



NJD-iScience

№117

The Norwegian Journal of Development of
the International Science





№117/2023

Norwegian Journal of development of the International Science

ISSN 3453-9875

It was established in November 2016 with support from the Norwegian Academy of Science.

DESCRIPTION

The Norwegian Journal of Development of the International Science, established in 2016 with support from the Norwegian Academy of Science, offers a platform for global researchers, academics, and students. Publishing 24 times annually, it covers current science topics. Submitting your article provides exposure to a diverse audience, enhancing your career. Our commitment to research and SEO ensures timely visibility. Submit to the Norwegian Journal of Development of the International Science today and join esteemed authors.

Editor in chief – Karin Kristiansen (University of Oslo, Norway)

The assistant of the editor in chief – Olof Hansen

- James Smith (University of Birmingham, UK)
- Kristian Nilsen (University Centre in Svalbard, Norway)
- Arne Jensen (Norwegian University of Science and Technology, Norway)
- Sander Svein (University of Tromsø, Norway)
- Lena Meyer (University of Gothenburg, Sweden)
- Hans Rasmussen (University of Southern Denmark, Denmark)
- Chantal Girard (ESC Rennes School of Business, France)
- Ann Claes (University of Groningen, Netherlands)
- Ingrid Karlsen (University of Oslo, Norway)
- Terje Gruterson (Norwegian Institute of Public Health, Norway)
- Sander Langfjord (University Hospital, Norway)
- Fredrik Mardosas (Oslo and Akershus University College, Norway)
- Emil Berger (Ministry of Agriculture and Food, Norway)
- Sofie Olsen (BioFokus, Norway)
- Rolf Ulrich Becker (University of Duisburg-Essen, Germany)
- Lutz Jäncke (University of Zürich, Switzerland)
- Elizabeth Davies (University of Glasgow, UK)
- Chan Jiang (Peking University, China) and other independent experts

1000 copies

Norwegian Journal of development of the International Science

Iduns gate 4A, 0178, Oslo, Norway

email: publish@nor-ijournal.com

site: <https://nor-ijournal.com>

CONTENT

EARTH SCIENCES

Tarko A.M. VERNADSKY'S NOOSPHERE AND CRITICAL POINTS OF ITS REALIZATION	4
--	---

ECONOMIC SCIENCES

Mirzayeva Ay. AZERBAIJAN'S TOURISM INDUSTRY'S EXPERIENCE WITH CUTTING-EDGE TRENDS	22
--	----

HISTORICAL SCIENCES

Avdanin V. AFGHAN EVENTS 1979—1989: XINJIANG FACTOR ...	26
---	----

MEDICAL SCIENCES

Jalilova G., Aliyev M., Ashrafov D. TREATMENT OF CHRONIC RECURRENT APHTHOUS STOMATITIS.....	31
Sattarov T. RELATIONSHIP BETWEEN DEPRESSIVE PATHOLOGY AND THE PERSONAL CHARACTERISTICS OF ADOLESCENTS	34
Skvortsov A. P., Khabibyanov R. Ya., Maleev M.V. TREATMENT OF KNEE JOINT DEFORMITIES IN CHILDREN	38

PEDAGOGICAL SCIENCES

Nykyporets S., Stepanova I., Hadaichuk N. TOOLS AND TECHNIQUES TO DEVELOP HIGHER ORDER THINKING SKILLS IN STUDENTS OF NON- LINGUISTIC TECHNICAL UNIVERSITIES OF UKRAINE DURING ONLINE LEARNING	44
---	----

PHILOLOGICAL SCIENCES

Kim O., Lvova I., Elkin D. SEMANTIC OPPOSITION “DAY GUEST / NIGHT GUEST” IN THE KOREAN LANGUAGE	50
--	----

PHYSICAL SCIENCES

Hossain K. EVALUATION OF BENEFITS AND CHALLENGES OF TECHNOLOGY ON EDUCATION IN 21ST CENTURY AND WAY FORWARD	56
Kulakov A. A SACRAMENTAL QUESTION ADDRESSED TO QUANTUM THEORY.....	80

PSYCHOLOGICAL SCIENCES

Aliyeva Kh. GENDER IDENTITY FORMATION IN CHILDREN AND ADOLESCENTS	81
Lohvys O. PSYCHOEDUCATIONAL PROGRAM AS AN EFFECTIVE TOOL IN DEVELOPING THE LEADERSHIP QUALITIES OF THE FUTURE TEACHER.....	88

TECHNICAL SCIENCES

Kazimov M., Aliyev M. CHARACTERISTICS OF WINDS IN THE TERRITORY OF NAKHCHIVAN AUTONOMOUS REPUBLIC	96
Halan O., Dovgenko O. AUTOMATE DATA COLLECTION AND PROCESSING FOR ANALYTICS	103
Halan O., Dovgenko S. USING APPS TO ENCOURAGE PHYSICAL ACTIVITY ..	106
Holovko V., Shtofel O., Krasikov I. FRACTAL PARAMETRISATION OF THE WELD METAL MICROSTRUCTURE. Part 2.....	109

VETERINARY SCIENCES

Hajiyev M., Guliyeva Sh., Aslanov Y.,

Mammadov K., Aliyeva E.

APPLICATION OF ZEOLITE AS AN ALTERNATIVE FEED
SOURCE IN POULTRY 116

Mamedova A., Jabbarov T., Agabalaev T.,

Soltanov I.

COMPARATIVE STUDY OF MILK PRODUCTIVITY OF
HYBRID OF SCHWYZ × LOCAL AND LOCAL BREED ...120

EARTH SCIENCES

VERNADSKY'S NOOSPHERE AND CRITICAL POINTS OF ITS REALIZATION

Tarko A.M.

*Doctor of Physical and Mathematical Sciences,
Professor of Mathematical Cybernetics,*

Chief Researcher of the Federal Research Center «Computer Science and Control» of the Russian Academy of Sciences

<https://doi.org/10.5281/zenodo.8385527>

Abstract

The analysis of the possibility of implementing V.I. Vernadsky's noosphere in the most critical areas and points of development of the biosphere and human life is carried out. The tasks are solved to assess the potential of the formation of the noosphere, depending both on human activity and on the laws of nature: the development of the economy and the growth of scientific and technological progress, the sources and limits of long-term energetic and climate conditions, the stabilization of the Earth's population, the preservation of the natural environment, the cessation of wars.

Keywords: Noosphere, critical point of development, eschatological concept, teleological principle, bifurcation point, systemic economic crisis, population stabilization, global warming, low-carbon energy, age distribution.

1. Introduction

The author of this article set the task to assess to what extent V.I. Vernadsky's faith in the noosphere can be realized and is being realized at critical points of modern and future reality. V.I. Vernadsky was the author of the noosphere doctrine, he believed that the noosphere must necessarily arise, and even wrote in the midst of World War II that humanity was already entering the era of the noosphere.

In the early 20s of the XX century, the theory of the noosphere was developed almost at the same time by Eduard Le Roy, Teilhard de Chardin and V.I. Vernadsky. We can celebrate the centenary of this concept and three theories together with the 160th anniversary of V.I. Vernadsky.

All three were famous scientists, and Teilhard de Chardin was also a member of the Jesuit Order and a priest. They were united by a high moral attitude to the idea of the noosphere, which E. Leroy and T. de Chardin considered to be discovered by V.I. Vernadsky. If E. Leroy and T. de Chardin saw in the noosphere the main phenomenon of connection with God, then V.I. Vernadsky was, first of all, a geologist and sought to find a material connection of the noosphere with human activity.

E. Le Roy was a mathematician, paleontologist and anthropologist, the most complete embodiment of his theory was found in the idea of vitalizing of matter, that the final point of the development of the noosphere will be merging with God.

A more complex concept of the noosphere was developed by T. de Chardin [28, 29]. In his understanding, the noosphere is based on the divine will, and the noosphere is a qualitatively new state of concentration of consciousness of the creator of the world, embedded in primary atoms and molecules, subsequently developed into new forms that form a special sphere of the spirit, a "thinking layer" covering the Earth. Like the biosphere, it is another earthly shell, a cover unfolding

"over the world of plants and animals – outside the biosphere and above it." The culmination point of the noosphere development will be a kind of higher consciousness, in which, having received a new quality, the whole set of individual consciousnesses will gather. The personality will not be lost in this higher consciousness. Individual human consciousnesses will continue to be aware of themselves in this common consciousness, moreover, thanks to the mutual convergence of their individuality will be enriched.

While on a business trip to Paris in the early 20s, V.I. Vernadsky conducted intensive scientific work and lectured on geochemistry at the Sorbonne and at the Ecole de France. The result of this work were his articles on mineralogy, geochemistry, biogeochemistry, problems of studying living matter and the biosphere. He emphasized that with the appearance of man in the history of the Earth, a new geological period and even a new geological era began. As a result, three concepts of the noosphere were formulated and developed in those years. The concept of V.I. Vernadsky will be the object of our research.

In 1924 V.I. Vernadsky published the book "Geochemistry" in French [32], the Russian translation of this book was published in 1927 [35]. He wrote: "Over the past decade or two, we have seen an amazing growth rate of geochemical work of mankind. With man, undoubtedly, a new huge geological force has appeared on the surface of our planet. The balance in the migration of elements, which has been established during geological times, is disturbed by the mind and activity of mankind."

In those years, V.I. Vernadsky confined himself to a descriptive interpretation of the discovered phenomenon. E. Le Roy was one of the listeners and admirers of his lectures in Paris, he proposed to call the new stage of the biosphere's existence "noosphere". Since then, the term "noosphere" was supplemented by the term "noosphere", which was proposed in 1875 by the Austrian geologist Eduard Suess.

In those years, V.I. Vernadsky limited himself to a descriptive interpretation of the open phenomenon. E. Le Roy was one of the listeners of his lectures in Paris and admirers, he proposed using this term to call a new stage of the existence of the biosphere "noosphere". Since then, the term "biosphere", which was proposed in 1875 by the Austrian geologist Eduard Suess, has been supplemented by the term "noosphere".

V.I. Vernadsky published a detailed teaching about the biosphere in 1926 in his classic work "Biosphere" [34]. Unlike his contemporaries, who believed that the purpose of organisms is to adapt to the environment created by nature, he introduced the classic concept of "biosphere", which consists in the fact that the living matter of the planet acts as a powerful geological factor that has changed the surface of the planet for many years of the existence of "living matter".

The doctrine of the noosphere has become a new, no less important achievement of V.I. Vernadsky. He argued that the noosphere develops from the biosphere and is formed by human labor and intelligence. The most important ideas about the noosphere were formulated and presented by him during World War II in 1943, the article [33] was published in 1944. This was his last lifetime publication. V.I. Vernadsky became the creator of the two most important modern concepts "biosphere" and "noosphere", as well as the corresponding sciences.

According to V.I. Vernadsky, the noosphere arises from the biosphere and human labor. It develops with the participation of conscious work of people. He wrote: "Humanity, taken as a whole, becomes a powerful geological force. And before him, before his thought and work, there is the question of rebuilding the biosphere in the interests of free-thinking humanity."

V.I. Vernadsky believed that the conscious activity of people leads both to the improvement of the geological environment and man: "The noosphere is a new geological phenomenon on our planet. In it, for the first time, man becomes the largest geological force. He can and should rebuild the area of his life with his work and thought, more and more creative opportunities are opening up before him. And maybe my granddaughter's generation will already be approaching their heyday."

For V.I. Vernadsky, E. Le Roy and T. de Chardin, the noosphere was an eschatological concept (from the ancient Greek "last"), the same as "the last judgment or "communism" - each of them will come at once for all mankind, no one knows when it will come, if it comes, then should last forever. V.I. Vernadsky wrote in [33]: "The noosphere is the last of many states of biosphere evolution in geological history".

Two authors of the doctrine of the noosphere, E. Le Roy and T. de Chardin, were also convinced that the noosphere is a teleological concept, i.e. having a predetermined goal, and it must necessarily be realized. Aristotle formulated this concept, believing that just as human activity contains an actual goal, so natural phenomena have an immanent potential external goal, which is realized in the process of their development. Teleological views were mainly used by defenders of the idea of expediency established by God. V.I. Vernadsky was not a believer. He wrote in his scientific

works that the noosphere is a phenomenon discovered by him, it arose from the biosphere, thanks to human activity, and that his conclusion is the obligatory onset of the noosphere. However, there are no his statements that noosphere is teleological object and it has a divine origin. He wrote: "I do not see God's manifestations in the world and I think that this has entered into the representation of humanity not in a scientific way and it was the result of a misinterpretation of the nature around us".

2. The realities of the noosphere

V.I. Vernadsky had no expectation of possible destruction of the geological and natural environment by human action. However, he was aware that development can and does have not only positive achievements. He wrote: "The face of the planet is changing by man physically and chemically. Man must now take greater and greater measures to preserve for future generations the riches of the sea that do not belong to anyone."

There is some ambiguity in the statements of V.I. Vernadsky. On the one hand, for him the noosphere was an object, the potential purpose of which must necessarily be realized in the process of development. So, he wrote: "We can look at our future with confidence." On the other hand, as a geophysicist, he understood that "the biosphere – chemically changes dramatically by a person consciously and mainly unconsciously" and that "the course of this process is just beginning to become clear to us." Apparently, his thoughts - from the certainty of the transition of the biosphere into the noosphere to the realization that the onset of the real noosphere is not inevitable, did not have time to form. In addition, there were no noticeable negative impacts on the biosphere in those years, and the current task of fighting for the preservation of nature was not so urgent.

Currently, there is a numerous literature evaluating the meaning of the concept of the noosphere, its connection with the concept of the biosphere and others, but there are no works evaluating the possibility of implementing the noosphere and analyzing the critical regimes of humanity and the biosphere responsible for its onset. V.I. Vernadsky did not identify the problems of the possibility or impossibility of the future formation of noosphere factors, without which its onset would be impossible: violation of the natural environment, development of energy and a long-term energy source, economy, demography, human mentality, and others. At the time of V.I. Vernadsky, such problems either had not yet arisen, or he did not associate them with the noosphere. The formulations and the importance of awareness of these problems appeared later, and the analysis of the possibility of their implementation became possible only today.

Previously, the author investigated the current level of development of the world and the direction of its development according to the principle based on the concept of "current weaknesses" or "current minimum levels" [23, 24]. The presence of severe poverty in countries was seen as a denial of the noosphere, high "medieval" mortality rates in some countries were con-

sidered incompatible with the noosphere. This approach allowed us to identify many previously undetected "weak points" in the development of the world.

In this article, the author intends to explore the possibility of implementing the noosphere in the most critical areas and points of development of the biosphere and human life, that is, to assess the extent to which V.I. Vernadsky's faith in the noosphere is realized in the modern and can be realized in the future reality. The purpose of this article is to assess the potential for the formation of the noosphere, depending on both human activity and the laws of nature.

3. Economy and high-tech development

According to Fernand Braudel [2] ancient civilizations developed mainly on the basis of slash-and-burn agriculture according to a cyclic agrarian scheme. The tribe burned the forest, cultivated the fertile land until the soil was depleted or the number of the population grew greatly. As a result, hunger appeared, it was necessary to move to a new, untreated place. The cycle was repeated in a new place or in a new civilization.

This situation is confirmed by mathematical modeling based on the economic model of A.M. Tarko [21, 25]. Fig. 1 shows the rise and decline of the development of individual civilizations for more than ten thousand years in the presence of the growth of technological progress. Several complete cycles of the civilizations development are reproduced: the dynamics of capital, population, agricultural resources, the level of scientific and technological progress (high tech progress) from the beginning of growth to degradation, and then the emergence and development of a new civilization. It can be seen from the figure that the model reproduces an increase in the rate of development and frequency of civilizations change over time. It also reproduces an increase in the minimum and maximum population, an growth in the living standard (an increase of capital) and, importantly, an increase in the minima and maxima of resource fluctuations.

In the ancient primitive scheme, a civilization perishes and a new one is reborn, in the modern one, a complex restructuring and rebirth takes place with new parameters of the system and sometimes participants.

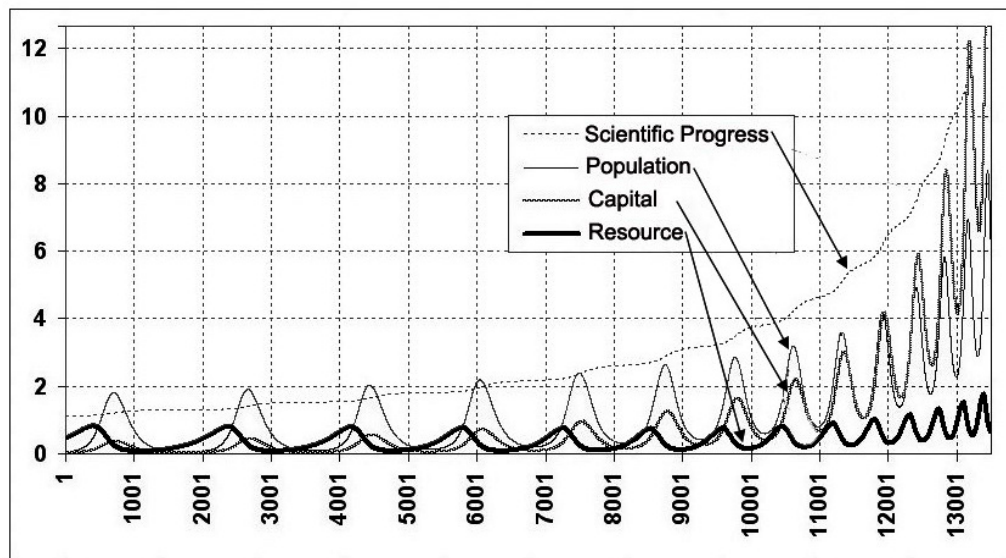


Fig. 1. Modeling of cyclic development of civilizations in the Ancient and Middle Ages

In the works of I.G. Pospelov [17], A.M. Tarko and V.N. Novokhatsky [27], M.Y. Portnoy and A.M. Tarko [16], economic models were developed that reproduce the dynamics of the both ancient civilizations and modern world system. The models were confirmed by computer calculations. There are many variables in the models, but the main ones are six main ones: population, capital, the amount of natural resources, the amount of pollution, the share of capital in agriculture, and high tech progress. In real life, the influence of epidemics and wars was added to this. Also, the death of civilizations was sometimes caused by climatic catastrophes. In these theories and mathematical models of economics, high tech progress is presented from the very beginning as an element of theory.

It followed from the simulation that the possibility of positive development of mankind in modern life can be provided only with the constant growth of high tech progress. Another property feature of the model was a decrease in mortality with an increase in living standards. Taking into account the high tech progress proved

to be necessary and also made it possible to obtain sustainable development with a high standard of living within the framework of the model and to achieve stabilization of the population. The absence of high tech progress and the associated with it non effective use of resources led to depletion, starvation, increased pollution and the subsequent death of the biosphere, and with it humanity. Another result of modeling obtained by I.G. Pospelov was the possibility of periodic occurrence of economic crises of the world system as a result of oversaturation of sales markets in a successfully developing economy [17].

The model of modern civilization which is based on J. Forrester [7] has a mathematical model of the world containing the same main variables, but without high tech progress. The main result of his work is the conclusion about the final insurmountable catastrophic decrease in the population, the growth of pollution, the depletion of biosphere resources, which is interpreted as the degradation of human civilization and the biosphere. Measures such as reducing the use of natural

resources, limiting fertility, reducing the impact of pollution are not able to eliminate the outcome, at best they can delay it.

Similar conclusions on other models of this class were obtained by D. Meadows, a follower of J. Forrester [10, 11]. The main conclusion from the works of J. Forrester and D. Meadows, consists in the fact that the technologies that existed in the early 70s were not able to provide a high standard of living for humanity for a long period of time.

These models were important and very popular for the time of their creation, they gave an understanding of the processes taking place then. The main result at the models of J. Forrester and D. Meadows from modern positions, is that, in fact, they reproduce one of the periods of the cyclical agrarian scheme of F. Brodel. In the books of J. Forrester and D. Meadows, at best, considered several constant levels of high tech progress, which in principle could not give a forecast of sustainable positive development.

From the conducted modeling, it can be determined that it is fundamentally important for the noosphere to determine what the development of the economy is, how the high tech progress is developing, whether there is a long-term energy source, whether the

preservation of the natural environment and climate that satisfies a person is carried out, whether it is possible to stabilize the population of the planet.

In the article, data for plotting and analysis were obtained in the World Bank [36] and the Gapminder organization [18].

4. Economy and rising living standards

Fig. 2 shows the dynamics of GDP in three groups of countries of the world – with European Union, North America, and High-income (World Bank classification) over a period of time with a lifetime of one generation from 1971 to 2019, as well as the group of the poorest countries - the least developed countries (LDC) (UN classification) during 1981-2019. We see fluctuating curves, while from 1972-1973 to 2018-2019, annual growth¹ rates decreased in the European Union from 5.4% to 1.9%, in North America from 5.5% to 2.6%, in high-income countries from 5.9% to 2.1%. During this period, five times the GDP growth rate in the group of the most successful countries in the world became less than zero – economic growth was slowed down. These were the years of several economic crises, including the systemic crisis that began in 2008 and three years of the serious global COVID-19 pandemic that claimed many lives.

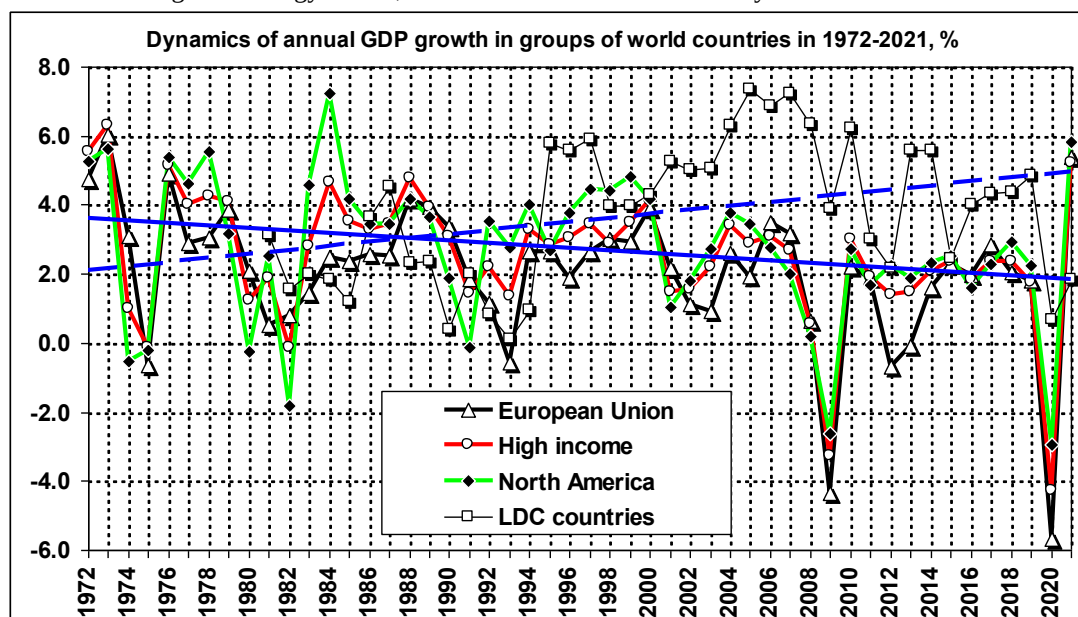


Fig. 2. Dynamics of GDP growth rates of four groups of countries in the world in 1972-2019. Linear regressions were carried out for High-income countries (solid line) and LDC (dashed line).

However, under these circumstances (Fig. 3), GDP per capita increased significantly in 1990-2020 - 2.6 times in the North America group, 2.3 times in the group of High-income countries, 2.2 times in the European Union, 3.1 times in the the LDC.

During these years, income from exports of goods and services increased 3.3 times in the European Union compared to 2000, 2.9 times in high-income countries,

2.2 times in North America, 6.3 times in the least developed countries.

Table 1 presents data on the increasing growth of exports of goods and services in a number of advanced developed countries and in three groups of countries in relation from 2000 to 2010 and 2021. Income from the export of high-tech goods increased from 2000 to 2021 in the European Union - by 3.3 times, in High-income countries by 2.9 times.

¹ The values of the mode (the most frequent values) of empirical distribution functions are given.

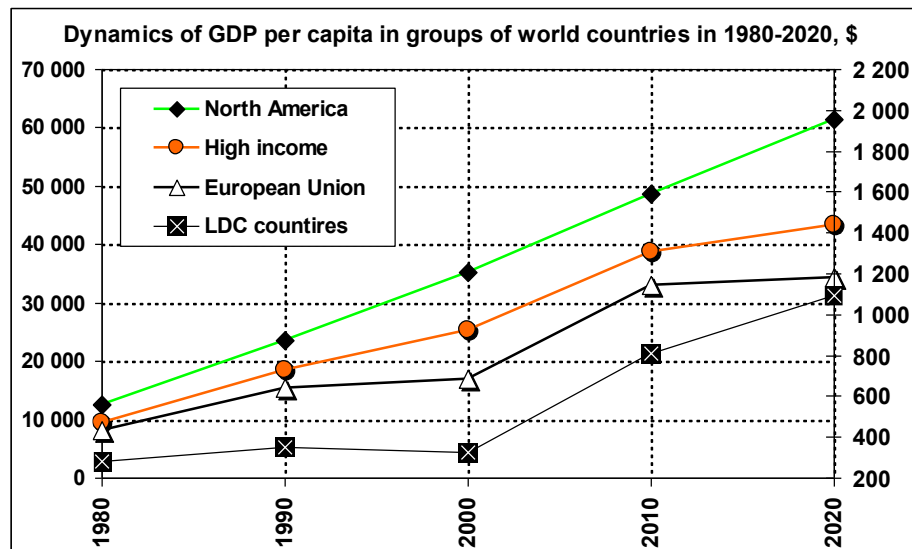


Fig. 3. Dynamics of GDP per capita of three groups of developed countries of the world (left coordinate axis) and the group of LDC (right coordinate axis) in 1980-2020.

Table 1. Growth of exports of goods and services (in current US dollars) in relation to 2000.

Country	2000	2010	2021
Ireland	1.0	2.4	7.2
Germany	1.0	2.4	3.3
Netherlands	1.0	2.1	3.0
Belgium	1.0	2.1	3.0
Spain	1.0	2.2	2.9
Italy	1.0	1.8	2.3
USA	1.0	1.7	2.3
France	1.0	1.8	2.2
Finland	1.0	1.8	2.2
Great Britain	1.0	1.7	2.1
European Union	1.0	2.3	3.3
High income	1.0	2.1	2.9
North America	1.0	1.6	2.2

These data indicate an increase in the standard of living of the population and the technological level of highly developed countries to new heights. Despite the existence of a global systemic economic crisis in these countries, over the past 30 years, the standard of living of their population has more than doubled.

Fig. 4 shows the dynamics of GDP per capita of several advanced developed countries of the world: Denmark, the Netherlands, Austria, Iceland, Germany, Sweden, Belgium, Australia, Finland, Canada, Great Britain, France, and Italy in 1900-2022 [29].

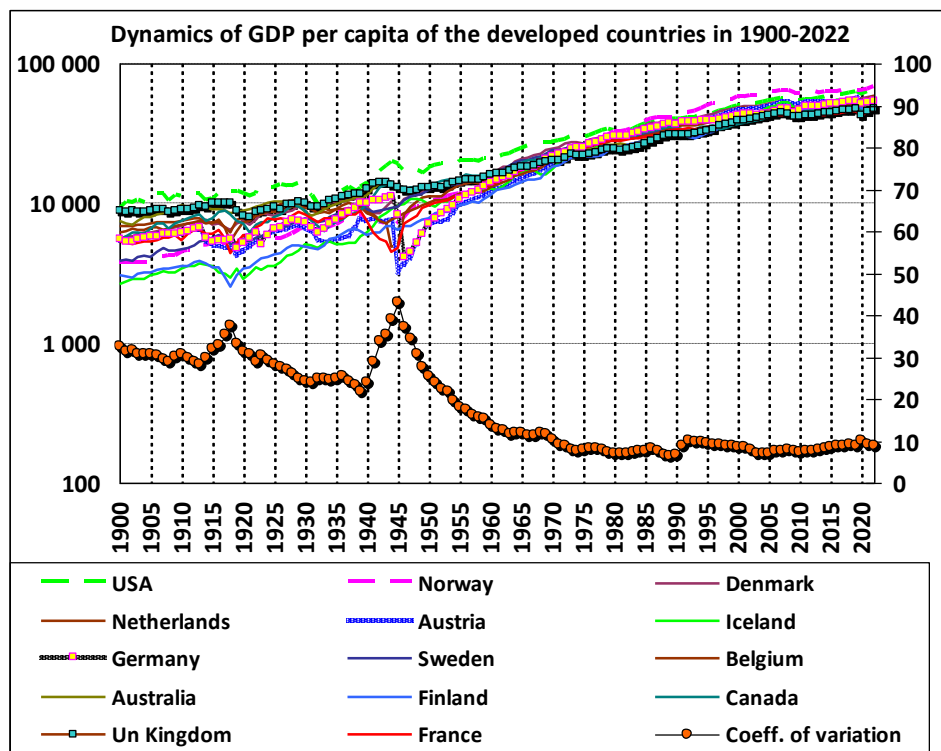


Fig. 4. Dynamics of growth of GDP per capita (left axis, US dollars) and coefficient of variation (right axis, %) of the group of highly developed countries of the world in 1900-2022. The left coordinate axis has a logarithmic scale

The curve of the coefficients of variation is also shown – it is the characteristic of the scattering of the specified parameter of these countries in each year of the considered time interval. The figure also shows the income curves of Norway and the United States, the values of which exceeded the values of other countries indicated here at certain time intervals. This group of countries does not include small, island and purely raw-material countries.

The graphs show both an increase in income per capita and a decrease in their variations during the period under review: from \$2,660 - 8,830 in 1900 to \$42,800 - 59,100 in 2022 and, accordingly, the coefficient of variation from 32.5% to 9.0%.

On the graph we see a local maximum of income and at the same time a minimum of variability in 1913. With the beginning of World War I, the direction of income growth and the decrease in variability are reversed, the minimum of income and the maximum of variability is reached by the end of the war in 1918-1919. After that, incomes grow again, and variability decreases until the beginning of the global economic crisis of the 30s. After – the beginning of World War II in 1939 until its end in 1945 there is a strong decline in income and an increase in their variability (note that in the United States, income growth occurred from 1934 to 1944, with the exception of 1938).

After the end of the war in 1945, the incomes of the countries began to grow again, but faster than before; their variability decreased also faster. The income curves were simultaneously going up and converging. The strong ups and downs of both income values and their variations have disappeared. Since 1971, income variability has become less than 10%, with the exception of local maxima (10.2%) in 1992 and in 2022 (the

year associated with the COVID-19 pandemic), the minimum variability value of 6.5% was in 1989. The recession of 2008, associated with the beginning of a new global economic crisis and the decline from the impact of the COVID-19 pandemic in 2022, turned out to be little noticeable in these countries. At the beginning of the economic crisis in 2008, the averaged income of the mentioned advanced developed countries was positive: 0.07%, and the largest decline was 1.7%.

It should be noted that the incomes of Norway and the USA differed from other countries considered here by exceeding the values over the incomes: the USA had more input than the other countries before 1982, and Norway - after 1980. Their parameters were not taken into account when analyzing income variability.

The presented data on the dynamics of income per capita indicate that over 122 years, the development of the economy of the most economically developed countries as a whole grew and had similar fluctuations, the corresponding curves converged over time, reaching a certain limit. This is evidenced by a decrease in the income variability of countries – the coefficient of variation decreased with some exceptions, and after 1971 the variability almost did not change, remaining in the range of 10% (from 6.5% to 10.2%). The curves on the graph began to represent an upward tube of trajectories of constant thickness.

The indicated results of changes in the parameters of economic development which are shown in Fig. 2-4 and Table 1 show that the modern economy is developing very unevenly, but in general has a socio-economic model in which the standard of living of the population is constantly increasing – not only in rich, but also in poor countries. There are two important points.

The first point is the uneven development of the economy – its inherent property: it is the unevenness that is a manifestation of the normal development of a market economy, which is stochastic in its core. It is important that the unevenness should not exceed some reasonable limit, then there is a positive growth of the economy as a whole. Systemic economic crises are a special case of unevenness, this is also an inherent property of the economy, they are not a defect of development [24, 25]. With the development and growth of the economy, variations in its parameters decrease, including the magnitude of economic crises decreases.

The second points is that development is possible only in the presence of scientific and technological progress. This is the most important factor of rapid and effective development at the same time. high tech progress is at the heart of successful modern economic growth.

These circumstances mean that, despite uneven development, including the presence of economic crises and the COVID-19 pandemic, the standard of living in the world is constantly growing. The economy is developing most successfully in developed countries. The author believes that in the part of economic development and living standards, the world is moving towards

the noosphere. Developing countries are moving forward more slowly, but they can reach the level of developed countries, their path can be passed faster – if the experience of the predecessor countries is taken into account.

5. Stabilization of population growth

One of the most important problems of the world's development is the possibility of stabilizing the population in the future. Limited in size, the Earth will not be able to feed the population with unlimited growth in its number.

Let's consider the dynamics of population growth in the countries of the world. Fig. 5 shows the dynamics and regression lines of population growth rates of three groups of the richest countries – the European Union, North America, High-income countries in 1961-2022. It can be seen that in these years the growth rate in each of the groups decreased. The population growth rate decreased from 0.8% - 1.7% in 1961 to 0.2% – 0.5% in 2022. The indicated decrease in growth rates is confirmed on the graph of the population growth rate of developed countries: the USA, North Korea, France and Japan (Fig. 6) – the rate decreased during 1990-2029, and after 2009 in Japan it became negative.

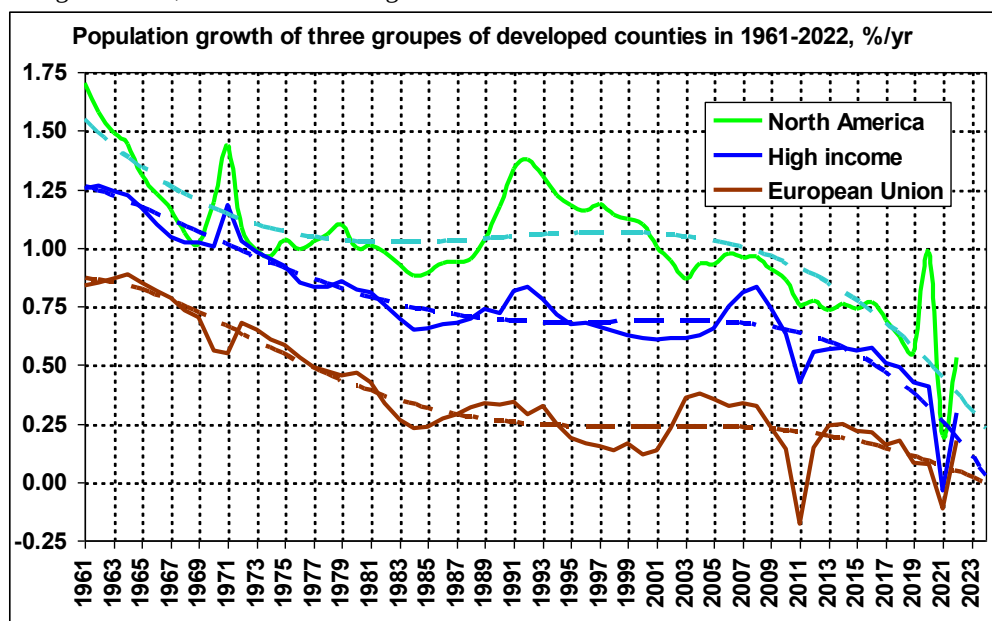


Figure 5. Dynamics of population growth rates in groups of countries: the European Union, North America and High-income countries in 1961-2023. Regression lines for each group of countries are given

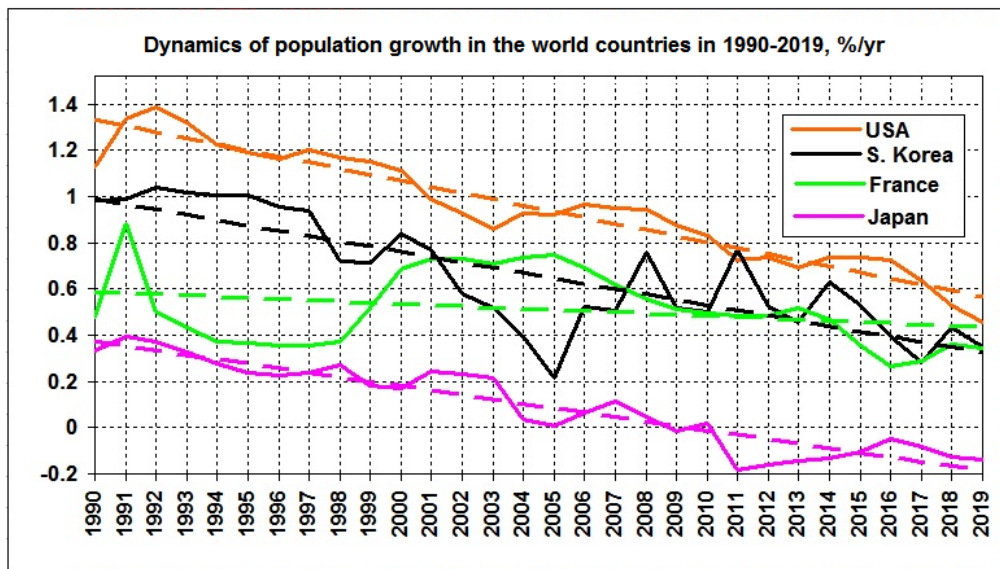


Fig. 6. Dynamics of population growth rates in the developed countries of the world in 1990-2019. Regression lines for each group of countries are given

We can explain the mechanism of population stabilization using the example of the population of Japan (Fig. 7). Currently, two processes are taking place simultaneously in developed countries: a decrease in the birth rate and an increase in life expectancy. The first process leads to a decrease in the number of the age group of young people "0-14 years", the second – to an increase in the number of elderly people in the age group "65 years and above". The change in the number of the group "0-14 years" is determined by the process of fertility in the group "15-64 years", which gives offspring and actively working people. Therefore, with a decrease in the birth rate, the number of young "0-14

years" first decreases, and then as they grow up and move to the "15-64 years" group, its number also decreases. The number of elderly people "65 years and above" is determined by the decreasing number of people coming out of the "15-64 years" group, but since life expectancy is increasing in the "65 years and above" group, its overall number is increasing. Birth rates in reality are regulated by the population themselves, as a rule, this happens unconsciously due to changes in living conditions and mentality. In general, the number of the population is decreasing and gradually comes to stabilization at a level acceptable for the continuation of life and economic activity.

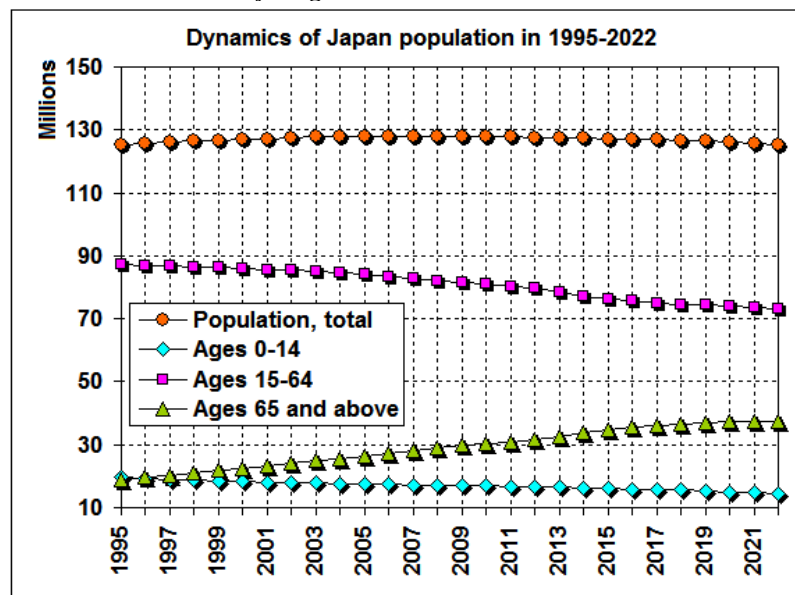


Fig. 7. Dynamics of the population and its age groups in Japan in 1995-2022

6. International migrations

In recent years, a new circumstance has appeared in the dynamics of the world's population. There have been significant international migrations in European countries, which have led to a visible increase in visible mortality in a number of countries. It turned out that the

population migrations taking place now in Europe have noticeably distorted the usual parameters of demographic processes. A.M. Tarko [24] found that for several years the total mortality in Bulgaria has become the highest in the world – 15.4 per 1000, and is ahead of all, even the poorest countries in Africa. It is followed

by Latvia – 15.0 per 1000, Serbia – 14.6 per 1000, followed by Lesotho – 14.2 per 1000 (Table 2).

In these and a number of other new EU member states, part of the young able-bodied population, taking advantage of the opportunity for free movement, moved to work in richer European countries. Since the mortality rate of the elderly people remaining in these countries is known to be significantly higher than that of the young (Gompertz–Makeham law) a strong "paper" increase in population mortality has appeared in statistics². Analysis of age-related migration parameters and other indicators confirmed this (Fig. 8). In this case, the violation of global demographic indicators turned out to be an indicator of the unfavorable situation in these countries.

Table 2. Values of parameters characterizing migration of the population of Europe and Central Asia in 2019: population growth (%), migration (% of the population), total mortality (per 1000). Sorting was performed by the parameter total mortality.

Country	Population growth, % of population	Migration, % of the population	Total mortality, per 1000
Bulgaria	-0.70	-0.16	15.50
Ukraine	-0.53	-0.02	14.70
Serbia	-0.54	0.01	14.60
Latvia	-0.70	-0.41	14.50
Lithuania	-0.26	-0.48	13.70
Romania	-0.53	-0.13	13.40
Moldova	-1.60	-1.06	13.09
Georgia	-0.17	-0.15	12.88
Croatia	-0.55	-0.31	12.70
Greece	-0.11	-0.20	11.70
Poland	-0.02	-0.01	10.80
Montenegro	-0.03	-0.26	10.60
Armenia	-0.56	-0.90	9.66
Albania	-0.43	-0.31	8.48
Kazakhstan	1.29	-0.20	7.19
Kyrgyzstan	2.09	-0.53	5.20
Tajikistan	2.26	-0.08	4.84
Uzbekistan	1.88	-0.21	4.60

Similar phenomena also occur in the countries of the former USSR. Their mostly young and middle-aged residents move to work in more profitable countries. This helped to raise the standard of living for them and their families at home, but also affected demographic statistics. In this case, the violation of global demographic indicators also turned out to be an indicator of the unfavorable situation in these countries. It should be noted that in the table, the positive values of growth and lower mortality values in Central Asia compared to countries in Europe are due to the fact that migrations have not yet had time to significantly change the historically established parameters of age distributions and other demographic parameters there.

² This is not the first case when the mortality rate leads to an inadequate description of population dynamics. After the end of World War I, both the ratio of numbers and the age struc-

tures of men and women were greatly changed. Therefore, ordinary statistics could not correctly predict the dynamics of population growth. The introduction of the fertility indicator – the number of births per woman – helped.

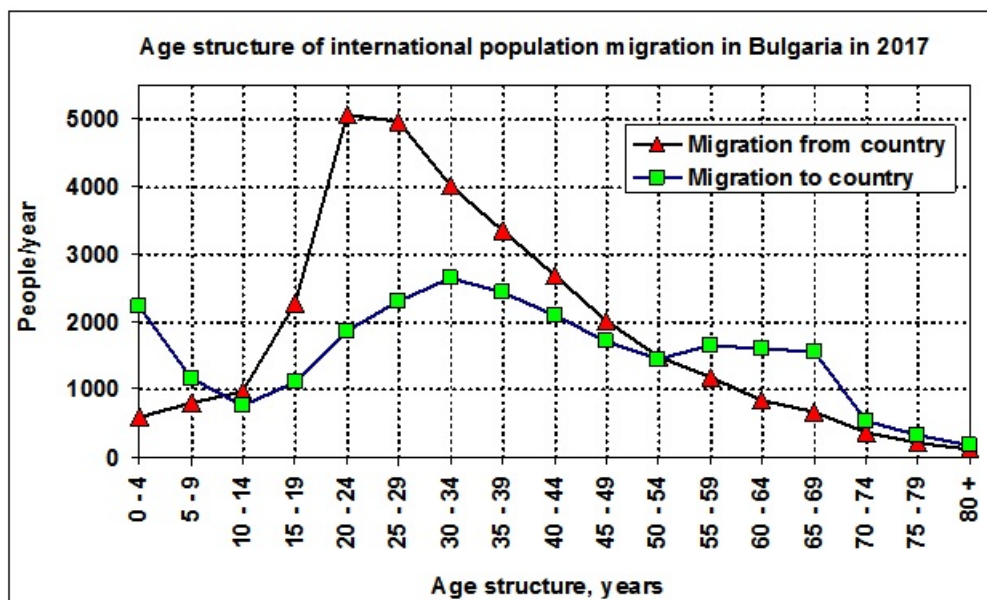


Fig. 8. Age distribution of migrants in Bulgaria in 2017

According to the forecast of A.N. Chumakov and M.S. Stychnsky [3], migration from less developed to more developed countries will increase significantly around the world in a few years and will become a new factor in global development.

The increase in migration to other countries in the world demonstrates the expansive manifestation of the idea of the "Devil's pump" by N.N. Moiseev [12]. He expected that rich countries take and will take talented people from developing countries, but it turned out that modern migrations attract everyone – from illiterate to educated and talented people.

The author considers effect of migration to be an important addition to the analysis of the development of the world economy and population growth. Already, this is manifested by a noticeable change in the nature and pace of economic development. Migrations do not change the previously made conclusions about the achievement of the noosphere in terms of the possibility of stabilizing the population. They show that unexpected delays are possible on the way to the noosphere.

7. Regional pollutions

In the early 1970s, two crises occurred in developed countries. The first was energy, the second was environmental. The energy crisis arose when Arab countries refused to sell oil to the United States and parts of Europe³ in 1973. This crisis was completed by March 1974. But the ongoing economic boom in developed countries suddenly was ended and was replaced by a drop in the pace of economic development and a serious stagnation of business activity. He gave a reason to think about the development of the economy, the use of energy resources, pollution of the natural environment and the further development of the West.

At that time, a serious environmental crisis began. In developed countries, it was suddenly noticed that by the 1970s there was a strong and widespread pollution

of the natural environment by industrial waste. For example, in some years in summer, acid rains in Europe and Canada killed large tracts of forests, heavy pollution was in most rivers and lakes. Fish became inedible in the lakes and died. Awareness of the threats and understanding of the causes of what is happening – uncontrolled and unintended regional growth of pollution in developed countries - came quite quickly. The leadership of developed countries belatedly realized the danger, but then took decisive action and solved the environmental crisis on the basis of the rapid development of high tech progress.

In the developed world, the problems of rational nature management and environmental conservation have become one of the top priorities. In those years it became clear that the achieved high standard of human life should be based on living in an environment with clean air, clean water, nature should not be disfigured by urbanization. Strict legislation on the preservation of the natural environment was adopted, the norms of impact on it were radically revised. In industry, technologies have been significantly improved, the energy industry began to produce more electricity per unit of fuel, the same was done in the production of steel and other products. New concepts of urban development were developed, the economy was rebuilt in terms of minimizing the production of pollution per unit of production and new technologies were developed in technology, including those providing for minimizing pollutions per unit of production [19, 24].

By the 1990s and by the 2000s, all technological processes in industry and agriculture were revised and significantly improved. Measures have been taken to restore local and regional environmental parameters – emissions released during the burning of coal, oil and products from them – sulfur and nitrogen compounds,

³ Then on October 17, 1973, OPEC countries announced that they would not supply oil to countries that supported Israel during the 1973 Arab-Israeli War in its conflict with Syria and Egypt. This concerned, first of all, the United States and its

allies in Western Europe. Over the next year, the price of oil rose from three to twelve dollars per barrel. In March 1974, the embargo was lifted.

which are the main component of acid rain that destroys forests and lakes, have been reduced.

In addition, it was possible to achieve a significant reduction in emissions of heavy metals in the production of steel and other materials. In general, the task of normalizing regional and local pollution in developed countries has been solved.

If earlier in the countries of Western Europe and North America large tracts of forests died from acid rain in dry and hot summers, then after the measures taken from the 1980s to the end of the 1990s, this phenomenon practically disappeared. Previously heavily polluted Great Lakes on the American continent and almost dead lakes in Scandinavia have come to life, water, plants, fish stocks in them have returned to normal [21, 24], the water in the rivers has become clean.

As a result of these actions, the environmental crisis and the problems of local and regional environmental pollution in developed countries have been largely resolved. One of the confirmations of this is that after 2000 the World Bank stopped publishing data on the release of sulfur compounds, the main source of acid rain.

Solving the problem of pollution and environmental conservation by developed countries does not mean that it is removed for developing countries. Now in the most developing countries solving of such problems has either not begun, or is just beginning. The task of preserving the environment in these countries has passed to new generations [24].

Problem of the preserving of natural environment and decent human life in it has required and requires great efforts of mankind. There have been many sad cases of severe and almost complete destruction of nature for economic purposes. As an example, it is worth mentioning a unique historical event when in England in the XVIII century all primary forests were cut down for the active introduction of looms. Now few people know about it.

The extraction of many minerals in developing countries, in many cases, is accompanied by large pollution, which is unacceptable in developed countries. For example, the extraction of rare earth metals (from which, in particular, computers and phones are made all over the world) is carried out in developing countries with high pollution. It may happen that the consciousness of their population will not want to put up with it. It follows from this that the price of the metals produced will become very high. Therefore, it is useful for residents of developed countries to realize that the construction of the noosphere is not cheap and morally difficult.

In general, the problem of the transition of the biosphere to the noosphere in terms of preserving its natural environment and a decent human life in it, as we have seen, has required and requires great efforts of mankind.

The author has no doubt that the task of regional and local conservation of the natural environment is a direct task of creating the noosphere as a sphere worthy of a person according to V.I. Vernadsky's plan and can be solved by humanity. Its solution by the developed

countries will undoubtedly be continued by the developed ones. It is worth recalling that according to V.I. Vernadsky's plan, the noosphere is a biosphere transformed by man, and therefore he is responsible for its preservation and transformation.

8. Global warming

A new environmental crisis, now global, is global warming. The fight against it was launched with the adoption of the UN Framework Convention on Climate Change in Rio de Janeiro on May 9, 1992 and on December 11, 1997 with the adoption of the Kyoto Protocol to it on reducing greenhouse gas emissions into the Earth's atmosphere to counter global warming. However, this did not give a noticeable braking result. It was replaced on December 12, 2015 by the Paris Climate Agreement [31]. The authors of the Paris Agreement have put forward a new ambitious goal – to stabilize the temperature of the atmosphere and, thereby, stop the development of global warming.

If a quantitative limit was set in Kyoto on the total amount of emissions of the main greenhouse gas – CO₂, then a new criterion has appeared in the Paris Agreement – all countries together must achieve by the end of this century a steady achievement of the average global atmospheric temperature of 2.0 °C (or even better, 1.5 °C) exceeding its pre-industrial value. This is supposed to be achieved by reducing industrial CO₂ emissions and switching to a low-carbon economy and alternative energy sources with the inhibition of the development of new nuclear-fueled power plants. Ideally, the initiators of the implementation of the Paris Agreement saw the future in the form of a complete transition to alternative energy by total abandoning gas, coal, oil and nuclear energy.

The author of the article has previously done a lot of work, including numerous calculations on mathematical modeling of the global biogeochemical cycle of carbon dioxide on a high spatial resolution model, on climate models, calculations on a mathematical model of the global economy [20, 23]. He made the conclusion that, in general, the planned fulfillment of the conditions for reducing industrial CO₂ emissions is impossible [19, 26]. There is only hope for its partial implementation by developed countries. The author sees the main problems in the impossibility of reducing CO₂ emissions by most developing countries, in the overestimation of the possibilities of alternative energy sources (which has already been catastrophically manifested), and in wrong estimation of the use of nuclear power plants. Thus, it can be argued that the Paris Agreement in modern terms is, in fact, a document of intent.

As mentioned above, developed countries during the 70s and 80s reached the level of development of high tech progress, at which normalizing regional and local pollution in developed countries has been solved. That is why, having raised the level of high tech progress, they are able now to solve new global problem – reducing CO₂ emissions into the atmosphere.

Developing countries have not passed this way. Most of them must first go through the development, accompanied by an increase in pollution, passed by de-

veloped countries many years ago, then the stage of reducing these pollutants, and only then proceed to the implementation of the most technologically difficult stage of reducing CO₂ emissions. This is a difficult and long way, only after reaching a sufficiently high level of high tech progress, developing countries will be able to make the implementation of the most technologically complex stage of reducing CO₂ emissions.

The required time to transition to a new technically advanced state of high-tech development will take at least several decades [6,16, 21, 26]. It needs the decisive participation of the leadership of the countries in it, therefore, few developing countries are ready for such a complex development.

Another disadvantage of the Paris Agreement, which has clearly emerged in recent years, is an unreasonably high attention to alternative energy sources. Thus, the share of solar and wind energy in Germany by 2021 has reached the level of 33%. However, the windless cloudy and cold weather that occurred in January and February 2021 and the almost complete freezing of the blades of wind turbines caused a massive failure of this technique on January 8, 2021, led to a disaster. 30 thousand wind turbines in Germany stopped generating electricity, other connected systems failed, as a result. A disaster in one country almost turned into the largest man-made catastrophe in Europe.

In this case, the catastrophe would be the direct fault of the organizers of the Paris Agreement, since the increase in climatic anomalies is a statistically proven feature of global warming.

The biggest mistake in the sense of understanding and planning the future of world energy is the complete disregard of the leadership of the Paris Agreement for the use of nuclear power plants.

According to the research materials of the EU Scientific Center, during the life cycle of a nuclear power plant emits into the atmosphere only 6 g of CO₂ per 1 kWh of generated energy, while emissions in wind power are 11 g, and the emissions of solar panels do not exceed 80 g per 1 kWh [8]. To complete the picture, it is worth adding that the most modern gas turbines in Germany have an emission level of 420 g per 1 kWh, and coal plants - 820 g of CO₂ per 1 kWh [8].

Thus, nuclear power is the most technologically advantageous for low-carbon energy in terms of its technological parameters, it emits a minimum of carbon into the atmosphere per unit of electricity.

We will evaluate the possibilities of nuclear energy from the point of view of its reliability. It is known that at the beginning of the use of new equipment and technologies, the greatest flow of failures and breakdowns occurs. At the same time, there is also a "burn-out" of poorly made options and the "run-in" of new equipment, the improvement of the technology of production and operation of equipment - in the future, accidents of complex equipment stop. An example may be the absence in recent years of accidents in the technology that ensures the launch of satellites and the presence of astronauts in space.

In the case of nuclear power plants, "burnout" and "run-in" can be considered complete. Two accidents at the nuclear power plant confirmed this. The first, on

April 26, 1986 in Chernobyl in April 1986, was caused by incompetent decisions of the management, which forced improvements to be made for the next holiday and insufficient training of service specialists. The second - "Fukushima" - March 11, 2011 - the designers, having located the nuclear power plant near the ocean shore, did not take into account the extremely unlikely, but possible simultaneous occurrence of two natural disasters - an earthquake and a tsunami. However, this really happened - a powerful earthquake, the strongest in the entire history of the country, and after that a 17-meter tsunami hit the station located on the ocean shore. In the current situation, the operators were not able to take sufficient measures.

Speaking about the future of energy, the author believes that only nuclear power plants can provide energy for a long period - this is the future of mankind and the noosphere. Alternative sources of electricity can supplement its production. Only nuclear power plants have the largest reserve for the future. If all available reserves of uranium are used, it can last for 800 years, and the use of "fast nuclear reactors" will allow for a period of up to 2500 years [8]. The supply of fossil carbon sources is much smaller, besides, it is difficult to wish descendants life in the new "Cretaceous" period.

Our analysis has shown that the long-term existence of mankind is possible only on the basis of the transition to nuclear power with partial use of alternative sources and with a maximum reduction in the use of fossil fuels that produce atmospheric CO₂ emissions. Nuclear power plants are necessary, only they provide a basic source of energy for humanity for a long period of time, this is the most important element for moving towards the noosphere. The world cannot yet stop using fossil fuels due to the impossibility of reducing it in developing countries. The positive development of humanity will undoubtedly come to such an opportunity. The complete cessation of the use of fossil fuels is not yet possible, including, it is impossible to do without them in the metallurgical and chemical industries. Additional research is needed for an appropriate replacement. Nuclear power enriches with new hope the scientific picture of the world moving towards the noosphere

9. Sustainability of the biosphere

Let us turn to the problem of global and regional stability of the biosphere in terms of the possibility of its unintentional transition as a result of anthropogenic impacts to a significantly degraded state. To do this, let us consider an important problem for the noosphere about the conditions of minimal possible state of coexistence of man and the biosphere.

N.N. Moiseev suggested that humanity may unintentionally bring the biosphere into such a significantly destroyed state that it will not be able to live in it [12]. This idea was born from the analysis of simulation results in the 80s of the last century by scientists of the USSR and the USA of the "Nuclear Winter" - the consequences of a large-scale nuclear war [1, 4, 5]. In mathematical terms, this means that in the biosphere model there are two or more equilibrium state under the same external conditions.

Consider the consequences of anthropogenic CO₂ emissions into the atmosphere, which have a global impact on the climate and cause global warming. Calculations based on a mathematical modeling of the global biogeochemical cycle of carbon dioxide with high spatial resolution of A.M. Tarko [19, 20] showed that anthropogenic CO₂ emissions cannot cause degradation of the biosphere. For each new value of the CO₂ content in the Earth's atmosphere, there is only one stable equilibrium state in the model.

A similar case was obtained by V.P. Parkhomenko on a climate model – a three-dimensional global model of the general circulation of the atmosphere and ocean [15]. In the model, under modern climatic conditions, there are two equilibrium state – one corresponds to the modern climate, the other corresponds to the almost frozen Earth (perhaps such a state is realized on Mars). Calculations show that the transition to a new equilibrium position requires significant changes in environmental parameters that technically exceed the capabilities of humanity. It follows from this that within the framework of climate models, there is a single stable state of the modern biosphere with the only possible climate.

This means that the mathematical models of biogeochemical and climatic processes do not show the possibility of the transition of the biosphere to a state unsuitable for human life. The simulation also showed that the greenhouse effect of CO₂ has saturation, and the largest release of CO₂ cannot lead to an increase in atmospheric temperature by more than 4.5⁰, which is acceptable for human life.

