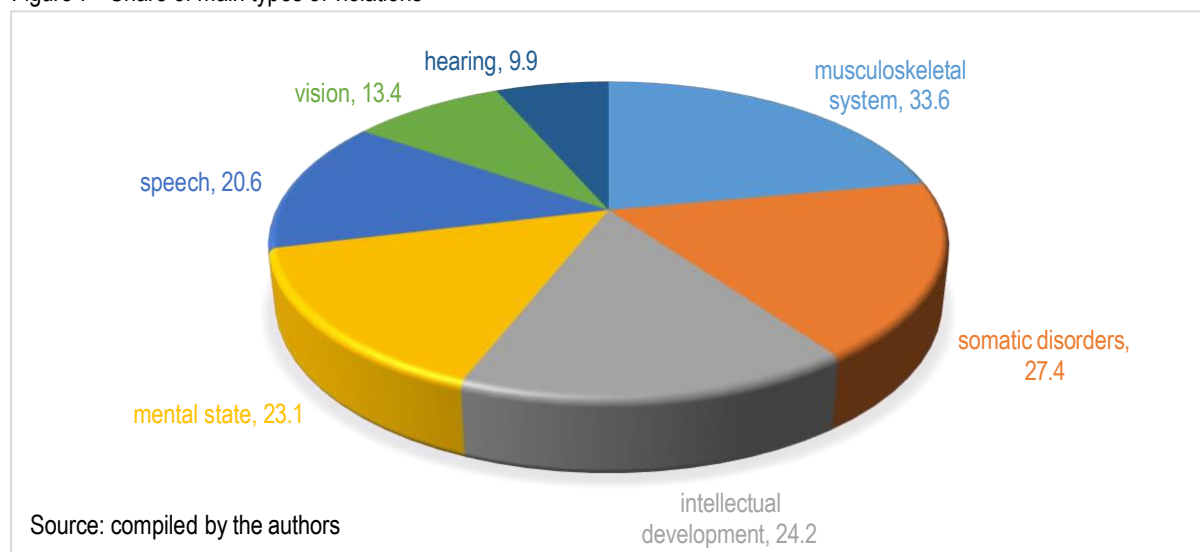
Table 8. Features of the distribution of children with disabilities as of 01.01.24 (people)

Indicator	Total	Incl.		Of these, by age, years			
		boys	girls	before 7	7-13	14-15	16-17
Total children surveyed	9,149	5,141	4,088	2,174	4,937	1,299	739
The surveyed children presented the following disorders:							
Musculoskeletal system	3,072	1,708	1,364	889	1,588	395	200
Vision	1,222	682	540	286	657	184	95
Hearing	903	512	391	190	503	134	76
Speech	1,889	1,104	785	534	980	237	138
Intellectual development	2,214	1,328	886	545	1,174	319	192
Mental state	2,109	1,240	869	424	1,174	319	192
Somatic (disorders of the functions of internal organs)	2,506	1,363	1,143	582	1,353	360	211

Source: compiled by the authors according to <https://www.stat.gov.kz>

According to the data presented in Table 7, three important sections can be identified: the structure of disorders (Figure 5), gender differences (Figure 6) and age concentration (Figure 7).

