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BIBLIOMETRIC STUDY: THE IMPACT OF EDUCATION ON ECONOMIC PROGRESS

Today, access to education remains a severe problem in Kazakhstan. Despite the Government's efforts to improve the education system, more efforts should be made to improve the availability of educational resources for all population segments. This article presents a bibliometric analysis of more than 42 sources from various databases, 22 unique journals have been identified. The main formats of the included research are journal articles, books, scientific documents, conference materials and reports. The authors revealed that most scientific articles are published in journals indexed in the most extensive databases, such as Scopus, WoS, PubMed, JSTOR, EconLit and others. The reviewed literature contains articles of various types, including descriptive and empirical, covering education-related topics. The range of research papers studied covered documents published between 1961 and 2023. The main problems of education raised in the selected articles include accessibility, quality, inequality in access to education, the cost of education, lack of attention to research, insufficient training and inadequate social infrastructure. The analysis of these articles included several stages, including analysis of the time volumes of selected journals, data visualization using a landscape map and keyword analysis. Solving the problems of accessibility in the field of education requires the development of distance education, improvement of infrastructure, government programs, training and partnership of the state, business and educational institutions. The introduction of technologies, especially ICT, promises to change the educational landscape, but for the successful implementation of reforms, it is also necessary to consider existing political constraints.

Key words: education, region, human capital, economic growth, bibliometric, analysis of conceptual literature.

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Библиометриялық зерттеу оқу жүйесінің экономикалық көбірекке тиесілігі

Қазақстанда білімге қолжетімділік күрделі мәселе болып қала береді. Үкіметтің білім беру жүйесін жетілдіруге күш салып жатқанына қарамастан, халықтың барлық топтары үшін қолжетімділікті жақсарту үшін көп жұмыс істеу қажет. Бұл мақалада 22 бірегей журналды анықтайтын әртүрлі дерекқорлардағы 42-ден астам дереккөздің талдауы берілген. Қамтылған зерттеудің негізгі форматтары журнал мақалалары, кітаптар, жұмыс құжаттары, конференция материалдары және баяндамалар болып табылады. Көптеген ғылыми мақалалар Scopus, Web of Science, PubMed, JSTOR, EconLit және т.б. сияқты ірі дерекқорларда индекстелген журналдарда жарияланады. Қаралған әдебиеттер білімге қатысты тақырыптарды қамтитын сипаттамалық және эмпирикалық мақалаларды қоса алғанда, әртүрлі мақалаларды қамтиды. Ғылыми еңбектер 1961-2023 жылдар аралығында жарық көрді. Таңдалған мақалаларда көтерілген білім берудегі негізгі мәселелерге қолжетімділік, сапа, білімге қол жеткізудегі теңсіздік, білім беру құны, зерттеулерге көңіл бөлмеу, кадрларды даярлаудың жеткіліксіздігі және әлеуметтік инфрақұрылымның жеткіліксіздігі жатады. Бұл мақалаларды талдау бірнеше қадамдарды қамтиды, соның ішінде таңдалған журналдардың уақытша көлемін талдау, ландшафт картасын пайдаланып деректерді визуализациялау және кілт сөздерді талдау. Білім беру саласындағы қолжетімділік мәселелерін шешу қашықтан білім беруді дамытуды, инфрақұрылымды, мемлекеттік бағдарламаларды

кадрларды даярлауды және мемлекет, бизнес пен білім беру мекемелері арасындағы әріптестік қарым-қатынасты қажет етеді. Технологияларды, әсіресе АКТ-ны енгізу білім беру ландшафтын өзгертуге уәде береді, бірақ реформаларды сәтті жүзеге асыру үшін бар саяси шектеулерді де ескеру қажет.

Түйін сөздер: білім, аймақ, адами капитал, экономикалық өсу, библиометрия, тұжырымдамалық әдебиеттерді талдау.

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Библиометрическое исследование: влияние образования на экономический прогресс

Сегодня доступ к образованию остается серьезной проблемой в мире. Несмотря на усилия правительств по улучшению системы образования, необходимо приложить больше усилий для улучшения доступности образовательных ресурсов для всех слоев населения. В данной статье представлен библиометрический анализ более 42 источников из различных баз данных, выявлено 22 уникальных журнала. Основными форматами включенных исследований являются журнальные статьи, книги, научные документы, материалы конференций и отчеты. Авторами было выявлено, что большинство научных статей публикуются в журналах, индексируемых в крупнейших базах данных, таких как Scopus, WoS, PubMed, JSTOR, EconLit и других. В обзорной литературе представлены статьи различного типа, в том числе описательные и эмпирические, освещающие темы, связанные с образованием. Диапазон изученных исследовательских работ охватывал документы, опубликованные в период с 1961 по 2023 год. Основные проблемы образования, поднятые в избранных статьях, включают доступность, качество, неравенство в доступе к образованию, стоимость образования, отсутствие внимания к исследованиям, недостаточную подготовку и неадекватную социальную инфраструктуру. Анализ этих статей включал несколько этапов, включая анализ временных объемов выбранных журналов, визуализацию данных с использованием ландшафтной карты и анализ ключевых слов. Решение проблем доступности в сфере образования требует развития дистанционного образования, совершенствования инфраструктуры, государственных программ, подготовки кадров и партнерства государства, бизнеса и образовательных учреждений. Внедрение технологий, особенно ИКТ, обещает изменить образовательный ландшафт, но для успешной реализации реформ необходимо также учитывать существующие политические ограничения.