Another impact in the biosphere is the regional pollution which we have considered. As mentioned above, in developed countries, it was possible to achieve acceptable levels of pollution for most indicators. If we hypothetically consider pollution in developing countries, increasing several times more than their current values, then we will see that, at least for the territory of Europe and North America, such pollution will not be able to lead to disasters. This is due to the fact that wind directions from west to east prevail in the atmosphere, and the territories of these regions have huge oceans from the west, crossing which, most of the atmospheric pollution from other countries can reach only in a significantly reduced amount. Mathematical modeling shows that at the same time, the pollution that has come there will be significantly weakened and will not be able to lead to disasters for the population living there. Consequently, it is not necessary to expect a catastrophe for developed countries located in these regions in case of pollution.

If we consider the decrease in species diversity occurring all over the world, then, as the analysis of modern data and expert opinions shows, regional effects prevail here, and we cannot expect its significant decrease in most regions of the world.

Analysis of problems in the ocean and freshwater systems with the involvement of experts shows the possibility of severe biota disturbance in a number of regions, but under no circumstances are global effects detected.

Thus, the idea of N.N. Moiseev about possible transition of the biosphere to an unacceptable life state is not confirmed in the modern science. Therefore, it can be argued that the biosphere is globally stable, therefore, the transition to its successor, the noosphere, is possible.

10. COVID-19 pandemic

On December 30, 2019, the Municipal Health Committee of Wuhan, Hubei Province, China, announced the appearance of a new viral disease. On December 31, the Chinese authorities reported the new virus to the World Health Organization (WHO). On January 28, 2020, cases of the disease were reported in 15 countries, including the USA, Germany, and France. Within two months, the coronavirus infection spread all over the world.

Thus began the acute viral disease COVID-19 with predominant respiratory damage caused by the SARS-CoV-2 virus, an RNA genomic virus of the genus Betacoronavirus of the family Coronaviridae. Infection has certainly taken a special place among the world's pandemics. In general, according to WHO, 14.8 million people died from COVID-19 in the world.

According to the World Health Organization, 218 countries and territories have administered more than 13 billion doses of the COVID-19 vaccine. Several different vaccines have been developed at record speed, largely due to previous years of research on related viruses, as well as investments in billions of dollars. Technologically new in the fight against the pandemic was that, in addition to the classic ones containing specially weakened viruses, a new type of vaccines based on nucleic acids containing neither the virus nor its proteins were used – only sections of nucleic acid encoding information about the structure of the virus element. The active ingredient in them is a part of the DNA molecule that is incapable of self-replication in human cells, into which the necessary genes are embedded. Together with the vaccine, it penetrates into cells and triggers the synthesis of copies of viral proteins, to which immunity is subsequently developed.

Table 3 provides information about the countries with the highest number of diseases and deaths.

Table 3. Countries with the highest number of diseases and deaths from COVID-19 on March 5, 2023 [37].

Country	Total cases	Total deaths	Total deaths, %
USA	105 392 498	1 146 723	1.09
Brazil	37 076 053	699 276	1.89
India	44 687 496	530 775	1.19
Russia	22 314 520	396 216	1.78
Mexico	7 459 860	333 038	4.46
Peru	4 486 665	219 485	4.89
United Kingdom	24 370 154	206 952	0.85
Italy	25 603 510	188 322	0.74
Germany	38 210 850	168 397	0.44
France	39 634 146	165 030	0.42
Indonesia	6 736 787	160 925	2.39
Iran	7 569 483	144 867	1.91

Active measures to reduce the spread of the disease in 2020-2022, the development of vaccines and vaccination, as a result of the rapid and unexpected end of the pandemic – all this suggests that now humanity, despite the disunity of countries, acted without delay and in uniform ways. The past pandemic differs from previous ones in two important ways. The first is the high mobility of the population, contributing to the rapid spread of the disease, which implemented both between countries and within them. The second is the ability of the leadership of most countries to quickly find and solve the most important areas of combating the pandemic and its manifestations: the introduction of communication restrictions, mask mode, the use of home mode for work, food delivery to the house without going to the store, strong restrictions on tourism and cultural events. The third is the implementation of organizational measures and significant funding of large centers for the development of vaccines, a risky but important reduction in the mandatory timing of vaccine testing, free vaccinations for the population in many cases. The last two properties ensured the speedy end of the pandemic and saved many lives.

The results of the fight against the pandemic of 2020-2022 showed that humanity is technologically and organizationally is on the way to the noosphere. The world is able to cope with new dangerous mass diseases.

11. Aggressiveness, wars and terrorism

The analysis of the relationship between wars and terrorism will begin by mentioning that man is not only an intellectual being, but also controlled by his biological nature. This is based on the genetic mechanisms inherent in man by nature. The direction and strength of their manifestation in each person are individual, therefore, the individual behavior of different people is different. Among the primary properties of human nature, we will see positive and negative. The most important for our analysis are the positive qualities of a person: kindness, inclination to work, self-sacrifice, and the most important negative ones are evil [9], aggressiveness [13], passion for individual leadership. The combination of positive and negative qualities is an inherent property of people in human society. In the process of development of society, negative biological properties of a person have often been and are a serious obstacle

to development, including the noosphere. Aggressive leaders are the main engine, which, in our opinion, are the basis of wars and terrorism.

As a factor bringing us closer to the noosphere, we note that a new world war has become almost impossible in the modern world. It depends on the availability of strategic nuclear weapons by the two largest nuclear states, the United States and Russia. The discovery by scientists of the USA and USSR of the phenomenon of "Nuclear winter" in the early 80s greatly contributed to the realization of this [1, 4, 5, 22].

In recent years, US scientists – part of the participants in the simulation of the "Nuclear winter" of the 80s, conducted a new computer simulation of the consequences of regional wars with the use of tactical nuclear weapons [38]. Thus, the consequences of possible war, in particular, between India and Pakistan with the use of nuclear weapons were simulated [30]. Calculations have shown that more than 2 billion people may die as a result of such a nuclear war, global and regional changes in climatic factors will occur for several years. There will be a massive shortage of food, animal husbandry and the production of aquatic feed will not be able to compensate for the decline in yields in almost all surrounding countries.

Currently, two forms of regional and local wars are a serious danger. One is the unification of regional wars with terrorism. This refers to aggressive Muslim fundamentalism, which is supported, of course, by the aggressive nature of man. Another military phenomenon that exists in some African countries is the abnormal situation when the leaders of countries conduct civil interethnic wars, increasingly religious. Wars are one of the mechanisms that slow down the development of the economy and preserve poverty in these countries.

It should be noted that their "material" base are poverty and high and uncontrolled birth rate, leading to rapid population growth, increasingly unemployed and less and less having food and water. This type of aggressive wars and terrorism was most clearly manifested during the Arab-Israeli War of 1973 and in New York in 2001, when two skyscrapers were destroyed by suicide bombers who hijacked peaceful planes.

Let us turn to the events of one of the aggressive wars for the liberation of Kuwait in the armed conflict

between the Multinational Forces (MNF) and Iraq (Operation Desert Shield) [14].

On August 2, 1990, four regular divisions of the Iraqi army invaded Kuwait. Due to the complete military superiority, by the end of the day, the capital of Kuwait was under the control of Iraqi forces. On August 8, the actual annexation of Kuwait was announced. On November 29, 1990, the UN Security Council adopted a resolution that gave Iraq the opportunity to "use all necessary means in order to restore international peace and security in this region." The UN granted the Multinational Force Coalition (MNF), which had already formed at that time, the right to conduct a military operation to liberate Kuwait. More than 40 countries participated in the MNS.

On January 17, 1991, the MNF troops launched a combat operation to liberate Kuwait. Massive air strikes were carried out, in which up to 1,000 aircraft were involved, which were based both on ground air bases and on 6 aircraft carriers. Iraq responded by shelling the territories of Saudi Arabia and Israel (which did not take part in the war) with ballistic missiles and actions of "environmental terrorism" – oil discharge into the Persian Gulf. The capital of Kuwait was liberated in two days. The ground operation lasted 100 hours. On February 28, 1991, the ground operation ended with the liberation of Kuwait and the restoration of the status of an independent State. In four days, the MNF troops completely liberated Kuwait and occupied about 15% of Iraq's territory. Directly on the battlefield during the offensive, the ratio of MNF and Iraqi losses was approximately one MNF soldier killed per one destroyed Iraqi division [14].

The situation is such that now there is no understanding of the ways and availability of effective political or other mechanisms that could lead to the absence of the possibility of the emergence and termination of modern local wars of any type. This is fundamentally different, for example, from the two World Wars, the mechanism of termination of which was clear, the actions of states wishing to end the war were clear.

In general, the existence of wars in the modern world is incompatible neither with the positive development of mankind, nor with the idea of the noosphere and its approach. The emergence and existence of wars is a problem of humanity and fundamentally unsolved in terms of the offensive and implementation of the ideas of the noosphere.

12. Developing countries

We need to understand whether developing countries will be able to reach the level of development in the future to enter the noosphere. There are two circumstances. The first is whether hot climatic conditions will not hinder economic development, because the first civilizations arose in places with a hot climate, and then they were overtaken by countries located in Europe and North America with a temperate climate. The second is whether the mentality of developing countries will change in the right direction. Will the system of their life values, largely left over from the primitive communal or tribal system, be able to transform into a modern one, without which it is impossible to exist in modern society.

The problem of assessing the impact of natural and climatic conditions on development has already been solved in the world: in modern life people are less and less dependent on them. With the growth of high tech progress, the share of costs for "overcoming" adverse climatic and natural phenomena is constantly decreasing. Costs here make up an ever smaller share of GDP, their influence in the economy is constantly decreasing. The costs in cold countries for the construction of expensive buildings with thick walls, for warming in winter, in hot countries the costs of air conditioning, earthquake resistance of structures, strengthening buildings due to frequent typhoons and hurricanes – all this is reduced, thanks to the development of high tech progress.

Let's look at an example with a change in public consciousness and lifestyle on the example of Tunisia. Fig. 9 shows the age distribution (women) in Tunisia in the 50 years apart – from 1971 to 2020.

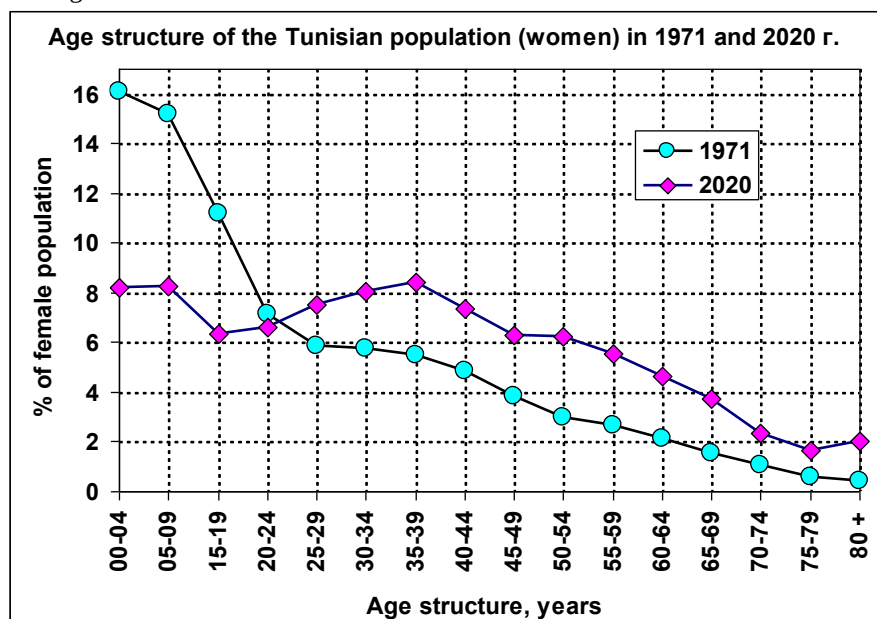


Figure 9. Age distribution of the Tunisian population (women) in 1971 and 2020

In our case, age distributions are both an indicator of the dynamics of the mentality and the standard of living of the people. The distribution of 1971 is typical "medieval" and indicates the proximity of the population to the corresponding lifestyle: a high birth rate in a country with a proportion of the population aged 0-4 years – 16.1% (with a fertility of 6.4 births per woman), then by older ages – a monotonous decline to almost zero by the age of 80 years and older – 0.4%.

By 2020, the country has undergone major changes in lifestyle and standard of living, they have manifested themselves in the form of age distribution – the birth rate has decreased, while fertility has tripled: from 6.4 to 2.1 births per woman, and the proportion of the population aged 0-4 years has almost halved – from 16.1% to 8.2%. Mortality has also decreased and life expectancy has increased, as a result, the proportion of the population in older ages has increased markedly – from 5.5% to 8.4% at the age of 30-39 years, and the proportion aged 80 years and older is even greater – from 0.4% to 2%. Thus, the age distribution has approached its modern appearance in highly developed countries. This indicates a significant lifestyle change approaching them.

Two conclusions can be made. Firstly, in a country where the economy is developing, demographic development is also improving – the need for the birth of a large number of children, requiring survival in a poor life, is disappearing. Secondly, the improvement of the economy creates the possibility of its further growth and a change in mentality towards further development.

An example of the changes of economic development and age distribution is indicative of the development of part of developing countries, including some poorest. It is hoped that all they will continue to develop in this direction. Consequently, there are no restrictions for the advancement of developing countries to the noosphere here.

13. Conclusion and discussion

The author has analyzed the factors of possible potential achievement of V.I. Vernadsky's noosphere. Important areas of the analysis are the determination of the source of long-term energy, the development of the economy and the improvement of high tech progress, the stabilization of the Earth's population, the preservation of the natural environment. The study showed that these tasks are being solved and can be solved in the future by humanity. But there are other tasks – maintaining acceptable climatic conditions and ending wars. The solution of the problem with the climate, apparently, will move into the next century, and wars – their cessation necessarily requires an increase in the standard of living, accompanied by an increase in the standard of living and consciousness of people – changes should be expected here.

One of the main conclusions is that the long-term existence of mankind is possible only on the basis of the transition to nuclear power with partial use of alternative sources and with a maximum reduction in the use of fossil fuels that give atmospheric CO₂ emissions. Nuclear power is the most important element to reach the noosphere. The world cannot yet abandon the use of fossil fuels. The positive development of humanity

will undoubtedly come to such an opportunity for all countries.

The world is moving towards population stabilization – developed countries are close to it. Economic development and an increase in living standards will lead to the stabilization of their population. They will be followed by developing countries, some of them are already moving towards stabilization.

The task of global, regional and local conservation of the natural environment is a direct task of creating the noosphere as a sphere worthy of a person according to V.I. Vernadsky. It is generally solved by developed countries, developing countries have to go through this difficult path.

There is a comparison of the development of human society with the effect of "fat growth" in plants. Conditions when plants in phytotrons or greenhouses are provided with excessively good conditions of high air temperature, illumination, humidity, leading to rapid growth, which in some cases lead to the fact that they cease to bear fruit. It is assumed that this is a universal phenomenon of life, in a number of developed countries, leading to a decrease in the birth rate, that is, that part of the population with a good life "misses" the genetically predisposed age of reproduction of offspring. The author believes that this is only a visible effect. Human life is accompanied by many phenomena, among which there are not only material conditions of life. One of them is the improvement of the living standards, which are connected with the level of cultural interests.

It may be objected that the conducted research on the formation of the noosphere could have been done without mentioning it, and finding the way for the positive development of mankind does not require the concept of the noosphere. However, this contradicts the main idea of V.I. Vernadsky that the noosphere is the way of human perfection. The results obtained here are based on this assumption. One can, for example, talk about the biosphere, but not know that, thanks to V.I. Vernadsky, we came to understand the activities of living organisms that have brought the atmosphere for several billion years from a state with a high content of CO₂ and low oxygen to the modern one. It will turn out like in Moliere's play in "A Philistine in the Nobility": his hero, Mr. Jourdain, lived his life and did not know that he was saying in prose.

The conclusions of this work on the use of the proposed factors for the formation of the noosphere express the author's reasonable belief. They are not wishes about their usefulness, they represent the necessary conditions for the possibility of the onset of the noosphere. They can be supplemented by other factors, it is possible to argue with them, but without the implementation of these conditions in real life, it is impossible to talk about the onset of the noosphere.

References:

1. Alexandrov G.A., Armand A.D., Svirezhev Yu.M., Tarko A.M., etc. Mathematical models of ecosystems. Ecological and demographic consequences of nuclear war. M., Nauka, 1986, 176 p.

2. Braudel F. Structures of everyday life. Possible and impossible. M.: Progress. vol. 1. 1986. 623 p.
3. Vernadsky V.I. Biosphere. Scientific Chemical and Technical Publishing House .N.X., Leningrad, 1926, p. 147.
4. Vernadsky V.I. Essays on geochemistry. M.-L.: Gosizdat, 1927. p. 368.
5. Vernadsky V.I. A few words about the noosphere. // Successes of modern biology. 1944, No. 18, issue 2, p. 113-120.
6. Lorenz K. The so-called evil. M.: publishing house "Cultural Revolution". 2008. p. 616.
7. Meadows D.H., Meadows D.L. Randers J., Behrens V.V. Limits of growth. – M., MSU, 1991, 207 p.
8. Meadows D.H., Meadows D.L. Randers Y. Beyond growth. – M., "Progress", 1994, 303 p.
9. Moiseev N.N. Modern rationalism. // M., Publishing House of MGVP COX, 1995, 376 p.
10. How much uranium will last in the Russian Federation. [electronic resource]. <https://vsevolod30.livejournal.com/358988.html?ysclid=lf1ai43tzg348942605/>. (date of address: 31.05.2023)
11. Nazaretyan A.P. Aggression, morality and crises in the development of world culture. (Synergetics of historical progress). M.: "Heritage". 1996. p. 184.
12. Operation Desert Shield. [electronic resource]. https://ru.wikipedia.org/w/index.php?title=%D0%9E%D0%BF%D0%B5%D1%80%D0%B0%D1%86%D0%B8%D1%8F_%C2%AB%D0%A9%D0%B8%D1%82_%D0%BF%D1%83%D1%81%D1%82%D1%8B%D0%BD%D0%B8%C2%BB&stable=1/. (accessed: 05/31/2023)
13. Paris Agreement. FCCC/CP/2015/L.9. [Electronic resource]. <https://unfccc.int/resource/docs/2015/cop21/rus/l09r.pdf>
14. Parkhomenko V.P. Modeling and forecasting of global climatic and biospheric processes. // IV All-Russian Scientific conference "Mathematical modeling of the developing economy and ecology" ECOMOD-2009, Collection of works. - Kirov, July 6-12, 2009 And: GO VPO "VyatGU", 2010, p. 277-295.
15. Portnoy M.Yu., Tarko A.M. Mathematical model of high technology development. – M., Computing A.A. Dorodnitsyn Center of the Russian Academy of Sciences, 2008. Messages on applied mathematics. 30 p.
16. Pospelov I.G. Mathematical model of economic mechanisms of capitalist economy // Methods of system analysis in the problems of rational use of resources. – M.: VC of the USSR Academy of Sciences, 1977. p.18-116.
17. Tarko A.M. Anthropogenic changes in global biospheric processes. Mathematical modeling. - Moscow: Fizmatlit, 2005, 232 p
18. Tarko A.M. Development of the countries of the world and Russia on the basis of modernization. Analysis and modeling. // Bulletin of Environmental Education in Russia. 2010, No. 3, p. 19-21, No. 4, p. 31-34.
19. Tarko A.M. On the approach of the noosphere. // Free Thought 2014. No. 4 (1646), p. 189-200.
20. Tarko A.M. The reverse side of growth. Modern structural economic crises and ways to overcome them. // Free thought. No. 5 (1653), p. 81-94. (2015).
21. Tarko A.M. On the present and future of Russia and the world. – Tula. Publishing house of Prompilot. – 2016. – 196 p.
22. Tarko A.M. Modeling the consequences of nuclear war as a strategic deterrent to potential aggressors. // Strategic priorities. International Scientific and Analytical journal. No. 4 (16), Moscow, 2017 p. 34-51.
23. Tarko A.M. Will the Paris Agreement stop global warming? // The Age of Globalization: Teacher Publishing House (Volgograd) No. 4, 2019 p. 71-85. ISSN: 1994-9065. DOI: 10.30884/vglob/2019.04.07
24. Tarko A.M. New understanding of biosphere stability and global warming. // Norwegian Journal of development of the International Science. Earth Sciences. No. 51, Vol. 2. 2020 p. 3-7. ISSN 3453-9875. DOI: 10.24412/3453-9875-2020-52-2-3-7
25. Tarko A.M., V.N. Novokhatsky. Modeling of world dynamics taking into account scientific and technological progress. // In the collection Modeling and optimization of socio-economic development of administrative-territorial complexes, CEMI of the USSR Academy of Sciences, 1988, p. 123-126.
26. Teilhard de Chardin P. Human phenomenon. — M. Nauka, 1987, p. 240.
27. Forrester J. World Dynamics. M., Nauka, 1978, 167 p
28. Chumakov A.N., Stychinsky M.S. Cultural and civilizational dialogue and its possibilities in the conditions of the global world // Century of Globalization. 2018, No. 1, p.3-13.
29. Expert. 2010, No. 1.Special issue.
30. Environmental Consequences of Nuclear War. Physical and Atmospheric Effects. SCOPE 28. – Eds.: Pittcock A. B., Ackerman T. P., Crutzen P. J., MacCracken M. C., Shapiro C. S., Turco R. P. – Wiley, U.K., 1985. – v. 1, 359 p.
31. Environmental Consequences of Nuclear War. Ecological and Agricultural Effects. SCOPE 28. – Eds.: Harwell M. A., Hutchinson T. C. – Wiley, U.K., 1985, v. 2, 523 p.
32. Rosling O. Gapminder. A non-profit foundation based in Stockholm. 2023. [Electronic resource] <http://www.gapminder.org/data> / (accessed: 05/31/2023).
33. Teilhard de Chardin, P. (1955/2015). The human phenomenon (Translation: Sarah Appleton [1] Weber). Brighton/Chicago/Toronto: Sussex Academic Press. <https://ia600206.us.archive.org/20/items/The-PhenomenonOfMan/phenomenon-of-man-pierre-teilhard-de-chardin.pdf>
34. Toon O.B., Bardeen C.G., Robock A., Xia L., Kristensen L., McKinzie M., Peterson R.J., Harrison C.S., Lovenduski N.S., Turco R.P. Rapid expansion of nuclear arsenals by Pakistan and India portends regional and global catastrophe. Sci. Adv. 5, eaay5478 (2019).
35. Vernadsky V. La geochimie. Paris: Alcan., 1924. 404 p.

36. World Bank Open Data. 2023. World Development Indicators. [Electronic resource] <https://data-bank.worldbank.org/data/home.aspx> (accessed: 03/11/2023)

37. Worldometer the American Library Association. [electronic resource]. <https://www.worldometers.info/coronavirus/>. (accessed: 03/11/2023)

38. Xia, L., Robock A., Scherrer K., Harrison C., Bodirsky B.L., Weindl I., Jägermeyr J., Bardeen C., Toon O.B., and Heneghan R., 2022: Global food insecurity and famine from reduced crop, marine fishery and livestock production due to climate disruption from nuclear war soot injection. *Nat. Food*, 3, no. 8, 586-596, doi:10.1038/s43016-022-00573-0.

ECONOMIC SCIENCES

AZERBAIJAN'S TOURISM INDUSTRY'S EXPERIENCE WITH CUTTING-EDGE TRENDS

Mirzayeva Ay.

PhD-Student,

Institute of Control Systems,

Baku State University, Azerbaijan

<https://doi.org/10.5281/zenodo.8385541>

Abstract

Tourism is one of the most important areas of activity of the modern economy, aimed at meeting the needs of people and improving the quality of life of the population. At the same time, unlike many other sectors of the economy, tourism does not lead to the depletion of natural resources. Being an export-oriented sphere, tourism shows greater stability compared to other industries in an unstable situation in world markets. The concept of innovation refers to both radical and gradual (incremental) changes in the products, processes and strategy of the organization (innovative activity). Based on the fact that the purpose of innovation is to increase the efficiency, cost-effectiveness, quality, customer satisfaction of the organization, the concept of innovation can be identified with the concept of entrepreneurship - vigilance for new opportunities to improve the work of the organization (commercial, government, charitable).

Keywords: innovative activity, innovation, natural resources, domestic tourism.

Innovation is the result of investing in the development of obtaining new knowledge, an innovative idea for updating the spheres of people's lives (technology; products; organizational forms of existence of society, such as education, management, labor organization, service, science, informatization, etc.) and the subsequent process of implementation (production) of this, with a fixed receipt of additional value (profit, lead, leadership, priority, fundamental improvement, qualitative superiority, creativity, progress) [6.-page 128]

Innovation is considered from different perspectives: in relation to technology, commerce, social systems, economic development and policy formulation. Accordingly, there is a wide range of approaches to the conceptualization of innovations in the scientific literature.

To distinguish innovation from the concepts listed above, it is often specified that the peculiarity of innovation is that it allows you to create additional value, allows the innovator to obtain additional value and is associated with implementation. In this view, an innovation is not an innovation until it has been successfully implemented and has begun to be useful.

An alternative approach uses other terms as part of the definition of innovation: "Innovation occurs when someone uses an invention - or uses something that already exists in a new way - to change the way people live." In this case, the invention may be a new concept, device or other things that facilitate activities, and innovation is not associated with whether the organizer of the innovation received any benefit and whether it brought a positive effect.

When conceptualizing the concept of innovation, it is useful to compare it with other concepts. In particular, in the scientific literature it is noted that the concept of "innovation" is often confused with the concept of "invention", denoting the creation of a new technical development or the improvement of an old one. In addition, many product and service

improvements would be better described simply as "improvement." The concepts of "change" and "creativity" can also sometimes be used instead of the concept of "innovation" [9.- 64page].

The innovation process is a gradual adoption of innovations in tourism.

The most promising direction is the creation of centers of cultural, scientific, educational, tourist activities on the basis of archaeological, ethnographic, architectural, natural landscape (and, in the best case, complex) open-air museums. A wealth of experience in creating such facilities has been accumulated in foreign countries (Flevopark in Holland, Lejre in Denmark, Butser Hill in England, Dyuppel in Germany, Pamunkey in the USA).

A fundamentally new direction is the inclusion of tourists, vacationers, visitors to theatrical performances and role-playing games in the service. This also includes the reconstruction of historical and cultural situations of different times. At the same time, viewers have the opportunity to become direct participants in the interactive process.

This direction may be associated with extreme entertainment and activities, such as hiking, expeditions, experiments, etc. of varying degrees of difficulty.

Currently, there is a huge number of completely new tourist destinations: ethnographic, archaeological, floristic; offers of photo tours, military tours, wine tours, religious and wedding tours are brought to the tourist market. Medical, educational, ecological and other types of cultural and educational tourism are developing, new museums are appearing, including private ones, with the possibility of introducing individual programs.

Against this background, the introduction of innovations contributes not only to the development of the areas under consideration, but also to the harmonization of the relationship of modern man with society and nature.

Socio-cultural service and tourism are designed to solve many problems: recreational, educational, educational, the task of preserving, studying and using the natural and historical and cultural heritage. They are also permanent, significant (and for some regions, the main) sources of income, solve the problem of creating jobs, etc.

Therefore, the introduction of innovations contributes not only to the development of the areas under consideration, but also to the harmonization of the relationship of modern man with society and nature.

The main goals of creating centers of cultural, scientific, educational, tourist activities are the development and implementation of a new model of cultural activity in the region by creating an interactive communication zone on the problems of the history, culture and art of ancient societies and civilizations, their role and place in the world historical process, as well as their impact on the modern world. However, the activities of such centers are not limited to human history and culture. Communicating with nature, studying it, as well as solving the problems of the relationship between nature and man, fostering respect for the environment can and should also be included in the scope of such a center. In general, we can say that one of the main goals of such institutions should be the greening of human life in the broadest sense of the word.

Respect for nature, love for it, competent environmental behavior of a person have become a necessary condition for the survival of mankind on our beautiful planet. Initiation to nature makes it possible to introduce a person to humanity, common sense, beauty, harmony with nature and with oneself.

The word "ecology" comes from the Greek words *oikos* - "house" and *logos* - "concept, teaching" Ecology in the broad sense of the word - knowledge about the environment in which a person lives: from the immediate environment to the scale of the universe and knowledge about oneself.

It is unlikely that our life can be healthy and harmonious without preserving the natural and cultural heritage. It is very important to acquaint a person from early childhood with the House in which he lives. But no matter how much information people remember, in the absence of a subtle feeling and perception of the world, without love for this world in all its manifestations, this knowledge will not become creative.

Modern problems of the relationship of a person with himself, his own kind and with the environment can be solved only if the ecological worldview is formed in all people, their environmental awareness and culture are improved, and the need to implement the principles of sustainable development is understood.

Work on the creation of integrated centers involves the activation and introduction of new forms of cooperation with state and public organizations, museums, research centers and individuals. The use of these forms, as well as new technologies, including information technologies, will not only provide access to a fundamentally new level of cultural, educational,

exposition, exhibition, and tourism activities, will create a recreational zone of a fundamentally new type, will help expand the audience, but also will make the center a very promising resource source with practically unlimited possibilities.

The main tasks of the center:

1. Creation of a center of culture, science, education, development of a fundamentally new type.
2. Prevention of destruction of monuments of nature, history and culture and their preservation for posterity.
3. Implementation of the role of a generator of public initiatives in the field of protection of natural, historical and cultural monuments and the environment in general.

The cultural and educational direction includes the creation of an open-air museum. Rich experience in this direction has been accumulated abroad. The movement to create them dates back to the 1960s. The historical and archaeological research center established in 1962 in Lejre (Denmark), which at first functioned as a scientific and experimental institution, can be considered a pioneer here. On a plot of 25 hectares in Leira, in the Gerthadalen valley, 40 km from Copenhagen, a "prehistoric village" was built, as well as educational, administrative and other buildings. Experimenters plowed small fields with wooden plows, acquired herds of the simplest types of domestic animals. Their meat, as well as the fruits of the fields, served as the main food.

At first, only archaeologists with their closest assistants were engaged in recreating the village of the early Iron Age and the ancient way of life. But in 1970, they got the idea to invite some ordinary Danish families to live for a week or two in a prehistoric village. Initially, the members of these families lived in the "prehistoric" village only in the summer. They learned how to make pottery, work the fields and harvest, churn butter, smoke cheeses, dress leather, spin wool and fiber, and weave. Then they tried to live in Iron Age houses during the winter. By their own admission, the participants really had the feeling that they were closer to the state in which people were 2000 years ago.

Following the example of the complex in Leira, a similar center was created in Duppel (Germany) Here, under the guidance of Leir instructors, a Slavic and Germanic settlement of the second half of the 12th - early 13th centuries was built with medieval tools. In addition to conducting purely scientific experiments to recreate "medieval life", the center's employees actively attract everyone to Duppel. Suffice it to say that much in the Dyuppel village was built by the hands and at the expense of hundreds of selfless enthusiasts, most of whom are not directly related to scientific activity. Some urban families come to Dyuppel for quite a long time and adapt to the medieval environment. The number of people who want to visit the village in Düppel far exceeds its ability to satisfy the interest of everyone.[9.-64page]

The example of Leire and Duppel "infected" many. So, in 1975, a small group of Dutch people, consisting of ten adults, the oldest of whom was 72

years old at that time), and four children (the youngest of them was only two years old), under the guidance of the teacher Roelof Gorreus de Haas, tried to recreate those the conditions in which their ancestors lived, as well as to experience for themselves all the "charms" of ancient life.

The Stone Age was chosen as a model. Enthusiasts approached the matter very thoroughly. They studied all the literature at their disposal, and also got acquainted with the expositions of various archaeological sites and museums. Having made a fairly complete picture of the methods of activity of people of the Stone Age, they began to select a place for the experiment. The choice fell on the Flevopark polder. However, before embarking on the implementation of a complex and time-consuming experiment, all participants regularly conducted training trips to the polder for several years, during which they imitated the life of ancient people.

Finally, the solemn moment arrived. The group arrived at the Flevopark polder, taking with them tools made in ancient ways, household equipment, everyday items, only natural products in the form of grains and beans, several goats, a ram and a dog. For housing, participants in the experiment built seven huts with hearths inside from tree trunks, twigs, bark and clay coating. In addition to residential buildings, a barn for cattle with a wicker fence, a barn for stocks of grain, hay, firewood and other household supplies were built. A well and storage pits were also dug. An earthen oven was built for baking bread.

For the whole summer the small collective lived a primitive life. The villagers cultivated tiny fields with stone hoes, ground grain on stone grain grinders, prepared fodder for livestock, cooked food on the hearth, made fabrics on looms, dressed leather, made various tools, molded and fired ceramic vessels, etc.

The experiment lasted for several years and brought a lot of impressions and discoveries to both its participants and specialists.

In our country, the creation of such active open-air museums began relatively recently.

Baku is the capital of Azerbaijan, a large and very beautiful city, as well as a popular tourist destination located on the shores of the Caspian Sea. It is rich in its history, impresses vacationers with architectural and natural sights, and surprises with modern infrastructure. You can come here for both beach and cultural recreation, but the main thing that delights all guests of Baku is the old city, called Icheri Sheher.

Icheri Sheher is an old quarter, which since 1977 has been an architectural and historical reserve. It is located in the central part of Baku, on a small hill, territorially within the Sabail region. Its area occupies a little over 220 thousand square meters. m. and includes not only places of cultural significance, but also ordinary houses inhabited by ordinary local residents. It was around this quarter, surrounded by powerful fortress walls, that the whole of Baku was gradually built and expanded.

It is worth noting that Icheri Sheher is the first object of the republic, which was included in the UNESCO World Heritage List. It happened in 2000

and served as a massive influx of tourists. Currently, the place is included in the list of popular resorts in Europe. Undoubtedly, there is something to do and see here.

In addition to the architectural monuments that have survived to this day in the form of towers, churches, mosques and other buildings that appeared during the reign of the shahs, the area is interesting because it is surrounded by a modern metropolis with a superbly developed infrastructure. In the neighborhood of narrow streets and ancient dwellings, there are beautiful high-rise buildings, respectable hotels, entertainment venues, restaurants, and a magnificent promenade..

A few tens of kilometers from Baku, on the Absheron Peninsula, there is a unique open-air archaeological and ethnographic museum "Gala" - a complex that has collected five thousand years of history.

The archaeological and ethnographic museum complex Gala was established in 2008 on the territory of the ancient village of Gala located in the Khazar region of Baku with the assistance of the Heydar Aliyev Foundation. Museum visitors can get acquainted with the ancient history of the village of Gala. In the Gala Archaeological and Ethnographic Museum Complex, one of the few open-air museums, the lifestyle of the population living in the Gala village from the 3rd millennium BC to the present day, mounds, tombs, residential buildings, the ruins of an ancient castle, 5 mosques, 3 bathhouses, etc. The pottery and bakery work today in the same way as in the Middle Ages. The Gala memorial complex exhibits ancient human settlements on rocks and caves dating back to the Bronze Age, rock paintings, ancient foundations, ruins of an ancient wall dating back to the X-XIV and X-XV centuries, two underground passages going in the direction of the Caspian Sea and the city of Baku, tendir dating back to the 18th century, gavaldash, ceramic products, household items and jewelry, weapons and coins, preserved ruins of an ancient settlement. Since 2011, the Gala Information Center, the Ethno-Ecological Center, the Museum of Antiques and the caravanserai-restaurant have been operating on the territory of the Gala Museum Complex.

The creation of open-air museums in the liberated territories of Azerbaijan will be of great historical significance. Open-air museums should demonstrate both moments of racism and ethnic cleansing against our people, as well as acts of vandalism committed over the past 28 years of modern history, and also provide visitors with a detailed information about the events that took place in this period of time. It should be noted that the creation of a museum will attract more attention where the ruins of buildings and structures are located more and more closely. An example is the relevant parts of the Istisu medical complex, the cities of Aghdam, Zangilan, Fizuli, Jabrayil, and in places with a small population - mosques, shrines. The complex of archaeological monuments illegally exploited by Armenians on the territory of Shahbulag in the Aghdam region and the Azykh cave in the Khojavend region will be of great importance from a historical point of view.

Restoration of the protected area of 350 hectares, the cradle of Azerbaijani culture, the city of Shusha, will turn it into an open-air museum.

Conclusion

The theoretical and experimental work carried out on the problem of innovation in the field of tourism allows us to assert that the goals and objectives set for the thesis work have been achieved. This fact is confirmed by the following findings:

According to the forecasts of Azerbaijani experts, in the next 10-15 years, tourism, under certain accompanying conditions, could have a significant positive impact on the economy of the country and its large cities.

The crisis, which negatively affected all enterprises of the Azerbaijani tourism industry without exception, has one positive side: despite the drop in demand for services in general, the reduction in the staff of qualified employees and the reduction in labor costs and marketing activities, the interest of Azerbaijanis in domestic tourism has noticeably increased.

In the context of the ongoing crisis, many travel agencies are forced to look for non-traditional options and methods for solving their problems, one of which is the problem of informatization.

The results of a study of the market of tourism innovative technologies and an analysis of the activities of a number of tourism companies showed that Azerbaijan is far behind the countries that have advanced the most in the field of tourism.

It also showed that the central place among modern information and computer technologies in tourism is occupied by automated booking systems integrated with the Internet.

The implementation of innovative technologies in Azerbaijan is possible with:

- creation of conditions for dynamic and sustainable economic growth;
- improving the level and quality of life of the population by increasing the availability of tourist services, employment and incomes of the inhabitants of our country;
- increasing the competitiveness of the Azerbaijan economy by increasing the attractiveness of our country as a tourist destination;

- ensuring a balanced socio-economic development of the constituent entities of the Azerbaijan by increasing the share of tourism in the regional gross product.

Taking into account the nature of Azerbaijan tourist resources, the state of the tourist infrastructure and the readiness of the tourist product, the following types of tourism can be of particular interest for the development of inbound tourism in our country: cultural, educational, business, as well as specialized tourism (event, ecological, hunting and fishing, active, including in the future skiing, extreme (adventure), ethnic etc.).

For the domestic market, it is especially important to develop beach and health tourism.

For Azerbaijan, with its underdeveloped tourism infrastructure and huge unclaimed tourism potential, the development of specialized tourism as a new alternative direction is of the greatest interest in terms of attracting a sophisticated foreign consumer and diversifying the domestic tourism offer. The identified priority types of tourism and promising tourist regions determine their respective priorities in the development of tourism infrastructure.

References:

1. Gulyaev VG Organization of tourist activities: 1996.
2. Gulyaev V.G. "New information technologies in tourism". 1999.
3. Dekhtyar G.M. "Tourism industry: Legal acts: Legal status of foreign citizens in the Russian Federation. International documents. Conventions", 2005.
4. Zhdanova E.I. Management and economics in show business. 2003
5. Zdorov A.B. The economics of tourism. Textbook. 2007
6. Prostakov Ivan Foreign terms in the tourist industry: A brief explanatory dictionary / 2008.
7. Romanov A.N. Marketing. / Ed. A.N. Romanova. - M.: Banks and stock exchanges, 1996.
8. Sviridenko S.S. "Information and information technologies in modern society". 1993.
9. Senin V.S. Tourism: mini-dictionary. 2nd ed., revised and additional. (Pocket allowance). - 2008. -
10. Sister G. "The strategic importance of information and the role of databases in marketing". J. Problems of the theory and practice of management, , 1997,

HISTORICAL SCIENCES

AFGHAN EVENTS 1979—1989: XINJIANG FACTOR

Avdanin V.

PhD in History

Saint Petersburg City Administration

<https://doi.org/10.5281/zenodo.8385557>

Abstract

Based on contemporary historiography, the reasons for the entry of the Soviet troops into Afghanistan in 1979 are reviewed, the factors that forced the Union of Soviet Socialist Republics (USSR) to directly get involved in a long-drawn-out armed conflict are analyzed, and the planned and factual scale of the military presence is reported. The author notes that the Soviet troops were not prepared for a prolonged military campaign in Afghanistan and had fundamentally different military-political objectives. In the author's opinion, the entry of the Soviet troops into Afghanistan was the initial stage of their subsequent deployment to the Xinjiang Uyghur Autonomous Region of China. The unique role of the Soviet special forces in the events under review is also discussed.

Keywords: armed conflict in Afghanistan 1979–1989; Soviet-Chinese relations; history of Soviet foreign policy.

Since the Second World War, the entry of the Soviet troops into Afghanistan in December 1979 was the first large-scale attempt by the Union of Soviet Socialist Republics (USSR) to extend its sphere of military influence beyond the borders of the pro-Soviet countries. There is no holistic vision of the Afghan events among professional historians. The prevailing view in historiography of the Afghan war suggests that the United States provoked the entry of the Soviet troops into Afghanistan, and the situation in Afghanistan stemmed from a long and continuing history of US challenges to Soviet influence there [8, p.1505]. Another researchers continue discussions about justice and the need for military intervention [11, p.4].

It should be noted that since the late 1950s and for decades thereafter, the United States, along with the Soviet Union, engaged in resource exploration in Afghanistan, built energy and transport facilities, and divided their spheres of presence and influence. In fact, Afghanistan was neutral territory, despite the height of the Cold War [10, p.387]. This was mainly due to the country's opiate production.

The lack of US interest in the entry of the Soviet troops into Afghanistan is due to the fact that since the late 1950s the United States controlled the production of opiates in southern Afghanistan, which accounted for about 90% of the world's production [22]. In 1967, with the active assistance of the United States, the construction of a hydroelectric power plant (northwest of Kandahar) with a capacity of 33 MW and transport infrastructure, including two highways from Kabul to Pakistan, began [21].

Soviet experts were charged with extracting coal and gas and building power plants, roads, and social infrastructure facilities. During the course of 20 years, they have built approximately 140 facilities [23], including those paid for by natural gas supplies from Afghanistan. Annual production from two fields west of Mazar-i-Sharif on the border with Turkmenistan amounted to more than 106 billion cubic feet, of which about 80% were sent to the USSR. [1] Among the energy facilities built by the USSR in Afghanistan during

the 1950s–1970s were dozens of power plants with a total capacity of about 300 MW [2, p. 32–34].

According to the US National Security Archive documents, starting in 1978, China became economically active in Afghanistan, providing loans to the Kabul government for the construction of industrial and social facilities. In 1978–1979 annual trade turnover between China and Afghanistan reached a maximum of about \$16 million [6, p.12].

Thus, China was gradually forcing out the Soviet construction workers and specialists from Afghanistan using economic methods. At the same time, the most alarming trend for the Kremlin leadership was the activation of Chinese radical Islamic cells in Afghanistan from the Xinjiang Uygur Autonomous Region of China (hereafter referred to as Xinjiang). Fearing the invasion of Soviet troops on their territory, the China made attempts to influence Amin, inclining him to abandon the orientation towards the Soviet Union, exposed the "threat of Soviet expansion" [6, p.9–10].

Pikhoya, a renowned researcher of Soviet history, shifted the focus in the study of the Afghan conflict, pointing out the need to clarify the reasons not for entering but for involving the Soviet troops in the internal Afghan conflict: "The question regarding the reasons for the USSR's direct involvement in an armed conflict still remains largely unclear. In all likelihood, several factors acted simultaneously." [18, p.353]. Within the framework of this methodological approach, the author's proposed thesis is as follows: two events—the entry of the Soviet troops into Afghanistan and their further involvement in the intra-Afghan conflict—had different reasons and mutually exclusive goals, which are examined henceforth. For this purpose let us consider Soviet-Chinese relations in the late 1970s.

Xinjiang factor

In the imperial worldview of the Kremlin leaders, Xinjiang historically has been a disputed territory. Xinjiang was a kind of buffer zone between the two states from 1921 to 1949. Soviet troops repeatedly participated in military operations in Xinjiang. In January

1941, Governor-General of Xinjiang Sheng Shicai approached the leadership of the Soviet Union with a proposal to accept Xinjiang into the USSR as the seventeenth union republic, but was refused. After this, in 1942, he took the side of Germany. He unleashed repression against the communists — in particular, by executing Mao Zemin (brother of Mao Zedong). In 1962, about 100,000 people fled from Xinjiang to the USSR. After these events, the Chinese leadership began to make claims to the border territories of the Soviet Union.

In a study by Shi Ninbo, it is emphasized that “in the late 1970s, China saw the Western countries as its ally in the fight against the Soviet Union.” [17]. In general, this position reflected the spirit of the preamble to the Chinese constitution of 1975, which declared preparations for war against Soviet social imperialism. In 1979, the United States and China, for pragmatic reasons, became temporary allies in the face of the threat of nuclear weapons use by the Soviet Union.

In preparation for a likely war with its northern neighbor in 1978, the Chinese government approved a strategic program to move the oil and gas base from the west to the east of the country, despite the presence of the largest oil and gas fields in Xinjiang. If this was a preparation for a planned invasion by the Soviet troops to “pacify” the Xinjiang separatists using the Soviet servicemen as a result of an agreement between the leadership of the USSR and the People’s Republic of China, then this was contrary to the United States’ interests.

During Deng Xiaoping’s visit to Washington, DC, in January 1979, the American leaders were able to convince him of the need to formally abrogate the Sino-Soviet Treaty of Friendship, Alliance, and Mutual Assistance, which expired in 1979. In response to this decision, Washington withdrew the American military base from Taiwan and provided China with large loans for the purchase of American weapons. In Washington, technology transfer contracts in the fields of electronics and space technology were signed. To prevent Soviet intervention on Vietnam’s behalf, Deng Xiaoping warned Moscow that China was prepared for a full-scale war against the Soviet Union. According to Pao-min Chang, “China in early February of 1979 had put her troops along the Sino-Soviet border on an emergency war footing, set up a new military command in the remote Xingjiang Autonomous Region, and even evacuated 300,000 civilians from the exposed areas along the border” [5, pp.88-89]. The main part of the active forces of China (up to one and a half million military personnel) was deployed along the border of China with the Soviet Union [20, p.28].

On February 17, 1979, a week after Deng Xiaoping’s visit to Washington, the Chinese troops invaded Vietnam. The Soviet troops in the eastern military districts were placed on heightened alert, and on March 12, the large-scale Soviet military exercises began along the Chinese border. The Soviet troops on the territory of Mongolia and ships of the Pacific Fleet were also placed on heightened alert.

After unit cohesion training during 2-week military exercises, the Soviet 39th Army of the Central Asian military district remained on the western section of the Mongolian-Chinese border, i.e., north of Chinese Xinjiang, bordering Afghanistan. At the same time, the number of military advisers in Afghanistan was increased several times.

According to our hypothesis, in 1979, the northern provinces of Afghanistan were assigned the role of a springboard for the transfer of Soviet troops to Xinjiang. The ideological cover for the invasion of Soviet troops in China could be the fulfillment of an international duty “to protect” the Muslim peoples of Xinjiang, the fraternal peoples of the Soviet republics. Against the backdrop of strengthening US-Chinese ties, the Soviet Union could view its military presence in western China as an opportunity to control the Beijing government and an alternative to defeat in the Cold War.

In the author’s opinion, the chief military-political objectives assigned by the Politburo to the General Staff could be as follows: 1) support of the pro-Soviet regime of Hafizullah Amin in Kabul with limited forces, which he repeatedly asked the Kremlin leadership to do; 2) blocking the process of China’s entry into the US political and economic orbit; 3) liquidation of the centers of the Islamic movement on the territory of Afghanistan and western China.

The entry of Soviet troops into Afghanistan

The head of the Afghan government, Hafizullah Amin, like his predecessor Nur Muhammad Taraki, was sympathetic to the communist ideology. At his persistent request, the question of sending troops to Kabul to help provide personal security was repeatedly brought up for discussion by the Politburo of the Communist Party of the Soviet Union. The decision to send troops to Afghanistan was made on December 12. According to General V. Khristoforov, Russian military historian: “The course and content of the fateful meeting on December 12, 1979, according to researchers, remains one of the greatest mysteries of the Cold War.” [11, C. 16].

The decision of the Soviet political leadership to eliminate Hafizullah Amin is known to be based on the report of the closest adviser of Hafizullah Amin — General Boris. Ivanov, Special Representative of Yuri Andropov to the government of Afghanistan. Hafizullah Amin was falsely compromised as a Central Intelligence Agency (CIA) agent [15]. On this basis, a decision was made behind closed doors to overthrow the legitimate leader of the Afghan government. It should be noted that Ivanov’s professional activity took place in those periods and in those countries where there were coups d’état or assassinations of state leaders, starting with John F. Kennedy, the events in Prague in 1968 and ending with Hafizullah Amin.

The leadership of the corps of military advisers of the USSR Ministry of Defense in Kabul held an opposite opinion about Hafizullah Amin and the military leadership of Afghanistan. Their relationship with the Afghan counterparts was based on respect and trust. According to the political-military adviser General Va-

sily Zaplatin, military advisers refused to sign unreliable reports to Moscow prepared by intelligence officers [15].

Meanwhile, the Soviet political leadership made decisions based on reports from the Committee for State Security of the USSR (KGB). On this basis, we can assume that General Secretary Leonid Brezhnev and members of the Politburo were subjected to the information blockade organized by Yuri Andropov.

According to Yuri Felshtinsky, a Russian-American historian, "based on the assumption that the leader of Afghanistan, Hafizullah Amin, is collaborating with the American intelligence agencies and plans to reorient his policies to align with the United States, the entire Soviet notion of the need to invade Afghanistan has been built, which led to the collapse of the Soviet Union a few years later. None of these assumptions were true. It was a deliberate provocation by the KGB against the Soviet state." [7, p.159].

On December 23, 1979, the Soviet ambassador informed Hafizullah Amin that the Soviet leadership had decided to satisfy his request to send troops to Afghanistan. Hafizullah Amin considered the Soviet troops the guarantor of his security and political stability in the country. The Kremlin ideologists saw Afghanistan as a "second Mongolia" capable of "jumping" from feudalism to socialism [18, p.352]. In the context of the events, Afghanistan was assigned the role of a springboard for the transfer of the 40th Army to Xinjiang from the west, just as the territory of southern Mongolia could serve as a springboard for the invasion of the 39th Army into China from the north.

The United States position regarding the two pro-Soviet leaders of Afghanistan was noted by Galster, the head of the National Security Archive's Afghanistan project: "in August 1979, the American embassy in Kabul issued a secret report, which concluded that the fall of the Taraki-Amin regime would serve the broader interests of the United States despite any negative consequences for any future social and economic reforms in Afghanistan." [8].

On December 25, 1979, the troops entry operation to Afghanistan began. According to T.Rabush, the leading Russian researcher on Afghanistan, "the initial reaction in the United States to the entry of the Soviet troops was characterized by shock, but soon the American leadership set a course to "wear down" the Soviet Union in the Afghan conflict." [19].

Shortly after the start of the entry of troops, two motorized rifle divisions (108th and 201st) took responsibility for the northeastern provinces of Afghanistan, the 68th division covered the border with China, the 56th separate air assault brigade guarded the Salang pass north of Kabul, and the 103rd Airborne Division began the movement of personnel and equipment to Kabul airport.

Two motorized reconnaissance groups of the 35th detachment of the border troops of the KGB of the USSR, stationed near the Soviet-Chinese border in Murgab (Tajikistan), passed through the Wakhan Corridor towards the unguarded Afghan-Chinese border.

Everything was ready for the planned deployment of the 40th Army from the Afghan Badakhshan Province through the Wakhan Corridor to Xinjiang. On the eastern administrative border of the Xinjiang, the 39th and 40th Armies meeting was planned, which made it possible to cut the region off from the main territory of China.

Kabul coup d'état and its consequences

On December 27, the situation changed dramatically and took a completely unexpected turn. During the storming of the government residence (Tajbeg Palace), the KGB special forces troops killed Hafizullah Amin, his family, and his personal guards — the unit of the special forces of the Main Intelligence Directorate of the USSR Ministry of Defense (GRU). A coup took place in Kabul.

Special forces of the KGB used the Soviet troops as a "Trojan horse" to penetrate into Kabul and carry out a coup. The Soviet embassy and the GRU unit in Tajbeg Palace had no information about the planned storm of the palace. Chief of the General Staff Nikolai Ogarkov, to whom the GRU reported, had been removed from leading the operation to send troops into Afghanistan shortly before it began.

In Kabul, 23 objects were seized, including government buildings, banks, state television and radio, as well as a prison in Puli-Charkhi, where about 10 thousand political prisoners were released. After the destruction of the communications center in Kabul, the Afghan military command was paralyzed.

The government coup in Kabul signaled the declaration of jihad against the Soviet troops in the northeastern provinces [9, p.47]. This circumstance made it impossible for the movement and the planned deployment of troops to the Xinjiang. The uprising then spread throughout the country.

General Yuri Drozdov, the former head of Soviet intelligence in China (1964-1968) and the United States (1975-1979), future head of illegal intelligence of the First Main Directorate of the KGB of the USSR (1979-1991), was charged with leading the key operation to destroy the legitimate government of Afghanistan. Having completed the task, he refused the title of Hero of the Soviet Union for the successful elimination of the rightful leader and destruction of the special forces unit of the GRU of the USSR Ministry of Defense that, based on the orders of the Soviet military command, guarded Hafizullah Amin.

It's obvious that this unexpected appointment to this position of a person with no combat experience was due to the need to coordinate the coup in Kabul and the actions of Soviet agents to organize an uprising in the Badakhshan province, bordering Xinjiang.

Thus, the Kabul coup was part of a large-scale operation carried out by the KGB on the territory of Afghanistan to disrupt the planned deployment by the Soviet General Staff of large military units of the 40th Army through the Afghan bridgehead to Chinese Xinjiang toward the 39th Army. This task was completed.

The question regarding the role of the American embassy in Kabul headed by James B. Amstutz in the coup, who was stating that the Afghan Communists are "a bunch of scorpions biting each other to death" and

that Amin had “a semi-psychopathic desire to humiliate and revenge himself against the United States” remains open [3].

Elimination of the legitimate leader of a sovereign state, Hafizullah Amin, and his government by the Soviet special forces constituted interference in the affairs of a sovereign state and an act of international terrorism, no matter who was behind it.

Our hypothesis is fully consistent with the testimony of General Gromov, commander of the 40th Army, Hero of the Soviet Union: “I was the authorized representative of the Soviet government for the temporary stay of the 40th Army in Afghanistan. There was not a single document, not a single order to defeat someone there <...> There was no war as such <...> The goals were set for the command to deter potential and real external threats, including from the Chinese territory bordering with Afghanistan, as well as to support the existing political regime and stability within Afghanistan.” [10, p.385, 386].

Another participant in the war in Afghanistan, Deputy Head of the operational unit of the USSR Ministry of Defense in Afghanistan General Merimsky, maintained that in Afghanistan “the army command did not have an objective of achieving a military victory.” [16, p.349]. A war without an order to defeat the enemy raises questions. However, the answer is simple: the goals set for the limited contingent of the Soviet troops were not directly related to the occupation of Afghanistan and carrying out of combat missions on its territory.

In addition, all 9 years of the Afghan events showed that the Soviet troops were not prepared for waging the war in the mountainous region and were not equipped for this, the methods of conducting guerrilla warfare were not practiced before deployment, and water availability and water quality challenges were not foreseen. The Soviet General Staff did not set such goals for the troops. That is why the redeployment of units of the 40th Army to the places of future garrisons located throughout Afghanistan, which began in January 1980, became a “triumph of improvisation.” [4, p.157; 10, p.388].

According to Khristoforov, “an attempt to master new combat tactics with the transition to raid maneuver operations as part of reinforced battalions in unfamiliar mountain conditions did not bring results. Unusual climate, mountainous or desert terrain, diseases quickly exhausted the soldiers, and the troops suffered unjustified losses.” [11, C.13].

The Afghan population started to treat the 40th Army as an army of invaders. Afghan insurgents enjoyed the active support of local residents. A total of 179 Soviet military units of the 40th Army, stationed in 34 garrisons, surrounded themselves with minefields and barbed wire.

The objectives of the coup d'état in Kabul corresponded to the geopolitical goals of the two temporary allies—the United States and China, interested in weakening the Soviet Union, which had the largest nuclear arsenal.

Consolation prize

The escalation of hostilities in Afghanistan in 1985–1988, associated with the appointment of Mikhail Gorbachev as General Secretary, ensured a shift toward the USSR of a significant part of the production of opiates in the south of the country, which was controlled by the United States for more than 20 years. A “veil” zone was created along the entire southern and eastern Afghan border. Soviet army units, which provided protection and cover for individual special forces units, were located in garrisons in the following areas: Asadabad, Baraki, Ghazni, Jalalabad, Shahjoi, Kandahar, Lashkargah and Farah.

Due to the active actions of the Soviet side, during the 9 years of the war, the area under cultivation for opiates was multiplied, including through the liquidation of private farms and their owners. The volume of opium production in Afghanistan until 1979 ranged from 200 to 400 tons per year; by the time of the Soviet troops' withdrawal in 1989, it reached 1000–1500 tons [7, p.165]. For the delivery of drugs to the territory of the USSR, Soviet military transport aircrafts and other channels controlled by the KGB were used [7, p.169].

As a result of coordinated actions, the “Northern Route” of drug trafficking was formed (Afghanistan – Central Asia – USSR (Russia) – Europe), which began operating at full capacity in the early 90s [13, p. 111]. One of the points of application for income from the Afghan drug business was Xinjiang, where, according to A. Kulagin, “separatists operated and terrorist acts were committed” [13, p. 112].

According to the CIA reports on Afghanistan declassified in 2010, starting in 1982, the use of toxic and chemical substances began on the territory of Afghanistan [14], the stocks of which, according to the author, were intended for use in Xinjiang to suppress the resistance of a million-strong Chinese army. Large losses among the Afghan population over 9 years could be the result of the fact that the stock of chemical weapons that arrived in transit to Afghanistan was not sent to its destination to Xinjiang.

According to Harvard professor M. Kramer, an American researcher of the Afghan war: “during the nine years of fighting, more than 2.5 million Afghans (mostly civilians) were killed or maimed; millions more were displaced or forced into exile.” [12].

The international outcry and the reaction of the Muslim world after the coup in Kabul forced Moscow in 1982 to take the initiative to start negotiations with Beijing, the 12th round of which ended in March 1988. Immediately after that, in April 1988, the Geneva Accords were signed. Thus, the determining factor in the settlement of the Afghan problem was the position of Chinese diplomacy.

The imperial plans of Kremlin politicians to seize the oil-rich western region of China — a country that embarked on the path of economic and political reforms in the late 1970s — were not realized. At the same time, the USSR gained control over drug trafficking.

Following the ancient rules of military art, China was able to defeat the enemy in Afghanistan without entering the battlefield and take the place of the

USSR in confrontation with the United States, shaping the new geopolitical reality.

Conclusion

Afghan events showed who was the main subject in the system of Soviet public administration at the turn of the 1970-1980s. The involvement of the USSR in the Afghan conflict was the final phase of the struggle between the party and security forces and a starting point for the era of the actual power of the state security agencies in the country.

