

Social Economic Factors of ICT Use in Education: Lessons from the Pandemic

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Abstract

The article is dedicated to the search of new scientific solutions to intensify the use of ICT in the field of education. The study has proved that under the pandemic conditions and the introduction of quarantine restrictions, the use of ICTs in the provision of educational services has sharply increased. The emphasis is put on the growing number of barriers and problems caused by the increased use of ICT in the field of education under the pandemic conditions. It is noted that the study the socio-economic aspects of activating the use of ICTs in the provision of educational services under quarantine restrictions is crucial. The identification of social aspects of the activation of the use of ICT in the field of education has been carried out on the example of Ukraine and the presence of significant gaps in gender, age and territorial characteristics has been revealed. Special attention has been paid to the economic aspects of enhancing the use of ICTs in the provision of educational services using the example of Ukraine and the existence of gaps only for low-income families has been proved. The study has identified two groups of participants in the educational process, namely: educational services providers (teachers, professors of universities and other educational institutions, trainers, consultants); consumers of educational services. The study emphasizes the necessity to study and identify other factors of activating the use of ICTs in the provision of educational services, since the identified ones do not fully reveal all aspects of this process.

Keywords

Information communication technologies, education services, social economic factors.

1 Introduction

The pandemic and the restrictions imposed on the provision of educational services around the world were a significant incentive to intensify the production of ICT [1, 2, 3]. Having been an important, but quite often secondary component of the educational process in the transition to distance learning ICTs have become the basis for providing high-quality educational services. The pandemic and its impact on education have led to the transformation of learning processes, which requires profound research on the use of ICT in educational activities. Following the opinion of S. Zenkina [4] we consider the ICT environment as a complex of electronic methods of teaching and communicating using of which allows performing the gradual learning activity that builds both professional and foreign language competences of a student.

The sharp increase in the use of ICTs in the provision of educational services in the conditions of quarantine restrictions caused by the pandemic has confirmed the existence of a significant number of problems and barriers [5, 6, 7], as well as the need to take into account the socio-economic aspects of the use of such technologies in the educational processes. It is social and economic conditions that have a decisive influence on the use of ICT in education and act as stimulating and de-stimulating factors for users of such technologies within the consumption of educational services.

The use of ICTs in the provision of educational services is particularly important in emerging countries and countries with transitive economies, including Ukraine [8, 9, 10]. This situation is caused both by the shorter

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time frame for the introduction of ICT in education, and by the presence of social economic features in national economies, the educational sphere and the use of ICTs.

Taking into account the above, the aim of the study is to identify key social economic aspects of the process of intensification of the use of ICTs in the provision of educational services in emerging countries and countries with transitive economy, using the example of Ukraine, taking into account the impact of quarantine restrictions on the education sector.

Based on the above stated goal, it is important to prove or refute a number of hypotheses, namely:

- ICTs has been playing a supporting role in educational activities, both before the pandemic and under quarantine restrictions;
- the presence of a significant number of barriers and problems hinder the introduction of ICT in educational activities under the pandemic conditions;
- social aspects are of secondary importance for enhancing the introduction of ICTs in educational activities in the context of the pandemic;
- economic aspects are the main ones in the context of increasing use of ICT in educational activities under the pandemic conditions.

2 The background of the research and the related works

The problem of using ICT in educational processes is in the focus of scientific researches of a significant number of scholars. At the same time it is possible to distinguish three main areas of scientific development:

1. Research of barriers and problems in implementing ICT in the educational sphere, including in emerging countries and countries with transitive economies.
2. Influence of ICT on educational activities and their development.
3. Features of the use of ICT in the educational sphere under the pandemic conditions.

B. Harjeet and I. Zeba [5] reveal the importance of using ICT in the educational process, as well as the barriers that prevent the introduction of ICT in education (infrastructure; preparation for the use of ICT; teacher training). Besides, the scholars have developed the recommendations for eliminating the identified barriers.