Ключевые слова: образование, регион, человеческий капитал, экономический рост, библиометрика, анализ концептуальной литературы.

Introduction

Education plays a key role in the economic development of regions and countries as a whole. Educated people, as a rule, have a greater potential for professional growth and can more easily adapt to changes in the economy. Regions with a high level of education usually have a more skilled workforce. This can attract investments and businesses that need highly qualified employees. However, it should be noted that the impact of education on economic development can be more complex and contextual, depending on the specific conditions and policies in the region. An effective education system that supports innovation and provides resources for professional development plays a key role in ensuring sustainable economic growth in the region.

The impact of education on the economic development of the region and the formation of human capital is extremely important and closely related. The study of human capital can be divided into many components: education, medicine, quality of life of the population, access to natural, social and economic resources of the population, and many others. When developing measures to solve problems in these areas, it is possible to rely on the data that scientists collect, so the results of research in each area are of wide interest. In this study, the emphasis is on the field of education. Through the development of human capital and the social sphere in general, innovation develops and, as a result, leads to a more excellent circulation of money in the region and, as a consequence, to increased economic efficiency. Thus, education plays an essential role in the formation of human

capital, which is a crucial engine of economic development of the regions.

Education is a key tool for the development of human capital, which in turn serves as a key component of the economy and society. Human capital is the main part of human civilization: the higher the qualifications of workers, the more efficient production becomes. Workers who have the necessary knowledge make fewer mistakes and accidents when working with equipment or can provide better and faster services. By thinking through the work process, such employees can save on raw materials and optimize the production process.

In the regions, education can become a factor that stimulates the creation of new jobs in the field of education. For example, the opening of new educational institutions and the attraction of more qualified teachers may lead to an increase in demand for jobs in other sectors of the economy: science, technology or medicine. More qualified teachers can improve the quality of teaching and research. It can also lead to the creation of new technologies, and innovations in science or technology. Educated people can create new ideas, and develop new technology or products to improve the economic situation of the region.

Education can improve the quality of life of the region's residents. People with higher levels of education typically have higher income levels and better careers, which can improve their standard of living and increase economic security. Health: Studies have shown that people with high education can understand the importance of a healthy lifestyle and receive better health care (better health care). Educated people have higher incomes, better social infrastructure, and better health – they receive better cultural values as a result of education. A high level of education can help improve tolerance and respect for differences between people, which helps reduce social tensions in regions.

Bibliometric review

Although the prevailing view is that raising educational standards can stimulate economic growth and strengthen the overall health of the economy, it is necessary to consider not only the volume of education itself but also its quality and accessibility to all segments of society. A bibliometric review of various scientific articles reveals consensus on several key strategies for creating inclusive, adaptable educational environments that can offer quality education to a large number of young

people. Firstly, there is an urgent need to develop a strong spirit of research and development in the education sector. Secondly, the creation of hubs or idea centres can facilitate the dissemination of innovative educational concepts. Thirdly, tapping into experiences and skills that exist outside the traditional classroom can provide invaluable insight. Fourthly, targeted financial investments are required, especially at the intermediate stages of educational projects. Finally, the emphasis is on using a data-driven approach, where continuous learning and data analysis help identify effective methodologies.

As we know from the literature, education and economic growth are related to each other in a number of ways. One mechanism most often cited is human capital theory (which states that learning increases people's knowledge) – which will ultimately lead to increased economic returns. As early as Mincer (1958), it was argued that education can be viewed as an investment in human capital. A bibliometric review of more recent literature confirms a direct positive relationship between educational attainment and a country's economic growth (Zhao & He, 2022; Abdullah, 2013; Dai et al., 2007). Some scientists study the return on higher education using the formula of J. Mintzer (1974), which estimates the level of wages through the duration of study, and work experience, taking into account gender and random errors. There is also a study that says that in countries with high GDP (per capita), the population has high access to good education, but the relationship is not direct. It was also found that the country is experiencing technological growth, accelerating innovative development and increasing labor productivity (Checchi & García-Peñalosa, 2010).

By examining the literature on the SDGs, which addresses educational development issues and often plays an important role in providing decent work opportunities and economic growth. Education, especially gender-sensitive education, can give people the skills and knowledge needed to access better job opportunities, leading to economic recovery. It is believed that investing in education will improve the quality of the economy. Scientists write that the main directions of investing in education have two directions: a) carrying out systematic work to determine the most popular specialities and professions; b) the use of dual training to bring theoretical education as close as possible to practice (Baidybekova et al., 2022; Barro, 2001).

Human capital refers to the knowledge, skills and abilities of people. that can be used to produce goods or services. Scientists have found that the quality of

education is important for economic growth. Other factors (access to education and gender inequality) may influence the relationship between education and economic growth. The article is structured as follows: the problems of education are studied; areas that are influenced by the education sector and through which economic development occurs are identified; recommendations are being developed to overcome issues in the education sector.