After the disappearance of the USSR from the political map of the world, the Soviet empire did not completely disintegrate. The economic reforms announced by Russian President Boris Yeltsin in the early 1990s were reduced to the large-scale privatization of property and assets in the hands of the ruling elite by the skillful actions of intelligence officers infiltrated into business. In the work of the Russian intelligence services business interests began to prevail over government interests. Most European countries benefited from the oil and gas Russian economy.

More than a third of a century after its formal end, the war in Afghanistan received a logical continuation, but already in Eastern Europe. Essentially, this is an attempt to take revenge and bring back the Soviet Union from the past. China and the United States are once again faced with the dilemma of identifying temporary allies on the path to overcoming the new Cold War mentality. They are once again united by one interest – prolongation the war in order to weaken Russia.

Historical analogies are not always appropriate, but today Ukraine is the Afghanistan of our time, and Europe being saved by Ukraine, is the Xinjiang of our days.

Millions of Afghan citizens were sacrificed on the altar of victory in the Cold War in the 20th century. How many victims will be there this time depends on many countries, and primarily on European countries. Today, however, the price of delaying the decision may become too high.

References:

1. Aftershock. Oil and Gas of Afghanistan in the Context of Geopolitics. <https://after-shock.news/?q=node/1195317>.
2. Avdanin V. Military energy specialists: the order is to survive. Center and Periphery, 2019, No. 2, pp. 32–39.
3. Blanton T., Savranskaya S. 2019. "The Soviet Invasion of Afghanistan, 1979: Not Trump's Terrorists, Nor Zbig's Warm Water Ports." National Security Archive, George Washington University.
4. Breytveyt R. Afgan: Russians at War, translated by Shirokova A. AST Corpus: Moscow, 2013, 496 p.
5. Chang P. Kampuchea between China and Vietnam. Singapore University Press: Singapore, 1985, 204 p.
6. Chinese in Afghanistan. <https://nsarchive.gwu.edu/document/26586-document-48-kitaycy-v-afganistane>.
7. Felshtinsky Yu., Popov V. 2021. Red Terror to Mafia State: Russia's Secret Services in the Struggle for World Domination (1917–2036). Nash Format: Kyiv, 383 p.
8. Galster S. 1988. "Rivalry and Reconciliation in Afghanistan: What Prospects for the Accords?" Third World Quarterly, Vol. 10, No. 4, Oct., 1988. pp. 1505–1541.
9. Harbottle, T. Harbottle's Dictionary of battles. 1981, NY, 344 p.
10. Khristoforov V., Guseva Yu. 2020. Soviet Military Strategy in Afghanistan: Errors in Planning and Public Condemnation. Quaestio Rossica, Vol. 8, 2020, No. 2, pp. 382–398.
11. Khristoforov V. 2019. Afghan Events 1979–1989: From Knowledge to Understanding and Recognition. Russian History, 2019, No. 6, pp. 3–21.
12. Kramer M. "The Soviets Nearly Won Afghan War". Los Angeles Times. 26.12.2004. <http://rsva-dzr.ru/fakty-i-daty/49-poteri-storon-v-afganskoj-vojne>.
13. Kulagin A. Afghan drug trafficking – threats to Russia and Europe. Scientific journal. Political science, 2016, No. 8(7), pp. 111–118. <https://cyberleninka.ru/article/n/afganskiy-narkotrafik-ugrozy-dlya-rossii-i-evropy>.
14. Memorandum to holders (CIA reports on Afghanistan). SNIE 11/50/37-82. "Use of toxins and other lethal chemicals in southeast Asia and Afghanistan", Table C-4. "Afghanistan: Summary of Chemical Warfare Attacks, 1982-83", pp. A-3, A-4. <https://archive.org/details/CIA-RDP85T00287R000701020001-3>
15. Memory and Debt. Major General Zaplatin V., "Before the Storm of Amin's Palace". <https://ok.ru/pamyatidol/topic/150843907517860>.
16. Merimsky V. Mysteries of the Afghan War. Veche: Moscow, 2006, 386 p.
17. Ninbo S. Development of Relations between China and the Soviet Union in the 80s of the XX Century. Thesis 07.00.03, 07.00.15, Moscow, 2003, 167 p.
18. Pikhoya R. Soviet Union: The History of Power: 1945–1991. 2nd edition. Sibirskiy Khronograf: Novosibirsk, 2000, 678 p.
19. Rabush T. Confrontation between the USA and the Soviet Union in Afghanistan: 1978–1985. Thesis 07.00.15, Saint Petersburg, 2011.
20. Scalapino R. "Asia in a Global Context: Strategic Issue for the Soviet Union." In The Soviet Far East Military Buildup. Solomon R.H., Kosaka M. (eds.). Auburn House Publishing: Dover, MA, 1986, p. 28.
21. Smith S. et al. Afghanistan: A Country Study. U.S. Government Printing Office: Washington, DC, 1980, 349 p.
22. United Nations Office on Drugs and Crime. Maps and Graphs. <http://www.unodc.org/afghanistan/en/media/maps.html>.
23. War and Peace. List of Facilities Built by the USSR in Afghanistan. <https://www.warandpeace.ru/reports/view/51015>.

MEDICAL SCIENCES

TREATMENT OF CHRONIC RECURRENT APHTHOUS STOMATITIS

Jalilova G.

Department of Pediatry Dentistry Assistant

Aliyev M.

Doctor of Philosophy in Medicine

Department of Therapeutic Dentistry Assistant

Ashrafov D.

Department of Orthopedic Dentistry Assistant

Azerbaijan Medical University

Baku, Azerbaijan

<https://doi.org/10.5281/zenodo.8385570>

Abstract.

Chronic recurrent aphthous stomatitis is a multifactorial disease that is associated with diseases of the digestive tract, endocrine, autoimmune, allergic and neurological disorders.

Keywords: Aphthous stomatitis, relapses, Setton's aphtha.

In practical dentistry, the diagnosis and treatment of diseases of the oral mucosa (OMD) in children are associated with certain difficulties. Chronic recurrent aphthous stomatitis (CRAS) is a disease characterized by a severe and long-term course, frequent relapses, and resistance to conventional treatment methods [1, 3, 7, 13]. Considering the close connection of the disease with somatic pathology, its adequate treatment requires a multidisciplinary approach and the participation of a pediatrician, pediatric gastroenterologist and other specialists [8, 9, 10]. The purpose of the work was to present a treatment regimen for a patient with a severe form of chronic relapse. Patient N., 15 years old, came to the hospital with complaints of a burning sensation, pain during eating and talking, and the presence of an ulcer on the oral mucosa. Manifestations in the oral cavity have periodically bothered the patient over the past two years. Relapses occur once a quarter. The lesion element epithelized in the oral cavity within a month. The boy did not go to the dentist for help. According to the mother, the child often (5-6 times a year) suffers from acute respiratory diseases. In 2005, he was examined at the city gastroenterological center, where a diagnosis of gallbladder dysfunction of the hypotonic-hypokinetic type was established. At the moment, we have not been able to identify the provoking factor for the appearance of aphtha. Upon objective examination: the face is symmetrical, pale, no skin lesions were found. The red border of the lips is without pathological changes. On the mucous membrane of the cheeks along the closure line there are imprints of teeth. A soft scar was found on the mucous membrane of the lower lip on the right. On the inner surface of the lower lip on the left there is an oval ulcer measuring 0.7×0.9×0.3 cm, which is surrounded by a border, the surface is covered with fibrinous plaque, and is sharply painful on palpation. The edges of the ulcer protrude above the level of the mucosa. An examination of the hard tissues of the teeth revealed: in the 11th tooth, a stain on the vestibular surface of a yellow-brown color, smooth and painless upon probing. When stained with methylene blue,

it is impermeable to the dye. In the two upper permanent first molars there are fillings made of a composite material with a good marginal fit and matching the color of the tooth; in the 36th and 46th teeth there are carious cavities. The intensity of caries was 4. When examining a patient with complaints of the appearance of aphthae on the surface of the mucous membrane, a differential diagnosis of recurrent herpes and chronic injury should be carried out. To carry out differential diagnosis of viral lesions, oral fluid and the absence of DNA of type I/II herpes viruses were examined [1, 6]. A microbiological study of the oral mucosa revealed a slight increase in the number of fungi of the genus *Candida*, *Str. mutans*, *Str. Sanguis*, *Str. salivarius*, *Str. mitis*. An immunological examination of the child (according to an extract from the medical history) revealed a low titer of immunoglobulins G and M in the blood serum. For cytological examination, a scraping from the lesion was used. The analysis of the results obtained was carried out in accordance with the recommendations of Kimele E. (1984) [4]. A cytological examination of the affected area revealed polygonal epithelial cells with light cytoplasm and a small nucleus, and round-shaped epithelial cells with dark-colored cytoplasm and a large nucleus. Among the epithelial cells there is a significant accumulation of phagocytic neutrophils and lymphocytes. The cellular epithelial index was 4.68. Thus, the results of clinical and additional research methods confirmed the diagnosis of chronic recurrent aphthous stomatitis (Setton's aphtha), severe.

An individualized algorithm for complex treatment of a patient with Setton's aphtha was developed, which included general and local treatment. gallbladder dysfunction with hypotonic-hypokinetic type (prescribed by a pediatric gastroenterologist) included: 1. Choleric (to stimulate bile synthesis) – a suspension of ursodeoxycholic acid 10 mg/kg per day in two doses for three weeks. 2. Cholekinetic (to stimulate contraction of the gallbladder) – artichoke leaf extract, ¼–½ teaspoon three times a day for three weeks. Prokinetic agent domperidone (to restore motor function of the biliary tract) 10 mg three times a day for 15–30 minutes.

before meals for ten days. 4. Tubages of medium mineralization mineral water twice a week No. 10, 100–200 ml. 5. Synbiotic Linex Forte (to restore microbiocenosis of the digestive canal) one capsule with meals for fourteen days. Enterogel, one tablespoon three times a day for seven days to reduce endogenous intoxication 1.5–2 hours before or two hours after meals (taking medications). Compliance with diet No. 5 for one month. 8. Essentuki mineral water No. 17, ½ glass at a temperature of 24° three times a day, 20 minutes before meals, a month after the aphthae has healed. To carry out local treatment during the healing period of the aphthae, the following scheme was used during a visit to the dentist: Pain relief (application of Kamistad gel). 2. Antiseptic treatment of the oral mucosa (rinsing with a 0.2% solution of bigluconate-chlorhexidine). 3. Anti-inflammatory therapy (irrigation of the mucous membranes with Tantum Verde spray). 4. Keratoplasty therapy (from the beginning of epithelization, days 5–6, in the form of phonophoresis of Solcoseryl gel) lasting 5 minutes, eight sessions. The patient also continued treatment at home, taking: 1. Immunomodulator of bacterial and fungal origin "Imudon" (one tablet after meals 4–6 times a day, dissolve in the mouth, then do not eat or rinse your mouth for one hour) in three courses of ten days with two 20-day breaks. . . Rinses and oral baths with Rotokan solution (one teaspoon per glass of warm water 2–3 times a day) during clinical manifestations and 5 days after epithelialization. 3. During the treatment period, Parodontax paste with fluoride was prescribed for hygienic care of the oral cavity for two months. The patient visited the dentist at the clinic every other day.

During the second visit, the patient noted an improvement in his health. The pain remained only when eating. The size of the erosion did not change, it was of the same shape, the surface was covered with plaque. On the mucous membrane of the cheeks there are imprints of teeth along the closure line. During the third visit, the patient's health was satisfactory. Pain when eating. Infiltration of the mucous membrane in the area of erosion has decreased, the affected element is of the same shape and size, its bottom is flat, the surface is covered with fibrinous plaque. The treatment was continued. Fourth visit (two days later): the patient complains of an ulcer. The mucous membrane of the lower lip is less swollen and smooth. The surface of the erosion has cleared of plaque, its depth has decreased, and during palpation there is slight pain. There are no tooth marks on the buccal mucosa. Fifth visit. Complaints of pain when eating solid food. The mucous membrane of the lower lip is pale, without pronounced pastiness and swelling. The erosion has decreased in size to 0.2×0.2×0.2 cm. The bottom is smooth, scarlet in color, and clean. To improve epithelialization, a keratoplasty drug, solcoseryl gel, was introduced into the local treatment regimen, which was administered by phonophoresis [12]. Sixth visit. Complaints of pain due to mechanical irritation of erosion. The lesion element has decreased to 0.1×0.1×0.1 cm. The bottom of the element is clean, areas of epithelialization are noted. A repeat cytological examination was performed. The results of a cytological study showed that the number of

epithelial cells, especially from the upper layers, increased significantly. Among neutrophilic leukocytes, unchanged forms predominated; the number of macrophages and phagocytes decreased. The cellular epithelial index was 2.824, which indicated good epithelialization of the lesion element. The treatment was continued. After two weeks of treatment, the mucous membrane of the lower lip is pale, elastic, and painless. At the site of the ulcer on the surface of slight hyperemia, a soft scar measuring 0.1 cm is determined. After epithelialization of the lesion element, the boy's 36 and 46 teeth were treated for chronic moderate caries and the 11th tooth was restored for local hypoplasia. The follow-up period for this patient was six months. During this time, not a single relapse of chronic recurrent aphthous stomatitis was observed in the presence of stable remission of gastroenterological pathology. The individualized improved algorithm for the treatment of CRAS (Setton's aphtha) developed by the authors, which included local and general therapy, made it possible to significantly reduce the time of epithelialization of the deep element of the lesion of the oral mucosa, achieve long-term and complete clinical remission of the disease and prevent it.

Conclusions.

An individualized approach to the treatment of chronic recurrent aphthous stomatitis (Setton's aphtha) made it possible to significantly reduce the time of epithelialization of deep lesions of the oral mucosa and reduce the frequency of disease relapses.

References:

1. . Abashidze N.O. Immunomorfologicheskie aspekty diagnostiki stomatita Settona / N.A. Abashidze, O.M. Khardeishvili, M.B. Ivereli i dr. // *Allergologiya i immunologiya*, 2010. – T. 2, № 2. – S. 195–198.
2. Zoryan E.V. Sovremennye napravleniya farmakoterapii zabolevaniy slizistoi obolochki polosti rta // *Klinicheskaya stomatologiya*. – 2009. – № 3. – S. 22–25.
3. Ionov V.V. Sostoyanie mestnogo immuniteta, svobodnoradikal'nykh protsessov i antioksidantnoi zashchity v slyune pri khronicheskom retsidiviruyushchem aftoznom stomatite: Avtoref. dis. ... kand. med. nauch. – M., 2008. – 25 s.
4. Kimele E. Tsitologicheskaya diagnostika v stomatologii / E.V. Kimele. – Riga: Zvaigzne, 1984. – 181 s.
5. Lechenie bol'nykh s retsidiviruyushchim aftoznym stomatitom, oslozhnennym disbakteriozom rotovoi polosti / O.F. Rabinovich, I.M. Rabinovich, A.V. Guseva, E.S. Abra-yazyk // *Klinicheskaya stomatologiya*. – 2009. – № 3. – S. 18–20.
6. Lukinykh L.M. Zabolevaniya slizistoi obolochki rotovoi polosti. – N. Novgorod: NGMA, 2000. – 367 s.
7. Morfologicheskie i immunogistokhimicheskie kharakteristiki slizistoi obolochki polosti rta u bol'nykh vospalitel'nyimi zabolevaniyami kishechnika / I.M. Kvetnoi, N.S. Robakidze, I.N. Kostyuchek, O.B. Shchukina // *Klinicheskaya meditsina*. – 2009. – T. 87, № 11. – S. 49–51.

8. Rabinovich O.F. Retsidiviruyushchii aftoznyi stomatit: klassifikatsiya, klinicheskie formy i lechenie / O.F. Rabinovich, I. M. Rabinovich // Stomatologiya. – 2010. – T. 78, № 3. – S. 76–79.
9. Rabinovich O.F. Retsidiviruyushchii aftoznyi stomatit – etiologiya, patogenez (chast' 1) / O.F. Rabinovich, I. M. Rabinovich, E.L. Vakhrushina, E.V. Panfilova // Stomatologiya, 2010. – № 1. – S. 71–74.
10. Savichuk O.V. Kliniko-anamnesticheskie faktory riska khronicheskogo retsidiviruyushchego aftoznogo stomatita u detei // Sbornik nauchnykh trudov sotrudnikov KMAPO. – 2003. – Vyp. 12. – Kniga 2. – S. 637–641.
11. Savichuk O.V. Mikrobiologiya polosti rta, disbakterioz i puti ego korrektsii / O.V. Savichuk, N.A. Savichuk // Sovremennaya stomatologiya. – 2002. – № 4. – S. 9–12.
12. Fizicheskie faktory v lechenii i profilaktike patologii chelyustno-litsevoi oblasti: uchebno-metodicheskie rekomendatsii / A.G. Safronov, V.V. Khramov, O.G. Kolesova, E.M. Svishcheva, A.G. Chizh, E.A. Islamova. – Saratov, 2009. – 84 s.
13. Chernyshev N.D. Sostoyanie topicheskogo immuniteta pri khronicheskom aftoznom stomatite / N.D. Chernysheva, T.V. Bushueva, G.I. Ron', I.I. Safiullina // Stomatologiya. – 2009. – № 5 (59). – S. 71–73

RELATIONSHIP BETWEEN DEPRESSIVE PATHOLOGY AND THE PERSONAL CHARACTERISTICS OF ADOLESCENTS

Sattarov T.

- PhD, Associate Professor of the Department of Psychiatry, Narcology, pediatric Psychiatry, Medical Psychology and Psychotherapy. Tashkent Pediatric Medical Institute, Republic of Uzbekistan, Tashkent
<https://doi.org/10.5281/zenodo.8385609>

Abstract

Objective Purpose: to study the features of depressive symptoms in adolescents to optimize therapeutic and preventive measures. **Material and methods:** 111 adolescents aged 15 to 17 years, with the presence of depressive symptoms, were examined in the departments of the Clinical Hospital of the city of Tashkent. The Zung scale was used to determine the severity of depression and the Lichko questionnaire to establish character accentuation. **Results:** an analysis of the features of depressive symptoms in adolescents established the presence of a predominance of behavioral disorders in the clinical picture of the disease with a tendency to use psychoactive substances, disorders of intra-family relationships, and dysphoric reactions. **Conclusion:** Thus, the study of the features of depressive symptoms in adolescents found that dysphoric depression with significant behavioral disorders in persons with epileptoid character accentuation and anxiety depression in persons with psychasthenic character traits are most often formed during puberty. The results obtained will make it possible to identify important personal targets of psychotherapeutic work with patients prone to the development of depressive symptoms.

Keywords: adolescents; personal characteristics; emotional disorders; depression.

Introduction: Over the past decades, there has been a rapid increase in suicidal tendencies of depressive genesis among children and adolescents. The relevance of the problem of depressive behavioral disorders in children and adolescents is caused by the difficulties of timely verification of affective pathology, the expediency of correctly chosen pharmacotherapy and the difficulties in predicting these mental disorders [1]. In children and adolescents, depressive pathology, in contrast to the adult population, in rare cases, clinically occurs with the classic symptoms of the depressive triad - lowering mood, slowing down thinking and motor activity [3]. Most often, the clinical picture of depression is atypical, characterized by the obliteration of the main symptoms, disguise as other diseases, and the predominance of somatovegetative disorders [2,4]. According to a number of authors, a psychiatrist consulted only 27% of children with a depressive onset of the disease during their first depression; general somatic specialists observed the rest for a long time [9]. At the initial visit to a psychiatrist, a depressive state was found only in 23.6% of cases due to the lack of expression of affective disorders proper, the prevalence of complaints of behavioral disorders, including aggressiveness, school maladaptation, and computer addiction [8]. In the puberty period, there is an increase in depressive symptoms against the background of ideas of one's own inferiority and dysmorphophobic inclinations with a tendency to antisocial behavior, which were not diagnosed in a timely manner due to the presence of an unhealthy microclimate in the family and the lack of mutual understanding between children and parents [5, 7, 10]. First, depressive states in adolescence and adolescence are associated with destructive forms of behavior, the extreme variant of which is suicidal behavior. Behavioral disorders and patho-characterological reactions of protest and opposition, interpersonal conflicts with peers and teachers are specific features of pubertal depression [6, 11].

The purpose of the study: study the features of depressive symptoms in adolescents, taking into account characterological personality traits and a tendency to suicidal tendencies.

Material and methods of the study: 111 adolescents aged up to 19 years inclusive, 78 boys and 33 girls (average age 16.96 ± 1.98 years) who were admitted for inpatient treatment in the adolescent departments of the City Clinical Psychiatric Hospital were chosen as the object for the study the Tashkent city with the presence of depressive disorders. The clinical and psychopathological method was used to identify the leading psychopathological syndrome at the time of examination. All established diagnoses were based on the tenth revision criteria of the International Classification of Diseases (ICD-10). We determined the personality traits of adolescents (PAD) using the Modified Patho-characterological Diagnostic Questionnaire (MDPO Lichko A.E., Ivanov N.Ya. 2001). We identified depressive disorders using the Zung Depression Self-Assessment Scale (ZDRS) (L.I. Wasserman, O.Yu. Shchelkova, 1995).

Results and their discussion: at the initial stage of our study, we studied the features of clinical manifestations of depressive pathology in adolescents. According to the classification of child psychiatrist E.G. Eidemiller (2005), in adolescence, depressive symptoms are divided into adolescent depressive equivalents - delinquent, asthenopathic, anxious, hypochondriacal, which mask the typical classic triad of depression, are perceived as features of the puberty period and make diagnosis and treatment very difficult. In our study, all adolescents were divided into five groups depending on the prevalence of the leading symptom of depression - dysphoric, anxious, dysmorphophobic, asthenopathic and masked. Dysphoric depression was clinically manifested by outbreaks of a melancholy-angry mood, conflict, aggression, rudeness towards adults, especially towards parents and close relatives against the background of a low psycho-emotional

state. Such behavior provokes the formation of intra-family conflicts, deterioration of the microclimate in the family, punishment and beatings of the child for bad behavior, which ultimately contributes to running away from home and vagrancy, and leads the teenager to asocial companies. In the clinical manifestations of dysphoric depression, we have identified addictive forms of behavioral disorders: a tendency to aggression and physical violence, petty offenses, theft, running away from home and vagrancy, smoking, early alcoholization and episodic use of psychoactive substances.

In our study, dysphoric depression was verified more often (in 33 adolescents) than other types, and was mainly observed in boys with socialized conduct disorder. Adolescents with anxious depression against the background of low mood had a feeling of expectation of a danger of an uncertain nature, which formed an idea of an unfavorable development of events, adolescents were in a state of constant tension, in the grip of bad forebodings, they observed somatovegetative reactions, restlessness and restlessness, behavior that was inadequate to the real situation. Anxious depression was found in 30 teenagers of the surveyed group. Dysmorphophobic depression was observed only in 14 (12.61%) adolescent girls. The clinical picture of dysmorphophobic depression was dominated by complaints of a sense of inferiority, the presence of physical disabilities, inconsistency with the standards and standards of beauty, unlike anorexia nervosa, girls with dysmorphophobic depression did not seek to change themselves by following diets and restrictive eating behavior, but, on the contrary, were passive and dejected, they noted a feeling of low value, worthlessness, uselessness due to the presence of excess weight and flaws in appearance. Such states were accompanied by a de-

crease in appetite against the background of hypothy-mia and the appearance of rudimentary ideas of self-abasement. In the clinical picture of asthenopathic depression, the leading complaints were fatigue and weakness, loss of strength, decreased motor activity, poor tolerance for large crowds of people, inability to be in the company of peers and classmates, communication difficulties, inactivity, feelings of boredom and despondency. The presence of this symptomatology caused in a teenager a desire for loneliness, a feeling of inferiority, worthlessness, a violation of relationships with parents and relatives, a disorder in school adaptation and the formation of suicidal thoughts and intentions. The lowered background of mood in asthenopathic depression is incorrectly interpreted as apathy, most likely it is the paucity of manifestations of a decrease in mood. A variant of asthenopathic depression occurred in 14 adolescents who complained to a greater extent of weakness, tearfulness, rapid exhaustion and fatigue. In patients with masked depression, in the foreground there were complaints of a hypochondriacal nature of somatic symptoms, such adolescents aggravated with existing somatic diseases, against the background of low mood, lack of appetite, increased fatigue, refused to attend school classes and lessons, prepare homework, help around the house. The clinical picture of masked depression was also dominated by behavioral disorders in the form of refusing to eat, do household chores, lack of motivation for vigorous activity, playing sports or attending circles and various events, there was a violation of the adaptive abilities of adolescents in communication with peers and schoolteachers. Interpersonal relationships were limited to the circle of relatives and friends. Masked depression occurred in 20 patients of the study sample (Fig. 1.).

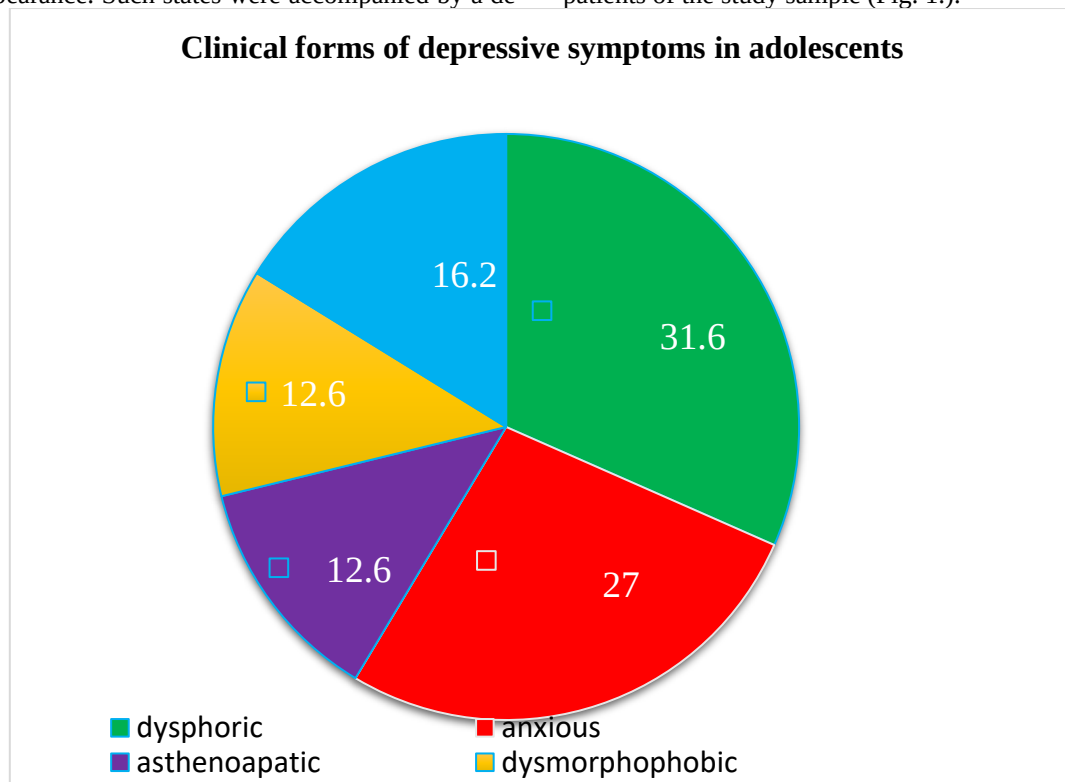


Fig. 1. Clinical forms of depressive symptoms in adolescents.

For a detailed study of the personality traits of adolescents, we used the Modified Pathocharacterological Diagnostic Questionnaire (MPDO) by A.E. Lichko and N.Y. Ivanov with an improved procedure for processing the results. According to the survey data, adolescents were divided according to character accentuations. Adolescents with a hysterical personality were statistically significantly prevalent in the main group of the study (41.1%), in contrast to adolescents in the comparison group (20.0%, $p < 0.045$). Similar results were obtained in adolescents with affective (24.6% of patients in the main and 4.0% of patients in the comparison group; $p < 0.003$) and epileptoid (26.2% of patients in the main and 8.0% of patients in the comparison group; $p < 0.01$) personality warehouse. In the comparison group, there was a statistically significant predominance of adolescents with unstable (1.6% of patients in the main and 14.0% of patients in the comparison group; $p < 0.045$). Psychasthenic (4.9% of patients in the main and 42.0% of patients in the comparison group; $p < 0.001$) and hyperthymic (1.6% of patients in the main and 12.0% of patients in the comparison group; $p < 0.045$) character accentuation. The correlation between the presence or absence of suicidal tendencies and the personality traits of adolescents was average in strength ($C = 0.51$, $p < 0.001$). Thus, the intergroup analysis of the results of the study determined that adolescents with epileptoid, affective and hysteroid

type of character accentuation can be included in the risk group for the development of suicidal tendencies. Adolescents with epileptoid character traits were prone to the formation of potentially dangerous suicidal tendencies against the background of sudden strong affect. Suicidal tendencies in adolescents with hysteroid accentuation of character were marked by demonstrative-blackmail and manipulative nature, but under the confluence of adverse circumstances they posed a threat to life. In adolescents with an affective type of character, the intensity of suicidal tendencies increased in the subdepressive phase, in being alone against the background of a reduced psycho-emotional state as a result of conflicts with parents and peers.

At the next stage of the study, with the help of MPDO, A.E. Lichko, we have identified the personality characteristics of adolescents in the form of character accentuations. Among them, 35 (31.5%) adolescents have a hysterical temperament, 17 (15.3%) have an affective temperament, 20 (18.1%) have an epileptoid type, 8 (7.2%) have an unstable personality type, psychasthenic - 24 (21.6%) and hyperthymic - 7 (6.3%) adolescents. No less interesting for the study was the study of the correlation between the clinical form of depression and the type of accentuation of the teenager's character. The distribution of adolescents with different types of character accentuation depending on the clinical form of depression is shown in Table 1.

Table 1.

Types of character accentuation and clinical form of depression

Types of depression	Type of character accentuation						
	hysterical	affective	epileptoid	Psychasthenic	Hyperthymic	Unstable	Total
	abs.:%	abs.:%	abs.:%	abs.:%	abs.:%	abs.:%	abs.:%
Dysphoric	10/9.0	2/1.8	20/18.0 *	—	1/0.9	2/1.8	35/31.5
Anxious	3 /2.7	13/11.7	—	14/12.6 *	—	—	30/27.0
Asthenoapatic	6/5.4	1/0.9	—	4/3.6	—	3/2.7	14/12.6
Dysmorphic-phobic	13/11.7 *	—	—	1/0.9	—	—	14/12.6
Masked	3/2.7	1/0.9	—	5/4.5	6/5.4	3/2.7	18/16.2
Total	35/31.5	17/15.4	20/18.0	24 /21.6	7/6.3	8/7.2	111/100

Note: *significance of differences $p < 0.045$

A comparative analysis of the distribution of adolescents with different types of character accentuation, depending on the clinical form of depression, revealed a relative predominance of dysphoric depression in adolescents with epileptoid character accentuation (18.0%), however, statistically significant differences with adolescents with hysteroid accentuation (9.0%, $p > 0.05$). Affective (1.8%, $p > 0.05$), hyperthymic (0.9%, $p > 0.05$) and unstable (1.8%, $p > 0.05$) type of character accentuation according to this indicator was not found. Anxious depression was more often observed in adolescents with a psychasthenic personality

(12.6%), although there were statistically significant differences with hysterical (2.7%; $p > 0.05$) and affective (11.7%, $p > 0.05$) warehouse identity was not found. Asthenoapathic depression was more often observed in hysterical personalities (5.4%), however, significant differences with affective (0.9%; $p > 0.05$), psychasthenic (3.6%; $p > 0.05$) and unstable (2.7%; $p > 0.05$) no warehouse has been established. Dysmorphic-phobic depression occurred in 11.7% of adolescents with hysteroid accentuation of character; however, differences with psychasthenic personalities (0.9%; $p > 0.05$) on this basis did not have statistical significance.

Hyperthymic (5.4%) individuals were relatively more likely to be diagnosed with hypochondriacal depression, but there were statistically significant differences with adolescents with hysteroid (2.7%, $p>0.05$), affective (0.9%, $p>0.05$), psychasthenic (4.5%, $p>0.05$) and unstable (2.7%, $p>0.05$) types of character accentuation was not revealed by this indicator. The correlation of the clinical form of depression with premorbid typological personality traits was quite strong ($C=0.71$, $p<0.001$) and exceeded the correlation with the nosological affiliation of the depressive disorder.

Conclusions: research of the relationship between depressive pathology and the personal characteristics of adolescents reveals some phenomena - thus, the study of the features of depressive symptoms in adolescents found that dysphoric depressions with significant behavioral disorders in persons with epileptoid accentuation of character and anxious depressions in persons with psychasthenic character traits are most often formed in the puberty period. The results obtained will allow us to identify important personal targets of psychotherapeutic work with patients prone to the development of depressive symptoms.

References:

1. Sattarov T.F., Babarakhimova S.B. Early detection of teenage depression // Вестник интегративной психологии // Журнал для психологов. Вып. 29. /Под ред. В.В.Козлова, Ш.Р. Баратова, М.Н.Усмановой. – Бухара - Ярославль: МАПН, 2023. – 429 с.; с.328-321
2. Мухторов Б.О. с соавторами. Влияние стилей родительского воспитания на формирование несуицидального самоповреждающего поведения у подростков // Вопросы психического здоровья детей и подростков. 2023. № 1 (23). С.80-85. [Mukhtorov B.O. et al. The influence of parenting styles on the formation of non-suicidal self-injurious behavior in adolescents // Mental health of children and adolescents. 2023. № 1 (23). S.80-85. (In Russ)].
3. Саттаров Т.Ф. с соавторами. Влияние стилей родительского воспитания на формирование суицидальных тенденций у детей и подростков // Человеческий фактор Социальный психолог, №1(45), 2023; С. 348-353. [Sattarov T.F. et al. The influence of parenting styles on the formation of suicidal tendencies in children and adolescents // Human Factor Social Psychologist, No. 1 (45), 2023; P. 348-353. (In Russ)].
4. Саттаров Т.Ф., Бабарахимова С.Б., Файзуллаева К.Р., Мирворисова З.Ш. Особенности психотерапии у пациентов с параноидной шизофренией. В сборнике: Ошибки и заблуждения в психиатрии. материалы российской научной конференции. ФГБОУ ВО РостГМУ Минздрава России. Ростов-на-Дону, 2023. С. 145-147.
5. Abdullaeva VK The influence of parenting styles on the formation of suicidal tendencies in adolescents / Sciences of Europe .VOL 1, No 37 (2019) pg. 7-8
6. Abdullaeva VK, Abbasova DS et al. Predict depressive disorders at the earliest stages of its formation in adolescents”// Annali d/ Italia (2020) VOL 1, No 7; pp 15-18 .
7. Abdullaeva VK, Babarakhimova SB Analisis of psychosocial factors in development of suicidal tendencies at adolescents / Central Asian Journal of Pediatrics 2 (1), 201-204, 2019.
8. Babarakhimova SB, Abdullaeva VK, Sultonova KB, et al. Role of psychological research of suicidal behavior in adolescents / Sciences of Europe. Vol 2, No 36 (2019) pp. 52-55
9. Babarakhimova SB, Abdullaeva VK, Abbasova DS., et al. Research of influence personal characteristics in adolescents in development types of suicidal tendencie // Austria-science. Vol 1, No 24 (2019) pp. 16-18
10. Matveeva A.A., Sultonova KB, Abbasova DS et al. Optimization of psycho-diagnostics of emotional states // Danish Scientific Journal. VOL 3, No. 5 pp. 24-27
11. Nurkhodjaev S., Babarakhimova S., Abdullaeva V. Early Detection and Prevention of Suicidal Behavior in Adolescents – Indian Journal of Forensic medicine & Toxicology. Vol 14, No 3(2020) pp.7258-7263

TREATMENT OF KNEE JOINT DEFORMITIES IN CHILDREN**Skvortsov A. P.***Doctor of Medical Sciences**Chief Researcher**State Autonomous Healthcare Institution "Republican Clinical Hospital of the Ministry of Health of the Republic of Tatarstan"***Khabibyanov R. Ya.***Doctor of Medical Sciences**Chief Researcher**State Autonomous Healthcare Institution "Republican Clinical Hospital of the Ministry of Health of the Republic of Tatarstan"***Maleev M.V.***Candidate of Physical and Mathematical Sciences**Leading Researcher**State Autonomous Institution of Health "Republican Clinical Hospital of the Ministry of Health of the Republic of Tatarstan"***ЛЕЧЕНИЕ ДЕФОРМАЦИЙ КОЛЕННОГО СУСТАВА У ДЕТЕЙ****Скворцов А.П.***Доктор медицинских наук**Главный научный сотрудник**Государственное автономное учреждение здравоохранения
«Республиканская клиническая больница Министерства
здравоохранения Республики Татарстан»***Хабибянов Р.Я.***Доктор медицинских наук**Главный научный сотрудник**Государственное автономное учреждение здравоохранения
«Республиканская клиническая больница Министерства
здравоохранения Республики Татарстан»***Малеев М.В.***Кандидат физико-математических наук**Ведущий научный сотрудник**Государственное автономное учреждение здравоохранения
«Республиканская клиническая больница Министерства
здравоохранения Республики Татарстан»*<https://doi.org/10.5281/zenodo.8385622>**Abstract**

The results of treatment of pediatric patients with deformities of the bones forming the knee joint were analyzed. At the same time, it was found that in patients with frontal deformities over 30 degrees, as well as in patients with shortened limb segments over 10–15%, multiplanar deformities of the knee joint area are observed, one of which is a pronounced violation of the biomechanical axis of the limb. When analyzing the long-term results of treatment of patients with angular deformities of the bones that form the knee joint according to the traditional Ilizarov method, it was revealed that the restoration of the biomechanical axis of the limb does not occur when the deformity is eliminated due to the formation of a wedge-shaped distraction regenerate. The axle breaking is even getting worse. A feature of the traditional layout of the Ilizarov apparatus, when used in these cases, is the inability to restore the biomechanical axis of the limb. This is the reason for the overload of one of the femoral condyles and the development of early gonarthrosis and the patient's disability. As for the occurrence of deformity recurrence in the postoperative period, it should be noted that one of them is the non-elimination of one of the multiplanar deformity components, in particular, the lack of correction of the biomechanical axis of the limb. Taking into account the causes of the above complications, we have developed additional units for the Ilizarov apparatus, which allow correct restoration of the limb axis at any stage of the formation of the distraction regenerate. We have proposed an algorithm for eliminating the deformity, taking into account the restoration of the limb axis, which makes it possible to achieve better long-term results in the treatment of this group of patients and prevent the development of early gonarthrosis.

Аннотация

Проанализированы результаты лечения пациентов детского возраста с деформациями костей, образующих коленный сустав. При этом выявлено, что у пациентов с фронтальными деформациями свыше 30 градусов, а также у больных с укороченными сегментами конечности свыше 10–15% наблюдаются многоплоскостные деформации области коленного сустава, одной из которых является выраженное нарушение

биомеханической оси конечности. При анализе отдаленных результатов лечения пациентов с угловыми деформациями костей, образующих коленный сустав, по традиционному методу Илизарова выявлено, что восстановления биомеханической оси конечности при устранении деформации за счет формирования клиновидного дистракционного регенерата не происходит. Нарушение оси даже усугубляется. Особенностью традиционной компоновки аппарата Илизарова при применении в этих случаях является отсутствие возможности восстановления биомеханической оси конечности. В этом заключается причина перегрузки одного из мышечков бедра и развития раннего гонартроза и инвалидности пациента. Следует отметить, что одной из причин возникновения рецидива деформации в послеоперационном периоде служит неустранение одного из компонентов многоплоскостной деформации, в частности отсутствие коррекции биомеханической оси конечности. С учетом причин возникновения приведенных осложнений нами разработаны дополнительные узлы к аппарату Илизарова, позволяющие корректно восстанавливать ось конечности на любом этапе формирования дистракционного регенерата. Нами предложен алгоритм устранения деформации с учетом восстановления оси конечности, позволяющий добиться лучших отдаленных результатов лечения данного контингента пациентов и предупредить развитие раннего гонартроза.

Keywords: multiplanar deformity, pin-and-pin apparatus for external fixation, biomechanical limb axis, correction.

Ключевые слова: многоплоскостная деформация, спице-стержневой аппарат внешней фиксации, биомеханическая ось конечности, коррекция.

Нами были изучены отдаленные результаты лечения пациентов с угловыми деформациями костей, образующих коленный сустав, пролеченных в отделении детской ортопедии ГАУЗ «Республиканская клиническая больница» МЗ РТ традиционным способом по методу Илизарова, – 27 пациентов в период до 1981 по 2003 гг. (группа сравнения). Также были изучены отдаленные результаты лечения 15 пациентов той же нозологии, пролеченных аппаратом собственной разработки в период с 2008 по 2017 гг. (собственная группа). У всех пациентов с деформациями костей, образующих коленный сустав, причинами были посттравматический или постостеомиелитический процесс, деформация превышала во фронтальной плоскости 30 градусов. Сроки отдаленного наблюдения в собственной группе пациентов составили от 4 до 15 лет.

У 16 пациентов, оперированных традиционным методом Илизарова (группа сравнения), было выявлено, что восстановление биомеханической оси конечности при устранении деформации за счет формирования клиновидного дистракционного регенерата в силу особенностей метода не осуществлена. Судя по рентгенограммам до операции и по окончании коррекции деформации, нарушение оси даже усугублялось. Это объясняется тем, что особенностью традиционной компоновки аппарата Илизарова, примененной в этих случаях, является отсутствие возможности восстановления биомеханической оси конечности. В этом заключается причина перегрузки одного из мышечков бедра в послеоперационном периоде, развития раннего гонартроза и инвалидности пациента. У этих пациентов развился выраженный гонартроз, пятерым из них произведено эндопротезирование сустава по окончании роста. Следует отметить, что у данной группы пациентов исходная деформация была многоплоскостной и во фронтальной плоскости превышала 30 градусов. Все эти пациенты перенесли острый гематогенный метаэпифизарный остеомиелит в дистальном отделе бедра или в проксимальном отделе голени в период новорожденно-

сти или первого года жизни. Они характеризовались многоплоскостной деформацией области коленного сустава наибольшей выраженности среди всех наблюдавшихся.

Причиной отсутствия восстановления оси конечности является то, что при использовании аппаратного метода лечения при кортикотомии один из кортикальных слоев кости полностью не пересекается, формирование дистракционного регенерата треугольной формы производится относительно непересеченного кортикального слоя кости с опережающим темпом дистракции [1, с.18; 2, с.57]. Не полностью пересеченный участок кортикального слоя метафиза является точкой вращения остеотомированного фрагмента. При этом формируется регенерат требуемой геометрии в зависимости от величин компонентов деформации [3, с.56; 4, с.256]. Подобные проблемы могут возникать и при линейном удлинении сегментов нижней конечности [5, с.19; 6, с.20].

При использовании штатных компоновок аппаратов нормализации оси и биомеханики нижней конечности при применении аппаратного лечения для исправления многокомпонентной деформации [2, с.57; 5, с.21; 7, с.36] достичь невозможно. Без применения дополнительных узлов нарушение оси конечности неизбежно усугубляется. Поэтому при лечении данной категории пациентов необходимо тщательное предоперационное планирование. Для этого мы использовали метод построения обычных скиаграмм (рис. 1) рентгеновских снимков области коленного сустава с целью изучения прохождения оси конечности и для определения величины необходимого перемещения остеотомированного фрагмента заинтересованного сегмента в целях восстановления оси конечности в процессе коррекции деформации.

Цель исследования – разработка технологии устранения многоплоскостных деформаций костей, образующих коленный сустав, с учетом восстановления оси конечности.

Материалы и методы исследования

Полученные и проанализированные отрицательные результаты лечения у 16 из 27 (59,25%) пациентов, оперированных традиционным способом по методу Илизарова, свидетельствовали о необходимости разработки индивидуального алгоритма лечения данного контингента пациентов с учетом сохранения или восстановления оси деформированного сегмента конечности. Так как наиболее частой причиной неудовлетворительного отдаленного результата лечения этих пациентов явилось развитие раннего гонартроза, наибольшее внимание было уделено вопросу восстановления именно биомеханической оси сегмента, хотя и другие компоненты деформации нельзя не учитывать. Мы исходили из постулата: неустранение одного из компонентов деформации неизбежно приведет к рецидиву всех имевших место составляющих деформации. Поэтому разработанный алгоритм для лечения этой категории пациентов с применением аппарата собственной разработки при предоперационном планировании учитывает следующие показатели [4, с.280]:

1) угол (фронтальной и сагиттальной) деформаций;

- 2) укорочение сегмента конечности;
- 3) наличие внутренней или наружной торсии сегмента конечности;
- 4) прохождение биомеханической оси конечности до и после окончания коррекции и ее исправление.

Все вышеперечисленные величины составляющих деформации учитывались нами при предоперационном планировании оперативного вмешательства с использованием аппарата внешней фиксации, а именно: выбор темпа дистракции, ее направления, поочередность их устранения. Предоперационное планирование выполнялось путем построения скиаграмм на обычной кальке. Полное восстановление биомеханики сустава аппаратным методом проводилось за счет формирования углового дистракционного регенерата заданных размеров и формы. Данная скиаграмма показывает также возникновение перегрузки мыщелка бедра в процессе устранения деформации за счет смещения оси конечности, а также окончательный результат устранения деформации (рис. 1) и дает возможность визуализировать исход лечения.

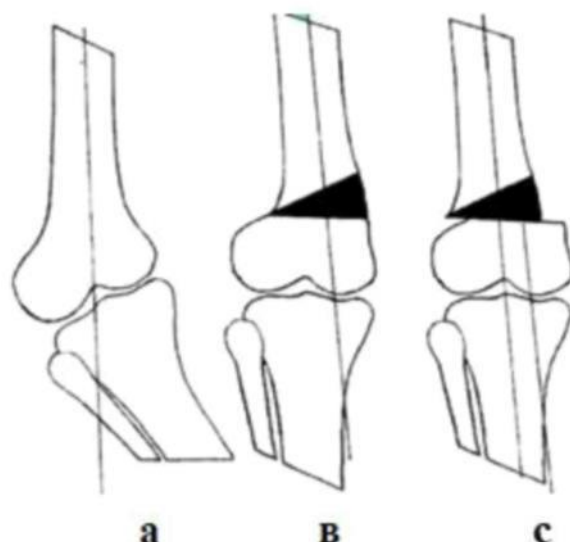


Рис. 1. Скиаграмма рентгеновского снимка пациента П-ва А., 12 лет (и/б. № 2053): а – варусная деформация за счет дистального метаэпифиза правой бедренной кости, в – после устранения фронтальной деформации за счет формирования дистракционного костного регенерата, но со смещенной внутрь оси конечности, с – после устранения деформации с перемещенным проксимальным фрагментом бедренной кости и восстановлением оси конечности

С целью воссоздания биомеханической оси сегмента при устранении деформации сегмента конечности нами были разработаны приставки к аппарату внешней фиксации [3, с.56]. Устранение фронтальной и сагиттальной деформаций, а также патологической торсии производят одновременно в аппарате Илизарова. После этого в периоде созревания дистракционного костного регенерата заданной формы выполняют перемонтаж и домонтаж аппарата путем установки разработанных приставок для коррекции биомеханической оси конечности.

Необходимость разработки данных узлов и приставок вызвана отсутствием таковых в штатных наборах деталей аппарата Илизарова. Более того, устранение угловых деформаций аппаратом Илизарова в общепринятой компоновке не обеспечивает индивидуальный учет патологической позиции оси конечности.

Узлы предлагаемых к клиническому применению приставок к аппарату внешней фиксации для исправления деформаций представлены на рисунке 2.

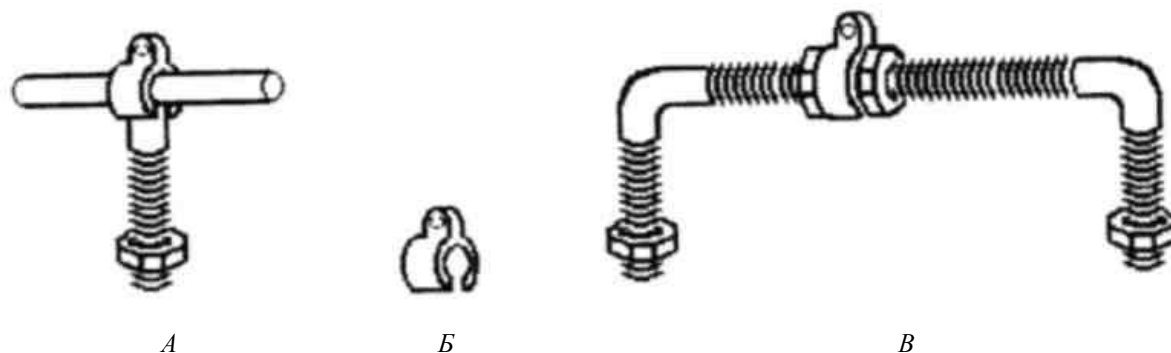


Рис. 2. Оригинальные приставки к аппарату внешней фиксации: А – Т-образная стойка, Б – втулка; В – П-образная резьбовая стойка, на которой размещена передвижная втулка с гайками

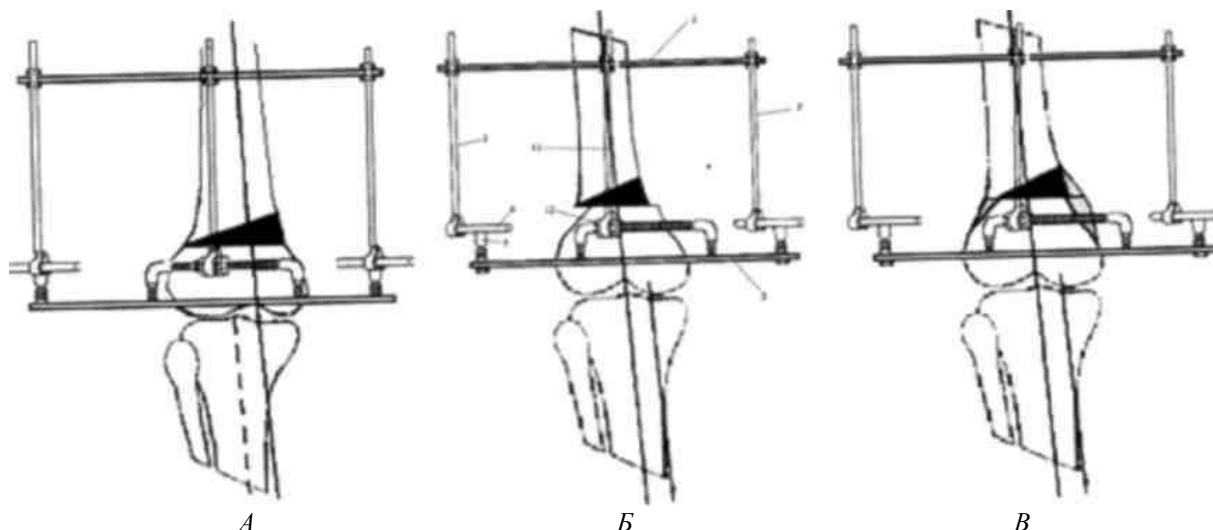


Рис. 3. Аппарат с разработанными приставными узлами для исправления биомеханической оси конечности: А – после устранения деформации за счет формирования дистракционного костного регенерата, но со смещенной внутрь осью конечности; Б – после устранения деформации с перемещенным проксимальным фрагментом бедренной кости и восстановленной осью конечности; В – окончательное формирование дистракционного клиновидного костного регенерата

Как следует из представленных схем формирования многоплоскостного дистракционного регенерата, процедура устранения многоплоскостной деформации является многоэтапной и индивидуальной, требующей постоянного рентгеноконтроля, перемонтажа и домонтажа применяемого аппарата (монтажа и демонтажа деторсионных узлов, приставок для коррекции оси конечности).

Результаты исследования и их обсуждение

Данный алгоритм устранения угловых деформаций костей, образующих коленный сустав, с применением выносных узлов для восстановления биомеханической оси конечности использован при лечении 15 пациентов с многоплоскостными деформациями, превышающими 30 градусов во фронтальной плоскости.

Отдаленные результаты лечения данной группы пациентов были оценены как положительные у 10 пациентов (66,7%). Несмотря на полное восстановление биомеханической оси конечности при устранении всех элементов деформации, все же у 5 были диагностированы гонартрозы I-II степени.

Клинический пример: пациентка П-ва А., 12 лет (и/б. № 2053), в раннем детском возрасте (8 месяцев) перенесла острый гематогенный остеомие-

лит области дистального метаэпифиза левой бедренной кости. Поступила на лечение в отделение детской ортопедии ГАУЗ «РКБ» МЗ РТ с диагнозом: «Вальгусная установка левой нижней конечности за счет деформации дистального метаэпифиза левой бедренной кости». После окончания острого гнойного процесса лечилась у ортопеда по месту жительства. Ей было рекомендовано ношение корригирующего ортеза. Несмотря на проводимое лечение, фронтальная деформация усугублялась и в момент обращения составила 42 градуса. Рекурвационной, атекурвационной, а также выраженной торсионной патологии у больной не выявлено (рис. 4 а, б, в, 5а).

Пациентке была произведена кортикотомия бедра на вершине деформации (рис. 4в, 4г). После создания дистракционного клиновидного костного регенерата по произведенной по рентгенологическому снимку скиаграмме выявилось отклонение биомеханической оси конечности кнаружи. Без обезболивания щадяще произведен перемонтаж аппарата с поочередной установкой разработанных выносных узлов на штанги (рис. 4г, 5б, 5в). В этом заключается подготовка к последнему этапу исправления деформации – восстановлению биомеха-

нической оси конечности путем постепенного перевода дистальной остеотомированной части левой бедренной кости относительно ее проксимального фрагмента. Окончание коррекции контролируется рентгенологически и выполнением по снимкам,

произведенным динамически, и скиаграммам. По завершении процесса восстановления биомеханической оси конечности разработанные узлы демонтируются с установкой штатных резьбовых штанг.

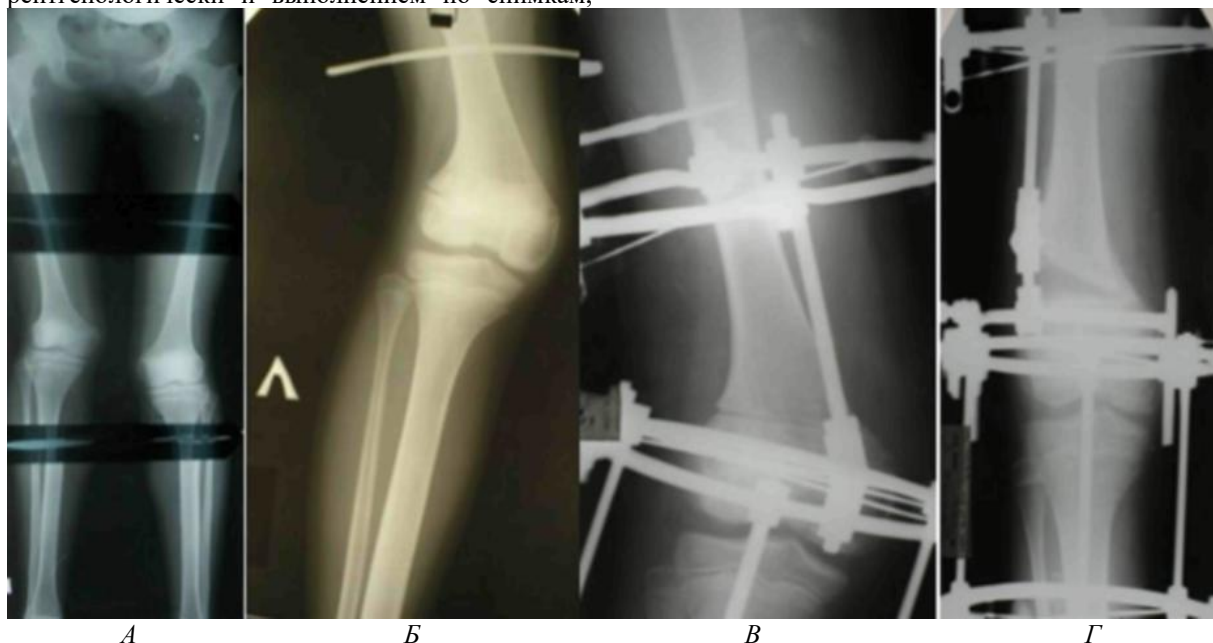


Рис. 4. Рентгенограммы пациентки П-ва А., 12 лет (и/б. № 2053), с осложнением после перенесенного острого гематогенного остеомиелита в виде вальгусной деформации на уровне коленного сустава за счет дистального метаэпифиза левой бедренной кости: А, Б – до операции; В – после произведенной кортикотомии на вершине деформации, начало периода устранения фронтальной деформации, Г – начало периода созревания дистракционного клиновидного костного регенерата, воссоздания биомеханической оси конечности за счет разработанных узлов к аппарату.



Рис. 5. Фото пациентки П-ва А., 12 лет (и/б. № 2053), на этапах устранения патологии: А – до наложения аппарата; Б, В – общий вид конструкции аппарата с наложенными узлами для воссоздания биомеханической оси конечности; Г – результат лечения – ось конечности восстановлена, дана гиперкоррекция при устранении вальгусной деформации на 5°.

Во время аппаратного лечения осуществлялся обычный темп distraction. По окончании купирования деформации коленный сустав освободили от наложенной на голень разгружающей опоры. Пациентка выписана на амбулаторное лечение для окончательного «созревания» distractionного костного регенерата.

Через 65 дней аппарат демонтирован (рис. 5г). Назначены физиомеханопродуры.

Выводы

Проведенный анализ лечения данной категории пациентов показал, что:

- при фронтальных деформациях свыше 30 градусов наиболее часто встречаются сагиттальная, торсионная патологии, сопровождающиеся нарушением биомеханической оси конечности;
- особенно выраженные многоплоскостные деформации наблюдаются у пациентов, перенесших повреждение ростковой пластины кости в младенческом возрасте (вследствие острого гематогенного остеомиелита в области сустава) или раннего детского возраста вследствие травмы;
- для профилактики поздних послеоперационных артрогенных осложнений у детей (ранний гонартроз) процесс устранения деформации аппаратным методом обязательно должен учитывать возможность восстановления биомеханической оси конечности, что должно быть предусмотрено соответственно применяемой конструкцией аппарата;
- воссоздание биомеханической оси конечности как последний этап устранения многоплоскостной деформации положительно влияет на «созревание» distractionного костного регенерата заданной формы;
- положительные результаты лечения пациентов при устранении деформации с воссозданием биомеханической оси конечности достигнуты в 66,7% случаев, тогда как у пациентов группы срав-

нения с применением общепринятого традиционного способа по методу Илизарова – в 40,8% случаев.