L. Raftree [6] explores the opportunities and the obstacles in the field of information and computer technology for young people in emerging countries, including those in the field of education. The paper focuses on revealing the capacity of international organizations in increasing the opportunities of young people to use ICT for their own development.

T. Sabaliauskas and K. Pukelis [7] focus on identifying the barriers to enhancing the use of ICT in the educational process. The scholars propose an algorithm for integrating ICT into educational activities, as well as the ways to eliminate problems with the use of such technologies in education.

A.A.E. Suliman, D.Y.G. Fie, M. Raman, N. Alam [11] focus on the study of barriers to the use of ICT in the provision of higher education in Sudan. The scholars identify the importance and the impact of ICT on education in the underdeveloped countries of the world, in particular Sudan, and investigate the role of ICT in higher education in such countries. The scholars pay special attention to barriers to the introduction of ICT in the educational sphere, including higher education in Sudan (personnel training; ICT financing; ICT infrastructure; insufficient ICT development in the country; insufficient awareness of ICT).

B.A. Tedla [10] in its research examines the problems of introducing ICT in the educational sphere of East African countries and identifies the barriers, which include: preparation of educational institutions for the introduction of ICT, external infrastructure for the introduction of ICT in educational activities, teacher training on the introduction of ICT in student education. The advantages and disadvantages of using ICT in educational activities without classifying them according to the subjects of educational processes (educational institutions, teachers, students) are provided in the research.

ICT have an increasing impact on the educational sphere, which leads to the increase in the number of researches in this direction.

A. Aristovnik [12] studies the effectiveness and impact of ICT on the educational results. For this purpose, the scholar conducts a nonparametric analysis of data from the European Union and the OECD countries. The

study reveals significant differences in the effectiveness of the use of ICT in education in different countries, as well as significant potential for increasing the effectiveness of the use of ICT in the provision of educational services and the improvement of the quality of education.

R.M. Hernandez [13] examines the processes of integration of ICT and education. The scholar considers the problems and prospects of using ICT in educational activities and notes that modern education is inextricably linked with such technologies, which are an important component of the educational sphere.

S.O. Oyebolu and O.O. Lemo [14] focus on the study of the impact of ICT on the quality of education of students of vocational schools. The scholars reveal the stages of learning using ICT and the key imperatives of implementing ICT in educational activities.

The pandemic and quarantine significantly have accelerated the integration of ICT and education, as well as increased the role of ICT in educational activities, causing an increase in the number of scientific developments and researches on this issue.

L.M.L. Lorente, A.A. Arrabal, C. Pulido-Montes [1] explore the opportunities of ICT to provide educational services under the restrictions on learning offline in countries of the world caused by quarantine restrictions. The assessment of the provision of educational services under the quarantine conditions in different countries of the world indicates problems with the quality of education. The scholars emphasize the importance of introducing inclusive education based on the use of ICTs in the context of the pandemic, especially in low-income countries.

M. Mohite [2] emphasizes that the education sector is one of the most affected under the pandemic conditions. The scholar examines the impact of quarantine restrictions on the education system, and also reveals the possibilities of using ICT in this situation. At the same time, the possibilities of using various ICT tools in educational activities are studied in detail.

S. Montoya and A. Barbosa [3] explore the problems for the global education sector caused by the pandemic and the closure of educational institutions. The scholars reveal the importance of developing ICT skills to overcome educational crises. Special attention is paid to reducing digital divide in the provision of educational services between countries, as well as between schools and households.

The current situation with the provision of educational services under the pandemic conditions requires further research on the introduction of ICT in educational activities, especially in emerging countries or countries with transitive economies.

3 Social economic aspects of enhancing the use of ICT in the provision of educational services

In recent decades, the role of ICT in the provision of educational services has been constantly growing [15, 16]. However, given the difficulties and barriers hindering the introduction of ICT in education, especially in emerging countries and countries with transitive economies, as well as some resistance from technology consumers and educational institutions, such technologies before the pandemic and the introduction of quarantine restrictions played a supporting role in education and served as an additional tool for establishing communication between participants in educational activities. Separately, we note the importance of information and computer technology in providing inclusive education [17, 18, 19]. Our research allows considering the transformation of the role of ICT in education.

