WCES 2014

Effects Of Access To Education And Information-Communication Technology On Income Inequality In Kazakhstan

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Abstract

The article examines the influence of access to education and information-communication technologies on the inequality in the population distribution by income. The aim of the study is to prove that the low accessibility to professional education and information-communication technologies is a factor of increasing income inequality in Kazakhstan. Based on the databases of Kazakhstan household studies, the presence of direct relationship between the denoted parameters is ascertained, and recommendations on improving government policies to reduce income inequality and enhance the population's quality of life are given.

Keywords: Standards level, income inequality, access to education, informational inequality, social government policy

1. Introduction

In the modern society many countries face the task of smoothing inequalities through different mechanisms of distribution and redistribution of income between socio-economic groups. It helps to ensure social justice and protection of the population, as well as to support socially vulnerable population categories. Taking into consideration the successfully developing economy of Kazakhstan, the matters of improving the quality of life and reducing the income inequality come to the fore.

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An important factor in the existence of inequality is the differences in access to vocational education and information-communication technologies. According to research by (OECD, 2011), since the 1980s, the main reason for the increase of income inequality from employment has been a steady growth in demand for highly skilled workers in high-tech industries. This was the reason for the growth of salaries of those with professional education, the relevant knowledge, and skills to work in high-tech information-communications sectors. As a result, the wage gap between highly skilled and low-skilled workers has been increasing, with growing income inequality in their employment. There is a perception that access to information and computer technologies could provide opportunities to obtain a higher income, reduce poverty, and improve the living standards in the country. Thus, access to education and information-communication technologies has a specific effect on inequality in the distribution of income from employment. In this article we will attempt to assess how strongly these two criteria influence the population distribution by income groups in Kazakhstan. *Aim.* The aim of the study is to prove that the low accessibility to professional education and information-communication technologies is a factor of increasing income inequality in Kazakhstan.

2. Method

As statistical instruments of research, methods of correlation and frequency analysis were applied, as well as tabular and graphical methods for visualizing the results of the study. The sources of data for statistical evaluations were: 1) the official data of the Statistics Agency of Kazakhstan, 2) household budget survey of the Statistics Agency in 2009 (12,000, or more than 45,000 members of the household), and 3) a database of the household survey in 2013 (1,530 households or 5,502 members of a household), conducted in the framework of the research project supported by the Ministry of Education and Science of Kazakhstan "The economic stratification of Kazakh society through the prism of the intellectual potential of the country". Household budget survey of the Statistics Agency of Kazakhstan (sample - 12,000 households) includes indicators on income, expenditure and household consumption, their socio-demographic characteristics, involvement in the labour market and living conditions on the basis of the annual, quarterly and daily survey. The sampling error on the basis of household budget survey in 2009 in the country did not exceed 1%, by region - not more than 4%.Household Survey for 2013 in the framework of the research project included 1,530 households. The sample is representative at the regional level as well as for the urban and rural areas, and the statistical error does not exceed 2.5% with a confidence interval of 95%. All data were processed utilising a software package for handling databases SPSS 11.

3. Results

3.1 Impact of education on the inequality in income distribution.

Education is the most important factor in human development; it expands the capacity of an individual in the acquisition of knowledge and professional skills, allows transforming the quality of life, and serves as a source of economic growth. In a number of countries studies proving the link between education and the level of income inequality were conducted (Coleman & et al., 1975; Heckman & Krueger, 2005; Castelló & Doménech, 2000,; De Gregorio & Lee, 2002). Famous Russian scientist (Bobkov, 2013) studying the domestic and international aspects of the socio-economic inequalities in the Russian living standards, gives the accessibility of education as the indicator of one of the key factors of inequality in income distribution. One of the main ways of increasing income and reducing inequality in Kazakhstan could be an increase in access to vocational education for the population. A higher level of education leads to the increase of human potential and the improvement of the qualification of the workforce, as well as career growth. Consequently, the increase in the educational level contributes to the revenue growth. On the other end of the spectrum, the low level of income is accompanied by a lack of access to quality education: the poor are not able to raise the level of education of adults and children of their households. Due to a low level of education and skills one is deprived of opportunities to make money and have a high income. Such a "vicious circle of poverty" only exacerbates income inequality and access to education. Thus, income inequality affects the education inequality, and vice versa. A positive correlation is seen in Kazakhstan between the income of the individual and the level of their education, especially *vocational education*. Pearson's Correlation between the