Список литературы:

1. Абросимов М.Н. Хирургическая коррекция вальгусной деформации нижних конечностей у взрослых: автореф. дис. ... канд. мед. наук. - Москва, 2019.
2. Моренко Е.С., Кенис В.М. Коррекция осевых деформаций коленного сустава у детей методом управляемого роста (обзор литературы) // Ортопедия, травматология и восстановительная хирургия детского возраста. - 2016. - Т. 4, Вып. 1.
3. Скворцов А.П. Аппарат для восстановления биомеханической оси конечности // Патент №2255694. Патентообладатель Научно-исследовательский центр Татарстана "Восстановительная травматология и ортопедия". - 2005. - Бюл. №19.
4. Скворцов А.П. Хирургическое лечение последствий гематогенного остеомиелита области суставов нижних конечностей у детей: дис. ... докт. мед. наук. - Казань, 2008.
5. Моренко Е.С. Коррекция вальгусных и варусных деформаций на уровне коленных суставов у детей с системными дисплазиями скелета методом управляемого роста: автореф. ... дис. канд. мед. наук. - Москва, 2019.
6. Кавецкий Ю.П. Особенности коррекции посттравматических деформаций голени: автореф. ... дис. канд. мед. наук. - Москва, 2017.
7. Виленский В.А., Поздеев А.А., Зубаиров Т.Ф., Захарьян Е.А., Поздеев А.П. Лечение детей с деформациями длинных трубчатых костей нижних конечностей методом чрескостного остеосинтеза с использованием аппарата Орто-сув: анализ 213 случаев // Ортопедия, травматология и восстановительная хирургия детского возраста. - 2016. - Т.4, № 4.

PEDAGOGICAL SCIENCES

TOOLS AND TECHNIQUES TO DEVELOP HIGHER ORDER THINKING SKILLS IN STUDENTS OF NON-LINGUISTIC TECHNICAL UNIVERSITIES OF UKRAINE DURING ONLINE LEARNING

Nykyporets S.

*Senior Lecturer of the Department of Foreign Languages
Vinnitsia national technical university, Vinnitsia, Ukraine
ORCID ID: 0000-0002-3546-1734*

Stepanova I.

*PhD in Philology, Associate Professor, Head of the Department of Foreign Languages
Vinnitsia national technical university, Vinnitsia, Ukraine
ORCID ID: 0009-0006-4374-1070*

Hadaichuk N.

*Senior Lecturer of the Department of Foreign Languages
Vinnitsia national technical university, Vinnitsia, Ukraine
ORCID ID: 0000-0001-8193-2376
<https://doi.org/10.5281/zenodo.8385809>*

Abstract

This article presents a comprehensive exploration of tools and techniques designed to motivate and develop Higher Order Thinking Skills (HOTS) in students of non-linguistic technical universities of Ukraine engaged in online learning. As critical and creative thinking have become indispensable for academic and professional success, fostering HOTS in this context is paramount. The article addresses the unique challenges faced by students and educators in the virtual learning environment and offers innovative strategies to engage students and promote active learning. We discuss various digital tools, platforms, and approaches that facilitate collaboration and encourage learners to analyse, evaluate, and create while mastering the English language. Drawing on best practices, real-life examples, and recent research, this article provides practical insights and actionable recommendations to help educators enhance the learning experience and equip students with the necessary skills to excel in an increasingly interconnected and competitive world.

Keywords: Higher Order Thinking Skills (HOTS), non-linguistic technical universities, online learning, English language teaching, critical thinking, problem-based learning, innovative strategies.

In today's rapidly evolving global landscape, the ability to think critically and creatively has become an essential skill for success in various fields, particularly in technical disciplines. As educational institutions increasingly shift toward online learning, fostering Higher Order Thinking Skills (HOTS) in students of non-linguistic technical universities has become a pressing concern. This article aims to provide educators with a comprehensive overview of tools and techniques that can be employed to motivate and cultivate HOTS in these students as they navigate the virtual learning environment. By integrating HOTS into their pedagogical practices, educators can better prepare learners to tackle complex challenges, enhance their language proficiency, and ultimately excel in their academic and professional pursuits.

The development of HOTS not only strengthens problem-solving and decision-making abilities but also elevates the overall learning experience, enabling students to apply critical and creative thinking to both their language studies and technical subjects. In this article, we will delve into the challenges and opportunities presented by online learning and explore innovative strategies for engaging students and fostering HOTS within this context. In our article we will discuss various digital tools, platforms, and approaches that facilitate collaboration, promote active learning, and encourage students to analyse, evaluate, and create while mastering the English language. By examining best practices,

real-life examples, and the latest research in the field, this article aims to equip educators with practical insights and actionable recommendations to help students of non-linguistic technical universities thrive in an increasingly interconnected and competitive world.

The formulation of the problem in this context revolves around the need to effectively cultivate Higher Order Thinking Skills among students of non-linguistic technical universities who are engaged in online learning. This issue carries significant relevance for both the scientific and practical domains.

General problem statement

In the digital age, as education increasingly transitions to online platforms, students pursuing technical degrees in non-linguistic fields face a critical challenge: the development of Higher Order Thinking Skills (HOTS) in a virtual learning environment. HOTS encompass essential cognitive abilities such as critical analysis, creative problem-solving, and in-depth evaluation, which are indispensable for academic success and future professional competence.

Connection with important scientific tasks

1. Educational psychology and pedagogy. The problem aligns with ongoing research in educational psychology and pedagogy, where scholars strive to understand how learners can effectively develop HOTS in diverse learning settings. Investigating strategies and tools for nurturing these skills in an online context is a pressing scientific task.

2. Technology-enhanced learning. As technology plays an increasingly central role in education, it is imperative to explore how digital tools and platforms can be harnessed to facilitate the growth of HOTS. This problem bridges the gap between educational theory and technology application.

3. Assessment and evaluation. The development of HOTS calls for innovative assessment methods that accurately measure these skills. Researchers are engaged in creating valid and reliable evaluation techniques, a challenge directly related to the problem at hand.

Connection with important practical tasks

1. Educator professional development. Addressing this problem directly benefits educators who seek effective strategies to engage students and promote HOTS in virtual classrooms. Practical solutions can guide teacher training and development programs.

2. Student success and employability. Equipping students with HOTS is not only essential for academic achievement but also for their future employability. Tackling this problem contributes to a well-prepared, competitive workforce.

3. Online curriculum design. Educational institutions and instructional designers are tasked with creating online curricula that foster HOTS. Identifying practical techniques and tools helps shape the design and delivery of digital courses.

In summary, the problem revolves around nurturing HOTS in students of non-linguistic technical universities engaged in online learning, which is of paramount importance both in scientific research and practical education, impacting educators, students, and the future workforce.

Higher Order Thinking Skills are cognitive skills that involve complex, critical, and creative thinking processes that go beyond the basic recall and understanding of facts. [1] HOTS enable learners to analyse, synthesize, evaluate, and apply information in new and meaningful ways. These skills are essential for problem-solving, decision-making, and independent learning.

The purpose of this article is to provide a comprehensive guide to tools and techniques aimed at fostering HOTS in students of non-linguistic technical universities who are engaged in online learning. In recognition of the critical importance of HOTS for academic and professional success, this article addresses the specific challenges posed by virtual learning environments. It offers innovative strategies to engage students and promote active learning, emphasizing the development of critical and creative thinking skills. By exploring a range of digital tools, platforms, and teaching approaches, this article seeks to empower educators with practical insights and actionable recommendations. Ultimately, the goal is to enhance the online learning experience for students, equipping them with the skills necessary to thrive in today's interconnected and competitive world.

Various researchers and psychologists have contributed to the understanding and development of HOTS. Some prominent figures include: an American educational psychologist, Bloom is best known for creating Bloom's Taxonomy, a hierarchical classification

of cognitive skills. [2] This taxonomy, first published in 1956 and later revised, has been influential in understanding and promoting higher-order thinking skills in education. The higher levels of the taxonomy – analysing, evaluating, and creating – encompass HOTS.

An educational researcher and author, Marzano has contributed significantly to the understanding of teaching and assessment strategies that promote higher-order thinking skills. His research and publications focus on effective instructional practices, including the use of questioning techniques, student engagement, and assessment methods that foster HOTS. [3]

An educational researcher and author, Arthur Costa developed the concept of "Habits of Mind," which are dispositions or patterns of intellectual behaviour that promote critical and creative thinking. [4] Costa's work emphasizes the importance of nurturing these habits in students to foster higher-order thinking skills and lifelong learning.

A cognitive psychologist and educator, David Perkins has researched the development of intelligence, creativity, and HOTS. [5] He has contributed to the understanding of how individuals think and learn and has developed several teaching strategies, such as "Teaching for Understanding" and "Visible Thinking," to promote higher-order thinking in the classroom.

A psychologist, philosopher, and author, Edward de Bono is best known for his work on creative thinking and the development of the "Six Thinking Hats" technique. [6] This method encourages structured and parallel thinking, helping individuals and groups develop higher-order thinking skills by exploring problems and solutions from different perspectives.

An American philosopher, psychologist, and educational reformer, John Dewey was an early advocate of progressive education and experiential learning. He believed that learning should be grounded in real-life experiences and problem-solving, which are essential for developing higher-order thinking skills. [7]

These researchers, among others, have significantly contributed to our understanding of Higher Order Thinking Skills and the methods and strategies that can be used to cultivate these skills in learners. Their work has helped shape educational practices, emphasizing the importance of critical and creative thinking in academic and professional success.

HOTS are grounded in the revised version of Bloom's Taxonomy, a hierarchical classification of cognitive skills. The taxonomy is divided into six levels, with the higher levels indicating more complex thinking processes:

Remembering. Recalling or recognizing information without necessarily understanding it.

Understanding. Grasping the meaning of information and being able to interpret, summarize, or explain it.

Applying. Using knowledge or skills in new situations or solving problems.

Analysing. Breaking information down into its constituent parts to understand relationships, patterns, and underlying structures.

Evaluating. Assessing the quality, credibility, or effectiveness of information, ideas, or arguments.

Creating. Generating new ideas, products, or ways of understanding by combining or reorganizing existing knowledge.

Higher Order Thinking Skills generally refer to the top three levels of Bloom's Taxonomy: analysing, evaluating, and creating. Developing HOTS involves practicing these cognitive processes, encouraging learners to think critically and creatively about the information they encounter. This approach to learning fosters deeper understanding, innovation, and lifelong learning.

To promote HOTS, educators should incorporate activities and assessments that require students to think critically and creatively. [8] Examples include:

- ✓ encouraging discussions and debates on complex topics;
- ✓ asking open-ended questions that require thoughtful responses;
- ✓ assigning projects that require problem-solving, analysis, and synthesis of information;
- ✓ encouraging students to create new solutions, products, or ideas;
- ✓ teaching students to evaluate sources and information for credibility and relevance.

By nurturing higher-order thinking skills, educators help students become more effective learners, problem solvers, and decision-makers, better preparing them for success in the future.

There are several digital tools and resources that can be employed to develop Higher Order Thinking Skills (HOTS) in students of technical universities during English lessons. [9] Here are some popular options:

Collaboration platforms. Tools like Zoom, Microsoft Teams, or Google Meet can be used for real-time discussions, group work, and debates, encouraging students to analyse, evaluate, and synthesize information.

Online discussion boards. Platforms such as Padlet, Edmodo, or Google Classroom can be used to create asynchronous discussion boards or forums, providing opportunities for reflection, analysis, and evaluation of different perspectives.

Interactive quizzes and polls. Tools like Kahoot, Quizlet, or Google Forms can be used to create quizzes, polls, or surveys that require higher-order thinking, such as analysing scenarios, evaluating options, or making predictions.

Digital whiteboards and mind mapping tools. Digital whiteboards (e.g., Miro or Mural) or mind mapping tools (e.g., MindMeister or XMind) can be used to encourage brainstorming, visualizing complex relationships, or organizing ideas during group work or individual tasks.

Multimedia content creation tools. Encourage students to create digital stories, presentations, or videos using tools like Adobe Spark, Canva, or Prezi to practice organizing, synthesizing, and communicating complex ideas.

Reflective blogging or e-portfolios. Have students maintain reflective blogs or e-portfolios using platforms like WordPress or Google Sites, where they can document their learning journey, self-assess their progress, and showcase their achievements.

Peer review and feedback tools. Platforms like Google Docs or peer review tools (e.g., Peergrade) can be used to facilitate the sharing and evaluation of student work, promoting evaluation and communication skills.

Educational games and simulations. Utilize games and simulations, such as those available on BrainPOP or iCivics, to engage students in interactive learning experiences that promote higher-order thinking.

Learning management systems (LMS). Platforms like Canvas, Blackboard, or Moodle can be used to organize course content, assignments, and assessments that emphasize HOTS, providing a structured and integrated learning environment.

Content control and research tools. Encourage students to explore topics of interest, gather resources, and develop their own learning goals using content control tools like Diigo, Scoop.it, or Feedly.

By incorporating these digital tools into English lessons, educators can effectively develop Higher Order Thinking Skills in students of technical universities, preparing them for academic and professional success. [10]

Generating Higher Order Thinking Skills in students at technical universities involves designing and implementing learning experiences that encourage critical and creative thinking. Here are some strategies to promote HOTS in technical university students.

1. Integrate real-world problems. Design courses and assignments that present students with authentic, complex problems relevant to their field of study. This encourages them to apply their knowledge and skills to practical situations, fostering problem-solving and critical thinking.

2. Encourage project-based learning. Implement project-based learning where students work in teams to design, build, or develop solutions to technical challenges. This approach requires students to analyse, synthesize, and evaluate information while also promoting collaboration and communication skills.

3. Use inquiry-based learning. Foster curiosity by presenting students with open-ended questions or scenarios and encouraging them to investigate, research, and analyse information to reach a conclusion. This method promotes critical thinking, analytical skills, and self-directed learning.

4. Promote reflection and self-assessment. Encourage students to reflect on their learning experiences, identify areas for improvement, and evaluate their progress. This process helps develop metacognitive skills and a growth mindset, which are crucial for lifelong learning and continuous improvement.

5. Facilitate peer review and collaboration. Encourage students to review and critique each other's work, providing constructive feedback and suggestions for improvement. This collaborative process helps develop evaluation and communication skills while fostering a deeper understanding of the subject matter.

6. Teach critical evaluation of sources. Instruct students on how to evaluate the credibility, reliability, and relevance of information sources, especially in the context of research and problem-solving. This skill is

essential for HOTS and helps students make informed decisions based on evidence.

7. Offer interdisciplinary courses. Create opportunities for students to explore connections between disciplines by offering interdisciplinary courses or encouraging collaboration between departments. This approach fosters creative thinking and exposes students to diverse perspectives.

8. Organize workshops and seminars. Offer workshops, seminars, or guest lectures that focus on critical and creative thinking skills, problem-solving strategies, or emerging technologies and trends. These events can inspire and motivate students to engage in higher-order thinking.

9. Support extracurricular activities. Encourage students to participate in clubs, organizations, or competitions related to their field of study, as these experiences often involve problem-solving, collaboration, and creative thinking.

10. Model HOTS and provide feedback. Educators should model higher-order thinking skills in their teaching and interactions with students. Offer constructive feedback on students' work, highlighting areas where they demonstrated HOTS and suggesting ways to improve.

By implementing these strategies, technical university educators can foster an environment where students develop and practice higher-order thinking skills, better preparing them for success in their careers and as lifelong learners. [11]

When students at technical universities who are just beginning to learn English try to generate Higher Order Thinking Skills (HOTS), they may face several challenges.

Limited vocabulary. A limited English vocabulary can make it difficult for students to express complex ideas, analyse information, or engage in higher-order thinking tasks. They might struggle to understand and use subject-specific terminology, which can hinder their ability to analyse, evaluate, and create.

Language comprehension. Students with limited English proficiency may struggle to understand complex texts, lectures, or instructions. This can make it difficult for them to grasp essential concepts, analyse relationships between ideas, or evaluate arguments and evidence.

Communication barriers. Students may face difficulties in participating in class discussions, debates, or group projects due to language barriers. This can limit their opportunities to practice critical and creative thinking, as well as hinder their ability to collaborate and learn from their peers.

Cognitive load. Learning a new language while simultaneously trying to develop higher-order thinking skills can impose a significant cognitive load on students. This added mental effort may cause fatigue, reduced motivation, or slower progress in both language acquisition and HOTS development.

Cultural differences. Students may experience challenges in understanding cultural references, idioms, or context-specific information, which can affect their ability to analyse, evaluate, or create within an English-speaking academic environment.

Inaccurate self-assessment. Students may struggle to accurately assess their own understanding of concepts or their progress in developing HOTS due to language barriers, which can lead to misconceptions or overconfidence.

To address these challenges and support students in generating HOTS while learning English, educators can consider the following strategies.

1. Provide language support. Offer additional language classes, tutoring, or resources to help students improve their English proficiency, focusing on both general and subject-specific vocabulary.

2. Use visual aids and multimedia. Utilize visual aids, diagrams, videos, and other multimedia resources to help students better understand complex concepts and relationships, even if their language skills are limited.

3. Encourage collaboration. Pair or group students with varying levels of English proficiency to promote peer support and learning, allowing more proficient students to help those who are struggling.

4. Simplify language. Use clear, simple language and avoid unnecessary jargon when presenting information or giving instructions, while still maintaining the complexity of ideas and concepts.

5. Scaffold learning. Break down complex tasks into smaller, manageable steps, providing guidance and support as students' progress through the learning process.

6. Foster a supportive environment. Create a classroom culture that encourages students to ask questions, seek help, and share their thoughts without fear of judgment or ridicule.

7. Incorporate native language resources. Where possible, provide resources or allow students to access materials in their native language to support their understanding of complex concepts and ideas.

Generating Higher Order Thinking Skills in students at technical universities involves designing and implementing learning experiences that encourage critical and creative thinking. [13] Here are some strategies to promote HOTS in technical university students.

Interactive multimedia content. Develop or curate interactive multimedia content, such as simulations, virtual labs, or games that require students to analyse, evaluate, or create as they engage with the material.

Online project-based learning. Assign collaborative projects that require students to research, design, or develop solutions to real-world problems using online tools and resources. This promotes higher-order thinking skills, as well as communication and collaboration in a virtual environment.

Peer review and feedback. Use platforms like Google Docs or peer review tools (e.g., Peergrade) to facilitate the sharing and evaluation of student work. Encourage students to provide constructive feedback to their peers, fostering evaluation and communication skills.

Digital storytelling and presentations. Encourage students to create digital stories, presentations, or videos using tools like Adobe Spark, Canva, or Prezi to

practice organizing, synthesizing, and communicating complex ideas.

Reflective blogging or e-portfolios. Have students maintain reflective blogs or e-portfolios using platforms like WordPress or Google Sites, where they can document their learning journey, self-assess their progress, and showcase their achievements.

Synchronous and asynchronous coaching. Offer real-time (synchronous) or pre-recorded (asynchronous) coaching sessions, tutorials, or workshops focused on developing higher-order thinking skills and strategies, tailored to students' needs and interests.

By using these tools and techniques in the online learning environment, educators can support the development of Higher Order Thinking Skills among students at non-linguistic technical universities, preparing them for success in their academic and professional pursuits. [14]

Incorporating Higher Order Thinking Skills into online English teaching for students of non-linguistic technical universities can yield several positive outcomes.

- ✓ **Enhanced language proficiency.** HOTS encourage students to actively engage with complex ideas and concepts in English, resulting in improved vocabulary, grammar, reading, writing, listening, and speaking skills.

- ✓ **Improved critical thinking.** By practicing HOTS, students learn to analyse and evaluate information, arguments, and ideas in English. This enables them to make well-informed decisions and develop logical reasoning abilities.

- ✓ **Better problem-solving skills.** Integrating HOTS in online learning helps students develop the ability to identify, analyse, and solve real-world problems using their English language skills, preparing them for professional challenges in their field.

- ✓ **Increased creativity.** When HOTS are emphasized in English teaching, students learn to generate original ideas, innovate, and think outside the box. This creativity can be applied to their language learning as well as their technical subjects.

- ✓ **Greater collaboration and communication.** Online learning activities that promote HOTS often involve teamwork, discussion, and debate. Students develop their ability to communicate effectively, negotiate, and collaborate with others in English, enhancing their interpersonal skills.

- ✓ **Higher engagement and motivation.** HOTS-based learning activities tend to be more engaging and stimulating, motivating students to actively participate and invest in their English language learning.

- ✓ **Deeper understanding of subject matter.** Incorporating HOTS allows students to better comprehend complex concepts related to their technical subjects, as they learn to analyse, synthesize, and evaluate information in English.

- ✓ **Development of metacognitive skills.** HOTS encourage students to reflect on their learning process, assess their progress, and develop strategies for improvement. This self-awareness and metacognition promote lifelong learning and adaptability.

- ✓ **Improved academic performance.** Students who develop HOTS typically demonstrate better academic performance, as they can apply their critical thinking, problem-solving, and creativity to both their English language studies and their technical subjects.

- ✓ **Enhanced career prospects.** Possessing strong HOTS and English language skills can increase students' employability and career opportunities, as these skills are highly valued in the global job market.

By integrating Higher Order Thinking Skills into online English teaching for students of non-linguistic technical universities, educators can help learners maximize their potential, excel academically, and prepare for successful careers in their chosen fields. [15]

Implementing Higher Order Thinking Skills (HOTS) in online English teaching for students of non-linguistic technical universities can be a rewarding endeavour, but it comes with its own set of challenges. Here are some of the key problems associated with this implementation.

1. **Limited Language Proficiency.** Many students in non-linguistic technical universities may have basic English language proficiency, making it challenging to engage in HOTS activities that require complex language comprehension and expression. Bridging this gap is a significant hurdle.

2. **Technical Competence.** Online learning often requires students to navigate digital tools and platforms effectively. Some students, particularly those in technical fields, may lack the necessary technical skills to fully engage in online HOTS activities.

3. **Lack of Motivation.** Keeping students motivated in an online environment can be challenging. Engaging in HOTS activities often requires sustained effort and critical thinking, which may be difficult to maintain without face-to-face interactions and immediate feedback.

4. **Time Management.** Balancing HOTS activities with technical coursework and other commitments can be a time-consuming task for students. Many may struggle to allocate sufficient time for in-depth analysis and creative thinking.

5. **Assessment and Feedback.** Assessing HOTS in an online setting can be complex. Educators may face difficulties in designing assessments that authentically measure higher-order thinking skills, and providing timely, constructive feedback can be challenging. [16]

6. **Digital Divide.** Not all students have equal access to technology and the internet. Some may lack the necessary devices or a stable internet connection, which can hinder their participation in online HOTS activities.

7. **Isolation and Engagement.** Online learning can be isolating, making it harder for students to engage in collaborative HOTS activities. Building a sense of community and encouraging active participation can be challenging in virtual classrooms.

8. **Adaptation of Teaching Strategies.** Educators may need to adapt their teaching methods and materials to effectively promote HOTS online. Traditional pedagogical approaches may not always translate seamlessly to the digital environment. [17]

9. Cultural and Linguistic Diversity. Non-linguistic technical universities often have diverse student populations with varying language backgrounds and cultural contexts. Adapting HOTS activities to accommodate this diversity can be complex.

10. Teacher Professional Development. Preparing educators to effectively facilitate HOTS in an online English teaching context is crucial but requires ongoing professional development. Many instructors may need training to master online HOTS strategies.

11. Resource Constraints. Developing and implementing HOTS activities can require additional resources, such as specialized software, content, or support staff. Budget constraints can limit the scope of these initiatives.

Addressing these challenges requires a thoughtful approach that considers the specific needs and context of non-linguistic technical universities. It may involve a combination of pedagogical innovation, technological support, teacher training, and ongoing evaluation to ensure the successful integration of HOTS into online English teaching.

In conclusion, fostering Higher Order Thinking Skills in students of non-linguistic technical universities of Ukraine is essential for their academic and professional success in an increasingly interconnected and competitive world. As online learning becomes more prevalent, it is imperative for educators to harness the potential of various digital tools and techniques to motivate and cultivate HOTS in their students. This article has outlined numerous strategies, tools, and platforms that can be integrated into English lessons to facilitate collaboration, active learning, and critical and creative thinking. By employing these approaches, educators can not only enhance students' language proficiency but also equip them with the vital skills needed to excel in their technical disciplines and future careers.

It is important to recognize that each learning environment and student population is unique, and educators should adapt and customize these tools and techniques to best suit their specific context. By continually reflecting on their teaching practices and staying informed of the latest developments in educational technology and pedagogy, educators can ensure that their students are well-prepared to tackle the complex challenges they will face in the 21st century.

References:

1. Anderson, L. W., Krathwohl, D. R., Airasian, P. W., Cruikshank, K. A., Mayer, R. E., Pintrich, P. R., et al. (2001). A taxonomy for learning, teaching, and assessing: A revision of Bloom's taxonomy of educational objectives. New York: Longman.
2. Bloom, B. S., Engelhart, M. D., Furst, E. J., Hill, W. H., & Krathwohl, D. R. (1956). Taxonomy of educational objectives: The classification of educational goals. Handbook I: Cognitive domain. New York: David McKay.
3. Marzano, R. J. (2001). Designing a new taxonomy of educational objectives. Thousand Oaks, CA: Corwin Press.
4. Costa, A. L., & Kallick, B. (2008). Learning and leading with habits of mind: 16 essential characteristics for success. Alexandria, VA: ASCD.
5. Perkins, D. (2009). Making learning whole: How seven principles of teaching can transform education. San Francisco, CA: Jossey-Bass.
6. de Bono, E. (1985). Six thinking hats. New York: Little, Brown and Company.
7. Dewey, J. (1938). Experience and education. New York: Macmillan.
8. Yaniawati, P. (2017). E-Learning to Improve Higher Order Thinking Skills (HOTS) of Students. *Journal of Education and Learning (EduLearn)*, 7, 109. DOI:10.11591/edulearn.v7i2.225.
9. Siemens, G. (2005). Connectivism: A learning theory for the digital age. *International Journal of Instructional Technology and Distance Learning*, 2(1), 3-10.
10. Nykyporets, S. S. (2021). Interactive technologies in foreign language lessons as a way of critical thinking formation for students of non-linguistic universities. In *International scientific and practical conference «Philological sciences, intercultural communication and translation studies: theoretical and practical aspects»: conference proceedings (February 26-27, 2021)* (pp. 156-160). Publishing House "Baltija Publishing".
11. Hadaichuk, N., Herasymenko, N., Melnyk, O., Nykyporets, S., & Slobodianiuk, A. (2020). Stimulation of Students' Cognitive Activities in the Process of Foreign Language Learning. *World Science*, 3, 6-10.
12. Zepke, N., & Leach, L. (2010). Improving student engagement: Ten proposals for action. *Active Learning in Higher Education*, 11(3), 167-177.
13. Brookhart, S. M. (2010). How to assess higher-order thinking skills in your classroom. Alexandria, VA: ASCD.
14. Kivunja, C. (2020). Innovative pedagogies in higher education to become effective teachers of 21st century skills: Unpacking the learning and innovations skills domain of the new learning paradigm. *International Journal of Higher Education*, 9(6), 47-60.
15. Dabbagh, N., & Kitsantas, A. (2012). Personal Learning Environments, social media, and self-regulated learning: A natural formula for connecting formal and informal learning. *The Internet and Higher Education*, 15(1), 3-8.
16. Nykyporets, S. S., Melnyk, O. D., Hadaichuk, N. M., Derun, V. H., & Chopliak, V. V. (2023). Neuropedagogical approach enhancing foreign language acquisition in non-linguistic higher education institutions. *Current Issues in Modern Science*, 5(11), 341-355.
17. Nykyporets, S. S., Hadaichuk, N. M., & Herasymenko, N. V. (2021). Innovative distance learning technologies for teaching foreign languages to students of non-linguistic universities. In *Proceedings of the 1st International Scientific and Practical Conference «Current Issues and Prospects for the Development of Scientific Research». Vol. 46: 76-82*. Scientific Publishing centre InterConf.

PHILOLOGICAL SCIENCES

SEMANTIC OPPOSITION “DAY GUEST / NIGHT GUEST” IN THE KOREAN LANGUAGE

Kim O.

*PhD in Philology, expert
Research Center for Korean Studies
at the Uzbek State University World Languages,
Tashkent, Uzbekistan*

Lvova I.

*Associate Professor, scientific researcher
Research Center for Korean Studies
at the Uzbek State University World Languages,
Tashkent, Uzbekistan*

Elkin D.

*Ph.D. in Philology, scientific researcher
Research Center for Korean Studies
at the Uzbek State University World Languages,
Tashkent, Uzbekistan
<https://doi.org/10.5281/zenodo.8385831>*

The research is carried out within the framework of a grant from the Academy of Korean Studies of the Republic of Korea (Research project No. AKS – 2021-INC-2230010)

Abstract

The study of semantic oppositions is extremely effective in determining language changes under the influence of interlinguistic and extralinguistic factors. The study of the semantic opposition «*day guest / night guest*» on the material of Korean paremias recreating human actions, attitudes, motives, habits, behavioral styles and interests revealed a number of features of the mutual influence of language and culture, and the interpersonal perception of people within one nation forms certain norms of morality, ethics, culture of communication, creating a socio-cultural background of their nation. The article attempts to determine the causes of particular cases of semantic oppositions, and the study of the interaction of semantic and word-formation processes retains a certain interest.

Keywords: semantic opposition, linguocultural processes, word formation processes, etymology, paremia, constant “guest”, national and cultural specifics.

Introduction. The analysis of the meaning of words is an area where etymological research is particularly often drawn to realities, extra-linguistic arguments, using data from a wide variety of fields of knowledge. The whole life of words in a language – their formation on the basis of pre-existing words or borrowing from another language, their further use, change in meaning and sound, prolonged existence or disappearance – is connected with the nature, features and history of those objects, phenomena, concepts that these words denote. The etymologist must imagine the world of realities behind the words. This is the reason for the constant contact of etymology with other sciences – history, economics, history of culture, history of technology, natural sciences – in their very different combinations. ... Thus, etymology owes much to the data of other fields of knowledge. However, this connection is reversible: etymological studies of words leading their history from ancient times make it possible to restore many aspects of life, culture, economy of ancient peoples, enriching history, ethnography and other sciences [Varbot J.J., 2001].

Studying linguistic units, a linguist acquires the opportunity through language to «penetrate into the sphere of mentality hidden from us, because it deter-

mines the way the world is divided in a particular culture. He tells us things about a person that the person himself does not even guess» [Maslova V.A., 2001].

The purpose of the study is to identify linguistic and cultural processes caused by the peculiarities of the Korean mentality. Research objectives: to determine the etymology of the lexemes «*day guest / night guest*», to analyze the extralinguistic processes that influenced their transformation, change in meaning, structure and sound composition. The research material was cultural research collected in the Encyclopedia of Korean National Culture and paremiological units from the NAVER 국어사전 dictionary. The study is of a complex nature, which led to the use of semantic analysis, comparative method, as well as the traditional descriptive method consisting in the selection, characterization and classification of factual material. The paper gives an etymological description of the lexemes «*day guest / night guest*», as well as an analysis of extra-linguistic arguments that influenced their formation on the basis of pre-existing words, their further use, and the change in meaning in the Korean language.

The main part. In different cultures there is a common, created in each historical epoch by human society in science and art, social life and mores, customs and traditions, but there is also a specific, peculiar. In

the semantics of each natural language, in its system organization and speech implementations, the spiritual riches of the world are embodied, and the language of the people reflects the world through the prism of human actions, relationships, motives and interests [Ter-Minasova S.G., 2000].

Language is an instrument of culture: it shapes a person, determines his behavior, lifestyle, worldview, mentality, national character. Through language, a person gets an idea of the world and the society of which he has become a member, about its culture, about the system of values, morality, behavior, etc. According to V. Humboldt, language stands between man and the world: «This is the world lying between the world of external phenomena and the inner world of man» [Humboldt B., 2000].

An important place in the formation of identity is occupied by cultural values, which are fundamental in the self-determination of both the state and the individual. Identity from such a position can be defined as self-portrait, self-awareness or self-characterization [Jeffrey T., Checkel P., 2009].

The study of the semantic opposition «*day guest* / *night guest*» on the material of Korean proverbs and sayings recreating human actions, attitudes, motives, habits, behavioral styles and interests revealed a number of features of the mutual influence of language and culture on the socio-cultural background. After all, it is the interpersonal perception of people that forms certain norms of morality, ethics, and communication culture, creating the socio-cultural background of the nation.

Semantics of the lexemes «*낮 손님* / *밤손님*» [nat sonnim/bamsonnim] *day guest* / *night guest* in Korean have the following dictionary entries:

1) «*낮 손님*» [nat sonnim] – a guest who came during the day; in the figurative meaning «*day thief*» (낮도둑 [natdoduk]), for example: a) 해물촌은 낮 손님과 저녁 손님의 취향이 구별된다 [Haemulchoneun nat sonnimgwa jeonyeok sonnimui chwihiyangi gubyeoldoenda]. *Seafood Village offers different tastes for day and evening guests (customers).*; b) 지난해1~5월의 OO 지역 아파트 침입 절도 사건 743건을 분석한 결과 63%가 낮 손님이었던 것으로 나타났다 [Jinanhae1~5wolui OO jiyek apateu chimip jeoldo sageon 743geoneul bunseokhan gyeolgwa 63%ga nat sonnimieotdeon geoteuro natanatda]. *As a result of the analysis of 743 cases of burglaries with penetration into apartments in the period from January to May of last year in the area of the NGO, it was found that 63% are daytime guests (hiefs).*

2) a guest who came in the evening / at night; figuratively, «*night thief*» («*밤도둑*» [bamdoduk]), for example: a) 낮 손님 못지않게 밤손님도 많은 숙박업인 만큼 투숙객을 세는 일은 오후 2시에 시작해 다음 날 새벽 2낮 손님3시에나 끝난다 [Nat sonnim motjiange bamsonnimdo maneun sukbakeopin mankeum tusukgaekeul seneun ileun ohu 2sie sijakhae daeum nal saebyeok 2nat sonnim3siena kkeutnandada]. *Since this is a hotel business with the same number of both night and day guests, the counting of guests starts at 14:00 and ends at 2:00 and 3:00 the next morning.*; b) 어젯밤에 밤손님이 들어 패물을 몽땅 가져가 버렸다 [Eojetbame bamsonnimi deuleo paemuleul mongttang gajyeoga beoryeotda]. *Last night a night guest(hief) snuck in and took all the jewelry.*

Let's consider dictionary entries reflecting the semantics of the words «*낮도둑* / *밤도둑*» [natdoduk / bamdoduk] *day thief* / *night thief*:

1) «*낮도둑*»[natdoduk] – a person stealing in broad daylight; metaphorically about a greedy and unscrupulous person, for example: a) 휴가철은 낮도둑도 많은 철이 [[Hyugacheoleun natdodukdo maneun cheolida]. *The holiday season is also the season when there are a lot of daytime thieves.*;

2) «*밤도둑*» [bamdoduk] – stealing other people's things at night or the one who steals the night, for example: 밤도둑이야 흔히 있는 일으로되 찻집산중도 아니고 이목이 뚜렷한 백주에 날강도를 만났구나 싶더니....«*박경리, 토지*» [Bamdodukiya heunhi itneun ilirodoe cheopcheopsanjungdo anigo imoki tturyeothan baekjue nalgangdoreul mannatguna sipdeoni....«*Bak Gyeongri, Toji*»]. *Night thieves are a common occurrence, but I could not even think that I would meet a thief not in the remote mountains, but in broad daylight ... (Pak Kenri, «Earth»).*

In the modern «Criminal Code» of the Republic of Korea, in «Article 329 Theft of property», it is stated that «A person who steals property belonging to another person is subject to punishment in the form of forced labor for a period of no more than six years or a fine of no more than ten million won.». And in «Article 330 Complex the case of theft of property» indicates that «A person who steals property belonging to another person by illegally entering a dwelling, a protected building, a structure, a ship or an occupied room at night, subject to punishment in the form of forced labor for up to ten years.». As we can see, the law provides for a more serious punishment for theft at night.

Let us turn to the analysis of paremiological units with the lexeme «*thief*» (도둑 [doduk]) in Korean and their equivalents in Russian [Table 1]:

Table 1.

<i>Paremiological units with the lexeme «thief» in Korean and their equivalents in Russian</i>			
	Proverbs in Korean	Semantics	Equivalents in Russian
1.	1 도둑고양이가 살찌라 [Dodukgoyangiga saljjirya]. <i>Will the cat-thief survive?</i>	That someone who is always hungry for someone else's cannot accumulate wealth.	No matter how much a thief steals, he will always be provoked. / You can't make money by stealing stone chambers. Thieves' acquisition will not work for the future. A thief's penny is of no use.
2.	2 도둑고양이가 제사상에 오른 꼴 [Dodukgoyangiga jesasange oreun kkol]. <i>Like a cat thief who jumped on the memorial table.</i>	Bad people do ruthless things.	The cat also climbs into the window. A cruel person cruelly punishes.
3.	3 도둑고양이더러 제물 지켜 달라 한다 [Dodukgoyangideoreo jemul jikyeo dalra handa]. <i>Ask the cat thief to guard the memorial table.</i>	If you entrust the fish to a cat, then it is obvious that the cat will eat the fish.	They let the goat into the garden. / Entrusted to the wolf to graze sheep. A man is no stranger to stealing. There is no constipation against a thief.
4.	4 딸은 예쁜 도둑 [Ttaleun yeppeun doduk]. <i>The daughter is a beautiful thief.</i> 딸은 산적 도둑이라 하네 [Ttaleun sanjeok dodukira hane]. <i>They say that my daughter is a bandit and a thief.</i>	Parents, raising a daughter, spend more than on a son. The daughter spends her parents' money even after she gets married, but the parents are so attached to their daughter that in their eyes she is even nicer.	A daughter in a cradle, and a dowry in a box. A daughter is someone else's treasure.
5.	5 딸 삼 형제 시집보내면 고무 도둑도 안 든다 [Ttal sam hyeongje sijipbonaemyeon gomu dodukdo an deunda]. <i>If you marry off three daughters, the thief will have nothing to steal.</i>	1. That raising a daughter and her marriage cost a lot of money, so life in the family is very difficult. 2. That married daughters will take everything from home, and will not even leave their livelihood.	To marry off a daughter is not to bake a pie. His child and humpback, yes cute. Father's blessing is not good for a bad child For a mother, a child up to a hundred years old is a cub. Maternal affection knows no end.
6.	6 바늘 도둑이 소도둑 된다 [Baneul doduki sododuk doenda]. <i>Thief of bags [boxes] for needles.</i> 바늘 찌미에서 도둑이 난다 [Baneul ssamjieseo doduki nanda]. <i>A needle thief becomes a cow thief.</i>	That a person who steals needles will eventually steal a cow. Committing minor offenses will lead to a big crime.	Whoever steals the egg will steal the chicken.
7.	7 낮에 난 도깨비(도둑) [Nate nan dokkaebi(doduk)]. <i>Day goblin [thief].</i>	About a strange person, or pejoratively about an insignificant person.	Day ring, night well done. He won't say, he won't dance. No bitches, no hook, no doodle.
7.	8 서투른 도둑이 첫날밤에 들킨다 [Seotureun doduki cheotnalbame deulkinda]. <i>A clumsy thief is caught on the first night.</i>	About a person who, after committing a misdemeanor, is accidentally caught.	Although stealing wisely, but there will be troubles. A thief steals not for profit, but for death.
8.	9 도둑의 두목도 도둑이요 그 줄개도 또한 도둑이라 [Dodukui dumokdo dodukiyo geu jolgaedo]	About a superior person and his subordinate, who only observes his misdeeds (crimes), which is equally	Not only the thief who steals, but also the one who indulges thieves. / The thief on the thief, the thief drives.

		ttohan dodukira]. <i>The leader of the thieves is also a thief, and his henchman is also a thief.</i>	bad.	
9.	10	도둑(의) 집 개는 짖지 않는다 [Doduk(ui) jip gaeneun jitji anneunda]. A domestic dog does not give a thief.	That if the boss does a bad job, the subordinate also forgets his duties and becomes careless.	Don't be afraid of a rattling dog, but be afraid of a silent one. Not the dog that bites that barks, but the one that is silent and wagging its tail.
10.	11	도둑이 도둑이야 한다 [Doduki dodukiya handa]. <i>The thief shouts: «Thief!»</i> 도둑이 매를 든다 [Doduki mae-reul deunda]. <i>The thief raises the stick</i>	About a man who tried to hide his sins, but instead revealed them. About a person who has done something wrong, but at the same time scolds another.	He runs ahead of himself, but shouts: «Stop the thief!». A wedge is knocked out by a wedge, a thief is ruined by a thief.
11.	12	도둑놈이 제 발자국에 놀란다 [Doduknomi je baljaguke nolranda]. <i>The thief is afraid of his own steps.</i>	About a person who has done something wrong, and in order to hide the offense, criticizes others, thereby revealing himself.	A thief is like a hare – and he is afraid of his shadow.
12.	13	도둑놈이 제 말에 잡힌다 [Doduknomi je male japhinda]. <i>Thief caught in his own words.</i> 도둑이 제 발 저리다 [doduki je bal jeorida]. <i>The thief's feet itch.</i>	About a person who has done something wrong, but exposes himself in his own words, without even suspecting it.	The thief's hat is on fire.
13.	14	나무 도둑과 숟가락 도둑은 간 곳마다 있다 [Namu dodukgwa sut-garak dodukeun gan gotmada itda]. <i>Thieves of firewood and thieves of spoons are everywhere.</i>	That there are always and everywhere petty thieves.	The thief and pestilence will not be transferred to the century. / On the forest and the priest is a thief (i.e. everyone steals firewood).
14.	15	열 사람이 지켜도 한 도둑놈을 못 막는다 [Yeol sarami jikyeodo han doduknomeul mot makneunda]. <i>And ten people won't be able to stop the thief.</i> 지키는 사람 열이 도둑 하나를 못 당한다 [Jikineun saram yeoli doduk hanareul mot danghanda]. <i>And ten guards won't be able to catch the thief.</i>	That the bad behavior of one person cannot be prevented even by a large number of people.	You can't see a thief. / There is no constipation against a thief.
15.	16	피 다 잡은 논 없고 도둑 다 잡은 나라 없다 [Pi da japeun non eopgo doduk da japeun nara eopda]. <i>There is not a single rice field that is not stained with blood, and there is no country that has caught all the thieves.</i>	About the difficulty of preventing unforeseen disasters, no matter how carefully you control them or try to prevent them.	The land will not be empty as a thief, even if he is hanged.
16.	17	산속에 있는 열 놈의 도둑은 잡아도 제 맘 속에 있는 한 놈의 도둑은 못 잡는다 [Sansoke itneun yeol nomui dodukeun japado je mam soke itneun han nomui dodukeun mot japneunda]. <i>Even if you catch 10 thieves hiding in the mountains, you can't catch a thief in yourself.</i>	About a man who finds it very difficult to correct the bad in himself.	No locks will save you from your thief. You can't protect yourself from a home thief.
17.	18	의사와 변호사는 나라에서 내놓은 도둑놈이라 [Uisawa byeonhosaneun naraeseo naenoteun	Sarcastic remark that doctors and lawyers practice with the permission of the	The Altyn thief is hanged, the fifty is honored. Not only the thief who

		doduknomira]. <i>Doctors and lawyers are thieves bred by the state.</i>	state, but there are those among them who demand exorbitant remuneration.	steals, but also the one who indulges thieves.
18.	19	아는 도둑놈 묶듯 [Aneun doduknom mukdeut]. <i>It's like he's tying up a thief he knows.</i>	About a man who weakly and weakly ties a rope (= «It's like tying someone you know.»).	To indulge a thief is like stealing yourself.
19.	20	도둑놈이 췌나락을 헤아리라 [Doduknomi ssitnarakeul hearirya]. <i>Will the thief count the drawings?</i>	Sarcastically about a person who acts only taking into account immediate interests, and not the future good.	To the thief, stolen goods seem to be a penny, to the owner – a ruble.

Since ancient times, theft has been regarded as a serious social crime. Judging by the section «8 Laws» in Ancient Choson, which prohibited murder, theft and adultery, «a thief caught stealing someone else's property became a slave.» Ancient Joseon is the first ancient state on the Korean peninsula, which, as indicated in the source Samguk Yusa (삼국유사 / 三 三), was founded by Dangun Wanggom. The Korean historical community as a whole recognizes that Ancient Joseon was a state located on the territory of the modern Chinese province of Liaoning and North Korean Hwangghedo, Pyeongdo, Hamgyongdo and Gangwon and dating back to the Bronze Age civilization, but numerous disputes are caused by the age, territory, history and culture of Ancient Choson, as the information contained in historical monuments are few and abstract.

«8 of the law» (8조법금 / 八條法禁 / Paljobeopgeum) the Ancient Choson sent in «Hanseo» (한서 / 漢書 /) – in the records about the history of the Han dynasty, written, Ban Go (반고 / 班固) during the dynasty of Later Han), have the right features, like the early Roman, used in all stages of social development. The «8 Laws», although they have some differences, are in general almost similar to the laws of Puyo, Goguryeo, Baekje and Silla.

In the era of the Three States (삼국 시대 / 三國時代 / [Samguk sidae]), if the thief could not refund the payment (in 10-fold in Buyeo (부여 / 夫餘/扶餘 / [Buyeo]), a 12-fold in Goguryeo (고구려 / 高句麗), together with him became slaves to his wife and children.

Many ancient civilizations in world history also had laws to punish thieves. In ancient China, punishments were fixed in dynastic codes. The purpose of the punishment was to intimidate the criminal and cause him physical suffering by self-mutilation. The system of punishments that developed during the reign of the Qin Dynasty (III century BC) was characterized by extreme cruelty.

According to the «Code of Hammurabi»: «If a thief steals at least one farm animal: a cow, bull, sheep, donkey, pig or goat, he must pay compensation tenfold. If the thief has no money to compensate, he will be executed. For stealing seeds... – cutting off hands. If the theft occurred in a certain area and the thief is not caught, the village must pay compensation.» The Code of Hammurabi is an ancient Babylonian code of laws promulgated by King Hammurabi, who ruled Babylon

from 1792 to 1750 BC. It was known as the oldest written law in the world before the discovery of the Sumerian codes of laws – the Ur-Nammu Code, which existed more than a hundred years earlier.

From the code of laws «12 tables of the Roman Empire» (Lat. Leges duodecim tabularum): «Arsonists, thieves and those who invade foreign lands without permission are punishable by death.» Anyone could kill a night thief captured with weapons in his hands. The day thief was subject to physical punishment, and then given to the victim (i.e., turned into slavery). The «12 tables of the Roman Empire» – a set of laws in Ancient Rome 451 – 450 BC, regulating almost all branches, represent the first written source of the law of Ancient Rome, remaining the basis of Roman public law until the II century AD. [Pokrovskiy I.A., 1999].

The punishment for theft is also mentioned in the Bible. A thief caught in the act at night was allowed to be killed with impunity. «If a thief was caught trying to dismantle the wall of a house and killed, then the murderer is innocent. But if it happened after sunrise, then the murderer is guilty.» (Exodus 22:2-3). Friendship with thieves is strictly condemned in the Bible. «You see a thief and you are friends with him, you are an accomplice to adulterers...» (Psalms 49:18) «Whoever is a thief's friend is his own enemy: he hears how the thief is cursed, but keeps quiet.» (Proverbs 29:24) «Your nobles are apostates, they make friends with thieves.» (Exodus 1:23).

Conclusion. The spiritual riches of the world are embodied in the semantics of each natural language, in its system organization and speech implementation, and the language of the people reflects the world through the prism of human actions, relationships, motives and interests [Daukshite Jovita, 2013].

The study of the complex image of the lexeme «guest» in the Korean language is impossible without knowledge of the culture, literature and history of the Korean people. This knowledge forms the psychological basis of the collective consciousness of the people, generalized by a visual representation of the surrounding world and reflected in the linguistic consciousness and in the linguistic picture of the world. An inexhaustible source of studying the perception of the «guest» at the level of the Korean mentality are proverbs and sayings that have preserved wisdom, understanding of the world and attitude to it.

The linguistic ontology of the constant «guest» in the Korean language is represented by a set of linguistic means potentially adapted to the expression of national and cultural specifics. The analysis of the semantic opposition «**낮 손님** [nat sonnim] *day guest* / **밤손님** [bamsonnim] *night guest*», manifested through the figurative meaning «**낮도둑** [natdoduk] *day thief* / **밤도둑** [bamdoduk] *night thief*» on the example of Korean proverbs and sayings, revealed a number of features of the mutual influence of language and culture on the socio-cultural background. Since ancient times, theft has been considered an unforgivable crime in Korean society (도둑이 없으면 법도 쓸데없다 [Doduki eopeumyeon beopdo sseuldeeopda]. *If there is no theft, there is no need for laws* (metaphorically that theft is the worst). Koreans' perception of theft has formed certain norms of morality, ethics, culture of communication, creating a socio-cultural and legal background of the nation, which is reflected in their proverbs and sayings.

References:

1. Jeffrey T., Checkel P. European Identity. Cambridge University Press, 2009. 25 p.
2. Warbot J.J. Etymology. The magazine «LETTERS. 2001. The Great Russian Encyclopedia. – URL: <https://old.bigenc.ru/literature/text/1900835>
3. Humboldt V. Selected works on linguistics. – M.: Progress, 2000. – 400 p.
4. Dauxite Jovita. Identity as a linguosociocultural phenomenon (by the example of proverbs and sayings). Scientific electronic journal «Česlovo Milošo skaitymai» No. 6. 2013. – pp. 156 – 161. – URL: [https://gs.elaba.lt «object»elaba:6122181](https://gs.elaba.lt/object/elaba:6122181).
5. Maslova V.A. Linguoculturology: A textbook for students. higher. studies. institutions. – M.: Academy, 2001. – 208 p.
6. Pokrovsky I.A. History of Roman law. – St. Petersburg: Publishing and trading house «Summer Garden», 1999. – 536 p. – URL: [http://ancientrome.ru/publik/article .htm?a= 1524230000](http://ancientrome.ru/publik/article.htm?a=1524230000).
7. Ter-Minasova S.G. Language and intercultural communication. – Moscow: Publishing house «Slovo», 2000. – 146 p. – URL: [http://www.ffl.msu.ru/research/publications / ter-minasova-lang-and-icc/ter-minasova-yazik-i-mkk-BOOK.pdf](http://www.ffl.msu.ru/research/publications/ter-minasova-lang-and-icc/ter-minasova-yazik-i-mkk-BOOK.pdf).
8. NAVER국어사전. – URL: <https://ko.dict.naver.com/>

PHYSICAL SCIENCES

EVALUATION OF BENEFITS AND CHALLENGES OF TECHNOLOGY ON EDUCATION IN 21ST CENTURY AND WAY FORWARD

Hossain K.

PhD is the former Head of Dept NAME, MIST; and professor/researcher/Examiner of BUET, Dhaka, Bangladesh

<https://doi.org/10.5281/zenodo.8385869>

Abstract

The generation of learners today is very different from those that existed before the internet revolution, online education, or digital learning. The learning environment is made more dynamic by technology. As technology develops, classrooms are being remodeled and reinvented in a variety of ways to meet the growing needs of contemporary digital learners. The internet has become into an essential informational resource. A child can increase their knowledge by reading one of the many children's books available online. It supports their development of independence and self-assurance as learners. Children have access to a multitude of knowledge on the internet that might spark their interest in reading, which is another benefit. The imaginations of youngsters cannot be restrained. Kids today have access to laptops, iPads, and so much more to help them make those ideas a reality. Students can still use pens and paper, but instead of drawing a picture they can now create a 3D animation. They work hard to use their ideas more creatively and to try out new things. Their potential for learning is enhanced, which will help them perform better in the future. On the other side, it is the most concerning result of kids and students using technology without adult supervision. It's shocking how much sexual content there is to be found online. Unsupervised technology access will therefore be more simpler as a result. Most websites that publish this kind of stuff have no limitations on who can view it, so kids can easily access them. Furthermore, if guardians haven't adequately taught their children about fundamental online safety, dangerous people online can easily trick youngsters into giving indecent photos, financial information, and security information. Online access also interferes with kids' and students' sleep, socializing, physical activity, teacher-student connection, and other activities. This is an analytical research on how technology affects education, along with a detailed analysis of the advantages and difficulties it presents for kids or students.

Keywords: Online, digital, smart, AI, ML, AR, VR, 3D animations

Introduction

The goal of technology is always to speed up and simplify the process of carrying out any particular mechanical or physical task. Almost all aspects of education, and notably school activities, have been mechanized by technology. However, it is now true that there is no reason for a child to master the fundamentals of math when they can use a calculator on their phone. Alternatively, why would a kid need to learn spelling or grammar when they have autocorrect software? Therefore, what started out as a good idea has resulted in the position where future generations would be unable to carry out routine cognitive tasks without technology. It's also true that youngsters who rely on technology to handle all of their educational or academic problems gradually lose their capacity for problem-solving, which is a set of characteristics that employers greatly value. Although digital technologies have been shown to improve student advancement and project collaboration, many people ignore their biological need for real-time interaction. The only way to solve this peculiar problem is to have teachers and educational institutions as a whole impose restrictions on the use of technology in education. We have evolved as social beings for many thousands of years, so we are aware of this fact and believe that we can simply overcome our genetic predisposition. Many aspects of our daily lives—as

well as the lives of our children—now depend heavily on technology. Technology may be both helpful and harmful for children when used within the boundaries of the classroom and learning environment.

Many school-age youngsters nowadays have grown up using technology devices for the first time. As a result, students frequently equate pleasure and excitement with computers, tablets, and other related technology. As a result, using technology in the classroom not only piques students' interest and excitement, but also energizes more traditional teaching methods.⁴ Today, technology is changing all aspects of life, including education. We are taking advantage of eLearning's benefits and the fruits of digitization. As a result, computers, laptops, mobile devices, and software programs are now used for teaching and learning outside of traditional classroom settings. Without a question, the technology industry's rapid development has greatly benefited the education sector. Both teachers and students found it to be more convenient. More specifically, the use of technology resulted in gradual modifications to instructional strategies. Students were able to study more effectively, enhance their academic performance, and get good grades as a result of this.⁵ Simply put, educational technology (EdTech) is the application of software programs, digital tools, and media to aid in the exchange

⁴ <https://www.celebree.com/blog/resources/the-pros-and-cons-of-technology-in-education/>, accessed on 24 Jul 2023

⁵ <https://www.tryclarifi.com/benefits-of-technology-in-education/>, accessed on 24 Jul 2023

of knowledge and educational resources. Technology innovation specialist Daniel Newman recently wrote an article for *Forbes* that claimed that educational technology had significantly improved learning. There are several benefits to utilizing technology in schooling. It is a blessing for everyone working in the field, from teachers and schools to students in the twenty-first century. Students found learning to be more enjoyable and simple because to the use of technology in the classroom.⁶ Devices, AI-based tools, and AR/VR technologies are being used by educational institutions and teachers to immerse students in learning. Lessons and homework are of greater interest to the students. They perform and receive better grades as a result.

On the other side, there is a significant negative impact of technology tools like smartphones, tablets, PCs, and laptops on pupils' academic performance. Teachers are becoming designers or architects of learning environments rather than information transmitters.⁷ By standing in the middle of students and curriculum, their main responsibility is to rearrange the components of effective learning. Recent research, however, indicates that technology has a detrimental effect on the educational process.⁸ a skilled educator who observes that texting has harmed students' capacity to write complete sentences free of fragmentation and poor punctuation.⁹ Actually, due to their constant, heavy reliance on technology, pupils have developed laziness. The issue is exacerbated in primary schools, where pupils are overloaded with technology, particularly cellphones, and as a result, their usage of grammar suffers as a result of textspeak like "4ever" instead of "forever."¹⁰ Students no longer read their favorite paperbacks in class; instead, they use smartphones, iPads, tablets, and other forms of technology. Since the last 50 years, there has been a significant decline in children's leisure reading, and technology must be to blame. While using technology has helped students learn more material in less time and has improved their ability to visualize it (using tools like PowerPoint presentations, maps, and charts, for example), an excessive reliance on technology in the classroom has a dehumanizing effect.¹¹ The

profession of teaching has been severed from the sphere of human endeavors and transformed into a technology behemoth that is gradually usurping its essence.¹² There are various sectors and degrees of education where this "leviathan," a mythical sea monster according to Jewish traditions, can be found, including pre-packaged curriculum that were not created by the instructor of a particular course.¹³ Using technology interferes with the relationships between teachers and students and creates a barrier to their simple communication. Collectivism and collaboration are two distinguishing characteristics of face-to-face instruction, whereas the absence of any sense of collectivism or community in 21st-century technology-based instruction is its greatest distinguishing characteristic.¹⁴

Our society is growing more and more dependent on technology, thus it is crucial to prepare kids for success in primary and secondary school by giving them a solid understanding of popular technological tools and their functions. It is never too early for young kids to start acquiring the knowledge and abilities they will need throughout their academic and professional careers. In this regard, early exposure to technology in the classroom is a terrific approach to start laying the groundwork for future success. Children who have access to technology can learn to research interests they have. Information wasn't as easily accessible to earlier generations, therefore kids needed to have access to conventional resources. Children and students today have access to a wealth of knowledge. When used properly and under supervision, technology can enhance learning both inside and outside of the classroom by giving students a way to research the subjects they are passionate about. For instance, a lesson on dinosaurs might be enhanced by a YouTube video or a virtual field trip to a natural history museum.¹⁵ It's interesting to note that children today are frequently referred to as "the Net Generation,"¹⁶ "Digital Natives,"¹⁷ "the Gamer Generation,"¹⁸

⁶ <https://hubvela.com/hub/technology/advantages-disadvantages/students-life/>, accessed on 24 Jul 2023

⁷ Hairon et al, (2017), The learning revolution: From pedagogues to designers of learning. *Learning: Research and Practice*, 3(3), 79-84, accessed on 24 Aug 2023

⁸ Wentworth D et al, (2014), Technology use and academic performance. *Computers & Education*, 78, 306-311, accessed on 24 Aug 2023

⁹⁹ Strain Moritz T, (2016), Perceptions of Technology Use and Its Effects on Student Writing, (Master's Thesis). Available: https://digitalcommons.brockport.edu/cgi/viewcontent.cgi?referer=https://www.google.com.eg/&httpsredir=1&article=1399&context=ehd_theses, accessed on 24 Aug 2023

¹⁰ van Dijk et al, (2016), The influence of texting language on grammar and executive functions in primary school children. *PloS One*, 11(3), accessed on 24 Aug 2023

¹¹ El-Hussein M, (2010), Defining mobile learning in the higher education landscape. *Educational Technology & Society*, 13(3), 12-21, accessed on 24 Aug 2023

¹² Kemp A et al, (2015). Technology and teaching: A conversation among faculty regarding the pros and cons of technology. *Qualitative Report*, 19(3), 1-23, accessed on 24 Aug 2023

¹³ Kearney M et al, (2012), Viewing mobile learning from a pedagogical perspective, *Association for Learning Technology Journal*, 20(3), 1-17, accessed on 24 Aug 2023

¹⁴ Croft N t al, (2010), Overcoming isolation in distance learning: Building a learning community through time and space. *Journal for Education in the Built Environment*, 5(1), 27-64, accessed on 24 Aug 2023

¹⁵ Saba Farhad, (November–December 2011), "Distance Education in the United States: Past, Present, Future", *Educational Technology*, 51 (6): 11–18. ISSN 0013-1962

¹⁶ Tapscott D et al, (1999), *Growing up Digital: the Rise of the Net Generation*. New York: McGraw-Hill. The Josephson Institute of Ethics, Character Study Reveals Predictors of Lying and Cheating, accessed on 24 Aug 2023

¹⁷ Prensky M, (2001). *Digital Natives, Digital Immigrants*. On the Horizon, 9(5), pp 1-6, , accessed on 24 Aug 2023

¹⁸ Carstens A, (2005). *Get Ready for the Gamer Generation*. *Tech Trends: Linking Research & Practice to Improve Learning*, 49(3), 22-25, accessed on 24 Aug 2023

"New Millennium Learners," etc. since they are obsessed with technology.¹⁹In actuality, technology is steadily and positively altering the educational system. While it does not at all replace traditional classroom teaching techniques, it does complement them in order to better prepare students for life in the fast-paced, technologically advanced world of the twenty-first century.²⁰The uses of technology in teaching are countless. This is a methodical and analytical study to assess how technology is affecting education and to show the advantages and difficulties for kids or students.