3.1 Transformation of the place and role of ICT in educational activities under the influence of quarantine restrictions

Regarding Ukraine, we have noted that in the period before the pandemic, ICT was used:

- in schools to attract students to extracurricular educational work, as well as to provide educational services within the development of inclusive education;
- in universities, the emphasis in the use of ICT was made on improving the quality of services, speeding up communication between participants in the process, as well as on attracting to educational activities those who, for a number of reasons, are not able to receive a full-fledged education offline (special categories of educational applicants, students of the correspondence Department);

- in other segments of the country's educational sphere - for greater audience coverage and demonstration of progressive teaching methods.

Summing up the above mentioned, it can be noted that ICT in educational activities before the pandemic and quarantine restrictions served as an additional communication channel (No. 1 in Figure 1), a tool for the development of inclusive education (No. 2 in Figure 1), an additional competitive advantage in the fight for consumers of educational services (No. 3 in Figure 1), and also acted as a secondary element of infrastructure in the field of Education (see Figure 1).

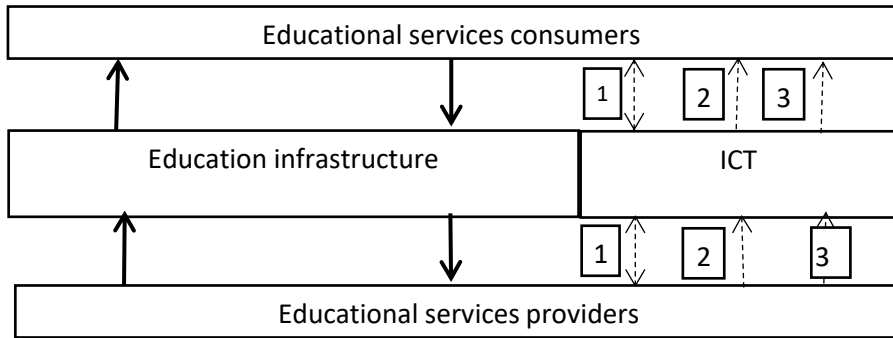


Figure 1: The place and role of information and computer technology in the provision of educational services before the pandemic.

The pandemic and related quarantine restrictions, as well as the timing of their introduction, have led to the inability to provide high-quality educational services offline, which triggered the development of educational activities online. Competition and the influence of state bodies stimulated educational institutions, as well as other providers of educational services, to transfer almost all activities to a remote scheme of work with the active use of ICTs, which was the most powerful stimulus for the integration of such technologies into the educational sphere. The above has led to the fact that ICT under the pandemic and quarantine restrictions have become the key in the provision of educational services, namely: they have become the main element of the educational infrastructure, replacing or complementing a significant number of other elements; the use of ICT is based on the communication process between participants in educational activities (No. 1 in Figure 2); the quality and quantity of ICT use have become the main competitive advantage in the provision of educational services (No. 3 in Figure 2); ICTs continue to be used to provide inclusive education (No. 2 in Figure 2) (see Figure 2).

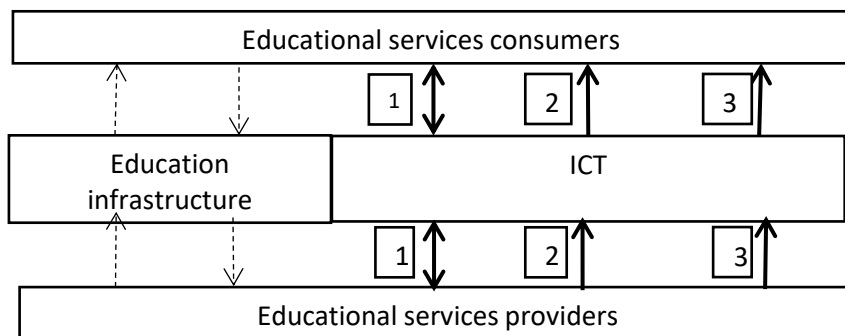


Figure 2: The place and role of information and computer technology in the provision of educational services under the pandemic and the quarantine restrictions.