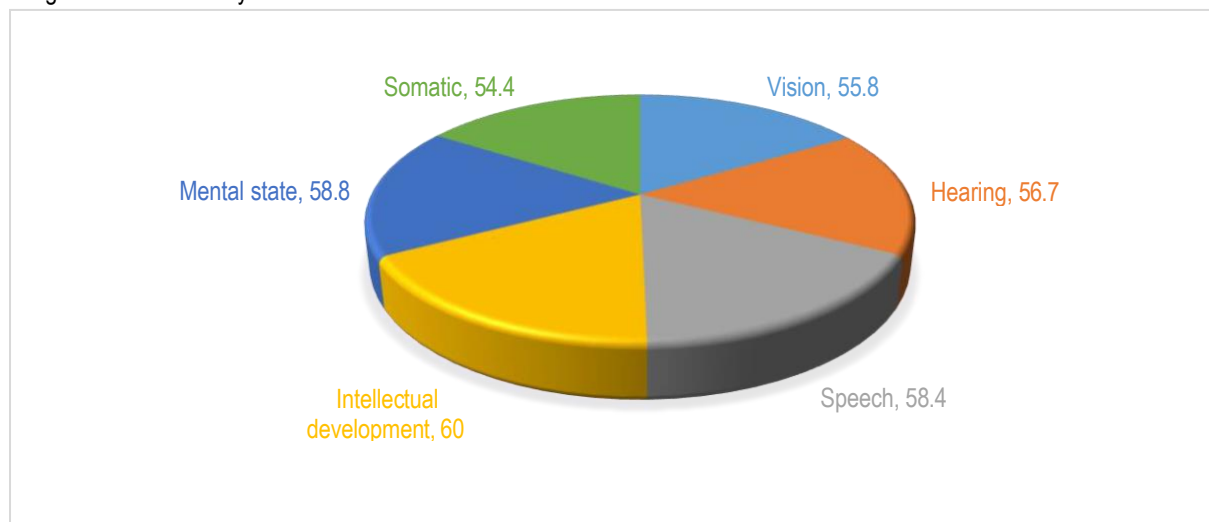
Figure 7 - Share of main types of violations



According to the data presented in Figure 5, motor, somatic, and cognitive-psychological disorders represent the most prevalent and resource-intensive categories among children with special educational needs. These conditions require significant investment in specialized personnel, adaptive learning materials, rehabilitation technologies, and tailored educational programs to ensure effective inclusion.

Furthermore, as illustrated in Figure 8, boys constitute the majority of diagnosed cases, which aligns with global and national trends showing a higher prevalence of developmental and behavioural disorders among male children. This gender imbalance underscores the importance of designing targeted support strategies that address both the specific educational and psychological needs of boys and the broader goal of promoting equal access to inclusive education for all children.

Figure 8: Gender analysis

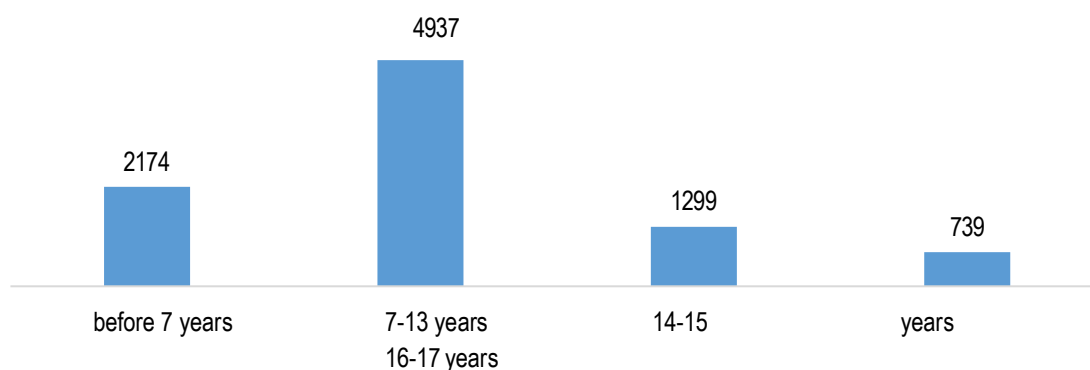


Source: compiled by the authors

Boys are more frequently diagnosed with developmental and behavioural disorders, particularly speech, cognitive, and intellectual impairments, therefore, correctional and inclusive education programs should be designed to account for this gender-based disparity.

Analysing the age distribution of children with intellectual disabilities, we note that the greatest burden falls on those aged 7–13 ($\approx 54\%$). This is school age, when both the incidence rate and the requirements for inclusion are higher (Figure 9).

Figure 9: Age structure of children with intellectual disabilities



Source: Compiled by the author

Considering the proportion within each diagnostic group (percentage relative to the group itself), the following patterns were identified:

- For musculoskeletal disorders (3,072 children), 28.9% are under 7 years old, 51.7% are aged 7–13, 12.9% are 14–15, and 6.5% are 16–17. The peak prevalence between 7 and 13 years indicates that adapted classrooms and accessible environments are particularly necessary at the school level.
- In the speech disorder group (1,889 children), 28.3% are under 7 and 51.9% are 7–13 years old, showing that speech therapy and correctional services should be made highly accessible during preschool and primary school stages.
- Among children with intellectual development disorders (2,214 cases), 24.4% are under 7 and 52.6% are 7–13 years old. Since half of these children are enrolled in mainstream schools, this emphasizes the need for inclusive classrooms and individualized tutoring.
- For mental health disorders (2,109 children), 20.1% are under 7 and 55.7% are 7–13 years old, suggesting that psychological and pedagogical support should be concentrated primarily within the early school years.