Benefits and Advantages of Technology in Education

Technology advancements are allowing for significant improvements in educational content, delivery, and accessibility. New technologies have enabled the exponential expansion of human knowledge throughout history. The employment of radios in education was the main topic of discussion at the start of the 20th century.²¹Since then, though, technology has been viewed as a means of enhancing learning, communication, and content comprehension. The next wave of educational innovations is bringing about a big shift. Beyond lectures and group projects, education technologies are developing to include games, simulations, and augmented reality.²²More software is being developed today that will enable pupils to create their own knowledge while receiving almost imperceptible guidance from teachers. The ability to save money is one benefit that digital technology may provide. Over a million jobs were lost in the education service sector during the Great Recession.²³Spending for education was reduced by state and local governments, which had a knock-on effect across the board. Today's educators, from colleges to primary schools, have a harder challenge than ever with fewer resources at their disposal. The possibility of budget funding returning to pre-recession levels in the near future is slim given the political environment of budget cuts. When trying to aid overworked teachers in deploying the newest assistive technology, educational technologies assume greater significance. Beyond monetary concerns, education confronts distinct resource difficulties. The duration of the school day is limited, and class time is a valuable resource. Compared to many other nations throughout the world, students in developed nations like the United States spend less time in the classroom.

Teaching is a difficult profession that involves many repetitive but time-consuming responsibilities.

Tools that make it easier to remember fundamental information free up teachers to assist children who require individualized interventions. Over the course of the school year, every additional minute spent instructing student has an impact.²⁴ Technology improvements in assessment have the potential to benefit both teachers and pupils. Without performance feedback, teachers cannot determine whether pupils have understood the lesson, and legislators cannot determine whether their reforms are effective. Since the development of the optical scan answer sheet half a century ago, assessment technology has barely, if at all, evolved. While some new assessment technologies enable accurate real-time assessment, others can assist reduce testing expenses. Testing innovations allow for low-stakes evaluation of children. Social robots may be useful as tutors and educators for both children and adults, according to recent theories. We want to investigate how social robots can be used to train young children in a second language, despite the fact that robots have been proved to be effective in teaching knowledge- and skill-based subjects. Social robots offer potential as educational instruments to enhance the acquisition of second languages (L2) since language learning depends on contextual, grounded, and social learning, in which interaction and repeated practice are key components.²⁵

Additionally, the epidemic persisted long enough to permanently transform the talent landscape for many businesses into a worldwide and hybrid one. This means that businesses can take advantage of the opportunity by considering a feasible way to get into the global talent market.²⁶So, if I were to be provocative, I'd suggest that technology will actually level the playing field. It will provide the finest opportunities to the brightest talent regardless of where they reside, thereby really unleashing a billion knowledge workers' potential. We'll look back on our recent digital interactions in the same manner as we do on our carbon emissions by the year 2027. The dangers of technology created without placing humans at the center and its detrimental impacts on our mental health and emotional wellness have been made public through social media. Humanity, closeness, depth, and empathy are things we lost from our encounters a decade ago, and they are now

¹⁹ Pedró F, (2006, May). The New Millennium Learners: Challenging our Views on ICT and Learning. Available: <https://publications.iadb.org/en/new-millennium-learners-challenging-our-views-ict-and-learning>, accessed on 25 Aug 2023

²⁰Anderson Ashton et al, (2014), "Engaging with massive online courses". Proceedings of the 23rd International Conference on World Wide Web - WWW '14. New York, New York, USA: ACM Press: 687–698, accessed on 25 Aug 2023

²¹ Reid Seerley and Daniel Day, "Radio and records in education" Review of Educational Research 12.3 (1942): 305–322, accessed on 25 Aug 2023

²² West, Darrell M. Digital Schools: How Technology Can Transform Education. Brookings Institution Press, 2012

²³Haver Analytics. "Employment Household Survey" Employment: Education Services January 1983 to January 2013, accessed on 25 Aug 2023

²⁴ Expanded Learning Time by the Numbers, Center for American Progress, April 2010, Web: <http://www.americanprogress.org/issues/education/news/2010/04/22/7716/expanded-learning-time-by-the-numbers/>, accessed on 29 Jul 2023, accessed on 25 Aug 2023

²⁵Spaulding S, Gordon G, Breazeal C (2016) Affect-aware student models for robot tutors. In: Proceedings of the 2016 international conference on autonomous agents and multiagent systems, , accessed on 25 Aug 2023

²⁶Pilgrim, Jodi; Christie Bledsoe (1 September 2011), "Learning Through Facebook: A Potential Tool for Educators", Delta Kappa Gamma, accessed on 25 Aug 2023

absent.²⁷Real dialogues will take the place of widespread influence. Interactions that bolster our sense of community. Our attention will be on the human experience in the future. It will not be a technological but a cultural paradigm change that ushers in the metaverse. Our ability to express our emotions through the use of tools like virtual and augmented reality and brain-computer interfaces will have an impact on the metaverse. There will be a need for new hardware, platforms, disciplines, and senses. In the virtual world, when feeling, trust, and safety become our most valuable commodities, we will rethink social contracts. The platform experience will be decentralized in favor of the user.²⁸We'll stroke our daughter from the other side of the abyss. Our deceased grandmother's hand will be held by us. We will cherish those special times. The focus of our relationships with others will be the human condition.

The traditional educational system, which was created about 200 years ago to address the demands of the industrial revolution, is no longer effective. The Sustainable Development Goals of the United Nations encompass the requirements of our world today. On the other hand, the World Economic Forum has a list of 21st century talents that will meet these needs. The younger generation is already motivated to work together to develop humane answers to the world's most pressing issues. The development of skills and competencies necessary to address these issues and create a better future for all children is greatly facilitated by technological advancement. AI will be used to comprehend children's individual preferences and recommend the following step in their educational journey.²⁹Additionally, AI will provide their parents, teachers, and other adult role models new perspectives. Children are already using the internet to access the best experts, enhance their education, and lessen disparities.³⁰Every youngster will be able to iterate, test, and prototype in an economical manner. They will innovate and raise global standards of living in this way.

The world will undergo a revolution brought on by the quantum internet, just as it has with the classical internet. And just as the current internet was made possible by classical networks, the quantum internet of the future will also need to be built with quantum networks.³¹Innovations in the fields of energy, medicine, material sciences, and other fields will be made possible by the quantum internet, which is anticipated to

have a significant impact on how we live. Quantum repeaters, the building blocks of the quantum internet, will be used to transform local area networks and clusters into continent-scale area networks over the course of the next five years.³²As a result, quantum networks will increasingly find applications. For instance, uncrackable security is made possible by quantum secure communications, which harness the power of physics. Super-precise clocks, GPS, and ultra-high-resolution telescopes will all be made possible by distributed quantum sensing. Additionally, clustered quantum computing and ultimately distributed quantum computing will enable the quantum internet in order to put the capabilities of quantum computing to good use. The following has a discussion of the pros and benefits of technology in education.

Faster access to information.

The ability to access a wealth of knowledge at any time is among the most significant benefits of technology in education. They have the quickest possible access to the data. Instead of visiting libraries and sifting through stacks of books, students may now get reliable information whenever they need it from a wide range of sources to prepare their assignments, projects, and homework, including websites, instructional sites, YouTube videos, eBooks, PDFs, and more.³³With the introduction of the World Wide Web (www), students are now experiencing the first-ever technology-related impact on education. With only a few clicks, students may access an endless amount of knowledge and data on their laptops, tablets, or smartphones. This makes it possible for any student to create a lesson plan or compose a paper without assistance. Thus, technology broadens pupils' knowledge and helps them become independent learners and 21st-century global citizens.³⁴

Wider variety of learning materials. Students have access to a large array of instructional resources via the internet. Among these are scientific publications, journals, research papers, instructional films, how-to manuals, educational websites, online databases, and author/educator blogs. These are really useful if you are in high school. You may compose academic papers more effectively if you include all relevant specific data, facts, and figures. You can construct a hypothesis, support an argument, or reach an appropriate conclusion for your essay by utilizing the material at your disposal.³⁵You may use technology to improve your academic achievement without putting in a lot of effort. You don't have to spend hours in the school

²⁷Clark, R. C., Mayer, R. E. (2007). *eLearning and the Science of Instruction*. San Francisco: Pfeiffer. ISBN 978-0-7879-8683-4, accessed on 25 Aug 2023

²⁸Du Boulay Benedict (6 August 2015), "Recent Meta-reviews and Meta-analyses of AIED Systems", *International Journal of Artificial Intelligence in Education*, 26 (1): 536–537. doi:10.1007/s40593-015-0060-1. ISSN 1560-4292,

²⁹ <https://www.twinscience.com/en/>, accessed on 25 Aug 2023

³⁰Courts, B. & Tucker, J. (2012). "Using Technology To Create A Dynamic Classroom Experience", *Journal of College Teaching & Learning*, 9 (2), 121-128, , accessed on 25 Aug 2023

³¹ , <https://tophat.com/glossary/e/educational-technology/>, accessed on 25 Aug 2023

³² <https://www.aliroquantum.com/>, accessed on 25 Aug 2023

³³Holstein, Kenneth; McLaren, Bruce M.; Aleven, Vincent (2018), "Student Learning Benefits of a Mixed-Reality Teacher Awareness Tool in AI-Enhanced Classrooms", *Lecture Notes in Computer Science*, Springer International Publishing,, ISBN 978-3-319-93842-4, accessed on 25 Aug 2023

³⁴Reeves, Thomas C. (12 February 1998), *The Impact of Media and Technology in Schools* (PDF) (Report). University of Georgia, Archived (PDF) from the original on 20 October 2013, , accessed on 25 Aug 2023

³⁵Van Leeuwen Anouschka et al, (December 2015), "Teacher regulation of cognitive activities during student collaboration: Effects of learning analytics", *Computers & Education*, 90: 80–94, accessed on 25 Aug 2023

library, harass teachers all the time, or borrow things from former students. You can do a paper on your own while using just credible sources and guaranteeing a great grade.

Increases the scope for distance learning.

The possibility of distance learning is a huge perk of the internet for students. Because of the internet, online lessons are now a reality! Students can learn just as effectively in a chat room or on a virtual screen. During the online session, they can exchange documents, crucial resource links, and media assets with other students. Virtual learning sessions are complemented with traditional classes in schools, which helps students learn more and develop their skills.³⁶In order to offer more tutoring to pupils, particularly the weaker ones, they enroll in online programs outside of the classroom. Furthermore, students can enroll in an online course to pursue their interest in a subject or profession that is beyond the scope of their academic program, such as data analytics. Additionally, a lot of brand-new educational institutions are emerging in the twenty-first century that only provide online courses in a variety of academic and professional areas. Some of the well-known suppliers of in-depth online courses include Coursera, edX, Udemy, etc.

Eases teaching methods.

An effortless teaching experience is one of EdTech's advantages. The teachers can easily communicate with the pupils outside of the classroom or tutor them remotely. This improves their capacity to instruct, the students' learning, and their potential to achieve higher academic standings. Furthermore, mobile and desktop programs that serve as virtual attention coaches for kids are a product of technology integration in education. They assisted teachers in organizing pupils' assignments and homework. They can monitor the status of tasks while also reminding or alerting the pupils if they are running behind schedule. Today, a lot of schools and teachers use internet tools to monitor their students' development and help them in the classroom. They can quickly determine who has poorer grades or who takes longer to finish classes. They can give them the essential instructions and assist in gradually raising their academic achievement.³⁷

Improves learners' communication skills in schools. One of the notable advantages of technology in higher education is this. Students in higher grades improve their communication skills when using various technological tools and online courses. We are aware that many students are apprehensive to interact with

their teachers in front of their peers or during class. However, during online sessions or classes, their reticence or introversion disappears. During their individual screen time, they can freely communicate via chat, audio, or video calls.³⁸Students who want to succeed in their studies and careers must have strong communication skills. Students who can communicate more effectively can express their ideas clearly and participate in worthwhile discussions. They can communicate their comprehension to teachers and learn what's on their minds. They can therefore learn more and apply it well to raise their academic achievement.

Makes studying enjoyable.

It is difficult to have young toddlers sit still and study. They get easily distracted. Older students, like younger students, struggle to keep focus and complete lengthy papers or assignments. In general, not all students find learning fun. However, to advancements in technology, anyone can now enjoy it.³⁹ Classes are more engaging for students thanks to the utilization of tablets, laptops, VR/AR technology, and touch screen boards. Teachers may find it easy to keep children's attention. Similarly, these cutting-edge tools help students at higher levels understand challenging concepts and science through immersive encounters. Making learning enjoyable for children is thus one of the key benefits of employing technology in education. Teachers could see their students' rising engagement, which was reflected in their improved academic achievement.

Helps learners to acquire new skills and knowledge.

Students benefit from the usage of technology in the classroom by increasing their knowledge and gaining new abilities. The internet and online courses make this possible! To understand more about a given subject, dedicated students can conduct internet research using a variety of information sources. With their newfound knowledge, they will be able to create academic classes and outperform other students. Education technology (EdTech) is also supporting aspiring young talents in learning professional skills that will benefit in their future development.⁴⁰The bulk of professional skills or disciplines are not included in university curriculum, such as business analytics, machine learning, data science, and digital marketing. You can complete an online course for any skill outside of class hours. It will allow you to gain in-depth understanding of the subject matter and will prepare you for a desired career or professional field.⁴¹

³⁶Hall, Ashley A.; DuFrene, Debbie D. (June 2016). "Best Practices for Launching a Flipped Classroom", *Business and Professional Communication Quarterly*. 79 (2): 234–242. doi:10.1177/2329490615606733. ISSN 2329-4906

³⁷"Global E-Learning Market 2017 to Boom \$275.10 Billion Value by 2022 at a CAGR of 7.5% – Orbis Research", Archived from the original on 27 May 2018, accessed on 25 Aug 2023

³⁸Boser U, (2013), "Are Schools Getting a Big Enough Bang for Their Education Technology Buck?" (PDF), *American Progress*, pp. 1–12. Archived (PDF) from the original on 17 May 2014, accessed on 25 Aug 2023

³⁹"Baby DVDs, Videos May Hinder, Not Help, Infants' Language Development", University of Washington Press. 7 August 2007. Archived from the original on 15 February 2015, accessed on 25 Aug 2023

⁴⁰Tanner Mirrlees; Shahid Alvi (22 October 2019). *EdTech Inc.: Selling, Automating and Globalizing Higher Education in the Digital Age*. New York: Routledge, p. 60, doi:10.4324/9780429343940. ISBN 978-0-429-34394-0, accessed on 25 Aug 2023

⁴¹D. Randy Garrison; Terry Anderson; *Definitions and Terminology Committee* (2003). *E-Learning in the 21st Century: A Framework for Research and Practice*. Routledge. ISBN 978-0-415-26346-7, accessed on 25 Aug 2023

Keeps students updated with the latest technological advancements.

One of the most significant benefits of digital learning for students is the chance to stay current on the most recent technological breakthroughs. Students will quickly embrace them, so improving your teaching approaches. Virtual classrooms, eLearning apps, and other new tools are becoming increasingly popular. If students are aware of edtech trends, they can use these tools to their advantage and develop academically.⁴² Students who keep up with educational technological changes have a better chance of excelling in their jobs. They can help businesses operate more efficiently and successfully by utilizing their knowledge of the most recent technologies and trends.

Allows students to enhance their mental well-being.

The enhancement of students' physical and mental health is one of the key advantages of digital technology in education. Different digital tools made their boring learning curricula more engaging and easier. EdTech techniques enhance students' cognitive abilities in a variety of ways. Two major factors are the use of AR and virtual learning sessions. They improve a person's capacity for reading, interpreting, learning, remembering, thinking, and applying logic. Over time, all of these have a significant impact on their academic performance and learning.⁴³ They get confidence and a nice sensation because they can earn good scores or marks thanks to the use of instructional technologies. This improves their mental health and enables them to focus more clearly while studying.⁴⁴

Makes teaching easier and more productive.

The advantages of educational technology extend to both teachers' and students' abilities to learn. Teachers benefit from the use of technology in a variety of ways, including wide-screen projectors, virtual classrooms, audio-visual presentations, and digital planners. As a result, the students' comprehension and understanding improved.⁴⁵ Furthermore, technology increases teacher productivity! The use of digital technologies increases student engagement, while providing them with more opportunities to learn.⁴⁶ Many teachers have the flexibility to adjust their teaching approaches

and use specific resources for their less fortunate students. Overall, instructional technology enhanced teacher productivity, benefiting both schools and students.⁴⁷

Helps teachers to track students' performance and progress.

The software or task organizer that teachers use to manage their students' homework is one of the best results of technology integration in education. They serve as digital alternatives to the paper planner or school diary. The assignments and tasks for the day, week, or month can all be input by the teachers. They can set deadlines for them. They receive real-time updates when the pupils begin, pause, and finish a task.⁴⁸ A dashboard that provides teachers with an overview of student performance is another feature of a thorough digital planner. They can view the number of hours spent studying, projects finished or ongoing, grades for classes already completed, and so on. They can keep tabs on each student's performance, successes, and failures. It enables them to plan their curricula appropriately for the upcoming learning session.⁴⁹

Limits external distractions as much as possible.

Contrary to what many experts claimed, technology in education really serves as a source of distraction. However, this is only guaranteed if teachers and schools know how to properly employ technology. It will be simple for kids to become distracted if they are given mobile-based learning apps. They frequently switch to social media platforms, game apps, etc.⁵⁰ As a result, students should select study aids like desktop-based digital planners that reduce distractions and improve concentration. These programs are designed to eliminate outside distractions and give kids a quiet workspace to complete their assignments.⁵¹

Improves collaboration between students and teachers. Collaboration between students and teachers has been shown to enhance when technology is used in the classroom. Online learning systems allow teachers and students to communicate outside of the classroom. Additionally, it enables one-on-one interactions between the students and the teachers.⁵² While they are at

⁴²Moret, B. (8 June 2012). "No television for babies: Why TV is bad for young children", The Washington Times. Archived from the original on 4 January 2015, accessed on 25 Aug 2023

⁴³D F O Onah et al, (2014), "Dropout Rates of Massive Open Online Courses: Behavioural Patterns". ResearchGate, accessed on 25 Aug 2023

⁴⁴Herold, Benjamin (5 February 2016). "Technology in Education: An Overview". Education Week. Archived from the original on 1 November 2016, accessed on 25 Aug 2023

⁴⁵Harris J et al, (2009), "Teachers' Technological Pedagogical Integration Reframed" (PDF), Journal of Research on Technology in Education, 41 (4): 393–416, accessed on 25 Aug 2023

⁴⁶Geng F, (2014), technologist,...discussed by @A L T members". Oxford, UK. Archived from the original on 5 August 2018,

⁴⁷Fletcher S (2013), "Machine Learning", Scientific American, 309 (2): 62–68, accessed on 25 Aug 2023

⁴⁸Cuban, Larry (2001). Oversold and Underused: Computers in the Classroom (PDF), Harvard University Press, Archived from the original (PDF) on 9 August 2017, accessed on 25 Aug 2023

⁴⁹Day R et al, (1987), "Computer-managed instruction: an alternative teaching strategy". Journal of Nursing Education, 26 (1): 30–6. doi:10.3928/0148-4834-19870101-08, accessed on 25 Aug 2023

⁵⁰Williamson Ben et al, (2020), "The datafication of teaching in Higher Education: Critical issues and perspectives", Teaching in Higher Education, 25 (4): 351–365, accessed on 25 Aug 2023

⁵¹Moore, J. L. et al, (2011). "E-Learning, online learning, and distance learning environments: Are they the same?", The Internet and Higher Education, 14 (2): 129–135. doi:10.1016/j.iheduc.2010.10.001, accessed on 25 Aug 2023

⁵²Malegam, F (13 December 2022). "How to Empower eLearning with Virtual Classrooms in WordPress?". Adobe, accessed on 25 Aug 2023

home, they can upload their assignments so that professors can access them and make the appropriate suggestions.⁵³ There will inevitably be some pupils who will speak up, some who will ask questions, some who will be scared to ask, and some who won't have the chance to be heard, which will cause chaos or confusion.⁵⁴ Contrary to popular belief, this does not occur in an online environment. Every student in the virtual classroom is connected. Each student receives a personalized response and solution from the teacher on a separate screen.⁵⁵ Online education has encouraged student relationships outside of the classroom in the twenty-first century. They can help one another and collaborate on challenging undertakings by exchanging ideas and materials.

Personalized learning experiences.

Students now have constant access to information, study tools, and resources thanks to educational technology. Anyone who found it difficult to learn or comprehend things in a traditional classroom setting might choose for additional live, online lessons. Teachers can specifically design individualized learning programs for their pupils based on their aptitudes and interests.⁵⁶ This is an additional benefit of online learning that gives teachers peace of mind because they can focus on each student individually.⁵⁷ Additionally, pupils have the opportunity to learn comfortably and easily. They are not required to observe or copy what their classmates are doing in class. Instead, students can adhere to the strict timetable established by their teacher and do the chores given to them.

Improvement in students' productivity. Students are improving their self-learning with the use of online educational resources, and this is evident in their rising academic production! In addition to providing students with individualized learning opportunities, EdTech allowed them to improve their cognitive thinking and task management abilities.⁵⁸ When children reach higher grades, they really need this. They can manage mountains of assignments and finish each one on time and without losing focus by doing so. Numerous online courses with deadlines encouraged students to become

more committed. In order to finish the courses on time, they learned to prevent any type of schedule diversions or disturbances. Additionally, information and learning resources are readily available to students.⁵⁹ In order to gain more assistance on a project, pupils can also start an online conversation or have a talk with a teacher outside of the classroom. Therefore, there is no chance of becoming bogged down in the middle of a task or assignment. Online learning resources assist students focus more intently on their work and enhance their educational opportunities, which raise their output as a whole.⁶⁰

Gamification that motivates students.

It makes sense that technology fosters creativity and innovation. Fun components were introduced by the designers of many EdTech tools and applications to better engage young learners. This is also known as "gamification," when programs offer natural responses upon completion of a learning stage, such as reward points, scores, clap noises, congrats images, gratitude notes, etc. The kids are really motivated by this and are propelled to take the next step.⁶¹ There are interactive game components in many eLearning apps, such as the ability to collect cash, gems, or other incentives. They have individual scoreboards that let pupils compete and outperform one another.⁶² In other words, gamification made learning engaging and exciting for pupils while strengthening their concentration and motivating them to perform better.

Immersive learning experiences.

Immersive learning opportunities were made available to pupils thanks to VR and AR concepts, which only served to broaden their knowledge. These technologies were utilized by educators to instruct students on difficult scientific ideas, puzzling theories, and historical locations. With textbooks, it was difficult for the students to comprehend and remember information.⁶³ Additionally, educational technology made learning fun for students. In the twenty-first century, kids and students are no longer limited to the pictures and descriptions found in textbooks. They can view movies, access websites, and conduct web searches. As

⁵³Kaplan, Andreas (2017), Rishi, Bikramjit; Bandyopadhyay, Subir (eds.), "Academia Goes Social Media, MOOC, SPOC, SMOC, and SSOC: The digital transformation of Higher Education Institutions and Universities", *Contemporary Issues in Social Media Marketing*, Routledge, accessed on 25 Aug 2023

⁵⁴rentin G. (2010). *Networked Collaborative Learning: Social Interaction and Active Learning* Archived 17 September 2018 at the Wayback Machine, Woodhead/Chandos Publishing Limited, Cambridge, UK, ISBN 978-1-84334-501-5, accessed on 25 Aug 2023

⁵⁵"Collaborative asynchronous online learning", US Patent Office, 10 March 2014, Archived from the original on 8 June 2021, accessed on 25 Aug 2023

⁵⁶J. Bransford; A. Brown; R. R. Cocking, eds. (2000), "Technology to support learning". *How people learn: Brain, mind, experience*. Washington, DC: National Academies Press. pp. 206–230, accessed on 25 Aug 2023

⁵⁷Beatty, Ian D; Gerace, William J (January 2009). "Technology-Enhanced Formative Assessment: A Research-Based Pedagogy for Teaching Science with Classroom Response Technology". *Journal of Science and Technology*, 18 (2): 146, accessed on 25 Aug 2023

⁵⁸Hwang, G. J. (2014), Definition, framework, and research issues of smart learning environments-a context-aware ubiquitous learning perspective, *Smart Learning Environments*, 1(1), 1-14, accessed on 25 Aug 2023

⁵⁹Sendall P et al, (December 2008), "Web 2.0 Matters: An Analysis of Implementing Web 2.0 in the Classroom", *Information Systems Education Journal*, 6 (64). Archived from the original on 29 November 2014, accessed on 26 Aug 2023

⁶⁰"Student Self-Assessment", unsw, Archived from the original on 13 August 2016, accessed on 26 Aug 2023

⁶¹McCue, T. J. (27 August 2014). "Online Learning Industry Poised for \$107 Billion in 2015". *Forbes*. Archived from the original on 25 August 2017, accessed on 26 Aug 2023

⁶²Spector Jonathan Michael, (16 October 2014), "Conceptualizing the emerging field of smart learning environments", *Smart Learning Environments*, 1 (1), doi:10.1186/s40561-014-0002-7, accessed on 26 Aug 2023

⁶³Al-Asfour A, (2012), "Online Teaching: Navigating Its Advantages, Disadvantages and Best Practices". *Tribal College Journal of American Indian Higher Education*, 23: 3, accessed on 26 Aug 2023

a result, they were better able to prepare thorough papers and obtain deeper understanding of a topic or concept.⁶⁴

Relieves the stress of parents and teachers.

Using digital tools, teachers are no longer required to keep a journal or to-do list. They have greatly benefited from time savings in the twenty-first century thanks to virtual lesson planners, grading software apps, and online tests. They can fill out the application completely and plan their submissions around the dates. Therefore, if they use such an app, pupils would never forget to turn in an assignment. The parents are also greatly relieved by this. Many applications help students keep track of their assignments or homework and remind them of their due dates. As a result, pupils develop self-awareness and finish their assignments on time.⁶⁵ As a result, parents do not need to peer over their kids' shoulders to make sure they are finishing their homework.⁶⁶ The learning experiences of students, particularly those in higher classes, have been enhanced by the additional eLearning choices such as online open courses, eBooks, YouTube tutorials, etc. They don't have to bother the teacher all the time to ask for help with assignments. This enhanced the bond between teachers and kids while also assisting teachers in relaxing a little.

Ensures sustainable learning. The fact that EdTech promotes sustainable learning and the environment is one of its most important advantages. Virtual classes and digital learning resources save a significant amount of paper and, consequently, forests. The use of computers to complete coursework and take exams, which can then be shared via email or cloud storage, is encouraged by teachers. In light of the fast environmental impact, many schools and educators are switching from paper books to eReaders.⁶⁷ Students of this age now understand the importance of environmental sustainability thanks to the use of technology in the classroom. The use of electronic and digital learning tools benefits both students and teachers while also preserving the environment.⁶⁸ They are able to reduce their spending on things like books, notes, boards, paper planners, educational excursions, etc.

Prepares for the digital future. Children and kids will benefit from embracing technology in the classroom today because it will get them ready for a totally digital future. The world is moving closer to a time

when technology will be used to power or influence everything. Students were familiar with contemporary technologies in the 21st century through the use of various EdTech tools like virtual classrooms, AI-assisted planners, video learning, engaged learning for TV applications, online exams, etc. They were also able to establish priorities for their use of technology thanks to it. They are able to distinguish between devices that are useful for learning and those that are utilized for entertainment, such as social media, TV apps, OTT, and game apps.⁶⁹ They will be able to draw a boundary now and utilize technology responsibly. Today, various businesses hire candidates after evaluating their technological competency, cognitive ability, and educational attainment. Students that become familiar with various technologies at a young age have an easier time getting hired by the desired organization.⁷⁰ They don't need to go somewhere for vocational training, and their parents don't need to teach them how to use computers, software, and internet communication tools.

Helps students to learn at their own pace.

The use of technology in schooling allowed the kids to progress at their own rate of learning. There are many students that have weaker memory or learning skills than others. They were unable to keep up with the lessons in the competitive classroom environment and traditional teaching methods, thus they were not appropriate for them. For them to perform better in school, they require specific attention.⁷¹ One of the main advantages of employing technology in education is that it has made it possible for such pupils to receive a more individualized education. Teachers can create personalized learning plans and schedules for students using digital tools.⁷² In accordance with their qualifications and talents, they might specify the tasks to be completed and the due dates. While many children benefited from this and saw an increase in their test scores. It also made it easier for teachers to give independent instruction to kids who had ADHD or other problems.⁷³

Technology impact student learning extensively. The advantages of technology in the classroom are becoming increasingly clear to educators across all grade levels. Education is frequently one of the last sectors to undergo significant change, clinging to outmoded strategies and procedures. But at a much faster rate than anticipated, instructors have started

⁶⁴Andone Diana, (26 November 2014), 2014 International Conference on Web and Open Access to Learning (ICWOAL), pp. 1–4, doi:10.1109/ICWOAL.2014.7009244. ISBN 978-1-4799-5739-2, accessed on 26 Aug 2023

⁶⁵Molenda, M. (2008), "Historical foundations", In M. J. Spector, M. D. Merrill, J. Merrienboer, & M. P. Driscoll (Eds.), *Handbook of Research on Educational Communications and Technology* (Third., pp. 3–20). New York, NY: Lawrence Erlbaum Associates, accessed on 26 Aug 2023

⁶⁶Asynchronous Learning: Definition, Benefits, and Example Activities". Archived from the original on 25 October 2019, accessed on 26 Aug 2023

⁶⁷What is collaborative learning?". spiral.ac. Archived from the original on 3 August 2016, accessed on 26 Aug 2023

⁶⁸Nye, D. (2007). *Technology Matters: Questions to Live With*. Cambridge MA: MIT Press, accessed on 26 Aug 2023

⁶⁹Kimme Hea Amy C, (January 2014), "Social Media in Technical Communication", *Technical Communication Quarterly*, 23 (1): 1–5, accessed on 26 Aug 2023

⁷⁰Suppes, P. (19 May 1971). *Computer Assisted Instruction at Stanford* (PDF) (Report). Archived from the original (PDF) on 17 July 2010, accessed on 26 Aug 2023

⁷¹Vie Stephanie, (3 July 2017), "Training Online Technical Communication Educators to Teach with Social Media: Best Practices and Professional Recommendations". *Technical Communication Quarterly*, 26 (3): 344–359, accessed on 26 Aug 2023

⁷²Gail S Thomas, (1 February 1988), "Connected Education, Inc", *Netweaver, Electronic Networking Association*. Archived from the original on 27 August 2008, accessed on 26 Aug 2023

⁷³<https://www.tryclarifi.com/adhd-student-planner/>, accessed on 26 Aug 2023

making significant changes to their curriculum, assessments, and even the physical layout of their classrooms as a result of the digital transformation and the advent of educational technology.⁷⁴Due of the effects these contemporary developments are having on students' learning, they are generating significant media attention in the field of education.⁷⁵

Revolutionize in classroom set of devices and learning tools. BYOD, or bringing your own device, is becoming less common in schools, and kids are no longer required to visit the technology lab to use a computer or laptop. The number of computer sets in classrooms has increased recently, thanks in part to federal financing. The Every Student Succeeds Act provided funding for Title I schools, and numerous grants and contributions equipped classrooms around the nation with iPads and laptops for every student.⁷⁶ More over half of the gadgets in US classrooms are Google Chromebooks. In educational establishments, more than three million Chromebooks were utilized in 2014.⁷⁷The demand for more attention to be paid to programs that impart digital citizenship skills grows along with that number. The prevalent internet world of today offers fascinating opportunities, but they also need for pupils to be properly educated on personal responsibility and cyber safety.

Augmented Reality / Virtual Reality / Mixed Reality. The days of instructing children to remain silent at their desks are long gone. Learning is becoming more dynamic and collaborative thanks to educational technologies. Examples of transformational technology include augmented, virtual, and mixed reality, which improve teacher training while also producing immersive lessons that are enjoyable and engaging for students. The outside world can enter the classroom through virtual reality, and vice versa. With the help of apps like Unimersiv, students can go back in time to ancient Greece, while Cospaces enables them to showcase their virtual works to a global audience.⁷⁸Virtual reality has the potential to improve audience attention, technological literacy, and visual literacy, according to Kathy Schrock, an independent educational technologist and adjunct professor at Wilkes University online.⁷⁹The concept of merging AR, VR, and MR is eagerly awaited. Consider the privately held business Magic Leap as an example.⁸⁰Magic Leap is already valued at \$4.55 billion, despite the fact that company has-

n't really sold anything yet. This illustrates the seemingly limitless potential for technology to transform education.⁸¹

Redesigned Learning spaces. You probably won't find rows of desks facing the front of the room if you walk into most classrooms in the country. Since then, educators have come to the realization that their classrooms must reflect the workplace, which has motivated them to design collaboratively conducive environments to support student learning. The adoption of technology has aided their effort. Instead of chalkboards and individual desks, classrooms in the twenty-first century use SMARTboards.⁸²In the twenty-first century, students create media instead of just consuming it; they go on virtual field trips rather than just reading from a text. The newly constructed learning environment is replete with integrated technology, indicating that students are not just using it but also comprehending how to use it to accomplish a certain objective. Even outside of the traditional classroom, some of these learning places exist. Because they recognize the value of producing and collaborating all the time, not just when classes are in session, colleges and universities are developing more informal campus learning spaces.

Internet of Things (IoT). Although IoT is nothing new, it must rank top on our list due to technological developments. When discussing IoT in the past, many educators tended to concentrate on topics like energy-efficient schools and universities. The advantages are enormous; hypothetically, IoT may make it possible for a teacher to share a student's test results with their parents in real-time, including them in any potential problems the student might encounter in the classroom or at home. The real-time procedure can automatically keep track of when (task) homework is finished, what the completion time stamp is, and even gather information on how long it takes the students to finish the assignment. With the crucial data, teachers can better assess whether their strategies are effective, whether the tasks are challenging, and whether or not students are staying up late to complete them.⁸³This is an important realization because it would improve upcoming educational digital transformation trends. It can also give pupils a boost as they prepare to do their schoolwork at home.⁸⁴

Artificial Intelligence (AI). Higher education has already benefited from the usage of AI. Deaken

⁷⁴ <https://www.brookings.edu/articles/promises-and-pitfalls-of-online-education/>, accessed on 26 Aug 2023

⁷⁵ <https://www.forbes.com/sites/danielnewman/2017/07/18/top-6-digital-transformation-trends-in-education/?sh=37ae58902a9a>, accessed on 26 Aug 2023

⁷⁶Hickey Ryan, (12 May 2014), "The history of online education", Peterson's, Archived from the original on 19 March 2018, accessed on 26 Aug 2023

⁷⁷ <https://www.cnbc.com/2015/12/03/googles-chromebooks-make-up-half-of-us-classroom-devices.html>, accessed on 26 Aug 2023

⁷⁸ <https://www.thetechedvocate.org/20-top-virtual-reality-apps-that-are-changing-education/>, accessed on 26 Aug 2023

⁷⁹ <https://www.eschoolnews.com/featured/2017/01/02/hot-edtech-trends-2017/>, accessed on 26 Aug 2023

⁸⁰Hiltz S, (1990), "Evaluating the Virtual Classroom". In Harasim, L. (ed.) Online Education: Perspectives on a New Environment. New York: Praeger, pp. 133–169, accessed on 26 Aug 2023

⁸¹ <https://campustechnology.com/Articles/2017/01/18/11-Ed-Tech-Trends-to-Watch-in-2017.aspx?Page=1>, accessed on 26 Aug 2023

⁸² <https://www.benq.com/en-in/business/resource/trends/steps-and-checklists-to-build-a-blended-learning-classroom.html>, accessed on 26 Aug 2023

⁸³ <https://elearningindustry.com/digital-trends-in-2019-shape-education-5>, accessed on 26 Aug 2023

⁸⁴Hossain, K. A., Evaluation of Influence of Internet of Things (IOT) Technologies and Devices in 21 Century, Scientific Research Journal 11 (7), Jul 2023, accessed on 26 Aug 2023

University in Australia employed IBM Watson to develop a virtual student advice service that was accessible every day of the week, round-the-clock.⁸⁵ More than 30,000 queries were answered by Watson's virtual advisors in the first trimester, freeing up the real advisors to handle more complex problems. Chatbots are one more application for AI. Because chatbots have Natural Language Progression, a feature found in Siri, they can assist students with paperwork like financial aid or bill payments and answer questions about homework, which relieves the workload of the people who would typically perform these duties. Personalized learning, which is covered in more detail below, assessing the quality of the curriculum and content, and enabling one-on-one tutoring through the use of Intelligent Tutoring Systems, are other uses of AI in education. Technology merely seeks to enhance teachers, not to replace them.⁸⁶

Personalized Learning. Personalized learning methods are more common than ever today. From opportunities for a student to learn, such as public, private, charter, and virtual schools. Today, education may be customized to each person. As less direct instruction from the teacher is used and more learning is done through discovery, blended learning places more responsibility on the shoulders of the student.⁸⁷ By choosing factors like where and how quickly they go through content, students can take control of some aspects of their learning through blended learning, for instance.⁸⁸ Adaptive learning is similar to blended learning in that it also gives students the option to choose their learning's timetable and direction. In order to change the learning experience, adaptive learning technology uses data on student behavior as they respond to questions. This data is then used to deliver immediate feedback.⁸⁹ Adaptive educational tools SEQUENCE Make split-second judgments based on ongoing, real-time analysis of student data.⁹⁰ In reaction to how a student is doing, it automatically adjusts what follows next in a sequence, whether it is altered content or a different order of skills. Osmosis, a different learning tool, was developed by doctors for doctors and has completely changed the way medical students study.⁹¹ Today, Os-

mosis maximizes learning and retention using evidence-based educational principles like questions, flashcards, and videos, pictures connected with memory anchors, adaptive spaced repetition, collaborative learning, and gamification. In the present, personalization is transforming education into a 'choose-your-own-adventure' kind of learning.

Capitalizing on student interest and engagement. Personalized learning is now possible, allowing institutions or individual students to tailor instruction to their specific requirements. With less teacher participation and a greater emphasis on the discovery method of learning, known as blended learning a notion may place more responsibility on the student. With the use of a new interactive method called blended learning, students can show how they can influence the aesthetics of their education by selecting choices in line with their degree of intuition and cognitive ability. The same is true for adaptive learning, in which students must make important choices regarding the job to be finished within a certain amount of time and the direction to go.⁹² Adaptive learning entails gathering information on how students behave as they address and solve issues and then providing feedback. Another educational technique that has emerged is called Osmosis; it was developed by doctors for the use of doctors and is very beneficial to medical students. It focuses on concepts supported by evidence and uses gamification, adaptive spaced repetition, movies, flashcard questions, and Osmosis to maximize learning and retention.⁹³ The motivation of a futuristic learning specter is such customization.

Gamification. When video games are used as a teaching tool in classrooms, playing and learning collide. Learning challenging material becomes more engaging and participatory thanks to gaming technologies.⁹⁴ As technology develops, it is being quickly applied to improve instructional games across all subject areas. These virtual game worlds offer a singular opportunity to apply new knowledge and make mission-critical decisions, while identifying obstacles, taking into account multiple perspectives, and practicing vari-

⁸⁵ <https://campustechnology.com/Articles/2017/01/18/11-Ed-Tech-Trends-to-Watch-in-2017.aspx?Page=2>, accessed on 27 Aug 2023

⁸⁶ Hossain K. A., Evaluation of Influence of Artificial Intelligence (AI) on Technologies in 21st Century, Journal of Electronics and Communication Engineering Research, Quest Journal, Jul 2023, accessed on 27 Aug 2023

⁸⁷ Baker, Celia (4 January 2013). "Blended learning: Teachers plus computers equal success". Desert News, Archived from the original on 23 October 2013. Retrieved 30 January 2014, accessed on 27 Aug 2023

⁸⁸ Bates A, (2005), Technology, e-Learning and Distance Education, London: Routledge, accessed on 27 Aug 2023

⁸⁹ <https://onlinedegrees.sandiego.edu/what-is-educational-technology-definition-examples-impact/https://www.adaptemy.com/>, accessed on 27 Aug

⁹⁰ Hossain K. A., Analysis of development trend of ship designing software and future of ship design, American Journal of Engineering Research (AJER), Vol 12, Issue 6, June 2023, ISSN 2120-0847

Hossain K. A., Tale of Container Ship, Journal of Software Engineering and Simulation, Quest Journals 9 (7), page: 48-61, Jul 2023, accessed on 27 Aug 2023

⁹¹ <http://virtuallyinspired.org/portfolio/osmosis/>, accessed on 27 Aug 2023

⁹² Harasim, L., Hiltz, S., Teles, L. and Turoff, M. (1995), Learning Networks: A Field Guide to Teaching and Learning Online. Cambridge, MA: MIT Press, accessed on 27 Aug 2023

⁹³ <https://www.usnews.com/higher-education/online-education/articles/2017-05-03/study-online-learning-enrollment-rising-fastest-at-private-nonprofit-schools>, accessed on 27 Aug 2023

⁹⁴ Craft, Anna (July 2012), "Childhood in a digital age: creative challenges for educational futures" (PDF), London Review of Education, 10 (2): 173–190. doi:10.1080/14748460.2012.691282, accessed on 27 Aug 2023

ous responses, says Susan Aldridge, senior vice president of online learning at Drexel University.⁹⁵ Since these games are made to offer rapid feedback, students are inherently compelled to play them again while honing their skills. Although exciting students with previously unimaginable opportunities are new technology and learning approaches necessitate ongoing IT assistance.⁹⁶ We must take into account the current paradigm for technology instruction and shift toward a team-based approach as educational institutions continue to jump on the bandwagon and adopt these digital transformation trends. Response time to needs must increase along with rising student expectations.

Technology provides credibility for the teacher.

Students of today have never lived in a world without cutting-edge technology. A new website didn't need to load over a sluggish dial-up modem in 45 minutes. The pleasures of an AOL chat room will never be fully appreciated. Technology-savvy educators provide their expertise a level of authority that is applicable to instruction across a wide range of subject areas.⁹⁷ A single technology instrument has the potential to have a significant impact on today's students. Not so long ago, students were required to carry their bulky textbooks to class each day. Nowadays, the majority of those textbooks is accessible via computers and is available online. Organizational platforms supplement e-books and other technologically accessible tools to make learning more efficient and streamlined.⁹⁸

Technology automates the boring stuff.

Technology in the classroom is crucial for instructors as well. Today's engagement tools have the potential to partially automate the grading process. Software systems make it simpler to monitor each student's progress, quickly spotting any learning gaps. There will be more time for actual teaching and less time spent at home reviewing work if more of the repetitive tasks that teachers perform every day are automated.⁹⁹ The quantity of information that students of any age recall when they are in a learning environment centered on a lecture format can be as low as 5%. For a lot of pupils, the classroom experience consisted of a "expert" using their podium to lecture to the class. Collaboration has been made possible in the classroom through technology. Up to 80% of the knowledge that students study can be retained by them if they learn in a collaborative setting.¹⁰⁰ Additionally, when interactive practice is

used in the classroom, some students' levels of information retention can reach 95%.

Technology make ease to learn core vocational skills. Almost everyone today has access to the internet. When technology is used in the classroom, students get to learn in a secure setting how to limit personal information. They can pick up the right writing manners for communicating online. Presentations are made by them. In the twenty-first century, writers style their documents following standards. They gain knowledge about conducting fresh subject research and appropriately citing the information they gather. Today's students have the chance to acquire all of these essential abilities before they even begin the job search process. They are all essential for the modern workplace.¹⁰¹ When students walk into their classrooms each day, they ought to be able to look forward. Going back in time could bring some nostalgia, but it won't prepare kids for the difficulties of a technologically advanced society. While we can undoubtedly benefit from the past's lessons, we also need to be prepared for what the future may hold once its shroud is lifted.¹⁰²

Technology ensures all the needed data into one location.

Technology offers a variety of platforms and apps that enable teachers to combine and utilize all relevant student data. This could cover anything from their attendance record to their level of math competency. Once acquired, this data can be utilized to pinpoint areas that can benefit from an intervention. Additionally, it can assist teachers in grouping children who could benefit more from learning together than separately.¹⁰³ Even while there are still strict routines in schools, technology has somewhat softened their rigidity. Students can work at a pace that suits them thanks to technology. It is simpler to modify curriculum requirements or programs to better match individual needs and advance learning.¹⁰⁴ If a student finds that the stimulation of a classroom is too much for them, it can also be employed for remote learning opportunities.

Technology provides an opportunity to learn different ways. When technology is used in the classroom, the learning process is more in the students' hands. Students have the ability to use their innate curiosity to discover their interests, skills, and talents. Additionally, technology gives pupils the chance to explore new things that may not have been possible in the past. They can then figure out for themselves which

⁹⁵ <https://campustechnology.com/Articles/2017/01/18/11-Ed-Tech-Trends-to-Watch-in-2017.aspx?Page=3>, accessed on 27 Aug 2023

⁹⁶ Hossain K. A., Evaluation of Influence of Artificial Intelligence (AI) on Technologies in 21st Century, Journal of Electronics and Communication Engineering Research, Quest Journal, Jul 2023, accessed on 27 Aug 2023

⁹⁷ Hall Ashley A, (June 2016). "Best Practices for Launching a Flipped Classroom", Business and Professional Communication Quarterly, 79 (2): 234–242, accessed on 27 Aug 2023

⁹⁸ Technology in Schools: Weighing The Pros And Cons". Huffington Post. 25 May 2011. Archived from the original on 23 April 2014, accessed on 27 Aug 2023

⁹⁹ Sean, Allan (25 September 2020). "How Covid-19 brought the University of Toronto Class of '24 Together Online". Brooke Godfrey. Archived from the original on 9 August 2021, accessed on 27 Aug 2023

¹⁰⁰ Kaplan, Andreas (6 April 2021). Higher Education at the Crossroads of Disruption: the University of the 21st Century. Emerald Publishing Limited, ISBN 978-1-80071-504-2, Archived from the original on 29 January 2021, accessed on 27 Aug 2023

¹⁰¹ Hossain K A (2015) Leadership qualities for 21st century leaders, Journal of Management, Social Science and Humanities, Published on 19 May 2015, accessed on 27 Aug 2023

¹⁰² Skinner B F, (1954), "The science of learning and the art of teaching", Harvard Educational Review, 24: 86–97,

¹⁰³ Irby Beverly et al, (2013), *Handbook of Educational Theories* Charlotte, NC: IAP. p. 105. ISBN 978-1-61735-866-1, accessed on 27 Aug 2023

¹⁰⁴ Hergenhahn B R, (2008), An Introduction to the History of Psychology. Belmont, CA: Wadsworth Cengage Learning, p. 627, ISBN 978-0-495-50621-8, accessed on 27 Aug 2023

learning methods really help them retain new information.¹⁰⁵Did pupils who were at school get out of bed eager to spend six to eight hours in class? Or did they fear the event since they had been idle for the majority of the day? The use of technology in the classroom can increase student motivation. Most children find some use of technology enjoyable. It enables engaged students to stay focused on the lectures and motivates less engaged students to discover something enjoyable.¹⁰⁶An improved level of motivation in the classroom is one of technology's finest benefits.

Technology is more affordable to do than many people may realize.

The expense of using technology in the classroom is modest. The cost of a Google Chromebook, which allows students to access all of their books, is less than the cost of a set of textbooks. Student Chromebooks with instructional designs can be purchased from educational wholesalers for as little as US\$ 189. Retail price for the Dell Chromebook 11 3100 Series is US\$199.¹⁰⁷Many schools could help to subsidize these fees so children may have access to the computer in the classroom, if not take it home every day as well. Some families might not be able to afford the cost of such a computer on their own.¹⁰⁸

Technology improves their problem-solving skills.

Children and students learn how to use current technology for study purposes through technology, and they commonly employ this skill in their daily lives. To successfully navigate problems in education and other areas throughout their life in the twenty-first century, they need learn it at a young age.¹⁰⁹There are numerous advantages to problem-solving skills instruction for kids. It teaches children how to stay out of fights at home and at school.¹¹⁰They may become more empathetic and acquire other advantageous traits as a result.¹¹¹For academic performance and preparedness for school, these abilities are crucial. In this contemporary day, social media platforms and applications have significantly changed society.¹¹²Their capacity to interact with people in their social circle is improved by these social networking websites and applications. They can gain more self-assurance and get ready for upcoming social marketing possibilities thanks to social media.

Through social networking sites, kids and children can perform many necessary tasks online. They can connect with friends and family, meet new people, share photos, and have discussions.¹¹³By enabling middle school and high school students to collaborate on homework and group projects, social media also improves learning opportunities.

Builds independence and empowerment.

Early education is now much more accessible than it was in previous generations because to online informational resources. Due to the abundance of internet resources, they can conduct research without going to a physical library.¹¹⁴That does not mean we are no longer in need of books. In reality, the internet is a tool that increases access to books and reliable information. Thanks to developments in technology, children can now finish the process! Without technology, who knows how far they would have come? Along with making and doing, it also refers to the sensation of authority and independence.¹¹⁵They can communicate in ways that words simply cannot. Children are more inclined to conduct additional investigation and develop novel lines of thought when they can find the answers to their queries. This approach can support youngsters' growth in terms of independence, academic self-assurance, and enthusiasm in new things.¹¹⁶

Disadvantages and Challenges of Technology in Education

The modern classroom's learning environment has advanced dramatically during the previous 25 years. Many of the benefits that we have seen in this setting can be attributed to the advent of new technology options for students. Rather than having a single computer for a class to use or a laboratory environment for the entire school contained in one room, we may now support children in learning at their table or desk with resources given directly to them.¹¹⁷We've been able to enhance knowledge availability in the classroom through technology since the creation of the Internet in 1989. If you grew up in the 1980s, you definitely remember having the A/V cart come to your class so you could watch educational videos and possibly eat a snack. Stu-

¹⁰⁵Termos, Mohamad (2012). "Does the Classroom Performance System (CPS) Increase Students' Chances for Getting a Good Grade in College Core Courses and Increase Retention?," *International Journal of Technologies in Learning*, 19 (1): 45–56. doi:10.18848/2327-0144/cgp/v19i01/49144, accessed on 27 Aug 2023

¹⁰⁶Rosenberg Richard, (2004), *The Social Impact of Computers*. Amsterdam: Elsevier Academic Press. ISBN 978-0-12-597121-8, accessed on 27 Aug 2023

¹⁰⁷ <https://www.globalsources.com/manufacturers/dell-chromebook-3100-2-in-1-11.6-inch-touch.html?>, accessed on 27 Aug 2023

¹⁰⁸Strauss, Valerie (22 September 2012). "Three fears about blended learning", *The Washington Post*, Archived from the original on 16 July 2017, accessed on 28 Aug 2023

¹⁰⁹ <https://bau.edu/blog/technology-impact-on-learning/>, accessed on 24 Jul 2023

¹¹⁰Putnam R, (2000), *Bowling Alone: The Collapse and Revival of American Community*. New York: Simon and Schuster, accessed on 28 Aug 2023

¹¹¹ <https://elearningindustry.com/how-important-is-technology-in-education>, accessed on 24 Jul 2023

¹¹²Cassidy, Margaret (2004). *Book Ends: The Changing Media Environment of American Classrooms*. Cresskill, NJ: Hampton Press, Inc. p. 224. ISBN 978-1-57273-492-0, accessed on 28 Aug 2023

¹¹³Buckleitner Warren, (12 June 2008), "So Young, and So Gadgeted", *The New York Times*. Archived from the original on 23 December 2016, accessed on 28 Aug 2023

¹¹⁴Spitzer M, (2014), *Information technology in education: Risks and side effects*. *Trends in Neuroscience and Education*, 3(3-4), 81-85, accessed on 28 Aug 2023

¹¹⁵Wallace, K. (2009, June 17), *High-Tech Cheating on the Rise at Schools*, *Cbsnews*. Available: <https://www.cbsnews.com/news/high-tech-cheating-on-the-rise-at-schools/>, accessed on 28 Aug 2023

¹¹⁶Roblyer M D, (2003), *Integrating Educational Technology into Teaching*, (3rd ed). Upper Saddle River, NJ: Merrill Prentice Hall, accessed on 28 Aug 2023

¹¹⁷Algerioy A. M., (1999), *The impact of multimedia on the collection of first-grade students in secondary mathematics in Riyadh Journal of King Saud University - Languages and Translation*, 24 (2), 75-82, accessed on 28 Aug 2023

dents can now play interactive learning games, competes with other students, and have their educational statistics tracked in real-time data to determine where their focus should be. While bringing technology to children in the classroom can clearly improve the learning environment, ensuring that all kids have equitable access to it is also critical for ensuring that everyone has the same possibilities for success. As a result, every school district, teacher, and parent should evaluate the benefits and cons of employing technology in the classroom on a regular basis.¹¹⁸

Nearly 90% of teachers agreed that technology helped them reinforce courses and had a favorable impact on students' performance, according to a built-in report. Other research revealed that after embracing technology and digital tools, the majority of middle-school children increased their test scores or grades. Despite this positive scenario, there are obstacles to using technology in education. Due to excessive screen time, educational technology might have a negative impact on pupils' ability to concentrate. Additionally, there are many questions about how well teachers use technology or tools like AR, VR, and AI. Several schools were unable to purchase the technology due to a shortage of funding. A few obstacles must be overcome for teachers and students to succeed in the age of educational technology. Here is a list of the main difficulties they encounter when implementing educational technology. Inadequate security measures can provide young children access to inappropriate content or information via computers. Lessons in "netiquette," or proper usage of the internet, can help to inculcate good web judgment and habits at a young age. Website blocks, internet filters, and strict monitoring can all help to prevent youngsters from being exposed to such. According to studies, the connections that technology makes possible through social networks are causing an increase in the number of people in society to feel alone and alienated. Young children may not connect with their peers as much if they spend more time using electronics, which can hinder their social and emotional development. In order to reduce this risk, "technology time" needs to be moderated so that kids can socialize with their relatives and friends. Many technology-based games and activities are "pre-made," enabling kids to finish tasks without having to use their imaginations and creative problem-solving skills. However, there are just as many games that serve as enjoyable solitary or group activities while encouraging the growth of creativity and problem-solving abilities. The latter option plus a wide range of other educational resources, such as manipulative or painting supplies, can guarantee that your kids are making use of their playtime in a healthy and productive way.¹¹⁹

The limitations of instructional technology should also be taken into account, notwithstanding its many

benefits. The most obvious drawback is that computers can't address every issue we have. The human brain is capable of many various types of thought, and there are some things that computers are unable to do, such as generate novel and unique thoughts. The internet's occasionally erroneous or misleading information is another drawback of technology in education. The internet offers many opportunities for people to exaggerate their achievements and mislead others about what they know in order to claim credit for something they did not do or were ignorant of. Always check the accuracy of any information you find online before relying on it. Additionally, while they should be focusing on their job or studies, students who take online classes can get sidetracked by their phones or other electronic gadgets. They may become distracted as a result and perform their work incorrectly. The last drawback of technology in education is that some students might not want to enroll in online courses since they don't feel like they are actually learning. Some people prefer to attend classes in person because it allows them to get to know their classmates better and see how much everyone else knows about a certain subject. However, there are many various sorts of online courses you can take if you wish to take classes online, including distance learning, live virtual classrooms, online video conferencing, etc. The following has a discussion of the drawbacks and difficulties of technology in education.

Faster but less memorable learning. Even while the rapid advancement of technology may appear to be advantageous, teachers with experience are actually leery of it. Learning aids like gadgets and applications can accelerate learning faster than the human mind can. Skimming by students can cause them to miss out on texture and depth. To think logically and clearly requires time. In the absence of such, engagement may drastically decline. Experts advise that in order to slow down the pace of media consumption and give ourselves more time for reflection, we need change the way videos are displayed. According to studies on the brain, the mere act of writing by hand has calming and stimulating effects that aid in memory and learning. Although typing is quick, it is monotonous because each keystroke is essentially the same.¹²⁰ Writing by hand is more difficult, involved, and time-consuming. This makes it simpler for your brain to create more "hooks" for ideas to latch onto.¹²¹

Technology can be distracting. The biggest problem with technology is the potential for pupil distraction. Researchers recently discovered that teachers who have tablets or other tablet-based gadgets in their classrooms are more likely to encounter distractions there. Technology-distracted students disregarded the subject altogether and refused to pay attention in class. According to experts, technology use in schools

¹¹⁸ <https://futureofworking.com/10-advantages-and-disadvantages-of-technology-in-education/>, accessed on 28 Aug 2023

¹¹⁹ <https://elearningindustry.com/the-limitations-of-educational-technology>, accessed on 28 Aug 2023

¹²⁰ Alhusban A. M., (2016), The Impact of Modern Technological Tools on Students' Writing Skills in English as a Second Language, *US-China Education Review*, 6 (7), 438-443, accessed on 28 Aug 2023

¹²¹ <https://topadvantagesof.com/disadvantages-of-technology-in-education/>, accessed on 28 Aug 2023

should be kept to a minimum because it may both distract students and create more distractions.¹²² Things like laptops and iPads in the classroom will undoubtedly cause students to become distracted. This is particularly true if the program does not restrict access to apps that are unrelated to classes, tests, and other educational pursuits.¹²³ In order to ensure that technology is used in classrooms to support learning and not, for instance, to play games or use social media for amusement, there needs to be a means to restrict its use. A few misbehaving students will inevitably try to utilize technology for purposes other than those for which it was intended. Concerning technology, high school kids may be more knowledgeable than their teachers. By visiting a proxy site that provides them with content from other websites without them actually visiting those websites, students can access websites that are not permitted.¹²⁴ By encrypting their browsing data with a virtual private network (VPN), students can circumvent a school firewall and ensure that no one can monitor their online activities.