Methodology

This study aims to analyze the problems of access to education comprehensively. Based on the aim, the research question can be posed: “What factors limit the accessibility of education and what strategies can be effective to improve the situation?”

Hypothesis: Accessibility challenges continue to exist due to insufficient infrastructure, limited access to distance education and socio-economic inequalities.

This article analyzed more than 48 sources from several databases. From the provided list, 22 unique journals were identified. According to the list at the end, the main formats for submitted research are journal articles, books, working papers, conference proceedings and reports. Most of the scientific articles reviewed were published in journals that are indexed in major databases such as Scopus, Web of Science, PubMed, JSTOR, and EconLit, among others.

Journals indexed in Scopus: 13 (27.08% of total), in Web of Science: 7 (14.58% of total), in PubMed: 2 (4.17% of total), journals indexed in multiple databases: 3 (6.25% of total). Magazine languages: English: 41 (97.92% of the total), Russian: 1 (2.08% of the total). Journals with DOI references: 41 (85.42% of the total), without DOI references: 7 (14.58%) – works over 20 years old and books.

Journal articles: These are scientific articles that are published in academic journals. They are usually peer-reviewed before publication. Journal articles often have volume and issue numbers. The majority of entries in the list (42) fall into this category (87.5%). Books are separate publications that deal in detail with a specific topic. They do not belong to journals or have a volume or issue number. In total, two books were reviewed (12.5%).

Working papers: These are preliminary research reports and are often not peer-reviewed. It is a way for researchers to share their findings and receive feedback before formal publication. This study reviewed 1 document (2.08%).

Conference materials: these are collections of scientific articles that are presented at professional conferences (1 paper or 2.08%). They may go

through a peer review process, which is usually less rigorous than journal articles.

Reports are detailed reports or statements on a specific topic, often produced by institutions or organizations. This study examined one report from the Center for Universal Education at The Brookings Institution (2.08%).

Data for analysis are presented by article types: descriptive or empirical. The literature shown includes references to scientific articles, books, summaries and reports of research projects, and other work formats. Some articles describe existing problems and pose hypotheses that are ultimately tested. The papers were published between 1956 and 2023 on topics related to the field of education (see Figure 1).

For the conceptual literature analysis of the available articles, the following basic steps were used:

- a) analysis of the temporal volume of the selected journals (co-authorship);
- b) data visualization by making a landscape map;
- c) generating a visual map keyword analysis of the selected articles (Qital & Rusydiana, 2022).

Visualizing the connections between authors based on joint publications allows you to identify leading authors in a particular field or community based on the number of collaborations. Temporal analysis offers the ability to analyze co-authorship networks over multiple time periods. In this work, about 100 co-authors were identified from 42 papers, and the program identified the leading authors based on a time analysis of the written documents. As this analysis shows, the sources in the article were selected relatively proportionally to the time the articles were written, with an emphasis on modern works (see Figure 2).

Node and Edge Metrics VOSviewer provides metrics such as degree centrality, betweenness centrality, and edge weight to quantify the importance of nodes and links. The size of a node indicates the centrality of the author in the network (often measured by the number of collaborations or publications), and the thickness of the boundary between nodes indicates the strength of the collaborative relationship. After analyzing all the sources that were discussed in this article, the program identified eight main clusters that covered publications. As you can see in the figure, earlier publications dealt with the topic of countries' economic growth; until about 2020, the topic of education in the country was studied more. Modern publications focus more on learning outcomes, students and research.