level of education (by groups: no education/ no vocational education/ has professional education) and per capita consumption has a positive correlation (r = 0.23, the correlation coefficient is significant at the 95 % significance level, sample size N = 31,690 persons without children up to 14 years old). It has been calculated on the basis of the Statistics Agency of Kazakhstan household survey data. As the indicator of consumption was considered, not the wages or income from a given occupation, the income redistribution effect within the family in favour of dependents was taken into account. It can be assumed that with the calculation of the correlation coefficient between wages and the education level, this figure will be higher than that obtained by us. The influence of education on the income level is seen in the distribution of population by quintile groups of consumption. The proportion with vocational education in the fifth quintile with the high level of consumption is 1.75 times greater than in the first quintile with the lowest consumption. People without vocational education (incomplete secondary education, secondary education) have a higher risk of falling into poverty than those with vocational education (Fig. 1).
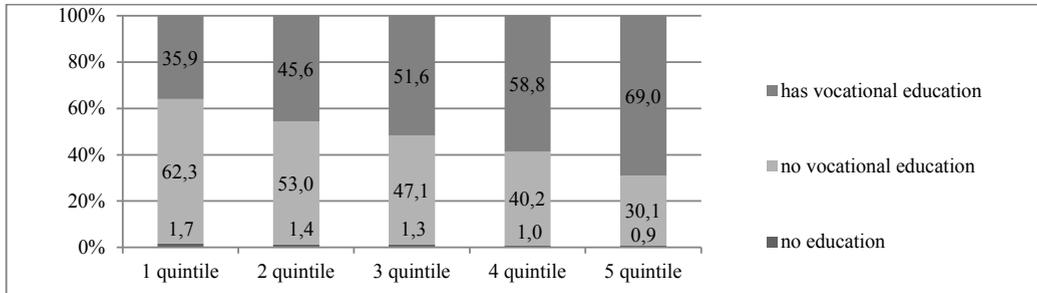

Fig. 1. The level of education of the population (excluding children under 15 years of age) by quintile groups of consumption, N = 31,367, in %.
Note. The authors' calculations using the database on budget survey of 12,000 households in Kazakhstani Agency Statistics, 2009