Finally, in the somatic health group (2,506 children), 23.2% are under 7 and 54.0% are 7–13 years old, confirming that long-term chronic conditions are most prevalent during school age and require sustained health and educational support.

Conclusion

Inclusive education serves not only as a mechanism for ensuring equal rights but also as an economically significant tool for building human capital, ensuring the development of academic, social, and emotional skills in both children with special educational needs and their peers. These results translate into increased employment, increased productivity, and reduced social costs for the state over the long term. Current changes in educational policy aim to expand equal opportunities and create a school environment that fosters collaboration and social integration, strengthening social capital and reducing future budgetary obligations.

However, the economic impact of an inclusive system can be significantly reduced by factors such as insufficient funding, a shortage of qualified teaching staff, a lack of support, and a lack of adapted infrastructure. Without adequate investment, the benefits of inclusive education are not fully realized, leading to increased long-term social costs, an increase in the number of students requiring specialized support, decreased success in entering the labour market, and increased pressure on healthcare and social protection systems. Successful implementation of an inclusive approach requires a comprehensive investment strategy, including: improving educational policy, sustainable financing, implementing digital and adaptive technologies, developing human resources, and creating a safe, accessible, and environmentally friendly educational environment. Environmental and social factors also directly impact the health and successful integration of children with disabilities, increasing or decreasing the economic efficiency of investments in education.

Therefore, ensuring the quality of inclusive education requires a review of existing approaches and the coordinated efforts of all stakeholders. With the growing importance of human capital, government agencies play a key role, as they determine investment policies, regulatory frameworks, funding standards, and mechanisms for interdepartmental cooperation. Public administration is becoming a central instrument for the development of a sustainable and cost-effective inclusive education system capable of reducing social costs and providing long-term benefits for both society and the economy.

Credit Authorship Contribution Statement

Turlubekova, M. contributed to the conceptualization of the study, the design of the methodology, supervision of data collection, and overall project administration. Dauletova, A. was responsible for data analysis, statistical modelling, and the preparation of figures and tables, as well as for validating the econometric results and drafting the empirical analysis and discussion sections. Orynassarova, Ye. conducted the literature review and policy analysis, and contributed to drafting the introduction and conclusion, as well as to editing, formatting, and final approval of the manuscript. All authors have read and approved the final version of the paper and agree to be accountable for all aspects of the work.

Conflict of Interest Statement

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Acknowledgement/Founding

N/A

Data Availability Statement

The data that support the findings of this study are available from the official statistics of the Republic of Kazakhstan (2015–2024) and from publicly accessible government reports on construction, R&D, and environmental indicators. Derived data and analyses generated during this study are available from the corresponding author upon reasonable request.