The dramatic increase in the use of ICTs in education has led to the increase in the number of barriers to be identified and removed to improve the quality of educational services, especially for emerging countries and countries with transitive economies.

3.2 Barriers and challenges to ICT implementation in education: lessons from the pandemic

The introduction and use of ICT in educational activities faces a significant number of barriers and problems [5, 7], which became crucial during the pandemic and quarantine restrictions [20, 21]. At the same time, we note that these barriers and problems differ for providers of educational services (educational institutions, etc.), teachers and students.

If we consider the barriers and problems of educational services providers with the introduction and use of ICT during the pandemic, the main ones are the following:

- institutional issues related to legislative aspects, as well as the influence of state institutions on the introduction and use of ICT, which primarily include the issues of copyright regulation and the use of intellectual property: we have noted the growth of these barriers in the context of increasing use of ICT under quarantine restrictions;
- infrastructure issues related to the incomplete readiness of infrastructure at the level of the state, region or individual territorial community for a sharp increase of ICT use in education, especially with regard to the provision of electric energy, speed internet, mobile communications;
- training of personnel, primarily technical, to provide adequate environment for the use of ICT in educational activities; the sharp increase in the use of ICT has led to the increase in demand for personnel who, in most countries, are absent from the labor market or the supply of their labor services is limited;
- organizational issues, associated with a sharp shift in educational activities to the online environment, or the use of mixed forms of providing educational services that combine online and offline learning;
- availability and quality of equipment; a significant increase in the use of ICT puts forward additional requirements for the supply of appropriate equipment, which is becoming a problem for a significant number of providers of educational services, especially in emerging countries and countries with transitive economies, including Ukraine;
- psychological issues, which are associated with the unwillingness of some staff to carry out work and training of students online due to the difficulties of switching to the new form of providing educational services.

For teachers and other providers of educational services (trainers, consultants, etc.), the key barriers and problems with the introduction and use of ICTs in educational activities during the pandemic are:

- training in the use of information technologies, since a significant number of them have problems with the introduction of ICT in the educational process and lack of time for advanced training;
- availability and quality of equipment; taking into account the problems of providers of educational services (see above), there is a need to use their own equipment, which is not suitable for increasing the load and switching to teaching online;
- difficulties of choice, since ICT developers offer a large number of products that can be used in educational activities, and their selection and testing take a significant amount of time;
- methodological issues related to the use of other teaching techniques and methods, taking into account the provision of educational services using information technologies;
- psychological issues (see above);
- encouraging students to learn, taking into account the lack of direct communication with them and decrease in stimuli on their part.

The growth of the use of ICTs in the educational sphere during the quarantine period bears the following main barriers and problems for consumers of educational services (students):

- technical support, especially for students from low-income families, as well as from areas with poorly developed ICT infrastructure;
- training, since a significant number of them are not familiar with the opportunities of using ICT in educational services;
- psychological problems associated with unwillingness to learn without direct communication with other students and teachers;

- creating the demand for educational services, as online learning increases the role of self-study and independent work with lack of teachers control.

The above requires intensifying the ICT in the supply of educational services, taking into account the social and economic aspects of these processes.

3.3 Social aspects of enhancing the introduction of ICTs in educational activities in the context of the pandemic

The study of social aspects of the introduction of ICT in education is one of the key conditions for intensifying educational processes and eliminating a significant number of problems in this direction. We have noted that it is necessary to check the impact on the use of ICT in education of such aspects as age, gender, locality, availability of appropriate equipment and its quantity. We consider it appropriate to conduct separate research for those who provide educational services and consumers of such services.

The study was held in 2020. The respondents are the providers of educational services who participated in national and international online conferences and webinars. They were asked to fill in the questionnaire and to encourage their colleagues and students to participate in the research. Thus the research involves the providers and consumers of educational services from different regions of Ukraine.