Less direct social interaction. Another cause for concern is how technology appears to be reducing social interaction. The amount of conversation between kids and their teachers and peers decreases when they utilize technology. Online teaching and learning lack face-to-face interaction. Teachers need to ensure that activities like oral presentations, recitations, and group work occur frequently in the classroom in order to remedy this. It's important to remember that we want to assist people in developing into well-rounded adults.¹²⁵ The school may be a chance for pupils who spend too much time on video games or social media to take a vacation. It is the responsibility of the professors to recognize when kids spend too much time staring at their devices. Students should be pushed or encouraged to communicate and show some life when they aren't utilizing technology.¹²⁶

Less personalized attention. Teachers are supposed to treat all of their students equally and provide them the same amount of attention under the present educational system. This disregards the possibility that

certain kids may require significantly more or less specialized treatment. Thanks to technological advancements, students can now learn when and how they choose. However, when personal ties are ruined in the process, it might not be a good thing.¹²⁷

Integrating tech is often time-consuming.

Although students may believe that technology may help teachers accomplish their to-do lists faster, this isn't necessarily the case. Teachers and students may find it difficult to keep up with the rapid changes in technology. While they are still being evaluated by academics, teachers frequently need to acquire new ideas. There are constantly updates and adjustments, which just makes things worse.¹²⁸ According to experts, we should focus our time on the things that matter most rather than useless technologies. You might believe that technology is the key to improving education, but this isn't always the case. Teachers will always be required to mentor and guide students.¹²⁹ Technology that enables direct face-to-face interaction and communication with teachers is the greatest technology.

Misleading information. Although the internet offers a wealth of knowledge, not all of it is reliable. Even if it seems to come from a reliable source, you can't always believe what you read online. Nowadays, websites prioritize greater ranks over providing users with the information they require. Even if the information on a website is fake, many do it to attract more visitors.¹³⁰

The presence of technology can be distracting to students. Children who play video games may display addictive habits. They are fascinated with the entertainment they are provided with more than anything else. If the educational setting uses reward-based activities to promote learning, the child may be more focused on what they gain from the program or app than what they are learning. Correct responses can indicate knowledge, but information retention may be lower than expected.¹³¹ To guarantee that healthy outcomes are feasible when utilizing technology in the classroom, teachers must establish and maintain healthy boundaries.¹³²

¹²²Reeves, Thomas C. (12 February 1998), The Impact of Media and Technology in Schools (PDF) (Report). University of Georgia, Archived (PDF) from the original on 20 October 2013, accessed on 28 Aug 2023

¹²³ Ascione, L. (2018). Do other countries value classroom technology equally? Available: <https://www.eschoolnews.com/2018/12/04/do-other-countries-value-classroom-technology-equally/> (July 2, 2019), accessed on 28 Aug 2023

¹²⁴Kaplan, Andreas (2017). Rishi, Bikramjit; Bandyopadhyay, Subir (eds.), "Academia Goes Social Media, MOOC, SPOC, SMOC, and SSOC: The digital transformation of Higher Education Institutions and Universities", Contemporary Issues in Social Media Marketing. Routledge, doi:10.4324/9781315563312-2, accessed on 28 Aug 2023

¹²⁵ Bahloul M, (2012), Lights! Camera! Action and the Brain: The Use of Film in Education. Newcastle upon Tyne: Cambridge Scholars Publishing, accessed on 28 Aug 2023

¹²⁶ Carter S P. et al, (2017). Should Professors Ban Laptops? EducationNext, 17(4), 68-74, accessed on 28 Aug 2023

¹²⁷Carstens A et al, (2005), Get Ready for the Gamer Generation. Tech Trends: Linking Research & Practice to Improve Learning, 49(3), 22-25,

¹²⁸Biocchi Michael, "Games in the Classroom", Gaming in the Classroom, Archived from the original on 15 August 2011, accessed on 28 Aug 2023

¹²⁹Al-Asfour, A (2012), "Online Teaching: Navigating Its Advantages, Disadvantages and Best Practices", Tribal College Journal of American Indian Higher Education. 23: 3, accessed on 28 Aug 2023

¹³⁰ Cazan A et al, (2016), Computer anxiety and attitudes towards the computer and the internet with Romanian high-school and university students. Computers in Human Behavior, 55, 258-267, accessed on 28 Aug 2023

¹³¹ Christensen, K. S. (1999). A Comparison of Student Performance in Human Development Classes Using Three Different Modes of Delivery: Online, Face-to-Face, and Combined. Department of Education: Drake University, accessed on 28 Aug 2023

¹³²Collaborative asynchronous online learning, US Patent Office, 10 March 2014, Archived from the original on 8 June 2021, accessed on 28 Aug 2023

Technology can make it easier to cheat.

Remember the TV series and movies where kids would sneak into a teacher's classroom, grab the test's solution manual, and scribble everything down on their wrist, shoe, or piece of paper? A student can now text that information to themselves.¹³³ Anyone with a phone can obtain such information from them. Email can also be used to send this information. When a precise assessment of a student's knowledge is required to assess the student's overall progress, strict standards surrounding the use of technology during quizzes or examinations must be in place.¹³⁴

Some students to disconnect from the classroom. Cooperating with someone via the Internet is a distinct experience than interacting with others online. Being behind a screen provides you with anonymity that a face-to-face conversation can not provide. Although using technology to collaborate with others is an important skill, teachers cannot make it the only option in the classroom.¹³⁵ So that a youngster can still improve their life even when they are offline, we must promote social connections that accurately transmit thoughts, sentiments, or emotions.

Some students not know the difference between reliable and unreliable resources. On the internet nowadays, there is a lot of stuff that looks to be factual but is actually fake or exaggerated. According to a research published in New York Magazine, less than 60% of web traffic today is genuinely generated by human-based searches or content interaction. Bots that pose as humans contribute for up to half of all YouTube traffic each year. The individuals themselves may not be genuine, and the content may occasionally be fake.¹³⁶ Teachers must show students how to obtain reliable information, verify its truth, and use it correctly.¹³⁷

Technology is a resource that not all families can afford.

Affordability is an issue in today's environment, whether technology is used at home or in the classroom. Some households cannot afford computers for their children to use for homework. Some school districts lack the funds to pay their staff's annual wages, let alone purchase current teaching technologies. When

we stress the use of technology in the classroom, we severely penalize individuals on the bottom end of the pay scale.¹³⁸ Greater access for students means they can access lessons more frequently and learn more, which increases their exposure to material and raises their chances of success.¹³⁹

Some technologies could replace the teacher in some classrooms.

The effectiveness of interactive learning sessions has increased to the point that software or apps can instruct students without a teacher being physically present. ABC Mouse, which gives simple instructions to pupils as early as so they can begin learning when they are ready, is one of the best examples of this possible drawback. Technology shifts the teacher's role from one of active participation to one of observation.¹⁴⁰ New tech automates the learning process while adapting to changing student needs.

There are privacy concerns to consider with technology in the classroom.

Each year, identity theft affects about 15 million people in some form. The criminal enterprise costs the economy more than \$16 billion annually. Due to this problem, about US\$ 100 billion in damages have occurred since 2011. It is spreading more widely in part because more people now have more access to technology. Every day, when we use technology in the classroom, we put our kids' identities in danger.¹⁴¹ There is no way to ensure that all hazards are eliminated unless the equipment is never connected to the internet, even when apps, PCs, mobile devices, and operating systems have cutting-edge privacy safeguards that lessen the possibility of identity theft. A lot of the benefits of having technology in the classroom in the first place are lost if we take this action.¹⁴²

Technology in the classroom could create medical problems for some kids.

Eye strain occurs when you gaze at a computer screen for an extended period of time. This condition's symptoms include back pain, eye pain, neck pain, weariness, blurred vision, and difficulty paying attention. Early myopia is an issue that can occur from prolonged continuous computer use, and it affects more than 60% of adults over the age

¹³³Trentin G. (2010). Networked Collaborative Learning: Social Interaction and Active Learning Archived 17 September 2018 at the Wayback Machine, Woodhead/Chandos Publishing Limited, Cambridge, UK, ISBN 978-1-84334-501-5, accessed on 28 Aug 2023

¹³⁴Croft N. et al, (2010). Overcoming isolation in distance learning: Building a learning community through time and space. *Journal for Education in the Built Environment*, 5(1), 27-64, accessed on 28 Aug 2023

¹³⁵Culén A et al, (2012), Tweens with the iPad classroom – Cool but not really helpful. *International Conference on e-learning and e-technologies in education (ICEEE)*, (pp. 1-6). Technical University of Lodz, Poland, accessed on 28 Aug 2023

¹³⁶Dansieh S. A., (2011), SMS Texting and Its Potential Impacts on Students' Written Communication Skills. *International Journal of English Linguistics*, 1(2), 222-229, accessed on 28 Aug 2023

¹³⁷Crane B., "Using Web 2.0 Tools in the K-12 Classroom". Neal-Schuman Publishers, Inc., 2009, accessed on 28 Aug 2023

¹³⁸Denoël, E. et al, (2017), Drivers of Student Performance: Insights from Europe. McKinsey & Company, accessed on 28 Aug 2023

¹³⁹Redecker Christine, (2009), "Review of Learning 2.0 Practices: Study on the Impact of Web 2.0 Innovations on Education and Training in Europe". JRC Scientific and Technical Reports (EUR 23664 EN – 2009), Archived from the original on 7 December 2016, accessed on 28 Aug 2023

¹⁴⁰El-Hussein M et al, (2010), Defining mobile learning in the higher education landscape. *Educational Technology & Society*, 13(3), 12-21, accessed on 28 Aug 2023

¹⁴¹Epper R et al, (2001), Teaching Faculty How to Use Technology. USA: American Council on Education. Oryx Press, accessed on 28 Aug 2023

¹⁴²Seely Brown et al, (2008), "Minds on Fire: Open Education, the Long Tail, and Learning 2.0" (PDF). *Educause Review* (January/February 2008): 16–32. Archived from the original (PDF) on 16 July 2014, accessed on 28 Aug 2023

of 12. Because this health issue can have a cumulative effect on certain people, the amount of time they spend on their phone, tablet, or television may also have an impact on their eye health.¹⁴³

Some kids/students often lose track of time in the classroom. Children can easily adjust to new situations, but what is normal for them is frequently determined by what they encounter in school. Since teachers and schools spend as much time with kids as their parents do throughout the day, if not more, the classroom has an impact on every student's life. While promoting computer use may serve to increase learning opportunities, it can also result in a more sedentary way of life.¹⁴⁴ Children who spend too much time sitting down during the day experience the same health problems as adults who don't get enough exercise. With prolonged sitting, there may be concerns with metabolism, ADHD, muscle ache, obesity, and hyperactivity.¹⁴⁵ Because of this, wherever possible, any school that integrates technology into the classroom should simultaneously encourage students to engage in at least 30 minutes of moderate physical activity.

Many classrooms place limits on technology access. There are restrictions on the usage of things under the premise of protecting children because schools are aware of the possible negative effects that technology may have in the classroom. Although site blocks and firewalls can stop the majority of harmful content from reaching children's eyes, it is not uncommon to see this problem escalated by limiting computer use to word processing and simple research. Assignments that require students to utilize technology on their own, in a library, or through a loan program are brought home by the students, absolving the parents of this duty.¹⁴⁶ Is it really creating a learning environment for kids if we impose restrictions on them rather than educating them on how to make sensible decisions?¹⁴⁷

Technology can create dependencies for information recall. What is a pupil to do if they are unable to recollect a piece of information right away? The majority of people would claim that they would use a

virtual assistant like Alexa or search online for the information they need.¹⁴⁸ Although having access to a wealth of resources is fantastic, their availability can sometimes lead to reliance. The following generation of students might not be able to operate unless there is technology available for them to access if we do not teach kids how to retain information independently without the help of a computer or smart device.¹⁴⁹

Technology can be distracting to students.

Access to technology can be just as addictive as using drugs, drinking, and other vices. Approximately 100 times every day, the average American checks their smart-phone. Even if there are no notifications for them to check on, that action still takes place. Instead than focusing on the learning process, students could try to access other parts of the online experience.¹⁵⁰ This problem can only be solved by setting up clear guidelines and expectations, which will then allow technology to offer an important learning opportunity.¹⁵¹

Technology can disconnect students from face-to-face relationships. The experience of engaging with people online and in person are extremely different. People start to lose control over their speech and behavior when they believe that they can be anonymous. Some people even avoid face-to-face interaction altogether in favor of a screen, words, and emojis.¹⁵² For this reason, technology ought to be utilized in the classroom. It cannot be the only part of a student's learning process.¹⁵³

Technology can make it easier to cheat.

Technology makes it simpler for people to communicate with one another, which is unquestionably beneficial. The ease of communication also increases the likelihood of cheating. If the teacher is not keeping an eye on student computer use, all it takes is one group email blast to distribute the results of a quiz

¹⁴³ Eyyam R et al, (2014), Impact of use of technology in mathematics lessons on student achievement and attitudes. *Social Behavior and Personality: An International Journal*, 42(1), 31S-42S, accessed on 28 Aug 2023

¹⁴⁴ Flanagan J. L. et al, (2008), *Technology: The Positive and Negative Effects on Student Achievement*. NY: University of New York, accessed on 28 Aug 2023

¹⁴⁵ Friess Erin et al, (October 2018), "Cultivating a Sense of Belonging: Using Twitter to Establish a Community in an Introductory Technical Communication Classroom", *Technical Communication Quarterly*, 27 (4): 343–361, accessed on 28 Aug 2023

¹⁴⁶ Fried, C. B., (2008), In-class laptop use and its effects on student learning, *Computers & Education*, 50(3), 906–914, accessed on 28 Aug 2023

¹⁴⁷ Verzosa Hurley et al, (January 2014), "The Rhetoric of Reach: Preparing Students for Technical Communication in the Age of Social Media", *Technical Communication Quarterly*, 23 (1): 55–68, accessed on 28 Aug 2023

¹⁴⁸ Kimme Hea et al, (January 2014), "Social Media in Technical Communication", *Technical Communication Quarterly*, 23 (1): 1–5. doi:10.1080/10572252.2014.850841, ISSN 1057-2252, S2CID 219641115, accessed on 28 Aug 2023

¹⁴⁹ Bowdon, Melody A. (1 January 2014), "Tweeting an Ethos: Emergency Messaging, Social Media, and Teaching Technical Communication", *Technical Communication Quarterly*, 23 (1): 35–54. doi:10.1080/10572252.2014.850853. ISSN 1057-2252, accessed on 28 Aug 2023

¹⁵⁰ Granata K, (2019), Tech May Be to Blame for Decline in Students' Reading for Pleasure: *Education World*. Available: https://www.educationworld.com/a_news/technology-proves-negatively-effect-reading-skills,

¹⁵¹ Vie, Stephanie (3 July 2017), "Training Online Technical Communication Educators to Teach with Social Media: Best Practices and Professional Recommendations", *Technical Communication Quarterly*, 26 (3): 344–359. doi:10.1080/10572252.2017.1339487. ISSN 1057-2252, accessed on 28 Aug 2023

¹⁵² <https://www.smartprix.com/bytes/a-guide-to-emojis-types-of-emojis-what-do-they-mean-how-to-use-them/>, accessed on 29 Aug 2023

¹⁵³ Häßler B et al, (2015). Tablet use in schools: A critical review of the evidence for learning outcomes. *Journal of Computer Assisted Learning*, 32(2), 139–156, accessed on 29 Aug 2023

or test. A simple solution to this problem is to give students assignments that call for a unique viewpoint.¹⁵⁴ Encouraging thought instead of memorization typically reduces the urge to cheat.

Technology could put some students at a disadvantage.

In the US, 1 in 5 families do not consistently have enough food on the table for their children. The notion of utilizing contemporary technology in their life is incidental. It's preferable to have a pantry full of necessary groceries than a brand-new iPhone in your pocket. For technology to be a useful teaching tool, schools must give everyone equal access. Barriers to access must be eliminated for free resources, such as library computers. This problem can only be solved by sharing.¹⁵⁵

Technology could cause students to use unreliable resources for learning.

Today, there is a ton of useful information available online. There is also a ton of information that is deceptive or outright untrue.¹⁵⁶ Students must learn how to distinguish reliable news sources from those that can be considered to be "fake news." Drawing conclusions on dubious material might make pupils less competitive while trying to establish themselves in society.¹⁵⁷

Technology can make curriculum planning more difficult or expensive.

The contemporary techniques that make instructors more organized nowadays are not all widely used. It can take just as much effort to learn how to utilize a new tool as it does to pass the challenging courses required acquiring a teaching degree or certification.¹⁵⁸ Although other school districts might not cover the costs of these resources either, they are expected to be present in the classroom. Therefore, the expenses are paid for directly out of the teacher's salary.

Technology can replace the teacher. There are numerous software learning aids that incorporate teaching elements inside the program itself. The same is true of apps. Students can communicate with a preprogrammed online teacher as they finish studying lessons by using a program like ABC Mouse. This forces the teacher into the position of manager or observer.¹⁵⁹ Although technology in the classroom has the potential to

replace a lot of what teachers already do, they may never completely disappear.¹⁶⁰ Thus, developing new technology may be the way that education develops in the future rather than creating a tailored curriculum.

Technology can create issues of privacy.

Nowadays, identity theft is a significant issue. 16.3 billion dollars were allegedly stolen from 15.4 million Americans in 2016. According to research from Javelin Strategy and Research, from 2011 to 2016, identity thieves took more than US\$107 billion from victims. Every day, exposing students to cutting-edge technology puts their privacy at danger.¹⁶¹ There is no way to totally eliminate the hazards associated with this field, despite the fact that the majority of apps and software have stringent privacy protections in place.

Technology could create medical issues for some students.

Eye strain can result from staring at a tablet, smartphone, or computer screen for extended periods of time. When this happens, symptoms including eye discomfort, weariness, and even blurred vision may appear. It might also result in "Computer Vision Syndrome," a more serious ailment. According to CBS News reporting, youngsters who use computers frequently run the risk of developing myopia early in life. Around 60% of individuals with 12 years of age or older, they have myopia.¹⁶²

Technology may cause children to lose track of time.

Uniquely equipped to adjust to shifting environments are children. Even though what they observe is harmful, they believe it to be normal. That extends beyond only their vision.¹⁶³ When using a screen-equipped gadget, kids frequently become disoriented and lose track of time. This results in extended durations of sitting, which raises the risk of obesity, hyperactivity, and other problems.¹⁶⁴ As the youngster loses connection with their circadian cycle, it can also affect how they sleep.

Technology is often limited. The use of technology in the classroom is frequently restricted to simple research or word processing needs. Because to governmental or personal constraints, many of the myriad uses of contemporary technology are either prohibited or only partially accepted. This reduces the usefulness of

¹⁵⁴ Johnson M et al, (1999), Technology as a change agent for the teaching process. *Theory into Practice*, 38(1), 24-30, accessed on 29 Aug 2023

¹⁵⁵ LeBlanc A G et al, (2015), Correlates of Total Sedentary Time and Screen Time in 9–11 Year-Old Children around the World: The International Study of Childhood Obesity, Lifestyle and the Environment, *PLoS ONE*, 10 (6), accessed on 29 Aug 2023

¹⁵⁶ Şad S et al, (2014), Preservice teachers' perceptions about using mobile phones and laptops in education as mobile learning tools, *British Journal of Educational Technology*, 45(4), 606-618, accessed on 29 Aug 2023

¹⁵⁷ Kaplan, Andreas (6 April 2021). *Higher Education at the Crossroads of Disruption*: the University of the 21st Century. ISBN 978-1-80071-504-2, accessed on 29 Aug 2023

¹⁵⁸ Lowerison G et al, (2006). Student perceived effectiveness of computer technology use in post-secondary classrooms. *Computers & Education*, 47(4), 465-489, accessed on 29 Aug 2023

¹⁵⁹ Nneji B. U. et al, (2014), Technologies in education and the dehumanization and imperialization of pedagogy: The African perspective. *Bulgarian Journal of Science and Education Policy*, 8(1), 86-105, accessed on 29 Aug 2023

¹⁶⁰ <https://www.dejaoffice.com/blog/2020/10/28/7-disadvantages-of-technology-in-education/>, accessed on 29 Aug 2023

¹⁶¹ Baker, Celia (4 January 2013). "Blended learning: Teachers plus computers equal success", *Desert News*, Archived from the original on 23 October 2013, accessed on 29 Aug 2023

¹⁶² Nye D. E. et al, (2006), *Technology Matters: Questions to Live with*, The MIT Press, accessed on 29 Aug 2023

¹⁶³ Purcell K et al, (2013), *The Impact of Digital Tools on Student Writing and How Writing is taught in Schools*: Pew Research Center. Available: <https://www.pewinternet.org/2013/07/16/theimpact-of-digital-tools-on-student-writing-and-how-writing-is-taught>, accessed on 29 Aug 2023

¹⁶⁴ Unesco (5 March 2020). "Distance learning solutions". Archived from the original on 31 March 2020, accessed on 29 Aug 2023

technology and adversely affects students' prospects for learning.¹⁶⁵

Technology can create dependence. What do students do initially when they are asked a question but don't have an immediate response? Do they make an effort to retrieve the knowledge from memory? Or do they use a search engine like Google or Siri to locate the answer for them? Technology can give users access to enormous amounts of data, but it can also lead to a dependency on that access on a personal level.¹⁶⁶ Students who are accustomed to utilizing technology could find it offensive to read from a physical book. Even going outside for recess or taking part in family activities could cause them to object.¹⁶⁷

Technology Can Help Student in Many Ways in 21st century

Technology helps students access to information and resources. Students now have fast access to a wealth of knowledge and resources thanks to technology. Students can study a variety of topics, conduct research, and access instructional materials that might not be available in conventional textbooks thanks to the internet and digital tools.¹⁶⁸ There are numerous real-world instances of how students can use technology to improve their education. Students can access a variety of academic and research materials, including e-books, scholarly papers, journals, and multimedia content that might help their study, through digital libraries or online databases. Learning management systems (LMS) and educational platforms offer a central area where teachers can share resources and where students may access information. These platforms can house interactive courses, digital textbooks, multimedia content, and assignments. Open Educational Resources (OER) are modern, online, publicly accessible educational resources. Teachers can use platforms for open educational resources (OER) to obtain textbooks, lesson plans, videos, and other materials that fit the curriculum and give students access to more sources of information.

Technology connects the classroom experience to the real world. By removing the physical boundaries in the classroom, technology enables educators to provide students with a means of making connections between the curriculum and the actual world as well as those academic areas that can genuinely enhance the learning experience.¹⁶⁹ For instance, a geology professor gives her pupils a virtual tour of Grand Canyon National Park. A history instructor takes his students on a tour of the White House's rooms and past. In order to increase

students' access to knowledge and real-world perspectives, technology can also provide virtual guest speaker sessions that enable them to meet with experts and professionals from many sectors through video conferencing. Students use technology in every part of their lives outside of the classroom. Technology can enhance the learning experience in the classroom. Here are some entertaining ways to include technology in lessons. Students can use educational gaming websites or apps that provide interactive quizzes, puzzles, and challenges connected to the subject matter in the twenty-first century with the aid of technology.¹⁷⁰

Technology can prepare students for the modern workplace. Students require more than just a working understanding of the latest technology tools in order to succeed in the workplace of the twenty-first century. The tools and abilities that they will probably need in the modern job must be introduced to them. Institutions may guarantee that their students are prepared for the workforce in multiple ways by incorporating these technologies into the normal curriculum and continuing activities.¹⁷¹ In the workplace, a great need exists for digital literacy abilities.¹⁷² Students learn how to use productivity tools, cooperate online, and communicate clearly on digital platforms by integrating technology into the classroom. Students can now access, manage, and analyze vast volumes of data thanks to technology. In order to make wise judgments, employees frequently need to gather information and carry out study. Students are prepared for these activities by using classroom technology to become familiar with information management tools and practices. Students that are exposed to technology learn about a range of digital resources and platforms. Because 21st-century industries frequently require employees to learn and adapt to new technologies and software, this experience helps students become flexible and adaptable in their use of various technologies.

Technology encourages collaboration, communication, creativity and Innovation. Students can use technology to produce prototypes, design projects, make multimedia presentations, and convey their thoughts in novel ways. Many companies place a high value on these abilities because they require innovative thinking and creative problem-solving. There are several different functionalities that encourage collaboration in educational technologies. For instance, students can hold virtual meetings with peers from any location thanks to video conferencing applications like Zoom, Microsoft Teams, Slack, and Skype. Students may readily share and edit projects with each other using

¹⁶⁵Technology in Schools: Weighing The Pros And Cons". Huffington Post. 25 May 2011. Archived from the original on 23 April 2014, accessed on 29 Aug 2023

¹⁶⁶Rosenberg, Richard (2004), The Social Impact of Computers. Amsterdam: Elsevier Academic Press. p. 219, ISBN 978-0-12-597121-8, accessed on 29 Aug 2023

¹⁶⁷As Schools Close Over Coronavirus, Protect Kids' Privacy in Online Learning", Human Rights Watch. 27 March 2020. Archived from the original on 10 April 2020, accessed on 29 Aug 2023

¹⁶⁸ <https://explorance.com/blog/7-reasons-students-need-technology-classroom/#>, accessed on 24 Feb 2023

¹⁶⁹Kemp Nenagh et al, (1 January 2014), "Face-to-face or face-to-screen?, Undergraduates' opinions and test performance in classroom vs. online learning", *Frontiers in Psychology*. 5: 1278, accessed on 30 Aug 2023

¹⁷⁰Clark, R C et al, (2007), *eLearning and the Science of Instruction*, San Francisco: Pfeiffer. ISBN 978-0787986834, accessed on 30 Aug 2023

¹⁷¹Kronholz J., (2011), "Getting at-risk teens to graduation", *Education Next*, Vol. 11, no. 4, accessed on 30 Aug 2023

¹⁷² Richards J. C. et al, (2010). *Longman Dictionary of Language Teaching and Applied Linguistics* (4th ed). London: Pearson, accessed on 30 Aug 2023

free online storage options like Google Drive, which promotes better overall teamwork in both the academic and professional worlds.¹⁷³ This mirrors the teamwork and communication skills required in any workplace in 21st century.

Technology allows global awareness and cultural exchange. Students can connect with peers and experts from around the world thanks to technology. Students can broaden their perspectives on a variety of subjects, acquire global awareness, learn about other cultures, and participate in virtual exchange programs through video conferencing, online collaborations, and other means.¹⁷⁴ No two kids learn in the same manner, but with the correct resources, instructors may accommodate differences in learning experiences and methods. In the twenty-first century, a platform for student insight solutions like Explorance Blue can assist in determining student needs based on real-time feedback. By enabling teachers to interact and connect with every student, regardless of where they are, what they do, what their culture or beliefs are, or what obstacles they are facing, Explorance Blue fosters student learning.¹⁷⁵

Technology teaches students to become digital citizen. Most pupils are now digital citizens thanks to the abundance of social media platforms. Students may learn how to be responsible in the digital world and with their online behavior by utilizing technology in the classroom, though. Students can practice speaking, searching for information, and interacting with other digital citizens in the classroom, which serves as a microcosm of the larger digital realm.¹⁷⁶ To get student feedback, run class surveys, or lead class discussions, you can use online polling tools or survey platforms. This promotes involvement and lets pupils voice their opinions. By employing instructional coding platforms or applications, it also aids in introducing kids to coding and programming activities.¹⁷⁷ Through lessons that are based on games, students can learn the fundamentals of coding and afterwards use their knowledge to make straightforward programs or animations.

Technology helps students to become smart citizen. Effective teachers use technology to improve their lessons and more effectively engage their students. However, it's crucial to make sure that children are instructed on how to find information efficiently,

evaluate sources critically, and use technology ethically. Teachers play a critical role in assisting students in navigating the digital world and mastering information literacy.¹⁷⁸ It aids in orienting and teaching students about cutting-edge technology such as artificial intelligence (AI), machine learning (ML), big data, augmented reality (AR), virtual reality (VR), etc. In order to build immersive and interactive learning experiences, students can now investigate AI, ML, AR, and VR technologies. Students can visit historical landmarks, study virtual species, or visualize challenging topics in a three-dimensional environment using AR/VR tools. In the twenty-first century, students can use applications or tools that leverage AI/ML to learn and receive information while seated from any location in the world.

Technology Create Problem for Student in Many Way in 21st century

Deterioration of students' competencies in reading, writing and arithmetic. These are the three fundamental abilities that every student must possess.¹⁷⁹ In general, classroom technology raises students' academic achievement and increases their drive to complete their assignments. The proficiency of students in reading, writing, and mathematics—three skills that are unquestionably important to them—seems to be negatively impacted by their heavy reliance on computers.¹⁸⁰ Similar to how they do with physical books and magazines, students do not learn as much from Google Books. Similarly, claims that technology makes our thoughts "shallow" and that kids who read linear materials have a stronger recall and a better understanding than those who read online. The transition from paper to screen affects more than simply how we read and explore written material.¹⁸¹ It also affects how much time and effort we put into it, as well as how immersed we are in it. When we use the internet, we enter a setting that encourages superficial learning, hasty and disorganized thinking, and brief reading.¹⁸² Technology in the classroom has a significant impact on students' writing abilities, particularly in terms of spelling and punctuation, grammatical precision, proofreading, critical thinking, and respect for coherence and linearity. Students who are constantly exposed to short forms find it difficult to put forth effort in their writing, and

¹⁷³Dalsgaard Christian, "Social software: E-learning beyond learning management systems", eurodl.org, University of Aarhus. Archived from the original on 20 May 2013, accessed on 31 Aug 2023

¹⁷⁴Technology Uses in Education, Nsba.org. 9 December 2011. Archived from the original on 6 July 2013, accessed on 31 Aug 2023

¹⁷⁵Warschauer M et al, (2010). "New technology and digital worlds: analyzing evidence of equity in access, use and outcomes". Review of Research in Education. 34 (1): 179–225, accessed on 31 Aug 2023

¹⁷⁶Deschaine Mark et al, (2017), "Increasing Student Engagement in Online Educational Leadership Courses" (PDF). Journal of Educators Online: 6. Archived (PDF) from the original on 31 December 2018, accessed on 31 Aug 2023

¹⁷⁷Izadpanah, S., (2016), The perception of EFL high school students in using of computer technology in the process of

learning: Merits and demerits. Advances in Language and Literary Studies, 7(3), 146- 156, accessed on 31 Aug 2023

¹⁷⁸Su Jiahong et al, (24 May 2023), "Teaching artificial intelligence in K–12 classrooms: a scoping review". Interactive Learning Environments: 1–20, accessed on 31 Aug 2023

¹⁷⁹Bishop J., (2013), The flipped classroom: A survey of the research. 120th ASEE National Conference Proceedings, 30, pp. 1-8. Atlanta, GA, accessed on 31 Aug 2023

¹⁸⁰Al-Hariri M, (2017), Impact of students' use of technology on their learning achievements in physiology courses at the University of Dammam, Journal of Taibah University Medical Sciences, 12(1), 82-85, accessed on 31 Aug 2023

¹⁸¹Clarke B., (2014), An updated literature review on the use of tablets in education. Tablets for Schools, UK: Family Kids & Youth, accessed on 31 Aug 2023

¹⁸²Carr, N. (2011). The Shallows: What the Internet Is Doing to Our Brains. New York: W. W. Norton & Company, accessed on 31 Aug 2023

they find it difficult to discern between formal and informal writing styles because to the short forms that are regularly employed in texting.¹⁸³ The use of technology in the teaching of math and arithmetic comes with a bewildering array of potential hazards. Since calculators are typically numerical devices, kids could not develop a strong conceptual understanding. Their understanding of mathematics will likely be more procedural, which could hinder their ability to solve problems. The employment of tech devices in the twenty-first century may also impede the development of their structural understanding of mathematics. A calculator may also provide inaccurate information and cause confusion when learning notation due to the way it is designed.¹⁸⁴ Due to kids' excessive usage of calculators, the UK government declared its plan to outlaw them in primary schools in 2012.¹⁸⁵

Dehumanization of education. Many educational settings are dehumanized by technology, which also distorts the dynamic between professors and pupils. For example, at higher education institutions and online courses, lecturers deliver their lectures from a distance and students are obliged to interact with computers rather than people. The end result is a teacher who knows very little or nothing about their pupils, and students who don't seem to have a deep relationship with their teacher. These days, technology draws students away from their physical surroundings. They genuinely shut out the outside world. College students today are accustomed to a world of electronic traces from online activities like instant messaging, blogging, and web browsing.¹⁸⁶ Dependence on technology in the classroom also results in a lack of rapport between teachers and students and/or among students themselves, which undermines one of the fundamental goals of education by undermining the social ties required in teaching.¹⁸⁷ In the twenty-first century, there is scarcely any time for teachers to have an impact on their students if they spend a lot of time using technology in the classrooms. Students also miss out on the chance to build healthy relationships with one another.¹⁸⁸

Isolation of students in a digital and virtual world. Students are separated from all forms of social interaction by technology. According to the psychoanalytic theory, solitude is a coping mechanism used by people when they find themselves in a dangerous or unpleasant situation. Because of this, kids who use technology regularly begin to avoid any social interactions that would cause them to feel disconnected and instead grow to feel safe and secure while "wired" to their devices. The phrase 'friendsickness' was first used by Paul & Brier in 2001 to describe the loneliness college-bound youngsters experience after leaving their old pals behind.¹⁸⁹ They make it seem as though technology fills the gap in connections and gives those young pupils the sense that their friendships are still strong.¹⁹⁰ argues that "The observation that a computer is placed in an individual's room rather than a family room and that a child uses a computer alone without any other family members' presence amplifies concerns about social isolation and harmful influences on children's social development." calls attention to the danger of technology-enhanced isolation and the potentially dangerous impact it may have on the children's social development. In 2011, Turkle draws attention to the dichotomous influence of technology, which can drive a person's perception of company and loneliness to opposite ends of the spectrum. She says, "We can find 'companion' online with ease, but the strain of performance wears us out."¹⁹¹ Despite our ongoing connection, we hardly ever pay attention to one another. The dehumanizing impact of technology plays a significant role in this sense of isolation, which frequently leads to a sense of loneliness. In 2013, Karsenti and Fievez bring up the instance of Quebec pupils who were distracted by the overuse of tablets in 21st-century education.¹⁹² In an effort to make the courses more interesting, educators frequently use technology-based games and entertainment, which isolates kids and may ultimately result in less effective learning.¹⁹³ Even while doing straightforward tasks like gap filling and matching, distractions can be added to the technical issues that come with tablet use by young

¹⁸³ Bronowicki, K. A. (2014). Technology's adverse effects on students' writing: An emphasis on formal writing is needed in an academic curriculum. Master's Thesis: State University of New York, accessed on 31 Aug 2023 Available: https://digitalcommons.brockport.edu/cgi/viewcontent.cgi?referer=https://www.google.com.eg/&httpsredir=1&article=1399&context=ehd_theses, accessed on 31 Aug 2023

¹⁸⁴ Zheng T., (1998), Impacts of using calculators in learning mathematics, The 3rd Asian Technology Conference on Mathematics (ATCM'98), 1-10. Available: <http://www.any2any.org/EP/1998/ATCMP015/paper.pdf>, accessed on 31 Aug 2023

¹⁸⁵ Stacey, O. (2014, November). Subtracting calculators from maths tests doesn't add up. Available: <https://thenferblog.org/2014/11/12/subtracting-calculators-from-maths-tests-doesnt-add-up/>, accessed on 31 Aug 2023

¹⁸⁶ Spitzer M., (2014), Information technology in education: Risks and side effects. Trends in Neuroscience and Education, 3(3-4), 81-85, accessed on 31 Aug 2023

¹⁸⁷ Nneji, B. U. (2014). Technologies in education and the dehumanization and imperialization of pedagogy: The African perspective. Bulgarian Journal of Science and Education Policy, 8(1), 86-105, accessed on 31 Aug 2023

¹⁸⁸ Nicholas, C., et al, (2010), Overcoming isolation in distance learning: Building a learning community through time and space. Journal for Education in the Built Environment, 5(1), 27-64, accessed on 31 Aug 2023

¹⁸⁹ Paul, E. et al, (2001), Friendsickness in the Transition to College: Precollege Predictors and College Adjustment Correlates. Journal of Counseling and Development, 79(1), 77-89, accessed on 31 Aug 2023

¹⁹⁰ Lee S. J. (2009). Online Communication and Adolescent social Ties: Who Benefits more from Internet Use? Journal of Computer-Mediated Communication, 14(3), 509-531, accessed on 31 Aug 2023

¹⁹¹ Turkle S., (2011), Alone Together: Why we Expect more from Technology and less from Each Other. New York: Basic Books, accessed on 31 Aug 2023

¹⁹² Karsenti, T., & Fievez, A. (2013), The iPad in education: Uses, benefits and challenges. A survey of 6,057 students and 302 teachers in Quebec, Canada, Montreal: CRIFPE, accessed on 31 Aug 2023

¹⁹³ Iserbyt, P. C. (2014). Learning basic life support (BLS) with tablet PCs in reciprocal learning at school: Are videos superior to pictures? A randomized controlled trial, Resuscitation, 85, 809-813, accessed on 31 Aug 2023

pupils, especially if technical support is not readily available to address such issues quickly.¹⁹⁴

Technology creates and deepening social inequalities.

The gap between students who have access to technology and those who do not is widening, which is a sign of social inequality. Between the rich and the poor, technology widens the income gap significantly. The infrastructure of schools in wealthy and underdeveloped nations clearly differs significantly. While practically all technology tools (PCs, laptops, tablets, projectors, and Internet connectivity) are available in classrooms in affluent nations, this is not the case in underdeveloped nations.¹⁹⁵ As a result, graduates from schools in underdeveloped nations often lack the fundamental technology skills needed to compete in the global labor market, such as PC literacy. There is frequently a digital divide even in affluent nations due to the stark differences in student achievement across kids from various social origins.¹⁹⁶ Although they may have access to technology in the classroom, low-income children are unable to purchase any gadgets for their homes, which is seen in their academic performance when compared to that of their wealthy friends. The National Telecommunications and Information Administration (NTIA) reported that Americans who live in towns are 50% more likely to have access to the Internet than Americans who live in rural areas.¹⁹⁷ The following quote from Sarah Phinney, the coordinator of remote education at Porterville Adult School in Central California, demonstrates the effects of this digital divide: In my seven years of working with this group [at Porterville Adult School], I have discovered that a large percentage of the students we serve, particularly those who speak English as a second language, are computer illiterate and fall on the lean side of the split.¹⁹⁸ If this is the outcome of the digital divide in the US, it must be much worse and more widespread in other nations where the divide is greater, as is the case in LDCs or

developing nations where private schools and universities have a better, more functional technological environment than state schools and universities, which is reflected in the significantly different levels of graduates from both types of education in the twenty-first century.¹⁹⁹

Emotional and behavioral issues. Children sometimes have a strong desire to be like their heroes or friends. When they can't get together or carry out what they see on TV, it may frighten them or make them feel inadequate and inferior.²⁰⁰ FOMO, or the toxic combo of worry and inadequateness, starts to take hold. Online communities can serve as breeding grounds for hatred. Children in the twenty-first century have a chance to experience emotional trauma because of the internet.²⁰¹ Social media and technology can be used by kids and teenagers to bully other youngsters without ever really meeting them. In the twenty-first century, this behavior is frequently referred to as cyberbullying.²⁰² Even with younger students, it is typical.²⁰³

Reduced sleep quality. Kids now have access to digital content 24/7 because to portable gadgets like smartphones and tablets. It suggests that rather than resting, some people would stay up all night responding to SMS and messages.²⁰⁴ Children require a lot of sleep because both physical and mental health depends on it.²⁰⁵ A restful night's sleep aids growth, enhances heart health, affects weight, lengthens attention span, and even aids in academic performance. Two of the downsides of technology include misuse and a lack of understanding of how much technology is "too much." In the twenty-first century, make sure that parents watch over and restrict their kids' use of technology.²⁰⁶

Reduced physical activity. Excessive use of technology by children can be harmful to their health. People who spend more time passively using their phones, playing video games, or watching TV engage in less overall physical activity. The increased use of

¹⁹⁴ Culén A, et al, (2012), Tweens with the iPad classroom – Cool but not really helpful, International Conference on e-learning and e-technologies in education (ICEEE), (pp. 1-6). Technical University of Lodz, Poland, accessed on 31 Aug 2023

¹⁹⁵ Kemp Nenagh et al, (1 January 2014), Face-to-face or face-to-screen?, Undergraduates' opinions and test performance in classroom vs. online learning", *Frontiers in Psychology*, 5: 1278. doi:10.3389/fpsyg.2014.01278, accessed on 31 Aug 2023

¹⁹⁶ Van Dijk, J, (2011), The digital divide as a complex and dynamic phenomenon, *The Information Society: An International Journal*, 19(4), 315-326, accessed on 31 Aug 2023

¹⁹⁷ Steele-Carlin S., (June 2017), Caught in the digital divide, *Education World*, Available: http://www.education-world.com/a_tech/tech041.shtml, accessed on 31 Aug 2023

¹⁹⁸ Tapscott D. (1999), *Growing up Digital: the Rise of the Net Generation*. New York: McGraw-Hill,

¹⁹⁹ Warschauer M., (2011), Dissecting the "digital divide": A case study in Egypt. *The Information Society: An International Journal*, 297-304, accessed on 31 Aug 2023

²⁰⁰ Wallace, K. (2009, June 17), High-Tech Cheating on the Rise at Schools, *Cbsnews*. Available: <https://www.cbsnews.com/news/high-tech-cheating-on-the-rise-at-schools/>, accessed on 31 Aug 2023

²⁰¹ Rideout, V.; Vanderwater, E.; Wartella, E. (2003), *Zero to six: Electronic media in the lives of infants, toddlers, and preschoolers (Report)*, Menlo Park, California: The Henry J. Kaiser Family Foundation. Archived from the original on 24 December 2014, accessed on 31 Aug 2023

²⁰² Kester, Liesbeth; Kirschner, Paul; Corbalan, Gemma (May 2007), "Designing support to facilitate learning in powerful electronic learning environments", *Computers in Human Behavior*, 23 (3): 1047–1054, accessed on 31 Aug 2023

²⁰³ Craft Anna, (July 2012), "Childhood in a digital age: creative challenges for educational futures" (PDF). *London Review of Education*, 10 (2): 173–190, accessed on 31 Aug 2023

²⁰⁴ Vonberg, J. (2015, December 8), The loneliness of the long distance learner, *The Guardian*, Available: <https://www.theguardian.com/higher-education-network/2015/dec/08/you-work-in-a-vacuum-the-loneliness-of-the-long-distance-learner>, accessed on 31 Aug 2023

²⁰⁵ Cuesta-Cambra, Ubaldo; Niño-González, José-Ignacio; Rodríguez-Terceño, José, (1 July 2017), "The Cognitive Processing of an Educational App with EEG and 'Eye Tracking'", *Comunicar*, 25 (52): 41–50. doi:10.3916/c52-2017-04, accessed on 03 Sep 2023

²⁰⁶ "Guiding Principles for Use of Technology with Early Learners", Office of Educational Technology, Archived from the original on 6 November 2018, accessed on 03 Sep 2023

technology promotes an unhealthy lifestyle.²⁰⁷ It has the potential to cause a slew of health issues, including obesity, coronary heart disease, and type 2 diabetics. Children who spend more time watching devices spend less time outside or engaged in physical activity.²⁰⁸ They may consume more mindlessly while watching TV or playing video games.²⁰⁹ As a result, it's critical to understand basic techniques for motivating youngsters to eat without using technology. While parents can promote a healthier lifestyle by promoting outdoor activities, limiting screen time, and providing healthy snacks, doctors or certified dietitians can counsel children on healthy eating habits and physical activity, as well as monitor growth and development.²¹⁰ By carefully managing their weight, children can achieve optimal health and avoid long-term health concerns in the twenty-first century.²¹¹

Weakened social skills. Children of the new generation use Facebook to chat, browse websites, and play online games. The constant use of technology can impede the growth of fundamental social skills.²¹² The ability to interpret and use facial emotions, take turns in conversations, and maintain eye contact are all examples of social skills. It's not that time spent online is bad. However, spending too much time online might rupture the link between parents and children and hinder children's social skill development.²¹³ Therefore, while technology can be a good thing for kids, too much exposure can be bad for them in the twenty-first century. If students limit their time spent on screens, these are less likely to happen. Follow the pediatrician's recommendations and your best judgment for a child's balanced day. Monitor their screen time, exercise, and social interaction. Parenting successfully requires harmony, moderation, and oversight.²¹⁴

New experiences can feel and seem scary.

The brain like what it is accustomed with, therefore we frequently feel secure in situations that are comfortable to us. It follows that many of the problems our society faces can be attributed to technology. We

frequently feel cautious or terrified of technology because of how quickly growth and innovation occur and how foreign it might seem to us. Technology encourages new experiences therefore it is actually quite normal to be afraid of the unknown and uneasy with new things.²¹⁵ There have been individuals advising against technology for as long as there has been technology. Technology has forced us to adjust to new and uncharted realms, from radios and TVs to the internet and social media.²¹⁶ How much time do students spend every day using screens? Most people might be surprised by the average screen time, broken down by age. For work, education, and leisure, people spend a significant amount of time each day in front of smartphones, laptops, tablets, and other technology.²¹⁷ The majority of individuals experience some guilt because of how much time they spend each day staring at screens.²¹⁸

Some Suggested and Recommendation

Technology is used extensively in education nowadays. The global adoption of contemporary technology has significantly altered how pupils study and teachers impart information. The amount of technology being used in a school's classrooms is frequently used to gauge how successful the institution is.²¹⁹ Thus, technology has so far played a significant role in students' social and academic lives, which inevitably leads to intense anxiety about the consequences of its use. The research and moral application of assisting learning and enhancing performance through the development, application, and management of suitable technical procedures and resources is what the Association for Educational Communications and Technology (AECT) defines as educational technology. Therefore, the definition of technology encompasses not only 'TECHNOLOGY' (such as computers or the internet), but also the application of scientific knowledge to enhance learning.²²⁰ No one disputes the fact that in the twenty-first century it is nearly impossible to ban technology from the classroom.²²¹ We still have the ability

²⁰⁷ Biocchi Michael, "Games in the Classroom", Gaming in the Classroom. Archived from the original on 15 August 2011, accessed on 03 Sep 2023

²⁰⁸ Schindler, Laura A.; Burkholder, Gary J.; Morad, Osama A.; Marsh, Craig (December 2017). "Computer-based technology and student engagement: a critical review of the literature", *International Journal of Educational Technology in Higher Education*, 14 (1): 25. doi:10.1186/s41239-017-0063-0. ISSN 2365-9440, accessed on 03 Sep 2023

²⁰⁹ "Technology in the Preschool Classroom", study.com, Archived from the original on 6 November 2018, accessed on 03 Sep 2023

²¹⁰ Publications, "The Rise of Cyber-Schools", *The New Atlantis*, Archived from the original on 25 February 2013

²¹¹ Viorica-Torii, C., & Carmen, A. (2013), The impact of educational technology on the learning styles of students. *Procedia-Social and Behavioral Sciences*, 83, 851-855, accessed on 03 Sep 2023

²¹² Steele-Carlin S, (2017, June), Caught in the digital divide, *Education World*, Available: http://www.education-world.com/a_tech/tech041.shtml, accessed on 03 Sep 2023

²¹³ Stacey, O. (2014, November). Subtracting calculators from maths tests doesn't add up. Available: <https://thenferblog.org/2014/11/12/subtracting-calculators-from-maths-tests-doesnt-add-up/>, accessed on 03 Sep 2023

²¹⁴ <https://www.cyberwise.org/post/positive-and-negative-effects-of-technology-on-children>, accessed on 26 Aug 2023

²¹⁵ "Technology in Schools: The Ongoing Challenge of Access Adequacy and Equity" (PDF), *NEA Education Policy and Practice Department*, Archived from the original (PDF) on 25 October 2019, accessed on 03 Sep 2023

²¹⁶ <https://www.cyberwise.org/post/from-social-media-to-smartphones-how-technology-affects-our-mental-health>, accessed on 31 Aug 2023

²¹⁷ Kronholz, J., (2011), "Getting at-risk teens to graduation", *Education Next*, Vol. 11, no. 4, ProQuest 1237831598,

²¹⁸ <https://www.igi-global.com/article/learning-object-models-learning-service/1666>, accessed on 03 Sep 2023

²¹⁹ Stacey, O. (2014, November). Subtracting calculators from maths tests doesn't add up. Available: <https://thenferblog.org/2014/11/12/subtracting-calculators-from-maths-tests-doesnt-add-up/>, accessed on 03 Sep 2023

²²⁰ https://www.researchgate.net/post/Confusion_over_the_Concept_of_Educational_Technology, accessed on 11 Sep 2023

²²¹ Shiao, Dennis. "Why Virtual Classrooms Are Excellent Learning Venues", *INXPO*, Archived from the original on 5 November 2013, accessed on 03 Sep 2023

to reduce its harmful consequences, though. Technology users are advised by UNICEF (2017) to "harness the good" and "limit the harm."²²²The following is a collection of advice on how to manage technology in a way that won't endanger pupils in the twenty-first century.²²³

- Ensuring that students engage with one another even when they are fully engrossed in their digital world.²²⁴Technologies for student tracking should incorporate visualization capabilities that make it simple for teachers to assess students' progress.

- Technology need to be employed to aid in teaching and learning. Creating activities that inevitably encourage teamwork and communication.²²⁵

- Comparing and exchanging (blog posts, school assignments, etc.) to demonstrate how technology can unite students from around the world.²²⁶

- Encouraging technologically competent students to create interactive materials that will improve the course.²²⁷The use of technology for instruction rather than for administrative activities should be the focus of professional development initiatives.

- Offer teacher preparation programs emphasizing constructivism and student-centered learning. It is crucial to include instructors in the decision-making process when implementing new technologies in the classroom.²²⁸

- When attempting to ensure the proper use of technology, teacher training may also serve as a launching point.²²⁹In fact, the more training teachers acquire, the more effectively they will use technology and the less adverse consequences it will have.²³⁰

- Technology-based tools wouldn't be useful unless they were used in conjunction with strong instructional strategies.²³¹

- Unexpectedly, adding technology to the classroom won't have the desired positive impact unless objectives are well defined and exercises are well-designed.²³²Teachers in the twenty-first century typically recognize the advantages of educational technologies, but they frequently find it difficult to integrate new technologies into their lessons in an efficient and effective way. Technological integration poses serious difficulties for teachers at all levels of school systems, from purchasing new technological equipment to adapting curricula and teaching methods to include new educational resources.²³³

- The dominant force influencing the educational landscape in the twenty-first century is probably technology. The teaching and learning process, as well as educational administration, management, and evaluation, should all make use of the proper technology.²³⁴

- Educational systems must now make sure that integrating ICT programs into the curriculum is supported by efficient programs for instructors' Continuing Professional Development (CPD), which incorporates technology-based learning. Parents should be made aware of the fact that technology is not always a blessing and that it is now their own responsibility to control their children's strong desire to utilize technology at all times and places.²³⁵

- Actually, computers were created for calculations and simulations, not management, and today we see that they are used in every part of life. So we will be useful if we have the mindset and mentality to use and benefit from technology.²³⁶

²²² UNICEF Report (2017). The State of the World's Children 2017: Children in a Digital World. Available: https://www.unicef.org/publications/files/SOWC_2017_ENG_WEB.pdf (June 14, 2019), accessed on 03 Sep 2023

²²³ Wilkins, K. (2014, May). How New Technologies Affect Student-Teacher Relationships. British Council Voices Magazine, Available: <https://www.britishcouncil.org/voices-magazine/new-technologies-affect-studentteacher-relationships>, accessed on 03 Sep 2023

²²⁴ Wentworth D. et al, (2014), Technology use and academic performance, Computers & Education, 78, 306-311, accessed on 03 Sep 2023

²²⁵ Warschauer M., (2011), Dissecting the "digital divide": A case study in Egypt. The Information Society: An International Journal, 297-304, accessed on 03 Sep 2023

²²⁶ Serbyt, P. C., (2014), Learning basic life support (BLS) with tablet PCs in reciprocal learning at school: Are videos superior to pictures? A randomized controlled trial, Resuscitation, 85, 809-813, accessed on 03 Sep 2023

²²⁷ Bishop J. et al, (2013), The flipped classroom: A survey of the research. 120th ASEE National Conference Proceedings, 30, pp. 1-8. Atlanta, GA, accessed on 03 Sep 2023

²²⁸ Hu H et al, (2014), iPads for STEM teachers: A case study on perceived usefulness, perceived proficiency, intention to adopt, and integration in K-12 instruction. Journal of Educational Technology Development and Exchange, 7, 49-66, accessed on 10 Sep 2023

²²⁹ Tremblay, Eric (2010), "Educating the Mobile Generation – using personal cell phones as audience response systems in post-secondary science teaching", Journal of Computers in Mathematics and Science Teaching, 29 (2): 217–

227, Archived from the original on 31 October 2010, accessed on 04 Sep 2023

²³⁰ Cleaver S, (2014), Technology in the Classroom: Helpful or Harmful? Retrieved from <http://www.education.com/magazine/article/effective-technology-teaching-child/>, accessed on 11 Sep 2023

²³¹ Laurillard, D. (2002). Rethinking University Teaching: A Conversational Framework for the Effective Use of Educational Technology (2nd ed.), London: Routledge, accessed on 03 Sep 2023

²³² McFarlane, A. (1997). What Are We and How Did We Get Here? Information Technology and Authentic Learning: Realizing the Potential of Computers in the Primary Classroom. London: Routledge, accessed on 03 Sep 2023

²³³ Hofer M et al, (2012), TPACK development in teacher education: A longitudinal study of preservice teachers in a secondary M.A.Ed. program. Journal of Research on Technology in Education, 45, 83–106, accessed on 11 Sep 2023

²³⁴ U. S. Department of Education, Office of Educational Technology, (2010), Transforming American education: Learning powered by technology, National Educational Technology Plan 2010, Retrieved March, 20, 2015, from <http://nces.ed.gov/pubs2007/2007020.pdf>, accessed on 11 Sep 2023

²³⁵ Turkle S, (2011), Alone Together: Why we expect more from Technology and less from Each Other. New York: Basic Books, accessed on 03 Sep 2023

²³⁶ Althoff T et al, (2015). Donor retention in online crowdfunding communities: A case study of DonorsChoose.org. Proceedings of the 24th International Conference on World Wide Web, 34-44, accessed on 11 Sep 2023

➤ TPK involves more than just acquaintance with technologies and knowledge of practical pedagogical or academic procedures; it also calls for an understanding of how specific technologies can support specific pedagogical strategies or techniques. Understanding how technologies can support particular domain-specific pedagogies is also a requirement for technological pedagogical content knowledge (TPACK).²³⁷

Conclusion

For today's student, technology brings new learning opportunities. Today's kids exhibit three essential types of intelligence: emotional, creative, and instructional. The latter alternative is given more attention in the conventional classroom setting, which frequently promotes lecture-based instruction. The same is done via standardized tests and other ranking systems. Students today have access to technology, which allows those who flourish outside of the traditional learning environment to still reach their full potential. With the help of technology, kids may express their curiosity in a variety of ways. Because they have access to technology, they can experiment without feeling embarrassed. Students are given the opportunity to go through trial-and-error as they choose to see through this process. However, a new approach to the learning process aids in their increased learning capacity. Students can now easily and conveniently access data and study resources thanks to technology. As is well known, students must visit the library before beginning any research project in order to borrow a few books to read, gain access to an encyclopedia, and even watch microfilm in order to have enough materials to complete their assignment. Thanks to technology, a student can get all the materials they require for a project from a single source. Students can perform a few searches on Google or any other search engine to obtain their supporting resources and information instead of wasting all that time looking for anything special or waiting for their library to order it. The education industry has been reluctant to adapt digital trends even after technological advancement, instead of educating the youth to advance technology. Let's face it: the education industry isn't typically the one to accept new technologies quickly. That is the only explanation for why educational development has continued while being hesitant and slow. New courses are now being offered in schools and colleges, and the sector will soon change.

The education industry has historically been the last to implement significant reforms while clinging to outdated teaching methods. However, teachers are introducing new cutting-edge elements as a result of the digital change in education. In this post, we'll look at and briefly discuss a few of the education-related changes and trends that are expected to have a significant impact in 2019. Students are losing interest in traditional teaching techniques over time, thus eLearning and digital transformation will be essential to pique

their attention. Our entire educational system will advance as more and more digital and smart trends become popular. Beyond monetary concerns, education confronts distinct resource difficulties. The duration of the school day is limited, and class time is a valuable resource. Compared to many other countries across the world, American students spend less time in the classroom. Teaching is a difficult profession that involves many repetitive but time-consuming responsibilities. Tools that make it easier to remember fundamental information free up teachers to assist children who require individualized interventions. Over the course of the school year, every additional minute spent instructing students has an impact. Technology improvements in assessment have the potential to benefit both teachers and pupils. Without performance feedback, teachers cannot determine whether pupils have understood the lesson, and legislators cannot determine whether their reforms are effective. Since the development of the optical scan answer sheet half a century ago, assessment technology has barely, if at all, evolved. While some new assessment technologies enable accurate real-time assessment, others can assist reduce testing expenses. Testing innovations allow for low-stakes evaluation of children.

Since the previous 60 years, technology has permeated the classroom and irrevocably changed how people learn and teach. One of the most crucial skills students should learn for the 21st century is technology. It is a new literacy that makes it easier to access a variety of knowledge sources. Whether for or against, this movement towards digital integration in the classroom will be continued further and each new breakthrough will be breed more alluring one. Students today are sometimes referred to as "the Net Generation," "Digital Natives," "the Gamer Generation," "New Millennium Learners," etc. since they are so obsessed with technology. This obsession with technology needs to be controlled; otherwise, there would be many risks and severe consequences. Despite the fact that many of our students think they are learning effectively when utilizing technology, several unfavorable and non-educative attitudes are common among them. No one can realistically fathom learning without technology, and no one can currently comprehend how an educational environment might achieve desired objectives and ends without actually utilizing technology. However, if steps are not taken to restrict the detrimental changes it can bring about to education, the use—more specifically, the excessive use of technology may run counter to many educational objectives. The importance of this essay is found in the way it has highlighted the potential drawbacks of employing technology in the classroom and offered a number of workable alternatives that could perhaps help mitigate these drawbacks.

²³⁷ Brantley-Dias L, (2013), Goldilocks and TPACK: Is the Construct "Just Right?" *Journal of Research on Technology in Education*, 46, 103–128, accessed on 11 Sep 2023

A SACRAMENTAL QUESTION ADDRESSED TO QUANTUM THEORY

Kulakov A.