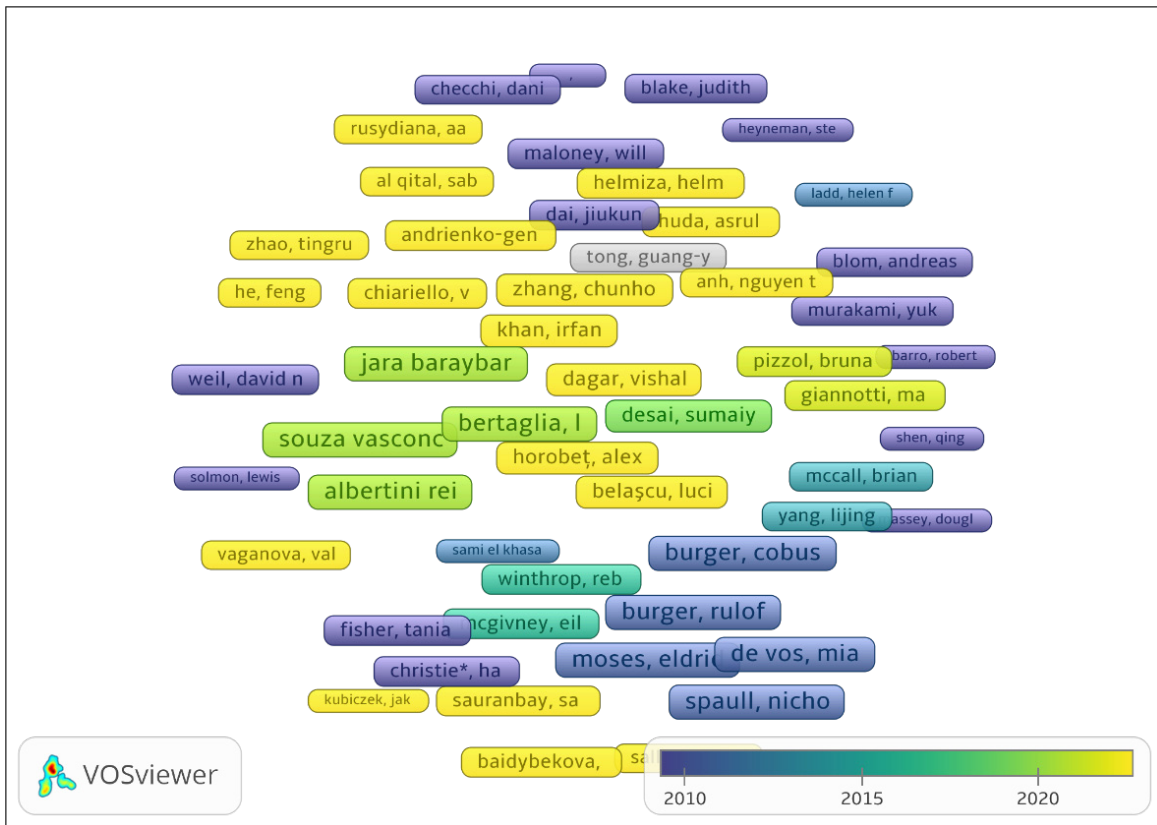


Figure 1 – Bibliometric analysis of co-authorship
 Note: compiled by authors

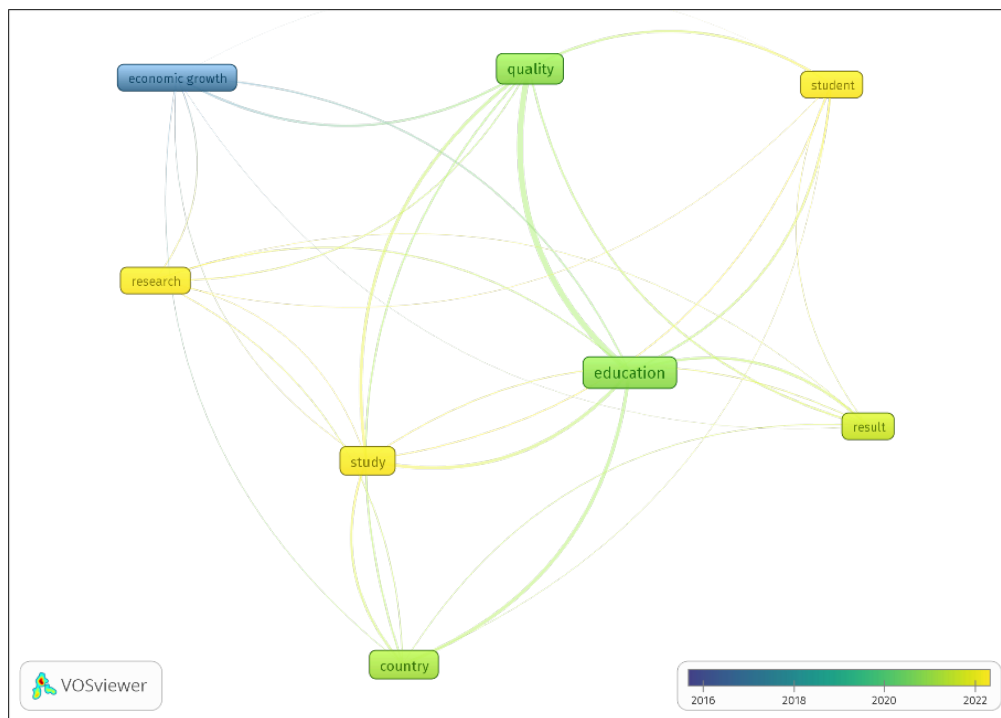


Figure 2 – Landscape map (clusters by meaning 2015-2022)
 Note: compiled by authors