Let us consider the results of the household survey conducted in 2013 as part of the grant funding for research, Kazakhstani Ministry of Education and Science (Project number 1145/GF, Stratification of Kazakh society). All households were divided into six income groups: the first income group - the extremely poor households (not enough money even for sustenance), while the sixth group - wealthy households (if necessary could purchase a new flat or house). For each income group households that are unable to give their children a higher education have been isolated. This means that these households are deprived in access to higher education for their children: about 47.6% of the households do not have the opportunity to give their children a higher education in Kazakhstan, and 76.9% - abroad. It could be noted by the income groups that low income households have a very limited ability to give their children a higher education in Kazakh universities: only 9.4% and none of the household - in foreign universities. The opportunity to pursue higher education for children increases with the change of the revenue of the group. Thus groups of high income 5 and 6 have more than 94% of such households. Thus, we have confirmed the hypothesis that for low-income groups of the population receiving higher education to improve skills and career development is difficult, and they are deprived of the opportunity to earn money and have higher incomes. Households were also asked to rate the availability and education quality for the same households as them. The results show that on average, about 84% of households reported access to upper secondary education in Kazakhstan for their children, 59 % believe higher education is accessible (either in Kazakh universities or foreign universities).
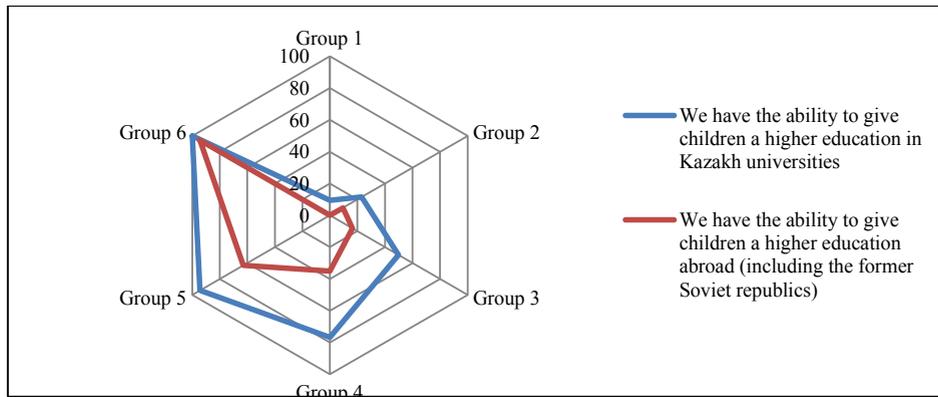
Fig. 2. Households with the ability provide higher education to children in Kazakhstan and abroad, in % for each income group.
Note: Income groups: Group 1 - the poorest households, 6 - the wealthiest households. Source: survey of 1530 households in Kazakhstan.

However, the analysis of access to education by income groups shows that for children from low-income families it is significantly lower than for children from high-income families. And if complete secondary education (11 years of schooling) can be expected by about 74% of children from poor households, the higher education can be expected by only 29.6 % of poor households. Access to vocational education/re-training for family members over 18 years old was evaluated positively by only 30 % of poor households. Although Kazakhstan has the state which Employment Program 2030 aims at the employment of people from low-income households? The data in Table 1 below show that the availability of education for the poorer income groups is lower than for the higher on all three levels of education.

Table 1. Evaluation of accessibility to education by households by income group, %

Evaluation of accessibility to education	Household income groups						
	Group 1 Lowest income	2	3	4	5	Group 6 Highest income	Total
Complete secondary education for children	73.5	75.7	85.9	87.1	96.1	96.2	84.2
Higher education for the children	29.6	39.4	56.3	76.9	88.2	90.5	59.3
Vocational education/retraining for family members older than 18 years	30.0	39.3	61.7	78.7	84.2	91.7	63.0

Source: survey of 1530 households in Kazakhstan in 2013
Note: Income groups: Group 1 - the poorest households, group 6 - the wealthiest households.

Receiving quality education plays a significant role in future incomes and provides the opportunity to move into higher-income group. However, households rated the quality of education lower than we had expected. An acceptable quality of education was reported by 66.1% of households (for complete secondary education), 56% of households (for higher education), and 55.3% of households (for vocational education /retraining for family members older than 18 years). At the same time, there is a significant difference in the assessment of the education quality in the income groups. The table shows that the poorest households assess the quality of education significantly lower than the average income groups: only 54% of poor households are satisfied with the quality of complete secondary education, 28% of poor households are satisfied with the quality of higher education. The data show that the education that is accessible to the poor is more often of lower quality than that for high-income groups. Therefore, they cannot escape from this social layer, possessing a lower human potential at the outset, formed by vocational education. Among the households belonging to the middle income group (the third, fourth and fifth groups) satisfactory assessment of the quality of education was made by 67% to 79% of households (for complete secondary education), from 58% to 72% (for higher education), and from 56% to 67% (for vocational education for adults). While in the high-income group households the quality assessment is lowered. This is due to

the higher demands for quality education from wealthy households. The results of the household survey showed that not all households are able to receive a quality education (complete secondary, higher education, vocational education for adults). Further, for the low-income groups the situation with the accessibility and quality of education is significantly worse than in high-income groups