*Corresponding Member of the Russian Academy of Sciences,
Doctor of Physics and Mathematical Science, Institute of Functional Economic Systems, Moscow, Russia
<https://doi.org/10.5281/zenodo.8385953>*

Abstract

The author of this small in size, but extremely important in terms of physical significance, article shares with readers his knowledge of quantum mechanics, experience in writing scientific books and articles, and logical thinking skills in relation to the problem of creating a quantum theory (in this situation, a response to A. Einstein's objection to one from the main relations of quantum mechanics - uncertainty relations).

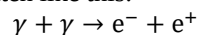
Keywords: uncertainty relation, gamma quanta, particles and antiparticles, theory of relativity, quantum theory, wave field reduction, corpuscular formations, waves of information, nonlocality of particles.

When I perceive, it is not I who thinks about the world. And he organizes himself around me.

Maurice Merleau Ponty

One of A. Einstein's strongest objections to one of the main relations of quantum mechanics - the uncertainty relation - is based on the following thought experiment.

When two gamma quanta collide, having the same and sufficiently high energy (exceeding the rest energy of the electron), the reaction of the formation of an electron-positron pair, particles that differ only in the sign of the electric charge, is possible. This reaction is symbolically written like this:



A particle (electron) and an antiparticle (positron) diverge from the place where the pair is formed in different directions and at the same speed. The position of the target on which pairs are produced is determined by the experimenter. According to quantum theory, the variables velocity and position of a particle (or antiparticle) are complementary in the sense that the possible accurate measurement of velocity excludes the simultaneous measurement of the coordinate; at least the uncertainty of the latter is so great (and this uncertainty is irremovable) that it does not allow one to judge the position of the particle within the experimentally used device or physical instrument. On the contrary, in the case when the device is designed to accurately measure the coordinate, it is practically impossible to judge the magnitude and direction of the particle velocity. The same can be said regarding the simultaneous measurement of the speed and position of the antiparticle.

Further A. Einstein reasoned as follows. If the coordinate of an electron is experimentally measured, and after a sufficiently long time t , such that the distance from the target to the counter recording the position of the particle exceeds ct , where c is the speed of light, then the mutual influence of the electron and positron at the moment of measurement is excluded (causal interdependence at This becomes, according to the theory of relativity, impossible). The speed of the particle, as already mentioned, is not determined. However, if the time t is known, then from its value it is not difficult to determine the speed of the antiparticle, since its position is given by a point symmetrically located relative to the target. It turns out that the positron has (at the moment of measuring the position of the electron) both

a certain coordinate value and a certain velocity value, which directly contradicts the uncertainty relation. In this case, any impact of the device on the state of the positron is excluded due to the accepted assumption that there is no causal connection between the act of measurement and the state of the positron.

A rather acute dilemma arises. Either the electron and the positron really are particles, i.e. they are localized regardless of whether any measurements are made on them or not. But in this case the uncertainty relation does not hold, and therefore, quantum theory, based on these positions, must be declared invalid. Or the quantum theory is correct, but the particles are not localized in space, but are somehow "smeared" throughout space. At the same time, the thesis of nonlocal interaction allows us to assume a causal relationship between an electron and a positron even at distances exceeding the light interaction (i.e., through the exchange of "signals") between them. But then it is difficult to explain the so-called reduction of the wave packet, precisely why the electron (and positron) give an almost point-like flash on the recording screen, i.e. the package shrinks to a point rather than creating a wide spot.

However, there is another possibility. This is an assumption that corpuscular formations do not exist at all as objects independent of our consciousness. But in physical theory, explicitly or implicitly, some physical processes are assumed to occur in objects, and not in the observer's brain. Our consciousness only states this occurrence. If this position is incorrect, then the question arises: how can our consciousness determine the course of physical processes? Measurement acts, it would seem, provide only information about these processes. Accepting the thesis about the nonlocality of particles as such, we will certainly encounter difficulties associated with the reduction of the wave field. Perhaps what we call a wave disturbance associated with an electron is in reality also just a wave of information. This eliminates many questions, with the exception of one - why these fields of information are exactly what quantum mechanics prescribes them to be, and not others. The answer to this sacramental question still awaits its time.

PSYCHOLOGICAL SCIENCES

GENDER IDENTITY FORMATION IN CHILDREN AND ADOLESCENTS

Aliyeva Kh.

Baku State University, Department of Psychology

Phd student

Baku, Azerbaijan

ПРОБЛЕМА ФОРМИРОВАНИЯ ГЕНДЕРНОЙ ИДЕНТИЧНОСТИ У ДЕТЕЙ И ПОДРОСТКОВ

Алиева Х.И.

Бакинский Государственный Университет, Кафедра психологии

Аспирант

Баку, Азербайджан

<https://doi.org/10.5281/zenodo.8385990>

Abstract

The problem of gender identity of adolescents is interested not only in Azerbaijan, but throughout the world. This problem requires in-depth and detailed scientific research to better understand its characteristics and impact on children and adolescents.

The purpose of this article is to explore certain aspects, especially the role of the family, in the formation of a child's gender identity. We aim to analyze the scientific definition of the term gender identity as proposed by various scholars in the field. In addition, we want to explore the influence of families on the process of gender identity formation in children and adolescents. We will also consider the modern points of view of researchers on this topic in order to get a more complete understanding of the problem of gender identity of children and adolescents and its relevance in our time.

Аннотация

В настоящее время проблема гендерной идентичности подростков вызывает огромный интерес не только в Азербайджане, но и по всему миру. Эта проблема требует глубокого и детального научного исследования для лучшего понимания ее характеристик и влияния на детей и подростков.

Цель данной статьи заключается в изучении определенных аспектов, в особенности роли семьи, в формировании гендерной идентичности ребенка. Мы стремимся проанализировать научное определение термина "гендерная идентичность", предложенное различными учеными в данной области. Кроме того, мы хотим исследовать влияние семей на процесс формирования гендерной идентичности у детей и подростков.

Также, мы рассмотрим современные точки зрения исследователей на данную тему, чтобы получить более полное представление о проблеме гендерной идентичности детей и подростков и ее актуальности в наше время.

Keywords: gender identity, gender role, gender stereotype, gender socialization

Ключевые слова: гендерная идентичность, гендерная роль, гендерный стереотип, гендерная социализация

Обзор литературы:

В современной психологии существует значительный интерес к кризису гендерной идентичности, который означает невозможность достижения внутреннего согласования, самоутверждения и внешнего подтверждения своей гендерной идентичности [1].

Понятие "идентичность" является относительно новым и популярным понятием в психологии личности, и его известность укрепилась благодаря работам Эрика Эриксона. Эриксон отметил, что подростковый возраст формирует у человека более или менее четкое представление о себе как о целостной личности, которая имеет сходства и отличия с другими. В ходе развития понятия идентичности в психологическом контексте, оно было разделено на персональную (личностную) и социальную идентичность.

Социальная идентичность предполагает, что человек определяет себя не только как отдельную личность, но и как члена различных социальных групп. Начиная с 1980-х годов, гендерная идентичность стала рассматриваться как одна из подструктур социальной идентичности в рамках теории социальной идентичности Тэджфела-Тернера. Гендерная идентичность описывает принадлежность индивида к мужской или женской группе и включает самокатегоризацию, то есть способ, которым человек категоризирует самого себя. Однако самокатегоризация является важным, но не единственным условием развития гендерной идентичности [3].

Социальная идентичность относится к тому, как другие люди определяют человека на основе

общих социальных категорий, таких как пол, возраст, профессия или этническая принадлежность [1].

Гендерная социализация начинается с момента, когда новорожденный ребенок определяется по признаку пола и становится объектом "принудительной" гендерной социализации. Взрослые в окружении, а затем и сверстники, а также культурные факторы, такие как персонажи из фильмов и книг, оказывают влияние на процесс формирования личности и устанавливают "правильное" гендерное направление. Гендерная идентичность является продуктом гендерной социализации, которая обеспечивает воспроизводство доминирующего "гендерного порядка" в обществе и соответствующую гендерную идентичность на уровне индивида [3].

Осознание собственной половой принадлежности и формирование гендерной идентичности являются частью социализации человека. Гендерная социализация — это процесс усвоения норм и образцов поведения, принятых в обществе для мужчин и женщин. Этот процесс определяется и направляется через различные социальные и культурные средства, такие как школа, семья, СМИ, религия и политика. Гендерная роль является механизмом гендерной социализации личности.

Гендерная роль представляет собой систему социальных стандартов, предписаний и стереотипов, которым человек должен соответствовать, чтобы быть признанным мужчиной или женщиной. Гендерные стереотипы являются стандартизированными представлениями о моделях поведения и чертах характера, соответствующих мужскому или женскому. Стереотипы усваиваются индивидом в процессе социализации в группе, к которой он принадлежит, например, семье, школе, группе друзей, СМИ и других [2].

Исследователи описывают процесс гендерной социализации и формирования гендерной идентичности как трехступенчатый, связанный с созреванием личности. Этот процесс включает идентификацию, достигаемую к 3 годам (осознание половой принадлежности), развитие компетентности в поведении в возрасте 7-12 лет (половая дифференциация поведения) и связанную со становлением первичной идентичности третью стадию, описанную Эриксеном (переоценка гендерной идентичности или саморегуляция Я) [3].

Родители играют основную роль в гендерной социализации своих детей. Многие исследователи утверждают, что первый этап гендерной социализации происходит в семье. В связи с этим возникает потребность в педагогическом воздействии на родителей. Под педагогизацией понимается целенаправленный процесс формирования у родителей знаний, схем, способов деятельности и поведения, а также оценок, которые помогают им успешно решать свои воспитательные задачи в семье. Эти задачи включают установление гармоничных и доверительных отношений с близкими, предотвращение отчуждения в отношениях с детьми, успешное осуществление социальных ролей, таких как роль сына или дочери, мужа или жены, отца или матери,

а также осознанная подготовка детей к выполнению этих социальных ролей.

При анализе роли семьи в гендерной социализации детей можно выделить следующие факторы, которые подчеркивают необходимость педагогизации родителей:

Независимо от того, хотят ли родители этого или нет, они неизбежно оказывают влияние на психическое и сексуальное развитие своих детей.

Семья влияет на ребенка через систему отношений между родителями, отношений каждого из родителей с ребенком и совместных отношений всех троих.

Эффективность влияния семьи во многом зависит от того, насколько оно соответствует врожденным особенностям маскулинности и фемининности, которые присущи каждому ребенку.

Семья является своего рода фильтром, через который ребенок входит в гендерную культуру.

В условиях традиционного семейного воспитания родители играют ключевую роль в воспитании детей, учитывая их гендерные особенности, при этом подходы отцов и матерей к воспитанию часто сильно отличаются. Отцы проявляют более дифференцированное отношение к детям в зависимости от их пола, чем матери. В течение первого года жизни они почти не взаимодействуют ни с сыновьями, ни с дочерьми, возможно, потому что считается, что дети в первые годы своей жизни идентифицируют себя с матерью и проявляют привязанность к ней. Однако есть данные, указывающие на то, что у мальчиков уже в первые два года жизни развивается устойчивая привязанность к отцу, если отец заботится о своем сыне. Отцы проявляют более активное взаимодействие со своими сыновьями по сравнению с дочерьми. Одновременно они больше утешают девочек, когда они огорчены, и чаще выражают одобрение по отношению к девочкам, чем к мальчикам.

Матери относятся к детям разного пола менее дифференцированно по сравнению с отцами. Однако они более терпимы и снисходительны к сыновьям, чем к дочерям, и разрешают им в большей степени проявлять агрессию в отношении родителей и других детей. Матери предпочитают использовать непрямые или психологические методы воздействия как на сыновей, так и на дочерей, в то время как отцы чаще полагаются на физическое воздействие.

Несколько исследований были проведены для изучения влияния отсутствия отца на гендерную социализацию детей. Существует более сильное воздействие отсутствия отца на полоролевую социализацию мальчиков по сравнению с девочками. В семьях, где отец отсутствует, у мальчиков медленнее проявляются черты, характерные для мужской роли. Мальчики, которые лишены отца, обычно проявляют большую зависимость и агрессивность по сравнению с мальчиками из полных семей. Им труднее усваивать мужские половые роли, и поэтому они чаще стремятся усилить свою маскулинность, проявляя грубость и склонность к конфлик-

там. Отсутствие отца оказывает более сильное влияние на полоролевую ориентацию ребенка в возрасте до 4 лет, чем в более позднем возрасте.

С раннего детства дети начинают формировать и закреплять качества личности, соответствующие общепринятым представлениям о маскулинности и фемининности, в зависимости от своего пола. У мальчиков развиваются активность, настойчивость, сообразительность и уверенность в себе, в то время как у девочек выражены уступчивость, пассивность и зависимость. То же самое происходит и с полоролевым поведением детей. Девочкам обычно не позволяют играть с игрушками, связанными с военной тематикой, в то время как мальчикам запрещается играть с куклами и детской посудой. Игрушки для девочек чаще связаны с домашней сферой и стереотипными действиями, в то время как для мальчиков предпочтительны игры, стимулирующие фантазию, сообразительность и исследовательскую активность [7].

Гендерная идентичность означает осознание принадлежности к мужскому или женскому полу. Это отражает способность человека ощущать себя как представителя определенного пола, связанного с характеристиками и поведением, соответствующими маскулинности или фемининности. Гендерная идентичность является частью социальной идентичности личности, включающей также этническую, возрастную, профессиональную и национальную идентичность.

Формирование гендерной идентичности начинается с рождения, когда пол ребенка определяется на основе наружных половых органов. Этот процесс связан с гендерной социализацией, при которой ребенка воспитывают таким образом, чтобы он соответствовал общепринятым представлениям о мужском и женском поведении и ролях. Представления о собственной гендерной идентичности, роли и поведении формируются на основе стандартов, принятых в обществе, и также влияют на самооценку.

Первоначальное представление о собственной половой принадлежности формируется у ребенка примерно в 1,5 года и становится основой самосознания. С возрастом гендерная идентичность развивается, становится более сложной. В возрасте 2-3 лет дети уже могут осознанно определять пол окружающих, но часто связывают его с внешними признаками. Около 6-7 лет дети осознают неизменность своей половой принадлежности, что сопровождается усилением различий в поведении и установках. В подростковом возрасте гендерная идентичность становится центральным компонентом самосознания. У взрослых она представляет собой сложноструктурированное образование, включающее осознание половой принадлежности, сексуальной ориентации, гендерных стереотипов и предпочтений.

Гендерная идентичность имеет три компонента: когнитивный, аффективный и конативный. Когнитивный компонент связан с осознанием принадлежности к определенному полу и описанием себя с использованием категорий мужественности

или женственности. Аффективный компонент включает оценку психологических черт и ролевого поведения на основе сравнения с эталонными моделями маскулинности или фемининности. Конативный компонент связан с представлением себя в качестве члена гендерной группы и способами решения кризисов идентичности, основанными на выборе поведенческих вариантов, соответствующих личным целям и ценностям [1].

Гендерная идентичность развивается на протяжении всей жизни, позволяя индивиду осваивать социокультурные нормы своей гендерной группы и учитывать собственные предпочтения. Исследования более подробно рассматривают содержание женской и мужской идентичностей. Женская идентичность имеет историю анализа и исследований, начиная от ортодоксального психоанализа. С развитием психологической науки были предложены более положительные описания психологии женщин, и влияние оказали исследования, проводимые в рамках философии феминизма.

В социологических и социально-психологических исследованиях конструирование женской идентичности связывается с "женским опытом" материнства и ролью женщины в обществе. Особую роль в формировании женской идентичности играет период полового созревания и менархе, где девочки испытывают нормативное и информационное давление в отношении гендерных норм.

Телесный опыт также имеет важное значение в создании женской идентичности. Развитие сексуальности, беременность и рождение детей считаются важными этапами в формировании женской идентичности. В традиционной культуре тело играет более значимую роль в структуре женской идентичности, поскольку оно становится основным представлением о женщине.

Первоначально, общество воспринимает поведение девочек менее строго, чем поведение мальчиков. К тому же, с самого детства девочки окружены женскими воспитателями, с которыми они могут идентифицироваться. Однако, недостаточная ценность "женского" в обществе создает трудности в развитии положительного представления о себе у девочек и формировании женской идентичности, особенно если они обладают высокими социальными способностями и стремятся к лидерству.

В настоящее время женская идентичность связана с такими понятиями, как "двойная занятость", "экономическая зависимость" и "конфликт ролей работающей женщины". Становление "мужской идентичности" базируется на "идеологии мужественности", которая является частью традиционной патриархальной культуры. Ролевые нормы "идеологии мужественности" определяются статусом, силой (физической, умственной и эмоциональной) и антиженственностью. Центральной характеристикой мужской идентичности является желание доминировать, которое неразрывно связано с мужской гендерной ролью.

Мужское доминирование, которое проявляется как в отношении женщин, так и в конкурент-

ных отношениях между мужчинами, является ключевым показателем мужской гендерной роли. Норма статуса обязывает мальчиков стремиться к более высокому социальному положению, норма силы требует демонстрации силы, компетентности и агрессии, а норма антиженственности подразумевает игнорирование женственности и использование женщин для подчинения.

Мужское доминирование также ярко представлено в концепциях социального развития, основанных на "биологических основах" [3]. Различия в социальном положении мужчин и женщин в этих концепциях объясняются различиями в биологических функциях, связанных с репродукцией. Отличия в проявлении способностей и возможностей мужчин и женщин в обществе также объясняются различиями в гормональном статусе и врожденными генетическими программами.

Социализация мальчиков связана с социальными преградами, которые затрудняют развитие маскулинности и вызывают эмоционально-когнитивное непримиримое противоречие, приводящее к "полоролевой растерянности" или чрезмерно маскулинным ориентациям.

Согласно теории мужской половой идентичности Дж. Плека, психологическое благополучие мужчин тесно связано с "правильным" пониманием мужской идентичности в контексте традиционной патриархальной культуры. Однако исследования последних лет показывают, что традиционная мужская гендерная роль вызывает тревогу и напряжение, поскольку некоторые ее аспекты являются дисфункциональными и противоречивыми. О'Нил предложил модель гендерно-ролевого конфликта, включающую шесть паттернов: ограничение эмоциональности, гомофобия, потребность в контроле над людьми и ситуациями, ограничения в проявлении сексуальности и привязанности, навязчивое стремление к соревнованию и успеху, проблемы со здоровьем из-за неправильного образа жизни.

Этнографические исследования Маргарет Мид показали, что в различных культурах мужчины и женщины могут играть противоположные роли, что подрывает идею о неизменности и биологическом обусловленности мужского доминирования. Мета-анализ исследований способностей также подтверждает, что социальное положение женщин влияет на снижение гендерных различий в проявлении способностей.

Современные исследования рассматривают различия между мужчинами и женщинами как социально конструируемые и связанные с экономическим и социальным неравенством. К. Гуинчи рассматривает мужчин и женщин как социальные группы с разным социальным статусом. Высоко-статусные группы оцениваются по компетентности и экономическому успеху, в то время как низкостатусные группы связываются с чертами, такими как доброта и гуманность. Женские стереотипы рассматриваются как компенсация отсутствия достижений в силовой позиции.

Женщины, находящиеся в низкостатусной группе, могут испытывать меньшую идентификацию со своей группой и переоценивать достижения и достоинства мужчин, принимая точку зрения высокостатусной группы. Данные многих исследований подтверждают это, например, студентки колледжей оценивают статьи, написанные мужчинами, выше, чем статьи, написанные женщинами.

Гендерная идентичность связана с понятием Я-концепции личности. Идентичность является важной характеристикой Я-концепции, отражая осознаваемую и принимаемую когнитивную составляющую личности. При исследовании гендерной идентичности необходимо учитывать динамичность этого понятия и изменения в гендерной унификации Я-концепции в соответствии с гендерными нормами общества.

В анализе гендерной идентичности используются модели, такие как "психологическая андрогиния" С. Бем. Однако эта модель стала перегруженной социокультурными аспектами и в настоящее время предлагается концепция "гендерных линз" для анализа дискриминационных гендерных практик и индивидуального сопротивления гендерной унификации.

Таким образом, поиск психодиагностических инструментов, соответствующих понятию "гендер", продолжается, что позволяет более эффективно изучать гендерную идентичность с использованием качественной методологии [3].

В поле изучения проблем гендерной идентичности интересны три важнейших направления.

Первое направление - поиск и формирование гендерной идентичности. Здесь рассматривается проблема формирования гендерной идентичности у подростков и молодежи, а также влияние различных факторов и агентов гендерной социализации, таких как семья, школа и сказки.

Второе направление - достижение и подтверждение гендерной идентичности. Здесь исследуется проблема ролевого конфликта личности и кризиса гендерной идентичности. Анализируются психологические переживания личности в процессе ее профессионального становления, связанные с необходимостью подтверждать свою гендерную идентичность в выбранной профессии. Также изучается вопрос эффективности личности в профессиональной сфере, включая гендерные различия в удовлетворенности жизнью и управлении персоналом.

Третье направление - связь гендерной идентичности с экзистенциальными смыслами личности. Здесь анализируются гендерные различия в переживании острых экзистенциальных кризисов, таких как потеря близкого, утрата доверия и измена. Исследуется гендерная интерпретация экзистенциальных смыслов, таких как смысл жизни и смерти, свобода, забота, любовь и тревога. Кроме того, изучается страх потери или приобретения маскулинности и феминности [4].

Гендерная идентичность, по определению И.С. Клециной, является аспектом самосознания, описывающим переживания человеком себя как пред-

ставителя определенного пола. С.И. Кон определяет гендерную идентичность как базовое чувство принадлежности к определенному полу, осознание себя как мужчины, женщины или какого-то другого "промежуточного" пола. Исследование Н.А. Шуковой показало, что гендерная идентичность включает самоопределение в категориях маскулинности/фемининности, цели и ценности, отношения и установки взаимодействия с окружающими, а также состояние идентичности, которое отражает уровень развития и степень зрелости личности [6].

Исследования показывают, что конструктивное преодоление кризиса гендерной идентичности является важным фактором для сохранения психологического благополучия личности. Особенно Ю. Коэн указывает, что внутренние конфликты, связанные с формированием гендерной идентичности, являются риском для суицидального поведения среди подростков [1].

Согласно О. А. Ворониной, гендерная идентичность включает осознание связи с культурными определениями мужественности и женственности. Однако большинство современных психологов считает, что гендерная идентичность, в индивидуальной интерпретации личности, может быть более широкой, чем просто идентификация с определенным полом или нормами мужественности и женственности.

В. С. Мухина отмечает, что гендерная идентичность является результатом сложного процесса личностной деятельности и самовоспитания. Здесь взаимодействуют следующие факторы:

Природные и генетически обусловленные особенности сексуального потенциала человека, способности реагирования на сексуальный объект и психическая чувствительность.

Социальное окружение с его разнообразными внешними влияниями, включая историческое время и влияние широкого общественного сознания.

Позиция самого человека в отношении собственной идентификации, которая может варьироваться от внешних образов и поведения до выбора собственных идеалов в качестве образца [2].

В современном американском обществе гендерные нормы играют важную роль, и последствия неподчинения им отчетливо проявляются в реакции, которую многие люди выражают по отношению к проявлениям гомосексуальности. Например, в 1994 году организаторы традиционного парада в честь Дня святого Патрика в Бостоне предпочли отменить парад, чем подчиниться решению суда, которое позволяло геям принимать в нем участие. С самого детства общество учит нас, что мы должны вступить в брак с представителем противоположного пола, иметь детей с ним и принять ролевые взаимоотношения, связанные с другим гендером. Люди, которые не заводят детей, не вступают в брак или имеют романтические и/или сексуальные отношения с людьми своего гендера, часто считаются нарушителями гендерных ролей и подвергаются серьезному социальному давлению.

Многим людям гомосексуальность представляется как наиболее крупное нарушение гендерных норм. В некоторых исследованиях (Deaux & Lewis, 1984; Storms et al., 1981) было обнаружено, что люди с большей вероятностью считают тех, у кого есть черты противоположного гендера, гомосексуалистами. Желание избежать этой постыдной метки частично объясняет пассивное подчинение гендерным ролям.

Исследователи доказали, что прочная связь между неподчинением гендерным нормам и гомосексуальностью стала серьезным препятствием для любых изменений в отношении общества к гендерным ролям (Phelan, 1993; Silber, 1990). Особенно отрицательно настроены к геям гетеросексуальные мужчины, так как они глубже прониклись традиционными ролями, и для них отклонение от мужской роли скорее ассоциируется с гомосексуальностью, чем отклонение от женской роли (Morin & Garfinkle, 1978; Whitely, 1990) [5].

Согласно предложению Р. Столлера в конце 1960-х годов, человеческую сексуальность можно концептуализировать по двум аспектам: биологическому, который он назвал "полом", и социальному, который он назвал "гендером". С. Кесслер и У. Маккенна внесли свой вклад, предлагая использовать термин "гендер" для обозначения не только социокультурных представлений и индивидуальных когнитивных схем восприятия биологического пола, но и тех аспектов бытия женщины или мужчины, которые традиционно считались биологическими. Они предложили сохранить термин "пол" только для репродуктивной активности. Именно С. Кесслер и У. Маккенна ввели практику обозначения термином "гендер" всех проявлений пола, не связанных непосредственно с репродуктивной активностью.

Гендер включает когнитивные (гендерное самосознание), эмоциональные (гендерная идентичность) и поведенческие (гендерные роли, особенности поведения) компоненты. Гендерное самосознание включает осознание собственного тела как тела человека определенного пола, осознание себя, своей личности и своего жизненного пути как представителя определенного пола, знание гендерных стереотипов и ролей, а также осознание своего соответствия гендерным представлениям, стереотипам и ролям.

Гендерное поведение предполагает соответствие поведения человека статусам, ролям, стереотипам, нормам и ценностям, характерным для определенного гендера [6].

Существуют четыре основных способа формирования гендерной роли у детей, которые используют взрослые: «социализация через манипуляции», «вербальная апелляция», «канализация», «демонстрация деятельности».

Гендерная социализация через определенные воздействия представляет заботу родителей о конкретных внешних аспектах своих детей. Например, родители могут постоянно выражать восхищение физическими характеристиками и силой своего

сына, либо проявлять беспокойство по поводу внешности дочери независимо от ситуации.

Вербальная апелляция представляет собой усиление первого метода. Родители подчеркивают привлекательные физические характеристики ребенка, его внешность, красоту, силу, ловкость, героические способности, способность отвечать обидчику, возможно, не уделяя достаточно внимания его интеллектуальным способностям. Ребенок привыкает видеть себя глазами родителей, а вербальное воздействие усиливает влияние манипулятивного процесса. Для девочек формируется представление о важности внешнего вида и стильной одежды, тогда как для мальчиков приоритетным становится занятие спортом и боевыми искусствами.

"Канализация" означает направление внимания ребенка на определенные объекты, способствующие формированию стереотипных гендерных ролей в семье. Например, девочек направляют на игрушки, связанные с ролью "дочки матери", или игрушки, имитирующие домашние предметы, а мальчиков – на конструкторы, трансформеры, автомобили и стратегические игры. Домашние активности для них обычно не рассматриваются. Дети часто получают социальное одобрение за игры с игрушками, которые "подходят к их полу".

"Демонстрация деятельности" подразумевает ожидание от ребенка выполнения деятельности, соответствующей не только его полу, но и деятельности, которую выполняет родитель того же пола. Другими словами, девочек учат вести себя и действовать "как мама", а мальчиков – "как папа".

Таким образом, соблюдение гендерных стереотипов проявляется в том, что родители, воспитывая своих детей, направляют мальчиков и девочек по-разному в отношении стиля жизни и деятельности, что способствует их различной личностной самореализации [7].

Казалось бы, гендерные отношения между родителями и детьми должны формироваться в условиях сближения полов. Предполагается, что муж и жена, заводя детей, будут воспитывать их совместно, что должно привести к гармоничным отношениям между супругами и родителями и детьми обоего пола. Однако существует скрытая половая сегрегация, которая проявляется в различиях в выполнении родительских ролей.

Исследования Э. Маккоби и других авторов указывают на существенные различия в гендерных ролях матери и отца в отношении детей. Эти различия проявляются в следующих аспектах:

Разделение ответственности за детей.

Стили поведения матери и отца.

Проявление гендерно-типичных черт своего пола в поведении.

Различие в стиле взаимодействия с сыном и дочерью.

Желание усилить половую сегрегацию или конвергенцию в отношении детей.

Все эти особенности оказывают влияние на отношения между родителями и детьми, а также на супружеские отношения.

Во многих культурах муж и жена разделяют функции в семье. После появления детей, супруги продолжают такое разделение. Муж заботится о финансовой стороне воспитания, обеспечивая материальные нужды детей, такие как питание, одежда, образование и прочее. Жена, в свою очередь, занимается домашними делами и воспитанием детей.

Попытки изменить этот традиционный стереотип не привели к существенным изменениям. Некоторые мужчины временно остаются дома и занимаются домашней работой при рождении детей, однако это продолжается недолго.

Еще одним фактором, влияющим на гендерные отношения, является стиль поведения родителей. Наблюдаются различия между женщинами и мужчинами в использовании инструментального или экспрессивного лидерского стиля, степени физического взаимодействия, чувствительности к эмоциям детей, подходе к требованиям (взаимность или властная асертивность), конфронтации и дисциплине, а также в обучении и информировании детей.

Еще одним мощным фактором, влияющим на гендерные отношения в семье, является соответствие поведения мужчин и женщин гендерным стереотипам, то есть типичному или нетипичному поведению. Оказывается, что мужчины более озабочены соблюдением гендерной типичности, в то время как женщины чаще отступают от правил своего пола. Западная культура, главным образом маскулиная, может предъявлять повышенные требования к маскулинности мужчин. Возможно, такие различия функциональны: поскольку матери чаще всего возлагается большая часть ответственности за ребенка, они иногда вынуждены выполнять и обе роли – и заботливой матери, и строгого отца, поскольку отцу может не хватать времени или не желать выполнять свою роль.

Еще одним фактором, влияющим на гендерные отношения, является отношение к детям разного пола. Отцы ведут себя по-разному с сыновьями и дочерьми. Они более контролируют сыновей, проявляют большую строгость, больше обращают внимания на дисциплину. У отцов наблюдается отрицательная реакция на проявления фемининности у сыновей, что связано с гомофобией их страхом перед гомосексуальностью. Одновременно они больше интересуются сыновьями и проводят больше времени на игры с ними по мере их взросления. Занятий с сыновьями более, чем с дочерьми. Взаимоотношения с дочерью отца характеризуются более нежным и рыцарским обращением: требования формулируются в виде предложений, а не прямых указаний. В общественных местах отец проявляет большую заботу о маленькой дочери, чем о сыне. Со временем взаимоотношения с дочерью приобретают характер "легкого флирта", где отец комплиментует девочку за ее внешность, одежду и прочее, то есть ведет себя с ней как с маленькой женщиной. Однако, с возрастом дочери, отец резко уменьшает степень психологической близости с

ней. Матери, в отличие от отцов, ведут себя примерно одинаково с сыновьями и дочерьми.

Наконец, важным фактором, влияющим на гендерные отношения, является явное или скрытое стремление усилить одну из тенденций - сегрегацию или конвергенцию полов и, как следствие, конфронтацию или гармонию между ними [8].

Список литературы:

1. Глава 14 Гендерная идентичность П. В. Румянцева, стр. 248-250 / Гендерная психология. 2-е изд. / Под ред. И. С. Клециной. — СПб.: Питер, 2009. — 496 с.: ил. — (Серия «Практикум»).
2. Глава 15 Исследование гендерной идентичности и гендерных стереотипов личности Л. Н. Ожигова стр. 256-258 / Гендерная психология. 2-е изд. / Под ред. И. С. Клециной. — СПб.: Питер, 2009. — 496 с.: ил. — (Серия «Практикум»).
3. Глава 16 Изучение гендерной идентичности при помощи качественных методов: фокус-

группа Н. К. Радина стр. 264-272 / Гендерная психология. 2-е изд. / Под ред. И. С. Клециной. — СПб.: Питер, 2009. — 496 с.: ил. — (Серия «Практикум»).

4. Гендерная идентичность: Поиск, достижение и самореализация личности или очень личное о гендерной психологии Л. Н. Ожигова, Человек. Сообщество. Управление • №4/2005, стр. 45-55

5. Шон Берн Гендерная психология, стр. 14-15

6. Олейникова Е. Ю. К проблеме исследования гендерной идентичности / Е. Ю. Олейникова // Вопросы науки и образования. — 2018. — № 8(20). — С. 176-178

7. Захарова И.В. Роль родителей в гендерной социализации ребёнка / И.В. Захарова // Молодой учёный. — 2011. — №5. — С.140-142.

8. Стр. 214-218 Бендас Т. В. Б46 Гендерная психология: Учебное пособие. — СПб.: Питер, 2006. — 431 с: ил. — (Серия «Учебное пособие»).

PSYCHOEDUCATIONAL PROGRAM AS AN EFFECTIVE TOOL IN DEVELOPING THE LEADERSHIP QUALITIES OF THE FUTURE TEACHER

Lohvys O.

*practical psychologist of the department for youth affairs, assistant at the Department of Developmental Psychology and Counseling,
Ternopil Volodymyr Hnatiuk National Pedagogic University, Ternopil
<https://doi.org/10.5281/zenodo.8386001>*

Abstract

The article analyses the presents considerations regarding the need for the formation and development of leadership qualities in future teachers in a higher education institution. Especially in modern conditions, it is very important to develop the leadership qualities of teachers. The transformation of education today calls for a new generation teacher - not just someone who will transfer knowledge and teach, but a facilitator in the child's educational trajectory, a mentor, a coach and a mentor. That is why the role of the teacher-leader is a conceptual point of the National Strategy for the Development of Education in Ukraine and the concept of the New Ukrainian School. Actually, this involves "ensuring the personal development of a person according to his individual abilities and needs based on lifelong learning", and the strategic direction is the reform of the education system based on the principle of the priority of the person [2, 4, 13].

Keywords: leadership qualities, future teachers, facilitation, subject-subject interaction, subjectivity, reflexivity, flexibility, emotional intelligence, empathy, internality

The defining features of leadership in education are: direct contact between the leader and his followers, the diversity of educational leadership, the presence of leadership qualities in both the heads of the educational institution and other participants, the ability to educate leaders. Researchers draw attention to the important role of the teacher's personality in the life of the future generation and in promoting their personal growth. That is why the concept of higher education today provides for the development of a leadership position in the subject-subject interaction of participants in the educational process [4, 6, 8].

A modern pedagogue-leader is called upon to be, first of all, a facilitator, whose main tasks are: involvement in the full participation of the subjects of the educational process, promoting mutual understanding, stimulating the adoption of a mutually acceptable decision, cultivating a sense of joint responsibility [13, 15].

In the process of such subject-subject interaction, co-action, coexistence in the "teacher-student" system, the teacher-leader often becomes an ideal for his students, thus forming a desire to become like him. That is why he must possess certain leadership qualities: confidence in himself and his pupils, pedagogical optimism, readiness for innovative changes, a desire for self-development and self-improvement, the ability to create a favorable educational environment for the development of his pupils and the formation of leadership qualities in them [8].

The following domestic scientists contributed to the development of research on leadership qualities: O. Bandurka, S. Bocharova, O. Vikhanskyi, O. Zhuravlyova, E. Zemlianska, T. Kabachenko, S. Kalashnikova, A. Mitlosh, V. Milyaeva, O. Nestulya, S. Novikova, O. Romanovsky, V. Sal'yakhov, N. Semchenko, V. Spivakovsky and others. Understanding the concept of leadership qualities of students of higher education institutions and their structure is considered in the works of B. Goloveshko, K.

Demchuk, A. Zorina, I. Krasnoshchok, N. Marakhovska, R. Sopivnyk, and others. According to E. Zharikov and E. Krushelnytskyi, a person's ability to be a leader largely depends on the development of his organizational and communicative qualities [7, 10].

Considering the specificity of our research, it is advisable to refer to the structure of the teacher's professional activity in order to find out what qualities a teacher-leader should possess. The issue of the teacher's leadership role was dealt with by A. Baldwin, Yu. Hilbukh, I. Ivanov, J. Ketten, O. Kyrychuk, K. Clark, Ya. Kolominskyi, N. Marakhovska, N. Semchenko, L. Termen et al. Studying various aspects of pedagogical leadership, these researchers emphasized the importance of the formation of the general and pedagogical culture of the individual, the development of leadership abilities and skills in the process of professional activity [5, 8, 10].

Summarizing the opinions of various authors, we conclude that leadership qualities are defined as "personal factors that manifest both in the context of professional work and outside of it. These are internal traits or abilities that enable the leader to act effectively, while contributing to the development of the organization".

The relevance of the study of the problem of leadership qualities of future teachers in the process of professional training is explained by the fact that a teacher must be, first of all, a leader for himself, a facilitator, an organizer, a mentor of student and parent teams. Pedagogical activity obliges him to reveal and develop his own leadership qualities and prepare leaders of the school team. The results of the study of the peculiarities of the development of leadership qualities in the process of personal and professional formation of the future teacher showed that leadership qualities represent a dynamic professional and personal formation that is formed in the process of professional training in a pedagogical institution of higher education [13].

Therefore, our research presents a model of the integral structure of a teacher's leadership qualities from the point of view of the psychology of pedagogical activity and the paradigm of leadership in education. As a result of studying the psychological and pedagogical literature on the selected topic, we singled out the four most important, in our opinion, components of this structure: motivational-value, emotional-communicative, organizational-regulatory and reflective-evaluative.

The motivational and value component of a teacher's leadership qualities is represented by such qualities as professional motivation, the desire for self-actualization, and orientation to the teacher's humanistic values. The emotional-communicative component is manifested in indicators of emotional intelligence, communicative inclinations, empathy, openness and flexibility in communication. Organizational-regulatory is a tendency to leadership, the level of self-regulation, organizational inclinations and an indicator of internality. And positive self-attitude, reflexivity and the need for self-development are revealed reflexive and evaluative component of the structure of leadership qualities of the future teacher [11].

These and other important qualities of a teacher-leader undoubtedly need to be developed both in the process of subject-subject interaction during the educational process and within the framework of informal education. Taking into account the above, we believe that the process of training future teachers in institutions of higher education from the position of leadership in education should be considered in more detail. Therefore, we set ourselves the goal of developing and testing a psycho-educational development program that would contribute to the development of leadership qualities in future teachers. We consider the consideration of the forms, methods and techniques of psychological and pedagogical influence, which will be carried out from the standpoint of student-centrism, to be a determining factor in this search.

The leadership qualities of a future teacher can be developed in the educational space of a higher education institution, in the process of professional training. In our opinion, we consider the use of such a psychodidactic technology as "educational dialogue" to be effective from the point of view of promoting the development of leadership qualities in the process of subject-subject interaction. After all, dialogue acts as a way of life of subjects in education, it is through it that the teacher can intervene in the meaning-seeking process of the student [12].

According to G. Radchuk, educational dialogue is a form of active learning, the purpose of which is the assimilation of professional knowledge at the value - meaning level, and at the same time as a form of communication in which the problems of personality development are solved, providing psychological support to it, which allows to debunk stereotypes and solve personal problems of participants, to form skills of social interaction. As an innovative psychodidactic technology, he involves the organization of the joint cognitive activity of the teacher and the student at the value -meaning level, the full inclusion of students in

the educational process and the actualization of their subject potential [10].

As noted by G. Radchuk, the student's readiness for dialogic communication includes: his internal motivation, relative autonomy, internality, the need for self-development, reflexivity, self-respect and situational self-actualization [9]. We singled out these qualities among the list included in the integral structure of leadership qualities necessary for the teacher to implement. Therefore, the dialogic nature of the teacher in the Concept of the New Ukrainian School is the basis of partnership interaction between subjects of the educational process [6].

According to G. Radchuk, the main principles of organizing cognitive activity in the form of educational dialogue are: the principle of acquiring personal experience through the actualization of meaningful experiences in the learning process; interaction in conditions of uncertainty; authorship as a condition of cognitive activity; incompleteness of dialogue as a method of knowledge; multi-aspect, alternative, multi-positional knowledge; the principle of openness [9].

Understanding education as meaningful, "authorial", we consider the educational dialogue as the starting point of the student's personal transformation. The essence of "dialogization" as a factor in the development of the subject's position consists, first of all, in overcoming the traditional antagonisms of education, namely, the executive position of the student in the educational situation, the passive position of the teacher in the development of intersubjective interaction, the reproductive nature of assimilation of educational information and initiating preparation of an active, capable of independent development and adoption of non-standard decisions of the future specialist [11, 14].

As G. Radchuk notes, the dialogic process in education can be presented at the level of formal dialogue as a form of communication between the subjects of the educational process, at the level of substantive dialogue that reflects the dialogic nature of educational material, at the level of personal-semantic dialogue as a way of establishing value-semantic unity. According to the researcher, a full-fledged educational dialogue depends on three components:

- dialogicity of the teacher;
- dialogicity of educational material (as a fragment of the educational content under consideration);
- dialogicity of the student [10].

Another researcher, Y. Senko, claims that self-determination and self-development of both the teacher and the learner take place in dialogue, resulting in cooperative relationships and the achievement of common goals, mutual education and co-creation [15].

In fact, the implementation of dialogic communication in the process of professional training leads to the fact that the relationships that are formed between the subjects of education will contribute to self-actualization and self-development of the individual, which is a determining point in the formation of the future teacher-leader.

Dialogue in education is considered as a space for expanding human resources. Taken as a method, dialogue can be considered as an adequate and culturally expedient integrative humanitarian technology, which allows finding a personal resource, determining the possibilities of constructing a holistic personality formation in the educational process [11].

Domestic scientist V. Galuziak notes that educational dialogue is considered as a productive method of personal and professional development of future teachers. Dialogue takes place in the form of cognitive interaction between equal subjects, each of whom has the right to his own position. The author singled out the essential characteristics of dialogic educational interaction: openness, trust, recognition of the equality of personal positions, consideration by the teacher of the interests and needs of students, focus on the interlocutor, personal attitude of the teacher and students to information, personification of messages, which contributes to the joint search for truth and analysis of the results of interaction [1].

As noted by researchers N. Kuzmin, L. Petrovska, T. Yatsenko, educational dialogue, as a subject-subject communication, in its structure resembles social-psychological training and active social-psychological training. The role of dialogue in development the value-semantic sphere of personality was studied by O. Bondarevska, M. Kagan, Z. Karpenko, O. Klymyshyn, H. Radchuk, T. Florenska, M. Yanitsky, and others. An important factor in the dialogization of the educational environment is the dialogic culture of the teacher.

As a psychodidactic technology for the formation of leadership qualities in future teachers, we used an educational dialogue in the form of a development program.

So, thanks to the educational dialogue, as a form of active learning, it is possible to promote subject-subject interaction between the participants of the educational space. The dialogic form of education is the basis for building interpersonal contact, openness, trust, empathy, ensuring heuristics and problematic learning, critical thinking, development of creative potential and productive activity of all subjects of the educational environment [12].

The content of "dialogization" as a factor in the development of leadership qualities in future teachers consists, first of all, in promoting and facilitating the preparation of an assertive, active, reflective, open to new experience, capable of independent development and making non-standard decisions of the future teacher [15].

Taking into account the above and analyzing the psychological and pedagogical literature, we conclude that the educational dialogue is a partnership form of interaction, an effective method of obtaining knowledge and skills, new information, which makes it possible to timely and comprehensively check the skills and abilities acquired during joint activities and to apply these skills and skills in both educational and practical activities. The educational space is precisely the environment for the formation of the future specialist's personality.

Therefore, we assume that in order to promote the formation and development of leadership qualities and the activation of personal leadership potential in future teachers, in the process of professional training in a higher education institution, an appropriate psychoeducational program will be effective. Which combines methods aimed at self-knowledge and self-analysis, research of one's strengths and weaknesses, development of communication and emotional-regulatory skills, setting goals and achieving them, ability to work in a team, etc.

As part of the activities of the H. Radchuk Scientific School "Personality Development in the Context of Higher Professional Education" a psycho-educational program was developed and tested program in the form of an educational dialogue "New Faces of Leadership" for future teachers.

The training had a systematic, holistic, personally oriented character in accordance with the structure and purpose of the program for future teachers.

The concept of our psychoeducational program is based on the idea of the leadership qualities of the future teacher as an integrative and integral personality formation, formulated in the first chapter of our work. The created training program uses the achievements of domestic and foreign scientists, integrated elements of educational and psychoeducational development programs.

The goal of our psychoeducational program is to reveal the leadership potential of future teachers and develop the leadership qualities necessary for carrying out professional activities on the basis of partnership and humanization of education.

The main ones the tasks of our psycho-educational program "New Faces of Leadership" are outlined:

- 1) actualization of the processes of self-knowledge and self-analysis;
- 2) promoting awareness of one's own life and professional goals;
- 3) development of such personal leadership qualities as openness, flexibility, empathy, internality, communicativeness, creativity, reflexivity, motivation, self-organization;
- 4) development of emotional intelligence, positive self-esteem and reflective skills;
- 5) improving the skills of self-regulation of one's own behavior and the ability for self-development and self-education.

While developing the topics of classes and their content, we relied on the results of theoretical and scientific-practical explorations and empirical research. The structure of the development program contains a number of content modules. Therefore, according to its content, the lessons of the development program were combined into 4 modules:

- 1) "Development of self-knowledge and self-esteem."
- 2) "The structure of the image of "I am the leader".
- 3) "Psychological principles of effective communication of a teacher-leader".
- 4) "Development of the emotional-regulatory ability of the individual".

The specified modules include a cycle of interconnected, logically structured classes held once a week. The structure of the development program included 12 thematic classes. The introductory and final classes were aimed at logically beginning and ending the entire cycle of classes and reflecting on the received information and acquired skills. After each class, training participants performed creative homework.

The method of carrying out the development program of the teacher's leadership qualities is based on the principle of phased development of the group and continuity in self-discovery and self-improvement. Each subsequent lesson is a logical continuation of the previous one, and in terms of content, it is the basis for the next one. In classes, it is important to create an emotionally comfortable, psychologically safe space so that participants can feel the influence of positive emotions and the desire to maintain and cultivate them.

Each lesson has a clear structure that includes the following components:

1) motivational and organizational – reflection by the participants of the previous lesson, analysis of homework, actualization of knowledge and experience on the subject of the lesson and formation of interest in it. In the introductory part of each lesson, short thematic stories-parables are offered; exercises to relieve emotional, physical and behavioral stiffness;

2) development of the emotional and personal sphere. The main part of the training is aimed at self-discovery of opportunities and limitations, emotional self-analysis; performing exercises for deepening emotional self-awareness, formation of skills to manage emotions, competence in time, positive thinking, social sensitivity, tolerance for others, assertiveness of behavior, readiness for cooperation and co-creation; development of personal authenticity, expressiveness and emotional expressiveness, increase of emotional freedom of participants, etc.;

3) reflexive At the final stage, summing up, discussion of work results, difficulties during class, as well as opportunities to apply the acquired experience in life are carried out. Exercise analysis and reflection include cognitive, emotional and behavioral components [3, 7, 8].

Each lesson was structured according to a logical scheme: greeting and clarifying the expectations of the participants from the lesson; dialogue between the participants and the trainer on the subject of the lesson; the telling of parables, the use of metaphors, which are one of the means of verbal visualization of the educational material, contribute to a better perception, visualization and understanding by the participants of its individual aspects, the development and consolidation of certain values and beliefs in them, awareness and recognition of the need to develop certain features of their personality; developmental exercises and exercises to develop certain abilities and skills; end of class

The following stages are distinguished in the structure of each lesson:

1. Greetings and clarifying the participants' expectations from the class. This is the creation of a favorable psychological climate for the work of the group and the coordination of the participants' expectations

before the start of the class. Such an approach helps to prepare participants for joint activities, brings the group together and allows the trainer to better understand the needs and moods of each participant.

Greeting exercises really help the participants to establish contact with each other and facilitate self-presentation, which can be especially useful in an unfamiliar group. Such exercises stimulate communication and strengthen interaction, as well as reduce tension and fear of new acquaintances.

Exercises on expressing expectations involve the active participation of participants, where everyone can freely share their wishes and expectations about the lesson. This allows each participant to feel important, heard and understood. In addition, such exercises help the trainer to navigate the needs of the group and to adjust the program of classes in such a way as to meet the expectations and needs of the participants as much as possible. Successful work with a group depends on the interaction between participants, because collective cooperation contributes to achieving better results. The introduction of psychological methods and techniques at the stage of greeting and expressing expectations creates a valuable foundation for further joint work and contributes to a positive experience for all group members.

Self-diagnosis is a method of self-discovery, awareness of one's own advantages and resources with the help of questions, exercises, and special methods.

2. Communication between the participants and the trainer on the subject of the lesson.

At this stage, the trainer introduces the subject of the lesson, outlines the main goals and tasks. Then the didactic part begins, which includes a discussion with the participants. To achieve the goals in this stage, the following forms and methods of work are used:

- educational dialogue: the use of this method allows you to present theoretical material related to the subject of the lesson to the participants. There is an expression of opinions and a discussion of the problems under consideration. Participants can share their ideas, points of view and analyze experiences;

- facilitation (from English to facilitate - the process of collective expression of opinions and solving tasks, where the leader plays the role of a facilitator), is an important element of training. The facilitator interacts with the participants, managing the process of discussion of issues, contributing to the establishment of constructive communication, directing them to find solutions and comply with the norms of interaction and regulations. During facilitation, the leader actively interacts with the group, asking questions that contribute to the activation of the group experience. It stimulates the exchange of information and experience between participants, supporting a constructive discussion. The facilitator also responds to each participant's statements, helping to elicit their opinions and encouraging active participation. At the beginning of a new topic, the facilitator invites each participant to briefly express their opinion on the question posed. After that, the host briefly summarizes what he heard, highlighting the most important points. During the discussion, the facilitator provides support for a constructive atmosphere

and helps to reconcile different views and approaches. At the end of the discussion, the presenter sums up and moves on to the theoretical part of the training. Facilitation helps to attract participants to active participation, promotes deeper assimilation of the material and development of critical thinking. It creates a favorable psychological climate for cooperation and joint activities of the group.

- use of parables and metaphors: the trainer can tell parables and use metaphors for a more visual representation of the learning material. These stories help participants better perceive and understand certain aspects of the topic, form values, beliefs and develop personal traits.

The use of such forms and methods of work helps to make the class more interesting, meaningful and contributes to better assimilation of the material by the participants. This approach encourages active participation, interaction and exchange of ideas between group members. In addition, it promotes the development of critical thinking and the perception of new ideas.

3. Carrying out development work on the subject of the lesson. At this stage of the class, correction and development of certain traits, qualities, individual psychological features, as well as skills and abilities of the participants is carried out. To achieve this goal, the following psychological methods and techniques are used:

- developmental exercises and exercises for the development of certain abilities and skills: these exercises contribute to the awareness of the importance of positive self-perception and the development of the skills of self-determination of individual characteristics. They help participants understand their strengths, work on weaknesses and achieve more harmonious development;

- creative work is exercises in which imagination is used as a means of training, for example: drawing, modeling, composing a composition, etc.

- role-playing method: This method involves "role-playing" where participants play certain social roles. This allows you to consider the behavior and attitude towards yourself and others through the prism of different roles. It promotes the development of empathy, analytical skills and the ability to cooperate;

- brainstorming method: using this method allows you to generate ideas and solutions with the participation of the whole group. Participants actively exchange their thoughts and ideas, which contributes to a broader consideration of the problem and finding creative solutions;

- mini-lectures and recommendations: The presenter can give mini-lectures and provide recommendations on optimizing certain personality traits and qualities or achieving self-created goals. It helps participants get practical advice and guidance to develop their skills and make personal changes;

- "aquarium" is a role-playing game in which several people participate, and others act as observers, that is, some "live" the situation, while others analyze the situation from the side and "empathize".

These methods and techniques contribute to the deep development of the participants, help to strengthen the positive sides of the personality and

work on self-improvement. They contribute to the creation of an atmosphere of support and understanding, which contributes to the positive development of each member of the group.

4. Completion of the lesson. This stage involves three points. At the final stage of the class, the following psychological methods and techniques are used:

- relaxation exercises these exercises help participants to relax and focus on their inner world. They contribute to deep introspection and reflection of various aspects of one's own life, which allows you to consolidate the positive effect of the lesson, establish emotional balance and relieve muscle tension;

- physical exercises : these exercises aim to end the class in a good mood, relieve emotional tension and psychologically relieve stress. They contribute to the creation of a positive emotional attitude towards the end of the class and contribute to raising the general mood of the participants;

- exercises-rituals: during these exercises, the results of the lesson are summed up, the results are analyzed and discussed with the participants. Participants have the opportunity to express their general impressions, share positive and negative moments, as well as express their wishes for further work;

- feedback, reflection. Most of the exercises involve the use of feedback to the presenter. The questions at the beginning of the exercise are asked in order to find out how familiar the participants are with the topic and to adjust them to the perception of new ideas and information. The questions at the end of the exercise are designed to find out the degree of assimilation of the material and its understanding. Effectively using the means of positive reinforcement - praise, positive evaluation, it is possible to significantly increase the self-esteem and motivation of the participants. Special exercises and questionnaires are used to establish feedback at the end of the training;

- sharing (eng . to share) is one of the final exercises of the class, which gives everyone present the opportunity to express their feelings, thoughts, impressions. Summary of the lesson;

- homework. After each class, the participants receive homework related to the application of emotional competences in real life.

These methods and techniques help to create a positive final accent of the lesson, consolidate the learning material and preserve the emotional satisfaction of participating in the lesson. They also help bring the group together and maintain a favorable psychological climate for the next class.

A feature of the first thematic block called "Development of self-knowledge and self-evaluation" was the promotion and teaching of methods of self-knowledge and research of one's "I". After all, without understanding the essence of one's personality, strengths and weaknesses, full-fledged development of the personality is impossible. The basis of any transformation is familiarization with one's own qualities, both positive and negative. This is the first step towards self-acceptance and self-development. Knowledge and understanding of oneself is the driving force of change. Therefore, the tasks, exercises and psychological workshops that were

used were mainly research-oriented and were aimed directly at the actualization of the processes of self-awareness and internal readiness for self-change .

The motivational and value block of the program is a key element aimed at the development of humanistic values of the future teacher. The exercises that were included in this block posed tasks to the participants that motivated them to present their life projects as best as possible in the context of their future profession, the manifestation of humanism and altruism.

These exercises contributed to the development and integration of national and professional values into the structure of personal values of future teachers . They directed the participants of the development program to act in the direction determined by these values, confirming and strengthening their significance. Thus, the formation of humanistic values contributed to the formation of a conscious attitude to the future professional activity, personality of the child. In addition, this block involved the development of achievement and affiliation motives. The exercises helped to find optimal situations for the development of one's own skills and abilities, and also taught to correctly analyze and evaluate the problem and one's possibilities for solving it. This helped the participants to enrich their motivation to achieve success and positive connections with others.

This approach contributes to the formation of deep values of the participants, ensures their development as responsible individuals capable of active activities in the interests of society

The purpose of the second module "Structure of the image of "I-leader" of our development program was to study the portrait of a modern teacher-leader. In the form of dialogue and discussions, outline and form a list of personal leadership qualities inherent in the professional image of the future teacher. The specifics of the classes consisted in the fact that game forms of work prevailed here, aimed at defining and discussing what qualities a pedagogue-leader should be endowed with. In the context of our research, it was important to find out that there are four components in the structure of leadership qualities (motivational-value, emotional-communicative, organizational-regulatory and reflective-evaluative). During the work, the participants had the opportunity to analyze personal experience, real life situations, which are analyzed by the group. In addition, the exercises of the " I-leader image structure " block were aimed at developing self-acceptance and self-understanding , as this is the basis of self-confidence. Some exercises taught to think rationally, to build logical chains, which ultimately led to the search for the optimal solution to each specific problem that may be faced by the leader.

The third thematic module " Psychological principles of effective communication of a teacher-leader " was aimed at research and development of effective communication skills . During the classes, future teachers had the opportunity to understand and rethink the phenomenon of dialogue, to discuss the importance of effective communication in the educational space, about dialogue as a driving condition for the formation of a full-fledged personality. The exercises helped to

practice the skills of effective communication, assertive behavior, develop emotional intelligence, skills of reflective analysis of one's own professional capabilities . was aimed at developing the skills of effective communication, communicative control. The exercises helped to show assertiveness , take the position of another person, choose a conversation style according to each interlocutor, approach each situation individually, determine one's own strengths and strategies of behavior in accordance with one's own needs, goals and expected results of the ongoing dialogue, as well as take into account interests others, recognize the interlocutor's emotions and predict his reactions to some of his own words, gestures and behavior.

The fourth block, entitled " Development of the emotional and regulatory ability of the individual ", involved learning and improving the skills of self-control and self-regulation of one's own behavior, actualization of the processes of self-improvement and self-actualization. With the help of exercises and techniques, the participants were able to explore their emotional state and that of their interlocutor, take it into account during communication, and also develop the skills of empathy and reflexivity . In developed self-regulation, it is important to single out skills that ensure a positive transformation of the student's attitude to himself, to activities and communication, to the surrounding world as a whole. That is, we are talking about the ability to control and correct one's own behavior; the ability to show will in achieving a goal; the ability to choose effective means of behavior and interaction with the surrounding people.

Emotional -regulatory qualities involve the ability and skills of self-understanding and self-mastery , first of all, in the emotional plan. This can be achieved by performing exercises aimed at identifying and defining one's own emotions, their causes and consequences, and then understanding the emotions of others, which is very important for a socially active person. Therefore, exercises aimed at teaching how to recognize the state of stress and social frustration , master them, use adequate coping strategies, reduce negative emotional manifestations and prevent the negative consequences of stress were selected. Also, to reduce the level of frustration and anxiety, exercises were used that teach you to trust others, tell your feelings and problems in search of support where needed.

The following interactive methods were used in our psychoeducational development program:

- "brain storming" or the "brainstorming" method (individual, "pair" and group options);
- method of incomplete sentences (with subsequent group discussion);
- filling out worksheets (studying expectations; revealing the content of the main concepts of the topic, etc.);
- execution of creative tasks (projects) and their presentation in the form of diagrams, drawings, etc.;
- "case method" or analysis of situations (discussion of "real" problem situations that arise in pedagogical activity and search for optimal options for their solution);
- "aquarium";

- role games;
- intergroup discussions (presentation by working groups of the results of certain tasks; asking clarifying and problematic questions; answers to the questions, etc.);
- psychological workshop (performance of diagnostic tasks; their analysis and discussion at the group level);
- performing homework (performance of individual tasks, using "specific" examples of social activity based on the activity material of a specific educational institution);
- sharing _
- lesson reflection (individual; group).