We have studied the share of those who have been using ICT in education among consumers of educational services in Ukraine before and during the pandemic (see Table 1) The survey to obtain data for the study was conducted among respondents in Ukraine (sample makes up 1,457 people). In the table, all respondents are divided into seven age groups: the first group – students under 15; the second group – students of 16-18 years old; the third group – undergraduate students; the fourth group – graduate and postgraduate students and those who receive additional education; the fifth, sixth and seventh groups are applicants for correspondence education and those who receive additional education. All age groups were divided by gender (men and women), place of residence (city or village), and possession of ICT equipment (sufficient and insufficient).

We have noted a sharp increase in the use of ICT by consumers of educational services in Ukraine under the pandemic and quarantine restrictions. However, given that negligible amount of offline classes held during the quarantine, it is clear that some consumers suspended their studies, especially critical the situation with students under 15 years of age and those over 31 years of age, especially for people of the older age group (more than 50 years). It is these age groups that require additional measures to enhance the use of ICTs for educational services.

Table 1

Share of those who used ICT in education among consumers of educational services in Ukraine before and during the pandemic (social aspects).

	Men				Women			
	Urban	Rural	Sufficient	Insufficient	Urban	Rural	Sufficient	Insufficient
Age 10-15								
Before pandemic	12	8	43	57	15	12	41	59
During pandemic	78	73	35	65	86	82	32	68
Age 16-18								
Before pandemic	15	12	45	55	17	14	46	54
During pandemic	81	77	33	67	88	84	30	70
Age 19-21								
Before pandemic	32	26	51	49	35	31	48	52
During pandemic	89	82	31	69	93	89	27	73
Age 22-23								
Before pandemic	34	33	52	48	38	32	49	51
During pandemic	89	81	34	66	95	91	29	71
Age 24-30								
Before pandemic	11	9	67	33	22	19	56	44
During pandemic	77	73	57	63	83	79	59	41
Age 31-50								
Before pandemic	6	2	88	12	12	11	77	23
During pandemic	68	59	75	25	78	74	57	43
Age >50								
Before pandemic	2	1	62	38	4	3	59	41
During pandemic	51	47	53	47	53	48	47	53

Importantly, the pandemic and quarantine restrictions have led to the increase in the proportion of students who do not possess sufficient equipment to use ICT in education. The state of affairs is satisfactory only for consumers in the age group of 31-50 years. This is one of the reasons why some consumers of educational services could not receive them during the pandemic. This situation leads to the decline in the quality of education and problems in the functioning of the educational sphere in Ukraine.

The situation with the territorial and gender gap among consumers of educational services in the country is quite interesting. Thus, women have more problems with access to equipment than men, especially in rural areas, mainly due to the economic aspects of ICT use in education, which will be discussed below. On the other hand, women, both in urban and rural areas, more actively use ICT in education.

For providers of educational services, the use of ICT in their own professional activities also has its own characteristics, which require research in relation to Ukrainian specifics before and under quarantine restrictions (see Table 2). The survey to obtain data for the study was conducted among respondents in Ukraine (sampling makes up 314 people). School teachers, university professors, teachers of other educational institutions, trainers, consultants from all over Ukraine were invited as respondents. In the table, all respondents are divided into three age groups: 19-35 years (youth); 36-50 years old; older than 50 years (those who have the right to retire on superannuation).

Table 2

Share of those who used ICT in education among educational services providers in Ukraine before and during the pandemic (social aspects).

	Men				Women			
	Urban	Rural	Sufficient	Insufficient	Urban	Rural	Sufficient	Insufficient
Age 19-35								
Before pandemic	64	51	31	69	66	60	24	76
During pandemic	98	96	19	81	99	97	15	85
Age 36-50								
Before pandemic	52	41	47	53	60	54	42	58
During pandemic	96	94	28	72	98	96	23	77
Age >50								
Before pandemic	28	21	49	51	36	31	46	54
During pandemic	92	89	23	77	95	94	20	80

The study showed a sharp increase in the use of ICT in the provision of educational services by teachers, trainers, consultants, etc. However, it is worrying that not all of them have implemented ICT in their professional activities, especially for the age category over 50 years. There are also certain gaps between urban and rural areas, while gender gaps, which were quite noticeable for consumers of educational services, are almost absent for educational services providers (teachers, trainers, consultants).