Table 2. Assessment of education quality by households by income groups**, in%

| Assessment of education quality: | Household income groups | | | | | | Total |
	Group 1 Lowest income	2	3	4	5	Group 6 Highest income	
Complete secondary education	54.5	60.5	68.0	66.8	79.2	62.5	66.1
Higher education for children	28.0	41.0	58.4	62.7	72.3	65.0	56.0
Vocational education/ retraining for adults	31.6	41.9	56.0	67.0	59.3	47.8	55.3

Source: survey of 1530 households in Kazakhstan in 2013
Note: Adults - members of the family over 18 years old
Assessment of education quality - the proportion of households that rated the quality of education on a 5-point scale for good (4 points) and excellent (5 points) Income groups: Group 1 - the poorest households, group 6 - the wealthiest households.

In addition to education, an important factor in forming human development is the availability of skills in working with information-communication technologies. Qualitative changes in the field of information-communication technologies could be of rapid character and could correspondingly have a significant impact on income inequality. Thus according to the OECD report (2011), persons with a very popular working knowledge of the new information and communication technologies, or appropriate skills for the job (for example, in the financial sector) have received a substantial increase in wages and personal income, while workers with a lower level of skills or a lack of skills were left behind. As a result, income inequality between high- and low-skilled workers has increased. The relationship between vocational education availability, access to information-communication technologies, and the inequality in income distribution can be described as follows. A higher level of professional education in the modern society requires higher levels of skills and abilities to work with ICT, which in turn can increase income from employment. On the other hand, access to ICT provides opportunities for access to information and further enhancement of one's professional education. In the modern world, ownership of information provides significant opportunities to increase one's income. Yet if a person does not know how to use computer technologies, they cannot pick and choose the relevant information on the Internet, do not have the skills to use the software, and are very limited in exercising their professional opportunities and the growth of their human potential. Hence the differences in availability of high quality vocational education and the differences in access to ICT between income groups of the population determine the preservation and enhancement of income inequality. The increase in income inequality in turn leads to further restriction of access to quality education and information technology.

2.2 Impact of access to information and communication technologies on the inequality in income distribution.

Another factor influencing the economic inequality is the digital divide, which (Dasgupta &. et al., 2001) define as the gap between those who have computers and Internet access and those who don't. The digital divide is a form of technological inequality. For example (Kenny, 2002) cites the following: of the 110 498 protected servers around the world which use encryption technology of Internet transactions, only 224 (0.2 %) are in the low-income countries. Vershinskaya submits that the problem of enhancing the digital divide, until recently, essentially did not bother the citizens of Russia, as it is not perceived as social inequality, yet "egalitarian in essence system of information services causes a new partitioning of society by the degree of access to them" (Vershinskaya, 2011), which gives rise to a new kind of social inequality - informational. Let us consider in more detail the results of the assessment of accessibility of information-communications technologies for households in Kazakhstan. Information illiteracy in the modern world generates "a digital divide" and "information poverty", which is quite difficult to

overcome. The level of information inequality in the world is growing, despite the rapid development of information-communication technologies and the reduction in price of hardware and software. On the one hand, information technologies increase access to knowledge and open up new opportunities for revenue growth, which reduces the differences between the groups. On the other hand, thanks to the same technology society is beginning to separate into an informational "elite" and "outsiders". The gap between them will grow continuously. The impact of information-communication technologies in Kazakhstan is growing every year. According to the Agency of Kazakhstan (ARKS, 2012) statistics in 2011 shows that the number of Internet users in Kazakhstan has increased over the past 6 years by 5.9 times and reached 49.5 per 100 persons. The study of Internet users' profiles found that the largest share (38.1%) consisted of respondents with higher education. More so, it should be noted that 18.5% of Internet users in 2011 used it to enhance their education. Using the Statistics Agency household budget survey data 2009, one can check the availability of a PC for quintile income groups. In the fifth quintile group (the highest income group) a share of households with a personal computer was 3.6-fold higher than in the first quintile of households (the lowest income group).
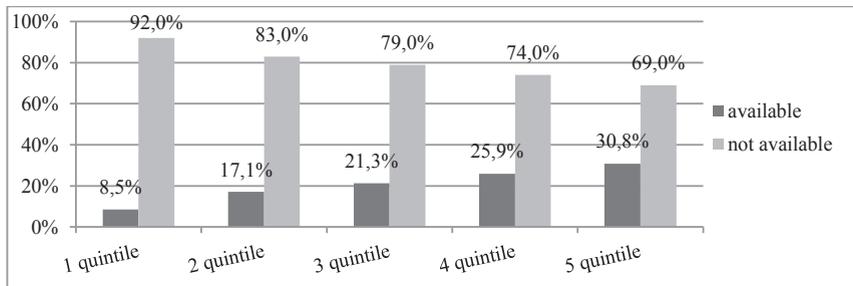