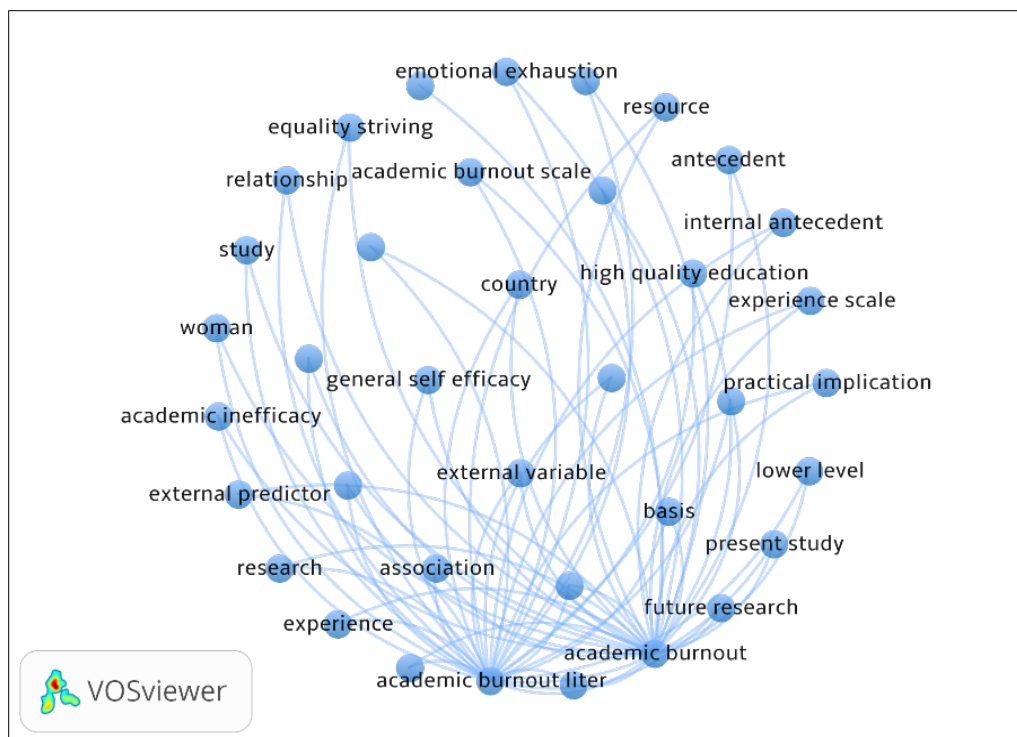


Figure 3 – Keyword analysis
Note: compiled by authors

Key trends and patterns can be interpreted based on the visual representation and network metrics (see Figure 3). This analysis helps to identify the main themes, concepts or ideas present in the data being analyzed. In this case, the keywords mentioned—academic burnout, literature, association, future research, basis, experience, external period, high-quality education, and external variable—apparently cover several research topics, possibly related ones, with the highest frequency repetition in abstracts and article titles.

Results and Discussions

Thus, a summation of several scientific works devoted to various problems in the field of education or related disciplines was carried out. Data serves as a valuable snapshot summarizing the critical issues in the field, the timeline of scientific attention, and the researchers actively contributing to these discussions. Table 1 organizes these issues, the time period during which the articles were published, and the authors who contributed to each issue area.

Table 1 – The main problems in the sphere of “education”

No.	Problem	The time range considered in the papers	Authors
1	Availability	2014-2022	Yang & McCall; Kurt; Pizzol et al.; Zhang et al.; Sewell et al.; Rodriguez-Segura; Toybazarova & Nazarova
2	Quality	1983-2011	Solmon; Heyneman; Van der Berg et al.; Kerimkulova & Kuzhabekova
3	Inequality in access to education	2021-2023	Nguyen & Cao; Rodriguez-Segura; Kireyeva et al.; Chiariello et al.; Jusaj & Fetai
4	The cost of education	2004-2012	Murakami & Blom; Ladd; Christie et al.; Onyusheva, 2017
5	Lack of attention to scientific research	2013-2023	Sapargaliyev & Shulenbayeva; Botoroga et al.; Kubiczek; Simut & Simut; Toimbek; Tong & Yang

No.	Problem	The time range considered in the papers	Authors
6	Insufficient training of the workforce	1961-2021	Johnston & Mellor; Bozhko & Naizabekov; Porter; Sami El-Khasawneh; Indrawati & Kuncoro; Baidybekova et al.; Baituova et al.
7	Lack of social infrastructure	1956-2021	Davis & Blake; Oliveira et al.; Massey; Molchanov et al.; Zhalnina

Note: compiled by authors

This table provides an overview of academic papers on various issues in education. Problems range from access and quality education to social infrastructure and inadequate workforce training. The time frame of publications indicates how long or recently these issues have been the subject of research.

Interestingly, some issues, such as “Inadequate workforce training,” have been studied for a long time (from 1961 to 2021), while others, such as “Inequality in access to education,” are relatively new and relevant (2021-2023). Some authors, such as Rodriguez-Segura, appear more than once,

which may indicate their crucial role in this area of research.

Based on the logic of the study, if there are problems in the field of education, this affects the economic growth of the entire country. Hypothetically, if such issues are solved, it is possible to improve the standard of living not only for students and employees employed in the field of education but also for workers employed in other economic spheres. Below is the authors’ logical hypothesis. The authors suggested the following hypotheses for the impact of education on the economic growth of the country (see Figure 4).