A critical problem for educational services providers in Ukraine is insufficient supply of appropriate equipment, which has increased significantly during the pandemic, especially for the age categories of 19-35 and more than 50 years. The gender gap in the provision of ICT equipment in education is also noticeable.

Thus, we have noted the critical need to eliminate territorial, age and gender gaps in the use of ICT in the professional activities of educational services providers, as well as for consumers in the educational sphere of Ukraine. It is the emphasis on these social aspects that will make it possible to intensify the use of ICT in educational activities under the pandemic and after its end. At the same time, a significant number of problems regarding the functioning of the education sector in the country are a consequence of economic factors, which requires their study.

3.4 Economic aspects of enhancing the introduction of ICTs in educational activities in the context of a pandemic

The economic component plays a critical role in the introduction of ICTs in educational activities, especially for emerging countries and countries with transitive economies, Ukraine included. We consider it appropriate to study the economic aspects of the use of ICT in education in Ukraine before and during the pandemic, having divided respondents into two groups: services consumers (1,457 people); service providers (314 people). At the same time, we have divided all respondents according to household incomes (high, medium and low), equipment and ICT costs (high, medium, low), gender (men and women) and territorial characteristics (living in urban and rural areas). It should be noted that we consider household in its traditional for economics way as a group of people living together in the same residence.

We have considered the change in the share of those who used ICT in education among consumers of educational services in Ukraine before and during the pandemic.

Table 3

Share of those who used ICT in education among consumers of educational services in Ukraine before and during the pandemic (economic aspects)

Gender and territorial factors	Household incomes			Expenses on equipment and ICT		
	High	Middle	Low	High	Middle	Low
Men(urban)						

Before pandemic	27	34	15	37	38	12
During pandemic	87	91	80	90	88	79
Men (rural)						
Before pandemic	25	32	10	35	34	9
During pandemic	85	90	75	92	92	75
Women (urban)						
Before pandemic	35	41	24	40	36	18
During pandemic	91	94	87	94	89	81
Women (rural)						
Before pandemic	33	40	12	37	35	13
During pandemic	89	91	83	93	90	78

As in the case of social aspects of the use of ICT in education in Ukraine, we have noted the following tendencies. On the one hand, a significant increase in the share of those who began to use ICT in education during the pandemic, and on the other hand there is a significant number of gaps and problems. So, if there are no large gaps between high-and middle-income households regarding the use of ICT in obtaining educational services, there is a significant gap in low-income families, both before the pandemic and during the introduction of quarantine restrictions. The other factor to be noted is the presence of those who do not consume educational services during the pandemic in high-and middle-income families indicates that the problems are not only economic in their nature. A rather interesting feature is that women in Ukraine have consumed more educational services using ICT, both before and during the pandemic, although the influence of economic factors was of great importance for this category of students.

Regarding the expenses on appropriate equipment and ICT, there was a clear connection between consumers of educational services with the use of such equipment and technologies only for the category of those who had low expenses. At the same time, high spending on equipment and ICT do not significantly affect the consumption of educational services by students. We also note that there are certain students who, even with high or medium expenses on equipment and ICTs before and during the pandemic, do not use them to receive educational services.

It is necessary to consider the impact of economic aspects on the intensification of the introduction of ICT in educational activities in Ukraine by providers of educational services before and during the pandemic (see Table 4).