Fig. 3. Personal computer availability in Kazakhstan by income deciles.
Note. Household Budget Survey 2009 of the Statistics Agency, N = 11837, the authors' calculations

According to the results of a sociological survey, in 2013 29.7% of the households do not have access to a computer, 61.2% have a computer at home, others can use it with friends, at work, or in an Internet-cafe (Fig. 4).
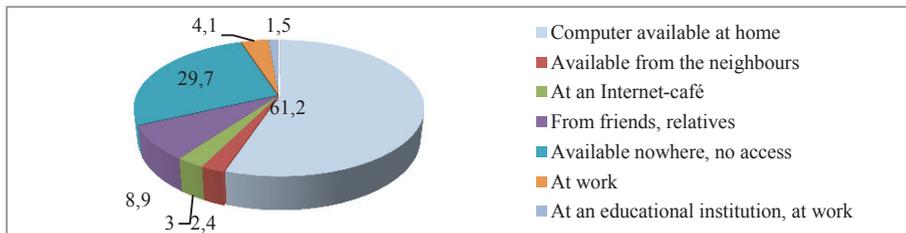

Fig. 4. Household access to a personal computer, % of household.
Source: survey of 1,530 households in Kazakhstan in 2013

However, considering access to a computer in the context of the six income groups, among the poorest groups of the population 48.1% do not have access to a computer, while in the highest income group all households have access. Dependence of the availability of computers across income groups is observed (Fig. 5). A similar situation exists with access to the Internet by income groups, where of high-income groups 93% of households have Internet access at home, while among the most low-income only 25% do (Fig. 6).
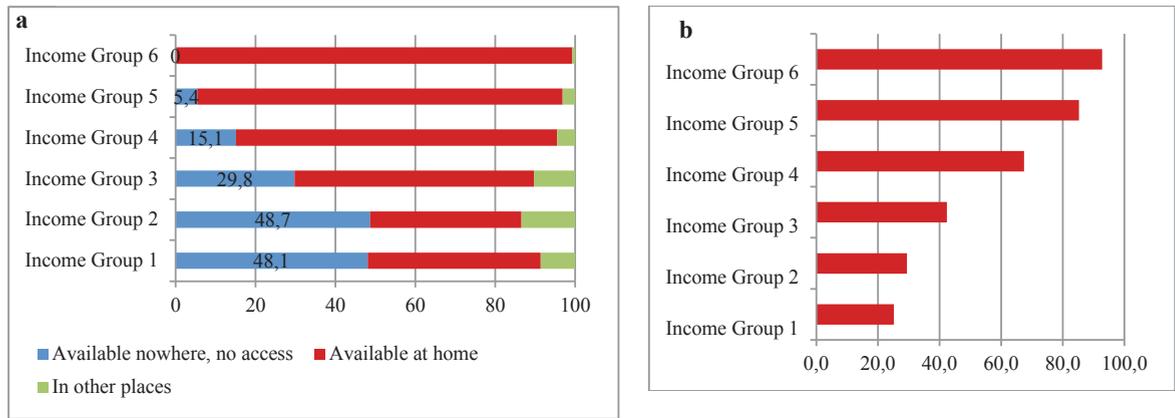
Fig. 5. a) Household access to a personal computer; b) Household access to the Internet from flat/house,
% of household; *Source: survey of 1,530 households in Kazakhstan in 2013*