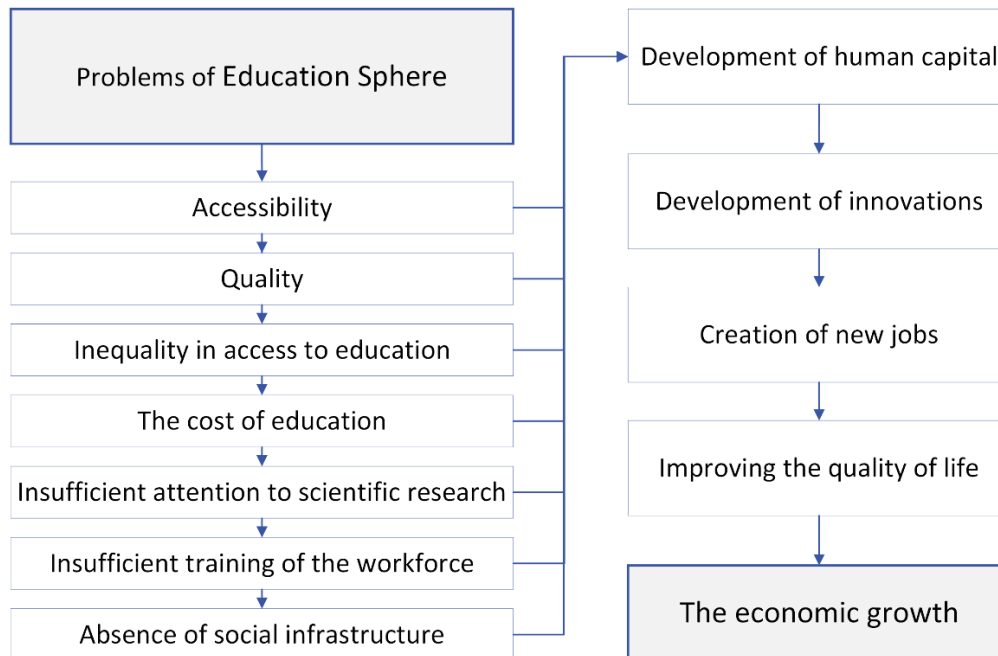


Figure 4 – Hypothesis: the relationship between the education sector and the country’s economy
Note: compiled by authors

Availability

Access to a high level of education in general is studied from the perspective of transport accessibility. In cities, the transport infrastructure is higher, which reduces the travel time for children and staff to school, university and back. Accordingly, in villages, and especially in remote settlements, a decrease in the quality of education is observed due to less training time. Fee-paying schools and private universities often provide higher-quality education and are located in cities. Accordingly, this delays the opportunity for rural children to attend such educational institutions (Pizzol et al., 2021). The researchers believe that while roads can indeed contribute to economic empowerment through improved access to markets, education and health care, their effectiveness as a poverty alleviation tool depends on various factors, including road quality, maintenance and integration with more comprehensive initiatives in the country development areas (Sewell et al., 2019).

There is also a problem in accessibility to education if the educational organization or students have problems with Internet access. And if earlier in 2019, most of the population really did not have access to the Internet, then after the Covid-19 pandemic, the situation has changed. The Internet was brought to many rural communities, and massive online courses (MOOCs) were introduced into the educational process. However, in remote regions the Internet still does not work. Also, the Internet speed is of great importance, so the government is striving to achieve 4G or 5G speeds and develop the efficiency of EdTech platforms (Kurt, 2018; Zhang et al., 2022; Rodriguez-Segura, 2022).

Financing of the education system is also a factor influencing access to higher education. Financial inclusion must be measured in terms of standard of living, cost of education, number of training grants, and many others. Some studies have shown that by reducing per-student funding for college, the cost of providing access to higher education overall has been significantly increased. At the same time, access to higher education in 86 countries was analyzed. The calculations were based on education expenditures as a percentage of GDP (Yang & McCall, 2014). The authors of Toybazarova & Nazarova (2018) write in their article that if we expand the availability of education, this will ultimately lead to an increase in the quality of human capital in Kazakhstan. Increasing access to education means increasing opportunities for people to obtain education, including access to higher education, vocational courses and other forms of training.

The quality of education

When curriculum standards, teacher qualifications, and learning outcomes are considered, countries that invest in high-quality education are better positioned for sustainable economic growth (Solmon, 1985). Poor quality education can lead to children not thinking as they grow up. To continue their studies or do not have the opportunity to enter universities. This creates a barrier that is difficult for the poor population to jump over to get a well-paid job. Scientists rely on a study of World Bank data – the results of testing the quality of knowledge of mathematics, reading, and the scientific component among school students. For example, in Africa, monitoring of school curriculum quality revealed a trend of poorer results in the six poorest countries (Van der Berg et al., 2011). Older studies have conducted that showed that another pattern can be traced among the countries of the Pacific region: low wages are observed among those workers who showed low results in writing articles, essays and tests of knowledge in mathematics, reading, and science component (Heyneman, 1983). In the future, some regions may face the problem of poor quality of education, which may limit the opportunities of pupils and students and affect their future. In Kazakhstan, the quality of preschool, primary and secondary education is controlled by the state, and the quality of higher education is controlled both by the Ministry of Science and Higher Education and by higher educational institutions (Kerimkulova & Kuzhabekova, 2017). Ensuring high quality education is critical for the preparation of qualified specialists who are competitive in the global labor market, and for the development of scientific and innovative initiatives.

Inequality in access to education

Authors Chiariello, Rotondo & Scalera (2021) examined the efficiency of Italian regions in providing public primary and secondary education, highlighting evident inequalities between North and South, which are influenced by socio-economic factors. The study aims to understand the underlying reasons for the southern regions' underperformance by looking at various contextual variables, including gross domestic product per capita, poverty levels, institutional quality and adult education.