Table 4

Share of those who used ICT in education among educational services providers in Ukraine before and during the pandemic (economic aspects)

Gender and territorial factors	Household incomes			Expenses on equipment and ICT		
	High	Middle	Low	High	Middle	Low
Men(urban)						
Before pandemic	35	37	20	46	40	21
During pandemic	98	97	93	96	95	89
Men (rural)						
Before pandemic	33	35	19	45	38	18
During pandemic	97	97	92	93	93	87
Women (urban)						
Before pandemic	42	45	29	48	45	26
During pandemic	98	99	95	98	97	93
Women (rural)						
Before pandemic	39	40	25	42	38	29
During pandemic	97	98	96	97	97	91

For those who provide educational services, gender and territorial gaps as well as the gaps in household income in the pandemic have almost disappeared. There are slightly more problems in low-income families. At the same time, those who spend heavily on equipment and ICTs do not have an advantage over those who spend middle amounts, especially during a pandemic. We are concerned that some providers (teachers,

trainers, consultants) do not use ICT in delivering educational services during the quarantine period, when offline classes are not available or significantly restricted. The analysis has shown that the pandemic has put significant pressure on low-income teachers and required them to spend additionally to use ICTs in their own educational activities.

Thus, the study of the economic aspects of enhancing the introduction of ICT in educational activities in the context of the pandemic has showed that low-income families are the most affected, which requires greater participation of state and municipal authorities, as well as educational institutions. It is worth mentioning that the problems with the use of ICTs in education in Ukraine are not only financial, which requires further research.

4 Conclusion

ICT are playing an increasingly important role in the field of education. The pandemic and accompanying quarantine restrictions have had a particularly negative impact on educational activities, which has been a significant stimulus to increase the use of ICTs in the provision of educational services. At the same time, given the sharp increase in the introduction of ICT in education, the number of barriers and problems has increased and there is a need to intensify the use of ICTs in educational activities, especially in emerging countries and countries with transitive economies, Ukraine including. In these circumstances, there is a need to study the social economic aspects of activating the introduction of ICTs in educational activities.

The study has found that with the beginning of the pandemic and the introduction of quarantine restrictions in education, which have critically reduced the ability to provide educational services offline, the role of ICT in educational activities has sharply increased. The above allows us to refute the first hypothesis put forward.

The introduction and use of ICTs in education has faced a significant number of barriers and problems, the number and varieties of which increased within the framework of a significant increase in the use of such technologies in the context of a pandemic, which allowed us to prove the second hypothesis of the study.

It was proved that the introduction of ICT in educational activities requires the study of social aspects of this process, which are of key importance for the activation of the use of ICT in the provision of educational services, especially in emerging countries and countries with transitive economies, including Ukraine. The above has allowed us to refute the third hypothesis of the study.

Disclosure of economic aspects of enhancing the introduction of ICTs in educational activities under the pandemic in Ukraine has allowed us to prove their critical importance and the fourth hypothesis of the study.

Identification of key socio-economic aspects of activating the introduction of ICT in education under the pandemic on the example of Ukraine will allow us to further develop effective ways to solve problems and eliminate barriers in this area of educational activity, which is a scientific and practical task for the further research.

5 References

- [1] L.M.L.Lorente, A.A. Arrabal, C.Pulido-Montes, The Right to Education and ICT during COVID-19: An International Perspective. *Sustainability* 2020, 12, 9091, 2020. URL: <https://www.mdpi.com/2071-1050/12/21/9091>.
- [2] M. Mohite, Covid 19 and use of ICT in education. *Educational Resurgence Journal* 2 (4), 17-23 (2020). URL: <https://coed.dypvp.edu.in/educational-resurgence-journal/documents/july-2020/03.pdf>
- [3] S. Montoya, A. Barbosa, The Importance of Monitoring and Improving ICT Use in Education Post-Confinement. UNESCO, 2020. URL: <http://uis.unesco.org/en/blog/importance-monitoring-and-improving-ict-use-education-post-confinement>.
- [4] S. Zenkina, Pedagogical basics of orientation of ICT to new learning results. (2007) URL: <https://www.dissercat.com/content/pedagogicheskie-osnovy-orientatsii-informatsionno-kommunikatsionnoi-sredy-na-novye-obrazovat/read>
- [5] B. Harjeet, I. Zeba, Barriers of ICT Integration in Teaching Learning. *Jamia Journal of Education: An International Biannual Publication* 3, 54-62 (2016).