On the one hand, the personal computer and access to the Internet is an advantage for those who can pay for it. It is indeed the economic inequality that can lead to an information inequality. On the other hand, the lack of access to information and communication technologies does not allow the poor to acquire the necessary knowledge and skills today to work with information, thus leaving them behind. Therefore we can talk about the mutual influence of the economic and digital divide, and from our point of view, these issues should be resolved simultaneously. In order to assess the availability of access to the Internet for different income groups, we asked all respondents to rate access on a five-point scale. There is evidence of a strong dependence of the estimates of availability and quality on the level of household income. High availability of Internet-based technologies was noted by 82-89 % of households in the richest fifth and sixth income groups. While from the first household income group high marks were given only by 54.5%.

Table 3. Assessment of the availability and quality of Internet services by income groups, in %

Mark	Household income groups						
	Group 1					Group 6	
	Lowest income	2	3	4	5	Highest income	Total
Availability of Internet services	54,5	53,6	77,5	85,4	82,4	88,9	75,8
Quality of Internet services	52,6	43,4	67,6	79,0	70,8	80,8	67,0

Source: survey of 1,530 households in Kazakhstan in 2013
Notes: Assessment of the quality of Internet services - the proportion of households that rated the quality of Internet services on a 5-point scale: good (4 points) and excellent (5 points). Income groups: Group 1 - the poorest households, 6 - the wealthiest households.

There is a similar situation with the assessment of quality of Internet services: among the richest households high scores were reported by 71-80 % of households, while among poor households by only 43-52%. This situation is primarily due to the financial capacity of representatives of different income groups. Wealthier households can afford to purchase a more expensive package of Internet services with a better quality, while low-income households are condemned to be content with the quality that the provider offers for the low available cost. Because in the modern world the Internet and the computer are the sources of information that often allows an opportune decision to be made, and this could in turn affect the growth of income, one should consider access to ICT as a means of reducing inequalities in income distribution.

4. Discussion and Conclusion

A long tradition of economic studies shows the importance of vocational education of family members to improve the households' living standards. Higher-educated people are more likely to enter the high-income groups of the population, since education offers a number of advantages. Kazakhstan needs to create conditions to ensure access to quality vocational education free for everyone and vocational training for members of low-income families. Access to education and vocational training is the most effective way to reduce inequality. It is one of the most effective social lifts that can produce the transition from lower to higher layers of society. Therefore, it is important to create an education system in which everyone can obtain high-quality vocational education free of charge. The research results shows that an inequality has formed in Kazakhstan in access to vocational education for different income groups: 1) for the poor households higher professional education and career development training are difficult to obtain, which is why they are unable to secure a higher income to get out of poverty, 2) for children from low-income families access to quality education is significantly lower than for children from families with high income, 3) high-quality vocational education is less affordable for low-income households. Access to information-communication technologies (ICT) is a factor that has a significant impact on the income of an individual, the household, and therefore the inequality in the distribution of income. We found that: 1) in recent years the influence of ICT has greatly increased in Kazakhstan, 2) access to the Internet and a computer among high-income groups is significantly higher than among low-income groups, 3) households with higher income can afford better Internet services, compared with the poor. Thus, there is a striking inequality in access to ICT for different income groups in Kazakhstan. The research results show that we can talk about the mutual influence of economic inequality, the digital divide, and inequality in access and quality of vocational education. From our point of view, these issues must be solved together. Creating the conditions for unrestricted access to quality vocational education and ICT to the poorest groups, the state would ensure equal starting opportunities for different groups, to improve their competence, education, and awareness. We believe that in Kazakhstan, to assess the inequality in income and living standards we should further use the availability and performance of vocational education and information-computer technology as indicators for different income groups of the population.

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