In a study focusing on Vietnam, Nguyen & Cao (2023) discussed the challenges faced by children from poor ethnic and mountainous areas in accessing quality education. The article provides statistics showing the high proportion of children out of school among some ethnic minorities, highlighting

the problems they face, such as inadequate facilities, transport problems and intellectual limitations. In addition, the article draws attention to the nutritional needs of students, emphasizing the importance of providing them with adequate nutrition to support their learning and development. Inequality in education can subsequently lead to inequality in economic opportunity. Lack of quality education not only reduces individual potential but also perpetuates cycles of poverty and disadvantage across generations (Rodriguez-Segura, 2022). Inequality in education may arise because of the equal distribution of costs in the education sector and lead to regional disparities (Kireyeva et al., 2023).

Some have researched and found a relationship between women's education and economic growth in Western Balkan countries and found that women's education positively affects economic growth. This is due to the fact that educated women tend to build a family in which children also receive education, which consequently positively affects the income of the next generation in the future (Jusaj & Fetaj, 2022).

Cost of education

Moreover, the affordability of higher education varies by country, with residents living in high-income countries paying less than 20 per cent of wages per year for their children's education. In comparison, parents in low-income countries spend more than 60 per cent (Murakami & Blom, 2008). On the other hand, even in a developed country (the US is an example), there is a gap in primary academic achievement (a test measured by the National Assessment of Educational Progress (NAEP)) between children of different skin colors at age 13. Race was more pronounced in the 1970s, but the gap is now calculated between children from families with low and high-income parents. Moreover, as a factor that influences assessments, the author named:

- a) the opportunity to invest in additional clubs that improve performance in core subjects;
- b) behavior and preferences of teachers,
- c) limited access to high-quality preschool institutions;
- d) housing market and many other factors.

Also, one of the reasons for students expelling from universities is an unstable financial situation. Students who do not experience financial hardship are more likely to graduate and receive a diploma (Ladd, 2012; Christie et al., 2004; Onyusheva, 2017).

Lack of attention to scientific research

Using examples from various EU countries, researchers demonstrate the link between education, economic growth and innovation, emphasizing the importance of R&D and education in promoting innovation and economic development. The high role of remuneration in the formation of human capital in academia should be noted, highlighting the insufficient funding in Polish higher education and the inequality in academic staff salaries (Botoroga et al., 2022; Kubiczek, 2023). In Romania, Simut & Simut (2022) examined the relationship between economic growth and R&D expenditure, suggesting that R&D expenditure in the business enterprise sector plays a significant role in economic growth.

In China (using the example of Shandong province), in recent years, there has been a constant increase in the number of universities and the number of students. Still, the equipment of higher education institutions lags behind. Insufficient funding and technical supply of universities, especially between urban and rural investments, lead to deterioration in university performance (Tong & Yang, 2017). In Kazakhstan, the concept of knowledge-based economy (KBE) is considered, which is based on the development of ICT (Sapargaliyev & Shulenbayeva, 2013), secondary education, control over corruption and Research and Development (R&D). Only with the targeted development of all four factors in the country will it be possible to achieve economic stability (Toimbek, 2022).

Insufficient workforce training

By studying urban studies, one can identify the strengths of large urban agglomerations and the weaknesses of smaller cities in different countries. Thus, Porter (2015) argues that inner cities, which are often overlooked and underinvested, have inherent advantages that can be harnessed for economic revitalization. To do this, it is necessary to revise educational policies to modernise human resources and increase the country's competitiveness, focusing on educational resources and innovative technologies not only in large population centres (Sami El-Khasawneh, 2012; Johnston & Mellor, 1961).

Other scholars, looking at Indonesia's vision for human capital development for the period 2019-2024, highlight the country's initiatives, policies and strategies, which support this theory. The authors argue that by focusing on vocational training and higher education everywhere, Indonesia aims to equip its workforce with the necessary skills and knowledge to meet the needs of the modern

global economy through five key areas: a) access to education; b) quality of education; c) synergy between government, industry and higher education; d) industry connections; e) incentives (Indrawati & Kuncoro, 2021).

For example, in Kazakhstan there is a demand for labor in the real sector of the economy, in healthcare or ICT, and the government is adopting programs that fill the need. However, the achievement of such goals is belated since retraining of specialists takes time. This leads to a low rate of development of innovative programs (Bozhko & Naizabekov, 2017; Baidybekova et al., 2022; Baituova et al., 2023).

Very often, in many countries worldwide, strengths include strategic location, concentrated workforce and local market demand. However, issues such as insufficient workforce training can hamper the development of economic sectors, leading to low productivity and reduced competitiveness in the market.

Lack of social infrastructure

The quality of education in different regions is a matter of concern for researchers. Oliveira et al. (2020), who emphasized the importance of health education to improve the quality of life of vulnerable populations, especially in regions with limited access to healthcare and socioeconomic challenges.