References

- Alnahdi, G. H., & Schwab, S. (2021). Special education major or attitudes to predict teachers' self-efficacy for teaching in inclusive education. *Front. Psychol.* 12, 680909. <https://doi.org/10.3389/fpsyg.2021.680909>
- Buchner, T., Shevlin, M., Donovan, M. A., Gercke, M., Goll, H., Šiška, J., Janyšková, K., Smogorzewska, J., Szumski, G., Vlachou, A., Demo, H., Feyerer, E., & Vlachou, A. (2021). Same progress for all? Inclusive education, the United Nations Convention on the rights of persons with disabilities and students with intellectual disability in European countries. *Journal of Policy and Practice in Intellectual Disabilities*, 18(1), 7–22. <https://doi.org/10.1111/jppi.12368>
- Dell'Anna, S., Pellegrini, M., Ianes, D., & Vivanet, G. (2020). Learning, social, and psychological outcomes of students with moderate, severe, and complex disabilities in inclusive education: A systematic review. *International Journal of Disability, Development and Education*, 69, 2025–2041. <https://doi.org/10.1080/1034912X.2020.1843143>
- Crispel, O., & Kasperski, R. (2021). The impact of teacher training in special education on the implementation of inclusion in mainstream classrooms. *International Journal of Inclusive Education*, 25(9), 1079–1090. <https://doi.org/10.1080/13603116.2019.1600590>
- Checa-Domene, L., García-Martínez, I., Gavín-Chocano, Ó., & Prieto, M. G. V. (2024). Augmented and virtual reality as a teaching resource to attend to the diversity of students with special educational needs: a systematic review. *European Journal of Special Needs Education*, 39(5), 709–728. <https://doi.org/10.1080/08856257.2023.2282247>
- Holzer, E. M., & Moser, O. (2025). The benefits of inclusive education: a systematic review of student achievement in secondary schools. *European Journal of Special Needs Education*, 1–19. <https://doi.org/10.1080/08856257.2025.2587615>
- Hornby, G. (2024). Inclusive Education, Intellectual Disabilities and the Question of Outcomes. *Journal of Intelligence*, 12(2), 20. <https://doi.org/10.3390/jintelligence12020020>
- Hallahan, D., Kauffman, P., & Pullen, J. (2022) *Exceptional Learners: An Introduction to Special Education*, 15th Edition Pearson Publisher. 978-0137520039
- Jungjohann, J., Schurig, M., & Gebhardt, M. (2023). Classroom Effects are as Large as Grade Level Effects on Curriculum-Based Measurement Maze Reading Scores of Secondary School Students with and without Special Educational Needs. *Journal of Research in Reading*, 46 (4), 411–429. <https://doi.org/10.1111/1467-9817.12436>
- Molina Roldán, S., Marauri, J., Aubert, A., & Flecha, R. (2021). How inclusive interactive learning environments benefit students without special needs. *Front. Psychol.*, 12, 661427. <https://doi.org/10.3389/fpsyg.2021.661427>
- Magyar, A., Krausz, A., Kapás, I. D., & Habók, A. (2020). Exploring Hungarian teachers' perceptions of inclusive education of SEN students. *Heliyon*, 6, e03851. <https://doi.org/10.1016/j.heliyon.2020.e03851>
- Nilholm, C. (2021). Research about Inclusive Education in 2020 - How Can We Improve Our Theories in Order to Change Practice? *European Journal of Special Needs Education*, 36(3), 358–370. <https://doi.org/10.1080/08856257.2020.1754547>
- Sedláčková, D., & Kantor, J. (2021) The Lived Experience with Inclusive Education: A Case Study of a Teenager with Diabetes, His Mother, and His Teacher. *Clinical Psychology and Special Education*, 10(2), 183–220. <https://doi.org/10.17759/cpse.2021100211>
- Shevlin, M., & Banks, J. (2021). Inclusion at a Crossroads: Dismantling Ireland's System of Special Education. *Educ. Sci.*, 11, 161. <https://doi.org/10.3390/educsci11040161>
- Szumski, G., Smogorzewska, J., & Grygiel, P. (2022). Academic Achievement of Students without Special Educational Needs and Disabilities in Inclusive Education - Does the Type of Inclusion Matter? *PLOS One*, 17(7), e0270124. <https://doi.org/10.1371/journal.pone.0270124>
- Tsediso, M. M., & Burmistrova, V. (2020). Funding inclusive education for equity and social justice in South African schools. *South African Journal of Education*, 40(4), 2037. <https://doi.org/10.15700/saje.v40n4a2037>