- [6] L. Raftree, ICT opportunities and barriers for youth in developing countries. UNICEF, 2014. URL: <https://www.unicef-irc.org/article/1009-ict-opportunities-and-barriers-for-youth-in-developing-countries.html>
- [7] T. Sabaliauskas, and K. Pukelis, Barriers to integration of information and communication technologies into the teaching and learning process. European Conference on Educational Research, University of Crete, 22-25 September, 2020 URL: https://www.researchgate.net/publication/314232398_BARRIERS_TO_THE_EFFECTIVE_INTEGRATION_OF_ICT_TO_UNIVERSITY_EDUCATION_IN_NIGERIA
- [8] T. Degtyarenko Dissemination of ideas for the introduction of information and communication technologies in the special education system.. *Informatsiyni tehnologii i zasobi navchannya* 2 (46), 11-21 (2015).
- [9] W. Palagolla, R. Wickramarachchi, Effective integration of ICT to facilitate the secondary education in Sri Lanka, 2019 URL: https://www.researchgate.net/publication/330101963_Effective_integration_of_ICT_to_facilitate_the_secondary_education_in_Sri_Lanka
- [10] B.A. Tedla, Understanding the Importance, Impacts and Barriers of ICT on Teaching and Learning in East African Countries. *International Journal for e-Learning Security (IJeLS)* 2 (2), 199-207 (2012).
- [11] A.A.E. Suliman, D.Y.G. Fie, M. Raman, N. Alam, Barriers for Implementing ICT on Higher Education in Underdeveloped Countries "Sudan: Case Study". *International Conference on Information Resources Management (CONF-IRM)*. CONF-IRM 2008 Proceedings, 12, 2008. URL: <https://aisel.aisnet.org/cgi/viewcontent.cgi?article=1011&context=confirm2008>.
- [12] Aristovnik, The Impact of ICT on Educational Performance and its Efficiency In Selected EU and OECD Countries: A Non-Parametric Analysis. *Turkish Online Journal of Educational Technology* 11, 144-152, 2012.
- [13] R.M. Hernandez, Impact of ICT on Education: Challenges and Perspectives. *Propósitos y Representaciones* 5(1), 325-347, 2017.
- [14] S.O. Oyebolu, O.O. Lemo, , The Impact of Information and Communication Technology (ICT) on Vocational and Technical Students' Learning. *Journal of Education and Practice* 4(7), 178-183, 2013.
- [15] Bhattacharjee, K. Deb, Role of ICT in 21st Century's Teacher Education. *International Journal of Education and Information Studies* 6(1), 1-6, 2016.
- [16] K.Ratheeswari, Information Communication Technology in Education. *Journal of Applied and Advanced Research* 3, 45-47, 2018.
- [17] H. Josjö, ICT and inclusion, 2012 URL: <https://www.diva-portal.org/smash/get/diva2:633789/FULLTEXT01.pdf>.
- [18] Masih, Vidyapati, Effective Use of ICT in Teacher Education for Inclusive Environment in Classroom. *Educational Quest: An Int. J. of Education and Applied Social Science* 9 (3), 247-251, 2018.
- [19] Yu. Zaporozhchenko, Using ICT tools to improve the quality of inclusive education. *Information technologies in education: Collection of scientific papers* 15, 138–145, 2013.
- [20] M. Chavez, J. Uribe-Hernandez, Y. Buendia-Aparcana, R. Vertiz, J. Alcoser, R. Rengifo-Lozano, Integration of ICTS and Digital Skills in Times of the Pandemic Covid-19. *International Journal of Higher Education* 9, 11-20, 2020.
- [21] H. Ndahi, The impact of the COVID-19 pandemic on the delivery of TVET in CARICOM Member States. The International Labour Organization, 2020 URL: https://www.ilo.org/wcmsp5/groups/public/-americas/---ro-lima/---sro-port_of_spain/documents/publication/wcms_755060.pdf