There is a view that low social norms, economic pressures and household strategies shape migration patterns, which is called “cumulative causation”. This concept suggests that migration, once initiated, can create feedback loops, increasing the likelihood of future migrations and potentially changing the socioeconomic landscape of both origin and destination regions. Accordingly, one of the reasons for the migration of high-level specialists from rural areas is the desire to provide a better education to their children (Massey, 1990). Not only the regional migration of education specialists causes instability in the teaching staff, but also international migration, including students, results in personnel drain. Many students go to study abroad and try to find employment there (Molchanov et al., 2018; Zhalnina 2021).

Another problem arising from the low level of social security of the population is the low birth rate and, as a consequence, the outflow of specialists from rural regions. This demographic phenomenon leads to the destruction of the concept of middle-class formation and the destruction of economic trajectories and political landscapes (Davis & Blake, 1956; Wacquant, 2019; Parscale et al., 2022). This is an essential aspect as the aspirations and demands

of the middle class play an important role in driving educational institutions towards excellence, innovation and quality assurance. Their influence is evident in efforts to improve teacher strategies, digital learning tools, and international accreditation standards (Helmiza et al., 2022; Vaganova & Kuchumova, 2022; Sutarman & Salleh, 2023).

The spatial distribution of educational institutions, training centers and other skill development centers in these areas can play a decisive role in determining residents’ employment opportunities. If educational resources are remote or inaccessible, residents may have difficulty acquiring the necessary skills or qualifications, further limiting their employment prospects. Conversely, areas with better access to educational institutions can improve the skill sets of their residents, increasing their chances of obtaining decent jobs (Shen, 1998).

Hypothesis. Accessibility challenges continue to exist due to insufficient infrastructure, limited access to distance education and socio-economic inequalities – accepted.

Conclusion

This study aimed to comprehensively analyze the problems of access to education. The research question was: “*What factors limit the accessibility of education, and what strategies can be effective to improve the situation?*” *Main conclusion regarding the research question:* Despite government initiatives to improve access to education, accessibility challenges continue to exist due to insufficient infrastructure, limited access to distance education, and socio-economic inequalities. The introduction of ICT and strategic partnerships between government, business and educational institutions can significantly improve the situation.

It should be noted that access to education is one of the most critical problems in Kazakhstan’s education field. Although the government of Kazakhstan is investing significant efforts in improving the educational system, much more needs to be done to improve access to education for all population categories. To solve the problem of access to education in Kazakhstan, it is necessary to consider the following measures:

a) Development of distance education. In today’s world, online courses and distance learning are becoming increasingly popular and widely used. Such forms of education provide education to everyone, even those who are in remote areas and cannot afford to move to big cities for education.

b) Infrastructure development. To ensure accessibility of education, appropriate infrastructure is needed: modern educational institutions, equipped laboratories and classrooms, access to current information technologies and the Internet.

c) Development of a state program to ensure accessibility of education for all categories of the population. Within the framework of such a program, various support measures can be provided, such as providing grants and scholarships, subsidizing education, establishing benefits for large families, etc.

d) Development and implementation of programs to improve the skills and retraining of workers, especially in areas related to innovation and technology. This will help improve the competitiveness of the economy and reduce unemployment.

e) Strengthening partnerships between government, business and educational institutions. Such partnerships can contribute to the creation of new educational programs and projects, as well as provide financial support for the development of educational infrastructure.

Addressing the shortcomings present in the education sector has become a priority for many decision-makers. Recognizing the profound impact of education on a country's economic trajectory, policymakers are placing increased emphasis on improving the quality of education. They see it not just as a short-term solution but as a fundamental strategy to ensure sustainable economic growth and prosperity in the long term.

a) The solution to the problem of low levels of education in the population may be to increase investment in education, increase teacher salaries and create additional educational opportunities for the wider population.

b) The solution to the problem of uneven distribution of resources and access to education can be the creation of programs aimed at supporting poor and disadvantaged groups, as well as improving access to education for people living in remote and underprivileged areas, which will reduce inequality in society.

c) The solution to the problem of insufficient efficiency of the education system, in which

graduates do not have sufficient knowledge and skills necessary for successful employment, can be strengthening control over the quality of education, reforming the education system, improving the qualifications of teachers and expanding opportunities for practical training.

d) Lack of innovation can slow down economic development and lead to loss of competitiveness. A solution to this problem could be to increase funding for research and development create innovation centers and start-up support programs.

It is essential to understand that isolated solutions may not produce the desired results. Instead, what is needed is a holistic approach in which different strategies seamlessly integrate and complement each other to create a coherent plan of action. One such process that has received significant attention is increasing technological accessibility in the educational sector. Providing students, teachers and educational institutions with easy access to modern technological tools can significantly improve the quality and accessibility of education. In this context, the development of information and communication technologies (ICT) appears to be a promising solution. Recent studies such as those by Zhang et al. (2022) and Rodriguez-Segura (2022) highlight the transformative potential of ICT in changing the educational landscape, making it more inclusive, dynamic and effective. However, while these strategies are promising, it is critical to consider existing policy constraints. These constraints, often rooted in politics, bureaucracy or management, can pose challenges to the smooth implementation of education reforms and must be addressed proactively to ensure the success of any education improvement initiative.

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