- van Kessel, R., Hrzic, R., Cassidy, S., Brayne, C., Baron-Cohen, S., & Czabanowska, K. (2021). Inclusive education in the European Union: A fuzzy-set qualitative comparative analysis of education policy for autism. *Soc. Work Public Health*, 36, 286–299. <https://doi.org/10.1080/19371918.2021.1877590>
- Urton, K., Wilbert, J., Krull, J., & Hennemann, T. (2023). Factors explaining teachers' intention to implement inclusive practices in the classroom: Indications based on the theory of planned behaviour. *Teaching and Teacher Education*, 132, 104225. <https://doi.org/10.1016/j.tate.2023.104225>
- Yada, A., Leskinen, M., Savolainen, H., & Schwab, S. (2022). Meta-analysis of the relationship between teachers' self-efficacy and attitudes toward inclusive education. *Teaching and Teacher Education*, 109, 103521. <https://doi.org/10.1016/j.tate.2021.103521>
- Williamson, P., Hoppey, D., McLeskey, J., Bergmann, E., & Moore, H. (2020). Trends in LRE Placement Rates Over the Past 25 Years. *Journal of Special Education*, 53 (4), 236–244. <https://doi.org/10.1177/0022466919855052>
- Woodcock, S., & Jones, G. (2020). Examining the Interrelationship Between Teachers' Self-Efficacy and Their Beliefs Towards Inclusive Education for All. *Teacher Development*, 24(4), 583–602. <https://doi.org/10.1080/13664530.2020.1803957>
- Woolfson, L. M. (2025). Is inclusive education for children with special educational needs and disabilities an impossible dream? *Br J Educ Psychol.*, 95(3): 725-737. <https://doi.org/10.1111/bjep.12701>
- Wray, E., Sharma, U., & Subban, P. (2022). Factors influencing teacher self-efficacy for inclusive education: A systematic literature review. *Teaching and Teacher Education*, 117, 103800. <https://doi.org/10.1016/j.tate.2022.103800>
- Zaks, Z. (2023). Changing the medical model of disability to the normalization model of disability: Clarifying the past to create a new future direction. *Disability & Society*, 1–28. <https://doi.org/10.1080/09687599.2023.2255926>
- *** UN Convention on the Rights of Persons with Disabilities, adopted by General Assembly resolution 61/106 of 13 December 2006. <https://www.ohchr.org/RU/HRBodies/CRPD/Pages/ConventionRightsPersonsWithDisabilities.aspx#preamble>
- *** Official resource of the UNESCO. (2020). Towards inclusion in education: Status, trends and challenges: The UNESCO Salamanca Statement 25 years. <https://doi.org/10.54675/ASIM9654>
- *** Official resource of Data from the Statistics Committee of the Republic of Kazakhstan for 2010-2023. <https://www.stat.gov.kz>

Annex A

Indicators of state funding for children with disabilities

Year	Kazakhstan		Almaty		Karaganda		Turkestan		Astana city	
	Children with disabilities	Beneficiaries of disability benefits	Children with disabilities	Recipients of social disability benefits	Children with disabilities	Recipients of social disability benefits	Children with disabilities	Recipients of social disability benefits	Children with disabilities	Recipients of social disability benefits
01.01.11	149,043	451,173	7,597	51,321	12,547	45,038	41,525	80,891	5,126	10,778
01.01.12	151,216	468,322	8,732	56,082	13,589	46,370	40,130	84,941	5,737	12,145
01.01.13	148,652	476,437	9,767	57,396	13,484	47,043	35,819	87,733	6,228	12,984
01.01.14	138,513	499,682	9,222	60,028	11,120	48,561	33,445	92,892	7,125	14,548
01.01.15	141,952	499,589	10,061	57,080	11,035	48,550	32,415	94,842	7,927	15,242
01.01.16	141,821	500,093	9,966	55,875	10,808	48,785	30,023	97,035	8,504	15,899
01.01.17	144,783	518,172	10,527	55,731	8,904	50,455	28,362	102,472	9,297	17,706
01.01.18	147,396	519,289	11,085	54,262	8,987	50,291	28,661	104,335	7,874	18,984
01.01.19	153,230	520,146	11,914	52,731	11,183	49,985	20,051	74,104	7,557	20,811
01.01.20	161,156	528,289	13,255	52,762	11,672	50,074	19,149	75,546	9,065	22,272
01.01.21	161,826	525,377	14,579	51,301	12,879	49,764	19,475	75,956	11,453	23,197
01.01.22	175,082	529,858	15,600	50,646	14,091	49,622	21,361	76,369	13,597	25,115
01.01.23	188,144	539,147	7,207	32,677	14,870	40,554	20,619	75,858	16,527	26,897
01.01.24	203,717	546,014	9,944	33,077	14,788	40,062	18,776	76,262	19,562	29,168

Source: compiled by the authors according to: <https://www.stat.gov.kz>