The main principles that guided us in conducting classes were:

- principle of activity
- the principle of responsibility;
- the principle of humanism;
- the principle of confidentiality;
- principle of competence;
- personifications of expressions;
- the principle of dialogization of interaction

Thus, the psychoeducational program "New Faces of Leadership" for the development of leadership qualities of future teachers was developed taking into account all the principles and requirements for conducting corrective and developmental work and contributed to the harmonization of professional and personal development, personal growth and actualization of leadership qualities of future teachers. A clear structure of the psycho-educational program was determined, which is a holistic tool for the development of personal qualities necessary for a teacher-leader. The psychoeducational program was developed by us taking into account all the principles and requirements for conducting developmental work and contributed to the actualization of the processes of self-knowledge, the harmonization of professional and personal growth and the development of leadership qualities in future teachers.

Indicators of the effectiveness of the psychoeducational program can be the following key aspects:

1). Achievements of the participants: the volume of acquired knowledge and competences acquired during the training are evaluated. It also includes changes in beliefs, emotional responses, behavior and personal development.

2). Results of motivational control: participants' progress is assessed at the end of each session. Special exercises or tasks are used to check mastery of the material and understanding of key concepts.

3). The quality of homework: the quality and timeliness of homework is evaluated, which helps to strengthen and consolidate the acquired knowledge and skills.

4). Positive reaction of the participants: questionnaires, surveys and interviews are used to find out about the satisfaction of the participants with the training and their positive impressions.

5). The results of self-diagnosis and testing: the progress of the participants before and after the training is evaluated with the help of special tests and self-diagnosis.

6). Evaluation of personal changes by others: the "360-degree method" is used, where colleagues, teachers, relatives, etc. evaluate the changes of the participants and the impact of the training on their behavior and relationships with others.

These indicators help determine the effectiveness of the program, assess its impact on participants and implement the necessary adjustments to improve results.

Conclusions. Therefore, the educational environment of a higher education institution is designed to promote the formation and development of leadership qualities of future teachers. Thus, dialogue is an important subject of discussion and analysis for modern education, as it is one of the most important elements of humanitarian paradigms in education. We believe that educational institutions should be a so-called school of leadership. After all, first of all, teachers must possess certain leadership qualities and must be ready for subject-subject relationships with students and dialogization of the educational process. The educational space is designed to be the environment in which self-sufficient personalities are formed and developed thanks to subject-subject interaction. After all, it is the youth age that is sensitive to the development of the value -meaning sphere of the individual, reflection, awareness of individuality and one's own "I". We see the prospect of further research in the further implementation of a psycho-educational development program of leadership qualities among future teachers and the use of educational dialogue as an effective psychological and pedagogical technology for the development of leadership qualities in the process of professional training in a higher education institution.

References:

1. Galuzyak V. M. Dialogue as a means of personal and professional development of future teachers. / Scientific notes of the Vinnytsia State Pedagogical University named after M. Kotsyubynskyi. Series "Pedagogy and Psychology", No. 56. P. 224-234.
2. Kalashnikova S. Development of the leadership potential of a modern university: basics and tools: Training manual. Kyiv: SE "NVC "Priority", 2016. 44 p.
3. Karpenko E. Basics of psychotraining: teaching . help _ Drohobych: Lviv State University of Internal Affairs (Lviv State University of Internal Affairs). Lviv, Prosvit. 2015. 78 p.
4. The New Ukrainian School [Electronic resource]-Access mode : <https://www.kmu.gov.ua/.../ukrainska-shkola-compressed.pdf> ...
5. Leadership qualities in professional activity / O. G. Romanovskiy , S. M. Reznik , T. V. Gura , Yu. I. Panfilov, B. R. Goloveshko, V. V. Bondarenko, in general . ed. O. H. Romanovskiy . Kharkiv: NTU "KhPI" , 2017 . 143 p.
6. Educational leadership: from theory to practice: monograph / author . quantity _ ; for sciences ed. V. R. Milyaeva ; Borys Grinchenko Kyiv University [Electronic edition]. Kyiv ; Kryvyi Rih: Ed. R. A. Kozlov, 2021. 296 p.

7. Pavlyuk O. D. Training as a method of developing leadership qualities of students of vocational and technical educational institutions. *Science Review* . 2019. 5 (22). P. 26–32.
8. Psychology of personal and spiritual growth of a leader / N.I. Zhigailo , R.I. Karpinska // Psychological magazine . 2019. No. 1. P. 57 – 77.
9. Radchuk H. K. Axiopsychology of higher education. Monograph. Ternopil: TNPU, 2014. 380 p.
10. Radchuk G. K. Educational dialogue as an innovative humanitarian technology of professional development of personality in universities. *Pedagogical process: theory and practice: coll . of science works K., LLC "EDELWEIS Publishing Company"*, 2017, No. 1, pp. 3-19.
11. Radchuk, G. K., Logvys, O. Leadership qualities in the integral structure of the teacher's personality. *Scientific Bulletin of Kherson State University. Series "Psychological Sciences"* . 2021 , No. 4, pp. 93-100 .
12. Subashkevich I. R. Formation of the value - meaning sphere of students of pedagogical specialties by means of media psychology technologies [practice guide .] . Lviv: Rastr-7, 2016. 60 p.
13. A modern teacher reveals the potential of students [Text]//*Modern school of Ukraine*. 2019. No. 1. p. 22.
14. Chaynska M. O. Dialogue as a factor in optimizing the professional axiogenesis of future teachers. *Scientific journal of the M.P. Drahomanov NPU. Series Psychological sciences: coll . scientific works*. Kyiv, 2008. No. 22 (46). P. 244-249.
15. The Art of facilitation : the essentials for leading great meetings and creating group synergy / Dale Hunter ; with Stephen Thorpe , Hamish Brown , Ann Bailey . 2009. 352 p.

TECHNICAL SCIENCES

CHARACTERISTICS OF WINDS IN THE TERRITORY OF NAKHCHIVAN AUTONOMOUS REPUBLIC

Kazimov M.

Doctor of philosophy in technical sciences, associate professor Senior scientific worker at Institute of Natural Resources,

Ministry of Science and Education of Azerbaijan, Baku

Aliyev M.

Doctor of philosophy in physics, associate professor

The head of the department of "Transport engineering and technical disciplines"

Nakhchivan State University, Nakhchivan

<https://doi.org/10.5281/zenodo.8386038>

Abstract

The article views the characteristics of mountain-valley winds in the territory of the Nakhchivan Autonomous Republic and the processes of the emergence of instant gusts of these winds.

Depending on the complex geographical conditions of the region, the characteristics of mountain-valley winds, their curvilinear flow around mountain valleys and narrow passages, and the dynamics of wind speed were analyzed, and the results of scientific research conducted to determine the current wind potential of Nakhchivan Autonomous Republic were shown.

The results of the scientific research conducted on the causes and development of the instant wind gusts in the territory of the Nakhchivan Autonomous Republic have been shown. The impact of sudden wind gust on the environment was analyzed.

The researches carried out fully confirm the existence of the instant wind gust in the territory of Nakhchivan Autonomous Republic and how dangerous it is.

Keywords: mountain-valley winds, instant wind gust, shower, thunderstorm, vortex, air temperature, relief of the area.

INTRODUCTION

In the Autonomous Republic of Nakhchivan, the winds move along the valleys in a meandering form, and move towards the exit to the valley through narrow passages.

As the territory of Nakhchivan Autonomous Republic is located in a hollow, the winds in summer and winter have a mountain-valley characteristic. During the day, the winds blow from the valley to the mountains, and at night from the mountains to the valley.

Mountain-valley winds have a curved shape due to the influence of the mountain topography. These winds are formed when air flows down the curved slopes of mountain ranges [1].

These types of air currents are present in all valleys and have their local characteristics in each mountainous region.

However, in the Nakhchivan depression, this type of strong air flow shows itself so sharply that the climate of these areas is called a dry and

sharp continental climate. At night, the cold air flow coming down from the slopes of the surrounding mountains causes the temperature to drop sharply (10-15 °C). At night, the temperature is 10-15 °C different from daytime.

The surface of the territory of Nakhchivan Autonomous Republic is split up into deep valleys by the rocks of the Deraleaz-Zangazur mountain range, and the speed of wind current decreases in these valleys (Fig. 1.).

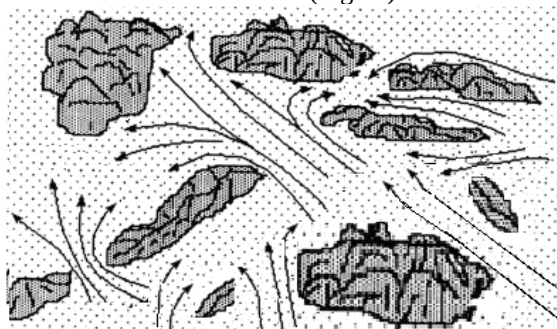


Fig. 1. The movement of the air stream through the valleys.

When the wind current is directed from valley to creek, maximum windspeed is concentrated in a relatively narrower juncture. Kazimov M and Aliyev M

note in their article: "In Nakhchivan, the winds move in a winding manner through the valleys, encounter obstacles in their way through narrow passages, and some of

these wind currents flowing around the obstacles move in a whirlpool towards the valley” [4,p.145] In the meanwhile, an interaction Table 1

№	The names of the regions	Altitude A (m.e.a.)	Pressure mm. mercury column.	Density Kg g c ² /m ⁴
1	Nakhchivan city	850	700,0	1,16
2	Babek region	850 - 1000	700,0 - 675,0	1,16 - 1,13
3	Julfa region	1000 - 2000	675,0 - 600,0	1,13 - 1,03
4	Shahbuz region	1500 - 3000	635,0 - 530,0	1,08 - 0,93
5	Ordubad region	1500 - 3000	635,0 - 530,0	1,08 - 0,93
6	Sharur region	800	710,0	1,17
7	Kangarli region	840 - 830	720,0	1,18
8	Sadarak region	750	720,0	1,18

between density and speed of wind and cross-sectional zone of valley.

Changes in air density and pressure in the Nakhchivan depression (up to 3 km high) are shown in Table 1:

EXPERIMENTAL PROCESS

The mountains in the territory are Ardichdag, Kükudag, Validag, Goydag, Ilanlıdag, Darıdag, etc. causing the currents of the wind to flow beside these

mountains and causing extra external pressures on structures.

In case wind flow meets a barrier, the fast current of wind escapes from the surface of the barrier and the wind pressure tumbles abruptly.

After the observations made in Julfa and Ordubad regions, it was determined that the fast air current approaches the mountain ranges of the Zangezur that obstructs its flow and gathers before these mountains, and it is accompanied by an increase in vorticity in the air flow (Figure 2.):

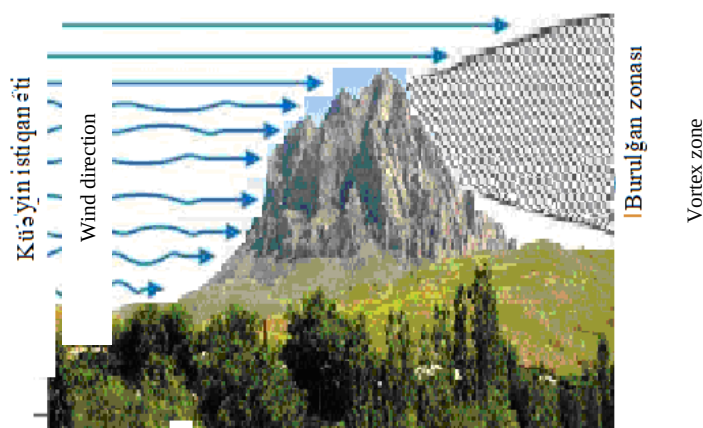


Fig. 2. Formation of vortex force

When the air flow tries to pass over the top of the mountain, the part facing the mountain stops and creates a vortex. Other parts of the air stream continue their movement from the right and left of the mountain, go around the mountain, move to the side of the mountain where there is no wind, and a small vortex is formed behind the mountain. This movement of the air flow causes an increase in pressure.

At this time, the wind pressure is ascertained by the formula shown below:

$$Q = K V$$

Here: Q – shows pressure of wind , (H/m2);

V – shows speed of wind , m/s;

K– is a coefficient that depends on the form of obstacles.

RESULTS AND DISCUSSIONS

The research carried out on the study of winds in the territory of the Nakhchivan Autonomous Republic was conducted on the basis of the study of the indicators of the wind conditions, local climate and meteorological conditions of the area [2].

For this purpose, in order to obtain information about winds in days, months and a year, a table of repetitions of wind speed and direction has been drawn up. Average monthly and annual wind speeds in 2022 are shown below (table 2. a, b):

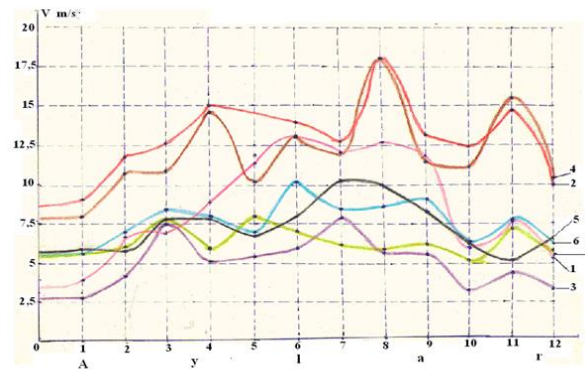
Table 2. a

№	Names	Average monthly wind speed, m/s											
		I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	Nakhchivan city	4,03	6,7	7,06	9,06	11,5	15,1	12,2	12,6	11,9	6,0	7,7	5,3
2	Julfa city	9,1	11,7	12,6	15,0	11,8	14,2	12,75	18,1	13,5	12,0	14,7	10,0
3	Sharur city	2,84	4,25	7,5	5,2	5,8	6,1	8,3	5,75	5,7	3,5	4,5	3,5
4	Shahbuz city	8,0	10,8	11,0	14,6	10,1	13,1	11,7	18,0	11,5	11,2	15,5	10,1
5	Bichanak (Shahbuz reg.)	6,9	6,7	7,7	7,8	6,8	7,9	10,6	10,0	8,3	6,5	5,3	6,7
6	Ordubad city	6,1	7,2	8,5	8,1	7,0	10,5	8,3	8,7	9,1	6,4	7,6	6,3
7	Agdara (Ordubad reg.)	6,1	6,3	8,2	6,1	8,3	7,1	6,3	6,0	6,5	5,2	7,1	5,4

Table 3.2.1. b

№	The names of the regions	Average annual wind speed, m/sec.
1	Nakhchivan city	8,95
2	Julfa region	13,0
3	Şərur region	5,2
4	Şahbuz region	12,2
5	Bichanak (Shahbuz reg.)	7,6
6	Ordubad region	7,8
7	Agdara (Ordubad reg.)	6,55

Below is the graph of average annual wind speeds in the regions of Nakhchivan Autonomous Republic (Fig. 3):



1. Nakhchivan city, 2. Julfa region, 3. Sharur region, 4. Shahbuz region, 5. Bichanak, Shahbuz region 6. Ordubad region, 7. Aghdara, Ordubad region.

Figure 3. Graph of average annual wind speeds in regions of Nakhchivan Autonomous Republic.

Analysis of wind rose in Nakhchivan Autonomous Republic showed that west and north-west winds prevail in the area. In the hot season, there is an increase in the calm state of the wind.

For the assessment of the wind energy resources of the Nakhchivan Autonomous Republic, for the first time, a cadastre of the territory was drawn up by us and the territory was divided into three zones:

Julfa and Ordubad cities, Nasirvaz, Aghdara villages of Ordubad region, Batabat passage of Shahbuz region, Kuku village were included in the first active, wind-rich zone. This active zone has large wind energy reserves.

The second middle zone includes the city of Nakhchivan, the village of Kermachatag of Shahbuz region, the village of Lekatag of Julfa region, the slopes

of Ilanli mountain, etc. can be entered. Analysis of winds in the second middle zone showed that medium-speed winds prevail here.

The third zone includes Sharur, Sadarak and Kangarli regions. In this zone, the wind speed varies steadily from 2 m/s to 3 m/s.

When the areas are divided into zones, the recurrence of winds and the potential of wind energy resources in the area were taken into account. This necessity is reflected in the study of the wind energy resources of the region, in the determination of wind zones, in the use of potential energy and in the analysis of the ecological potential of wind (Figure 4.)

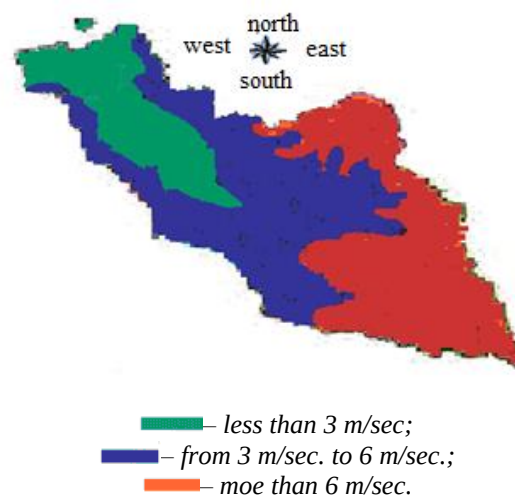


Fig. 4. Division of wind energy resources of Nakhchivan MR into zones.

In the summer months, strong and sharp wind bursts occur mainly in the mountainous areas of the area. These eruptions are formed at the Deraleyaz-Zangazur heights (2500-3500), passing through deep valleys and moving rapidly down the slopes and river basins.

The basis of the wind blast is the front of cold air. Reaching the earth's surface from the mountains, it intercepts the warm, low-density air and spreads in all directions. The speed of this wind burst depends on its deviation and vorticity.

In Batabat, Shahbuz region and Lekatag, Julfa region, wind bursts are accompanied by shower and lightning.

Wind blast is defined by the formula below:

$$G = 1 + g \frac{\sigma_x}{X}$$

Here: X – maximum wind speed during (T);

g – is the highest (peak) wind factor;

σ_x – value of mean square deviation;

G is the moment of explosion.

The magnitude of wind bursts is determined by the following formula:

$$L_x = 0,25 \cdot V_{3600} \cdot G_{xx} / \sigma_v^2$$

Here: G_{xx} – wind density at zero frequency;

σ_v – mean square deviation of wind speed,

V_{3600} – wind burst to occur within one hour.

The results of the conducted researches showed that when the air temperature was +35 °C and more (the temperature was measured in the shade between 1000 and 1800 hours), clouds saturated with ice particles accumulated in the mountains, and wind bursts accompanied by thunder and torrential rains occurred. These wind bursts created wind currents acting as a destructive force on the earth's surface (Table 4.)

Table 4.

Months	Ave rage tempe rature of weat her (°C)	Note
July		–
1	26,4°C	–
2	27,4°C	
3	31,1°C	–
4	32,4°C	–
5	33°C	–
6	33°C	–
7	35°C	Wind blasts, lightning and torrential rains were observed in mountains of Julfa region
8	33°C	Wind blasts, lightning and torrential rains were observed in the mountains of Ordubad region.
9	32,5°C	Wind blasts, lightning and torrential rains were observed in the mountains of Shahbuz region
10	29°C	
11	35°C	Wind blasts, lightning and torrential rains were observed in the mountains and in the city of Nakhchivan Shahbuz region.
12	36°C	–
13	36,5°C	–
14	35,5°C	Wind blasts, lightning and torrential rains were observed in the mountains of Ordubad and Julfa regions.
15	34°C	Wind blasts, lightning and torrential rains were observed in the mountains of Shahbuz region.
16	35°C	Wind blasts, lightning and torrential rains were observed in the mountains of Shahbuz and Julfa regions.
16	35°C	Wind blasts, lightning and torrential rains were observed in the mountains of Shahbuz and Julfa regions.
17	35°C	–
18	36°C	–
19	36,5°C	–
20	35,5°C	Wind blasts, lightning and torrential rains were observed in the mountains of Julfa and Ordubad regions.
21	36,4°C	–
22	38°C	–
23	37,5°C	–
24	36,4°C	–
25	36,5°C	–
26	34,5°C	Wind blasts, lightning and torrential rains were observed, in the mountains of in Shahbuz region.
27	34°C	–
28	33,5°C	Wind blasts, lightning and torrential rains were observed in the mountains of Julfa and in the city of Nakhchivan.
29	30,5°C	–
30	38,5°C	–

31	40 ⁰ C	–
Avqust		
1	39 ⁰ C	–
2	37,5 ⁰ C	–
3	38 ⁰ C	Wind blasts, lightning and torrential rains were observed in the mountains of Julfa region.
4	35 ⁰ C	Wind blasts, lightning and torrential rains were observed in the mountains of Ordubad region.
5	34,5 ⁰ C	Wind blasts, lightning and torrential rains were observed in the mountains of Shahbuz region.
6	30 ⁰ C	--
7	31 ⁰ C	Wind blasts, lightning and torrential rains were observed in the mountains of Julfa and Ordubad districts
8	27 ⁰ C	–
9	29 ⁰ C	–
10	31 ⁰ C	Wind blasts, lightning and torrential rains were observed in the mountains of Julfa and Shahbuz regions.
11	31 ⁰ C	–
12	32 ⁰ C	–
13	32,5 ⁰ C	–
14	33,5 ⁰ C	–
15	36 ⁰ C	–
16	37 ⁰ C	–
17	35,5 ⁰ C	Wind blasts, lightning and torrential rains were observed in the mountains of Julfa and Shahbuz regions.
18	33,5 ⁰ C	–
19	35,5 ⁰ C	–
20	36,4 ⁰ C	–
21	35,5 ⁰ C	–
22	38 ⁰ C	–
23	38 ⁰ C	–
24	36,5 ⁰ C	–
25	31 ⁰ C	Wind blasts, lightning and torrential rains were observed in the mountains of Ordubad and Shahbuz regions.
26	35 ⁰ C	–
27	33 ⁰ C	–
28	31 ⁰ C	–
29	34 ⁰ C	Wind blasts, lightning and torrential rains were observed in the mountains of Ordubad region
30	32 ⁰ C	–
31	29 ⁰ C	–

In the aftermath of the conducted research, it is completely confirmed that these strong blasts of wind in the territory of Nakhchivan MR pose a serious threat. These strong wind blasts 0.5-2 km. at a distance uproot trees and destroy power lines, inflict serious damage to buildings completely destroying the roof coverings of houses. Usually, these strong short-term wind blasts occurred after 17:00 in the mountainous areas of Shahbuz, Julfa and Ordubad regions. Wind blasts were not observed in the areas when the air temperature was +32 °C and lower [3].

The blasts have the power to completely destroy buildings, collapse houses and uproot large trees.

The column of wind blast, which is 300-400 meters in diameter, cloud-shaped, and the lower part is funnel-shaped, reaches the ground and creates a vertical vortex, and moves in a circle on the ground at a speed of 20-30 m/s, creating a disaster in its path [5].

This wind, with a speed of more than 20-25 m/s, hits empty buildings and roofs of houses, breaks timber,

trees, breaks power lines and poses a danger to people, animals and cars.

Thus, our research studies fully confirm that strong wind blasts pose a serious threat in the territory of the Nakhchivan Autonomous Republic.

The article elaborates funnel-shaped vortices and their complications were discussed [6].

CONCLUSIONS

1. The winds blowing in the territory of the Nakhchivan Autonomous Republic, including the "mountain-valley" winds specific to the region, were investigated and their characteristics were studied.

2. Annual average wind speeds in Nakhchivan Autonomous Republic were determined and their cadastres were drawn up.

3. The intensity and dynamics of wind explosions in mountainous areas of Nakhchivan Autonomous Republic were investigated.

References:

1. Gorokhov E.V., Kazakevich M.I., Shapovalov S.N., Nazim Y.V. Aerodynamics of high-rise structures, Donetsk, 2000, pp. 336.
2. Горшков В.Г., Макарьева А.М., Сила ветра в земной атмосфере. Российская Академия Наук, Петербургский Институт Ядерной Физики, Гатчина, 2008, с. 21
3. Elistratov V.V., Kuznetsov M.V., Theoretical foundations of non-traditional and renewable energy, Determination of wind energy resources in the region, Textbook, Moscow, 2004, pp. 59.
4. M.H.Kazimov.,M.E.Aliyev. Snow loads on tall structures and tower constructions in territory of Nakhchivan, The 17th International Conference on "Technical and Physical Problems of Engineering", 18-19 October 2021, Istanbul, Turkey, pp.145
5. Lukutin B.V, Renewable energy sources, Tomsk, Publish of the Tomsk Polytechnic University, 2008, pp. 187
6. Savitsky G.A, Wind load on structures, Moscow, Stoyizdat, 1998, pp. 34-75.

AUTOMATE DATA COLLECTION AND PROCESSING FOR ANALYTICS

Halan O.*PhD, associate professor of the department of information technologies
of the State University of Infrastructure and Technologies,
Kyiv, Ukraine***Dovgenko O.***student (master's degree) of the State University of Infrastructure and Technology,
Kyiv, Ukraine*

АВТОМАТИЗАЦІЯ ЗБОРУ ТА ОБРОБКИ ДАНИХ ДЛЯ АНАЛІТИКИ

Галан О.*кандидат технічних наук, доцент кафедри інформаційних технологій
Державного університету інфраструктури та технологій, м. Київ, Україна***Довгенко О.***студент (магістрант) Державного університету інфраструктури та технологій,
Київ, Україна*<https://doi.org/10.5281/zenodo.8386046>**Abstract**

This article is dedicated to the topic of developing software to improve decision-making processes and gain a competitive advantage. Accelerating data collection and processing for commercial institutions.

Анотація

Дана стаття присвячена розробці програмного забезпечення для вдосконалення процесів прийняття рішень і отримання конкурентної переваги, пришвидшенню збору та обробки даних комерційних установ..

Keywords: software, decision-making, data collection and processing, data mining, automation.

Ключові слова: програмне забезпечення, прийняття рішень, збір та обробка даних, data mining, автоматизація.

Вступ. У середовищі інформаційних технологій, що швидко змінюється, підприємства постійно шукають способи використання передових інструментів для вдосконалення процесів прийняття рішень і отримання конкурентної переваги. У даній статті представлено інноваційну програму, яка використовує автоматизовані методи аналізу даних і аналізу для отримання цінної інформації про вибрані продукти. Програма використовує складні алгоритми для збору даних, їх аналізу та представлення результатів у вигляді інфографіки та вичерпних звітів.

У сучасному швидкому бізнес-середовищі збереження конкурентної переваги вимагає гнучкого підходу до аналізу даних. Ручні методи збору та обробки даних виявилися трудомісткими та схильними до помилок. Однак із появою передових технологій, таких як автоматичний аналіз і розширена аналітика, тепер компанії можуть ефективно витягувати ключову інформацію з великих обсягів даних.[1]

Програмний продукт та його переваги. У цій статті висвітлюються переваги програм, призначених для спрощення аналізу вибраних продуктів шляхом реалізації аналітичних алгоритмів.

Автоматизована аналітика (також відома як автоматизований аналіз даних) – це метод аналізу даних, який використовує алгоритми машинного навчання та штучний інтелект для виконання завдань аналізу даних без прямого втручання людини. Такий підхід спрощує процес, мінімізує помилки та прискорює прийняття рішень.

Автоматичний аналіз продукту пропонує кілька суттєвих переваг, які змінюють сутність прийняття бізнес-рішень. фективність і швидкість автоматизованого збору (рис.1) й обробки даних значно скорочує час, необхідний для аналізу, що дозволяє компаніям швидко реагувати на ринкові тенденції та дії конкурентів.[2]



Рис. 1 Автоматичний збір й обробка даних

Точність даних, усунення ручного введення й обробки даних, мінімізація ймовірності людської помилки для точного й надійного аналізу. Масштабована автоматизована аналітика може безперешкодно обробляти великі обсяги даних, забезпечуючи підприємствам можливість аналізувати великі

набори даних без шкоди для точності та ефективності. Узгодженість, автоматизація забезпечує узгодженість аналітичних методів і зменшує варіативність, пов'язану з ручною інтерпретацією.[3]

Інноваційні програми автоматизованої аналітики широко застосовуються в різних галузях (рис. 2):



Рис. 2. Галузі застосування автоматизованої аналітики

Автоматизована аналітика відіграє ключову роль в охороні здоров'я, уможливллюючи діагностику захворювань, моніторинг пацієнтів і пошук ліків шляхом аналізу медичних зображень, клінічних записів і даних пацієнтів.

Фінансові установи використовують автоматизовану аналітику для виявлення шахрайства, прогнозування ринкових тенденцій та оптимізації інвестиційних портфелів. Це полегшує швидку та точну обробку великих обсягів фінансових даних.

Маркетологи використовують автоматичну аналітику, щоб аналізувати поведінку споживачів, персоналізувати маркетингові кампанії та максимізувати віддачу від інвестицій у рекламу. Це покращує сегментацію клієнтів і стратегії націлювання.

На виробництві автоматизована аналітика підтримує прогнозне обслуговування, контроль якості та оптимізацію виробництва. Це мінімізує час простою та підвищує продуктивність.

Алгоритм продукту. Алгоритми автоматичного аналізу продукту Запропонована програма використовує чітко визначені алгоритми для полегшення автоматичного аналізу продукту.

Алгоритм можна розділити на наступні кроки:

Крок 1: Збір даних Програма спочатку використовує аналізатори для збору відповідних даних із різних джерел. Це включає отримання інформації про продукт, ціни, відгуки клієнтів та інші відповідні дані з сайтів електронної комерції, форумів і сайтів конкурентів.

Крок 2: Обробка даних Після збору даних алгоритми обробляють і очищають їх. Непотрібна інформація відфільтровується, а решта даних структурується в єдиному форматі для аналізу.

Крок 3. Аналізуйте та створюйте ідеї. На цьому етапі програма використовує розширену аналітику,

щоб отримати інформацію з оброблених даних. Алгоритм визначає тенденції, порівнює ціни, оцінює настрої клієнтів і виявляє закономірності в даних.

Крок 4: Візуалізація та звітність. Додаток виходить за рамки аналізу даних, щоб візуалізувати інформацію за допомогою інтуїтивно зрозумілих графіків і діаграм. Крім того, він створює вичерпні звіти, що містять результати аналізу. Ці звіти легко доступні, і ними можна поділитися з зацікавленими сторонами та особами, які приймають рішення.

Приклад методу аналізу популярності товару на ринку

Вхід: масив даних про продажі продукту за останній місяць: `sales_data = [120, 150, 180, 210, 250, 200, 190, 230, 280, 320, 300, 280]`.

Масив даних кількості позитивних відгуків про продукт за останній місяць: `positive_reviews = [50, 60, 70, 80, 90, 85, 75, 95, 100, 110, 105, 95]`.

Середня ціна товару за останній місяць: `average_price = 150`.

Етапи алгоритму: Розрахувати середньоденні продажі:

Обчисліть середні щоденні продажі для кожного місяця: `daily_sales = [sum(sales_data[i:i+30]) / 30 for i in range(0, len(sales_data), 30)]`.

Розрахунок відносних позитивних відгуків: для кожного місяця обчисліть відносну кількість позитивних відгуків: `relative_positive_reviews = [reviews / sales * 100 for Reviews, sales in zip(positive_reviews, daily_sales)]`.

Обчисліть індекс популярності: для кожного місяця обчисліть індекс популярності на основі середніх щоденних продажів і відносних позитивних відгуків: `popularity_index = [(daily_sales[i] + relative_positive_reviews[i]) / 2 for i in range(len(daily_sales))]`.

Аналіз популярності продукту: знайдіть місяць із найвищим індексом популярності: `most_popular_month = popularity_index.index (max (popularity_index)) + 1`.

Вихід: найпопулярніший місяць для продукту: `most_popular_month`.

Алгоритм допомагає аналізувати дані про продажі, огляди та ціни продукту, щоб визначити його популярність на ринку. Індекс популярності розраховується на основі середньодобових продажів і відносних позитивних відгуків, що дозволяє об'єктивно оцінити популярність продукту по місяцях. Відстежуючи рейтинги та відгуки про товари, ви маєте можливість коригувати та оптимізувати свою стратегію продажів. Моніторинг кількісних показників, таких як кількість відгуків та середня оцінка, може надати вам дані, необхідні для побудови відносин між продуктом і покупцем та збільшення продажів. Також корисно регулярно відстежувати стан ваших конкурентів і великих маркетплейсів, щоб бути в курсі ключових тенденцій. І, звісно, покращення репутації вашого продукту може сприяти

зростанню продажів і підвищенню видимості продукту в пошукових системах.

Висновок. Представлена програма демонструє трансформаційний потенціал використання аналітичних методів для автоматизованого аналізу продуктів. Оптимізуючи процеси збору даних, обробки, аналізу та звітності, компанії можуть прискорити прийняття рішень, підвищити конкурентоспроможність і адаптуватися до динамічних ринкових умов. Оскільки технологія продовжує розвиватися, інтеграція автоматизованих аналітичних програм, безсумнівно, відіграватиме ключову роль у формуванні майбутніх бізнес-стратегій у галузі інформаційних технологій.

Список літератури:

1. Fawcett T., Provost F. Data Science for Business. Київ : Наш Формат, 2019. 400 p.
2. Dunnigan R., H. Pries K. Big Data Analytics: A Practical Guide for Managers. Boca Raton : Auerbach Publications, 2015. 576 p.
3. McKinney W. Python for Data Analysis. Сербастопол : O'Reilly, 2022. 552 p.

USING APPS TO ENCOURAGE PHYSICAL ACTIVITY

Halan O.*PhD, associate professor of the department of information technologies
of the State University of Infrastructure and Technologies,
Kyiv, Ukraine***Dovgenko S.***student (master's degree) of the State University of Infrastructure and Technology,
Kyiv, Ukraine*

РОЛЬ МОБІЛЬНИХ ДОДАТКІВ У ЗАОХОЧЕННІ ДО ФІЗИЧНОЇ АКТИВНОСТІ

Галан О.*кандидат технічних наук, доцент кафедри інформаційних технологій
Державного університету інфраструктури та технологій, м. Київ, Україна***Довгенко С.***студент (магістрант) Державного університету інфраструктури та технологій,
Київ, Україна*<https://doi.org/10.5281/zenodo.8386078>**Abstract**

This article examines the role of apps in encouraging physical activity and engaging people to spend more time outdoors. This article discusses the role of apps in encouraging physical activity and getting people to spend more time outdoors. The concept of a travel app that promotes healthy lifestyles and social interaction is considered.

Анотація

У даній статті розглядається роль апікацій (додатків) у заохоченні фізичної активності та залученні людей проводити більше часу на свіжому повітрі. Розглянуто концепцію додатку для подорожей, який пропагує здоровий спосіб життя та соціальну взаємодію.

Keywords: health, app for walking, algorithm for generating tourist routes, tourism, app for improving health.

Ключові слова: здоров'я, додаток для прогулянок, алгоритм генерації туристичних маршрутів, туризм, додаток для покращення здоров'я.

Вступ. З появою сучасних технологій мобільні додатки стали невід'ємною частиною нашого життя, пропонуючи різноманітні можливості для покращення фізичного здоров'я та соціальної активності. У цій статті досліджується концепцію мобільних додатків, які заохочують користувачів брати участь у заходах на свіжому повітрі та спільній взаємодії.[1]

Поширеність малорухливого способу життя та пов'язані з цим ризики для здоров'я змушують заохочувати фізичну активність. Мобільні додатки стали потужним інструментом для заохочення людей до регулярних прогулянок, тим самим покращуючи загальний стан здоров'я та самопочуття. У цьому дослідницькому документі досліджується використання мобільних додатків для просування програм ходьби, з'ясовується їх функціональність і потенційний вплив.

Програма ходьби в основі цього дослідження використовує мобільний додаток, щоб мотивувати та допомогти користувачам включити ходьбу у своє повсякденне життя.

Користувачі можуть встановлювати персоналізовані цілі ходьби, наприклад щоденні кроки або цілі відстані. Потім додаток відстежує їхній прогрес, забезпечує зворотний зв'язок у реальному часі та мотивує їхні досягнення. (рис. 1)

Розглянемо програму, яка поєднує в собі маршрути подорожей і елементи фітнесу. Користувач обирає маршрут, який включає цікаві місця та визначні місця. Під час процесу маршрутизації користувачеві надається фізичне завдання, наприклад, пройти певну відстань, зробити певну кількість кроків тощо.[2]

Для виконання завдань використовується вбудований крокомір і GPS. Створення маршруту: програма використовує алгоритм створення маршруту на основі доступної інформації про місцезнаходження. Маршрут сформульований таким чином, щоб поєднати туристичні атракції з можливістю спортивних заходів.

Алгоритми. Алгоритм генерації туристичних маршрутів. Збір локаційних даних для формування маршруту. Нехай маємо множину локацій: $L = \{L_1, L_2, \dots, L_n\}$ $L = \{L_1, L_2, \dots, L_n\}$, де L_i - координати i -тої локації. Відстань між локаціями L_i та L_j визначається функцією відстані $D(L_i, L_j)$.

Вибір початкової точки користувачем: Користувач обирає випадкову початкову локацію L_{start} . Визначення наступної локації: Нехай $L_{current}$ - поточна локація. Обчислюємо відстані до всіх невідвіданих локацій $D_{unvisited} = \{D(L_{current}, L_i) | L_i \notin \text{вже відвідані локації}\}$ $D_{unvisited} = \{D(L_{current}, L_i) | L_i \notin \text{вже відвідані локації}\}$.

Знаходимо найближчу невідвідану локацію $L_{next}: L_{next} = \arg \min_{L_i \in D_{unvisited}} D(L_{current}, L_i)$.

Система фітнес-завдань: Для кожного маршруту буде створено набір фітнес-завдань, визначених відповідно до довжини маршруту та його характеристик. Алгоритм адаптує завдання до фізичної

підготовки користувача, створюючи для нього виклик, але не перевантажуючи його. Оцінки та залучення: кожне завдання оцінюється та додається до загальної оцінки користувача. Це спонукає користувачів бути активними та змагальними.

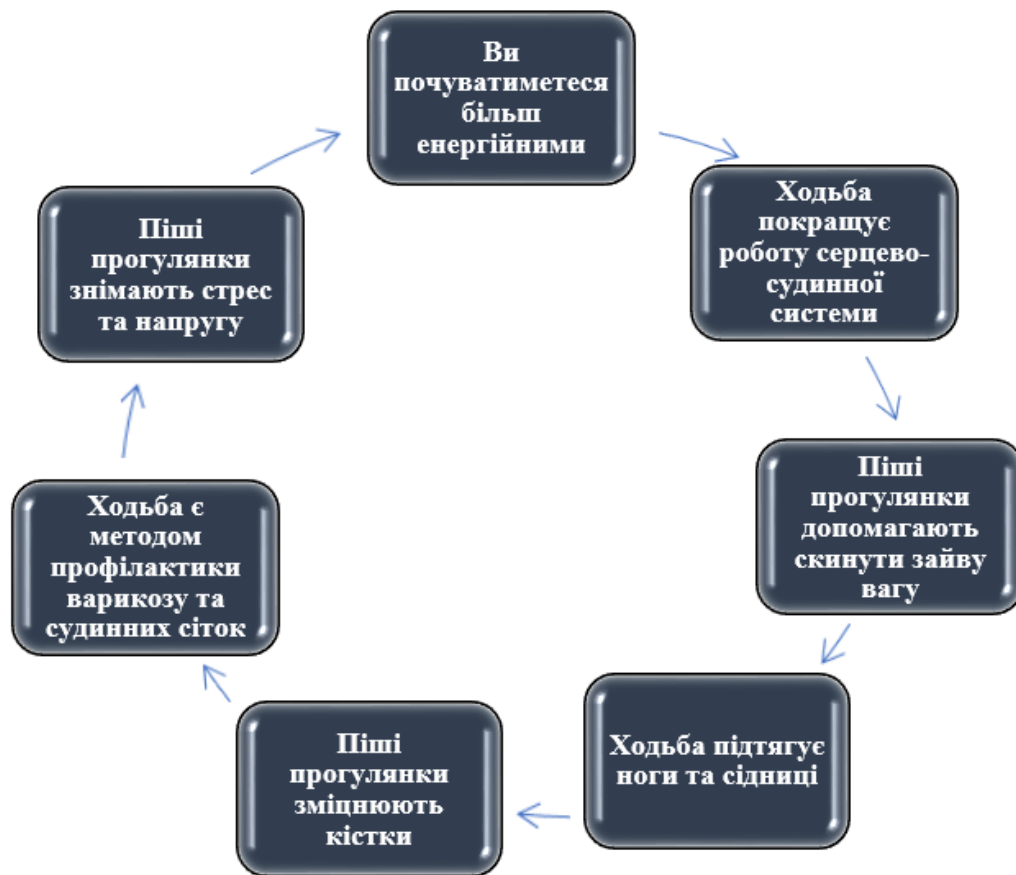


Рис. 1 Зворотний зв'язок у реальному часі та мотивація на досягнення

Додаток також забезпечує взаємодію між користувачами, де вони можуть обговорювати маршрути та дзвінки. Результати практичних досліджень показують, що застосування туристичних маршрутів з оздоровчою складовою позитивно впливає на рухову активність користувачів.

Алгоритм додавання фітнес-завдань. Для локації L_{next} обираємо випадкове завдання з подолання маршрутів T_{next} з набору можливих завдань.

Перевірка завершення маршруту. Якщо всі обрані локації з завдань відвідані, алгоритм завершує роботу. В іншому випадку, повертаємось до визначення наступної локації для L_{next} . Формування туристичного маршруту. Створюємо послідовність локацій $R = \{L_{start}, L_2, L_3, \dots, L_{end}\}$, де L_{end} - остання відвідана локація.

Кожній локації L_i з послідовності R відповідає завдання з подолання маршруту T_i . Цей математичний опис алгоритму враховує вибір початкової локації, обчислення найближчої невідвіданої локації, додавання фітнес-завдань, формування маршруту та перевірку завершення маршруту.

Додаток та його можливості. Додаток дозволяє туристам відвідати різноманітні цікаві місця та

пам'ятки міста пішохідними маршрутами. Ходьба сприяє фізичній активності, збільшує кількість кроків і покращує здоров'я серця.

Додаток може допомогти відстежувати час ходьби, розраховувати кількість спалених калорій та інші параметри здоров'я. Додаток надає інформацію про історико-культурні об'єкти міста під час прогулянки. Користувачі можуть дізнатися нове та розширити свої знання. Прогулянки можуть включати фітнес-випробування або завдання, такі як розтяжка або силові вправи. Додаток дозволяє користувачам знаходити співрозмовників і компаньйонів зі схожими інтересами та інтересами. Це сприяє соціальній взаємодії та можливості проводити час з однодумцями в ефірі.

Маршрути з різною складністю: додаток може надавати маршрути з різною складністю відповідно до фізичної підготовки користувача. Додаток може містити ігрові елементи, наприклад графіку або завдання, щоб зробити подорожі більш захоплюючим. Зміцнює психічне здоров'я, проведення часу на свіжому повітрі та відвідування цікавих місць можуть допомогти користувачам розслабитися та зменшити стрес. Підтримка місцевих компаній,

програма може містити рекомендації щодо кафе, ресторанів і магазинів уздовж маршруту, щоб допомогти підтримати місцеві компанії. Спосіб здорового туризму, відвідуючи туристичні пам'ятки пішки, туристи можуть насолоджуватися новими місцями, дотримуючись здорового способу життя. Програми для подорожей містом допомагають вести активний спосіб життя, займатися фізичною активністю, допомагають насолоджуватися подорожами та відкривати нові місця.[3]

Додаток інтегрує технологію GPS для картографування стежок, допомагаючи користувачам відкривати нові туристичні маршрути та відстежувати їхні маршрути. Ця функція додає елемент дослідження до досвіду ходьби.

Користувачі можуть спілкуватися з друзями, родиною чи іншими учасниками за допомогою програми, сприяючи спільноті та дружньому змагання. Соціальні функції дозволяють випробування, таблиці лідерів і спільні досягнення.

Додаток може включати показники здоров'я та фізичної форми, такі як моніторинг серцевого ритму, відстеження калорій та інтеграція з переносними пристроями. Ця інформація дає користувачам повне уявлення про їхню фізичну активність.

Додаток використовує алгоритми машинного навчання, щоб надавати персоналізовані пропозиції щодо пішохідних маршрутів, завдань і цілей на основі індивідуальних рівнів фізичної підготовки та вподобань.

Використання мобільних додатків для просування пішохідних ініціатив широко використовується в різних сферах:

- Уряди та громадські організації охорони здоров'я запустили програми ходьби в рамках кампа-

ній громадського здоров'я, спрямованих на боротьбу з сидячим способом життя та зменшення ожиріння.

- Роботодавці інтегрують додатки для ходьби у свої оздоровчі програми, щоб заохотити працівників бути фізично активними, зрештою створюючи здоровішу та продуктивнішу робочу силу.

- Любителі фітнесу використовують програми для ходьби, щоб доповнювати свої щоденні тренування та досягати фітнес-цілей, стежачи за своїм загальним станом здоров'я.

- Місцеві громади та райони використовують програми пішохідних прогулянок, щоб сприяти участі громади, соціальній взаємодії та фізичній активності серед мешканців.

Висновок. Користувачі, які користуються додатками, де пропагується здоровий спосіб життя, проводять більше часу на свіжому повітрі та рухаються більше, ніж ті, хто не користується подібними додатками. Крім того, спільнота користувачів, сформована навколо програми, позитивно впливає на соціальні взаємодії та сприяє досягненню результатів.

Список літератури:

1. Garcia, M. et al. (2022). Integrating Social Interaction into Health and Fitness Apps: A Case Study. *Journal of Interactive Health*.
2. Smith, J. et al. (2019). Mobile Applications and Physical Activity: A Review of Current Evidence. *Journal of Health and Technology*.
3. Johnson, A. et al. (2021). Gamification in Health and Fitness Apps: A Systematic Review. *International Journal of Sports Science*.

FRACTAL PARAMETRISATION OF THE WELD METAL MICROSTRUCTURE. Part 2.**Holovko V.****Shtofel O.****Krasikov I.**<https://doi.org/10.5281/zenodo.8386083>**Abstract**

The growing of high-strength low-alloy steels use in the welded metal structures manufacture is accompanied by an increase in the requirements for the reliability of prediction results in the "composition-structure-properties" system. The fractal analysis methods use makes it possible to establish a metal structure characteristics numerical parameterization, the metallographic analysis of which gave only a qualitative assessment. The article shows the fractal analysis possibilities for the numerical evaluation of such of the structure of weld metal characteristics as the total length of grain boundaries, the distribution of dislocations at the grains structural boundaries, the distribution density of non-metallic inclusions accumulations with a distance less than $5r$ from one another. That will show the possibility of the structure and non-metallic inclusions numerical parametrization in the "structure-fractal-properties" system for predicting the mechanical properties of the low-alloy high-strength steels weld metal

Keywords: low-alloy steel; metallographic; fractal analysis; metal structure; non-metallic inclusions; mechanical properties.

INTRODUCTION

The problem of assessing the structure and metal objects qualitative characteristics has been solved for a considerable period of time by the solid state physics methods and means, mechanics, chemistry, materials science, and other scientific disciplines. The reason for this is that the structure and the evaluation analysis of the metals qualitative characteristics is a time-consuming process and requires a complex approach, which consists in combining traditional evaluating methods the qualitative metals characteristics with new of their structural components evaluating methods. The traditional analysis methods such as electron and optical microscopy, X-ray structural analysis, quantitative metallography shows that none of them can be universal and suitable for solving the full tasks range of identifying the metal quality characteristics by analyzing its structure.

The metal structure usually consists of several factors, including the structural grains size, their boundaries branching, dislocations density, non-metals content, size and their distribution in the solid solution, and others. There is a large studies number on the each of these parameters influence on the metal mechanical properties. The metal ability to perform certain service functions does not depend on its structure individual indicators, but on the structure as a complete object. Such an assessment requires a statistical description of a heterogeneous data large volume. For this purpose, it is

appropriate to use the fractal analysis method along with other diagnosis methods and welded metal structures quality control, metal structures components, parts, etc. The advantages of this method are low cost, speed of calculations and availability. One of the general issues remains the statistical data collection for various steels, alloys, metals, etc.

The possibility proof of using the fractal analysis method for the metal structure analysis is based on the comparison of the crystallization process with the geometric and stochastic fractals formation. From the definition of the term "fractal", it follows that a fractal is a figure that has the following properties: it has a complex structure at any magnification; is approximately self-similar; has a fractional Hausdorff (fractal) dimension, which is more topological; and can be constructed by recursive procedures.

To analyze the structural properties by the fractal method, it is necessary to analyze the crystallization scheme under one or another regime. From the typical microstructure example of the low-alloy steel weld metal, which is shown in Fig. 1, it can be seen that its components are various morphology ferrite grains (from acircular to globular), the second phase grains, non-metallic inclusions (up to $5\text{ }\mu\text{m}$ in size), cementite segregation.

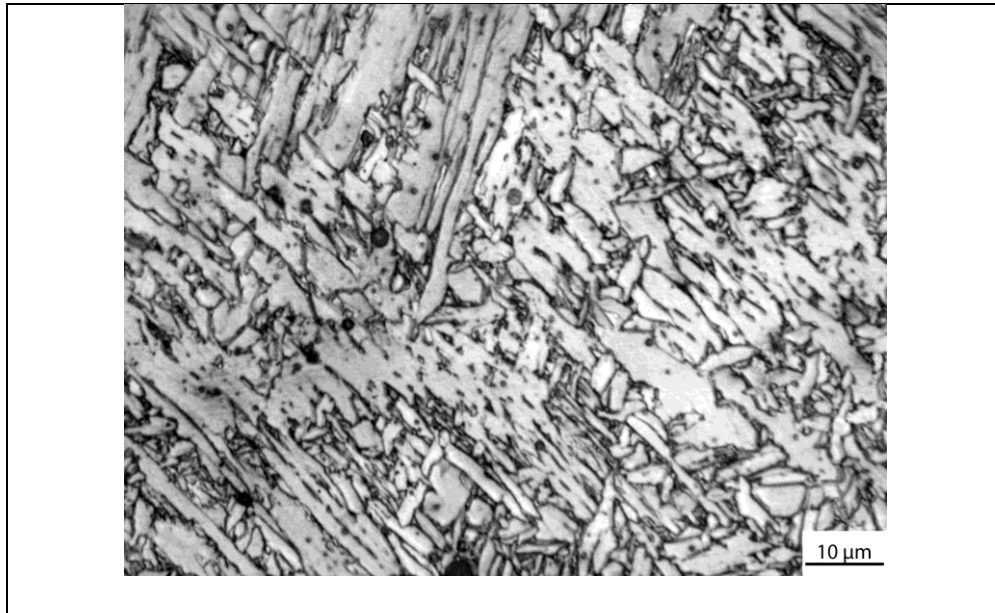


Fig.1. Typical microstructure of low-alloy steel weld metal

At first glance, the structure in Fig. 1 seems chaotic, however, if we consider the content and nature of each component distribution separately, it is possible to establish a certain order. To describe chaos, it is advisable to use synergistic approaches, which allow you to focus on phenomena that arise due to the joint several factors action, each of which does not lead to this phenomenon separately. In our work, self-organized zones/objects are considered in fig. 1, are different morphology crystals and non-metallic inclusions, which are the main factors in the manifestation of the sample necessary mechanical properties. Self-organization is understood as the involuntary, spontaneous self-complication of the structure, system, and its functioning laws as a slow and smooth changes result in its parameters. In other words, self-organization is the ordered structures formation from chaos.

The main fractals using purpose in the metallurgy field is to establish a connection in the system "structure - fractal/multifractal dimension — properties".

I MATERIALS AND METHOD

The research was carried out on weld metal samples, which were performed according to the method [1] during arc welding in shielding gas (82% Ar, 18% CO₂) with flux-cored "metalcore" type wire with 1.6 mm diameter at a 200 (±5) A constant current, at an 30 (±2) V arc voltage with a 21 (±2) kJ/cm input energy. In order to form weld metal with a changed (within a certain range) structural components content, a powder wire with a 1.6 mm diameter was introduced into the

"cold" part of the welding pool, The introduced wire core contained a mixture of 10% refractory compounds particles with a 0.040...0.200 mm size (inoculants) and 90% iron powder of the PZHV brand according to DSTU 9849. Titanium-based compounds were chosen as inoculants: titanium oxide (TiO₂ weld metal), titanium carbide (TiC weld metal), titanium nitride (TiN weld metal), as well as aluminum oxide (Al₂O₃ weld metal) and silicon carbide (SiC weld metal). The obtained results were compared with the data of weld metal samples obtained during flux-cored wire welding, the core of which included ferrotitanium (Base weld metal).

Metallographic studies were performed on transverse sections cut from welded joints. The welds metal structure was studied using a Neophot 32 optical microscope. Determination of the structural components content in weld metal was carried out according to the ISO 9042 method. The welds metal mechanical properties were evaluated according to the standard tests results in accordance with the DSTU ISO 6892-1:2019, DSTU EN 10045-1: 2006, DSTU ISO 15792 - 1: 2009 requirements. Photographs (optical images) of the structure and inclusions were studied using the fractal analysis method.

II. RESULTS AND DISCUSSION

The base metal (BM) chemical composition, the Base weld metal and welds metal with inoculants are given in Table 1. The welds metal mechanical properties are given in the table. 2.

Table 1.

Chemical composition of the base metal and the metal othe examined seams

Weld №	C	Si	Mn	S	P	Ni	Mo	Al	Ti	Inoculant
BM	0.088	0.680	1.57	0.012	0.010	0.13	0.08	0.015	0.004	
Base	0,049	0,298	1,39	0,023	0,015	2,26	0,25	0,039	0,008	—
TiC	0,054	0,263	1,28	0,025	0,011	2,22	0,26	0,035	0,009	TiC
TiN	0,035	0,317	1,40	0,019	0,009	2,29	0,26	0,036	0,011	TiN
SiC	0,066	0,270	0,92	0,018	0,014	1,92	0,23	0,031	0,005	SiC
TiO ₂	0,035	0,405	1,24	0,016	0,011	1,97	0,27	0,031	0,027	TiO ₂
Al ₂ O ₃	0,034	0,324	1,12	0,017	0,013	2,15	0,29	0,032	0,015	Al ₂ O ₃

Table 2

Results of mechanical tests of the metal of the studied seams

Weld №	σ_B	$\sigma_{0,2}$	δ	ψ	KCV, J/cm ² at T, °C		
	MPa		%		+ 20	0	-20
Base	746	690	19	60	73	79	63
TiC	715	644	19	63	112	93	85
TiN	712	580	5	15	55	47	40
SiC	726	650	21	62	85	72	65
TiO ₂	709	636	19	57	85	72	60
Al ₂ O ₃	728	621	17	54	82	58	50

The purpose of the study was to establish the possibilities of describing the weld metal structure as a whole object using the multifractal index. A multifractal is a complex fractal, which in turn consists of individual structural objects (Table 1) fractals: bainite grains, grain boundaries; non-metallic inclusions and others

The main calculations were based on the fact that:

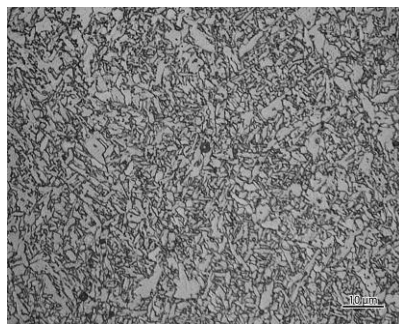
- Inclusions were considered as a certain factor of influence on the ferrite structure formation, on the one hand, and also as an effective center of cracks nucleation and development.
- Reducing the distance between two or more inclusions to less than five times the radius of the inclusion contributes to an increase in the stress level in the metal matrix near the inclusion;

• Bainite is a prominent structure component of low-alloy steels welds metal from the mechanical properties point of view;

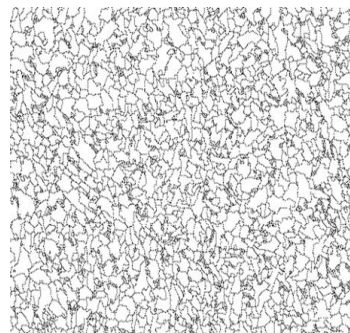
• The size of the structural grains and the grain boundaries branching have a direct effect on the weld metal strength and plasticity.

The influence of each microstructure constituent element on the weld metal mechanical properties can be described by the fractal dimension, and to generalize the microstructure influence, it is advisable to use a multifractal dependence.

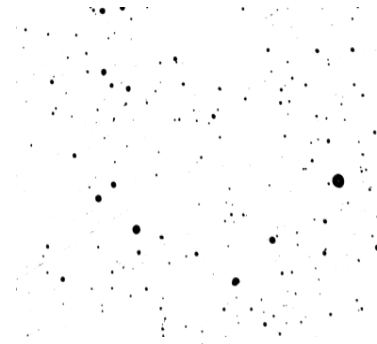
The objects of the study were the weld metals microstructure grains, grain boundaries and non-metallic inclusions in a solid metal solution (Fig. 2).



a)



b)



c)

Fig. 2. Samples of research objects

Optical microscopy data showed that the weld metal secondary microstructure consists a bainite-martensitic mixture with a small ferrite component fraction (Fig. 1). The secondary structure composition and the structural grains size are given in Table 3. Bainite is

represented by the morphological forms of upper, lower and intragranular bainite, ferrite by broken polygonal formations and Widmannstett ferrite outside the grains. Martensite is formed as a traditional acircular structure.

Table 3

The weld metal secondary structure composition

Weld №	The average share of components (%) in the weld metal micro-structure				Size of structural grains, μm
	Lower bainite	Upper bainite	Martensite	Ferrite	
Base	50	30	10	10	54,30
TiN	30	57	10	3	51,23
SiC	30	50	10	10	41,89
TiO ₂	25	45	10	10	41,17
Al ₂ O ₃	15	50	15	15	45,24
TiC	25	60	10	5	44,18

Fractal parameterization of the characteristics of non-metallic inclusions

The Minkowski method [2] was used to obtain the fractal dimension. For this purpose, several images were chosen for each sample. At the first stage, using the ImageJ program, the sizes of all structure grains and non-metallic inclusions were measured, the grain boundaries distribution and dislocations in the metal structure, as well as inclusions in the solid solution were studied (Fig. 3), and the fractal dimension of the studied objects was calculated using the Fractal program [3] objects.

For fractal analysis, five optical images of the secondary structure were selected at a X1000 magnification for each weld metal (Fig. 3a). After processing with the ImageJ program, binary images of the corresponding structures were obtained (Fig. 3b), for which

the fractal parameter was determined. The fractal parameterization results are given in Table 4.

The cellular method was used to calculate the fractal dimension. According to this method, the prepared fractal image (Fig. 1) is covered with grids with square cells ("box counting method") with a decrease in the grid step d to $1\text{px} = 0.0377\mu\text{m}$, and the number of cells $N(d)$ in which the information boundary (the boundary grains) of the investigated fractal object - structure. The fractal image D dimension is determined as an approximation result of the obtained points set using the least squares method according to expression (1).

$$D = \lim_{d \rightarrow 0} \frac{\ln N(d)}{\ln \frac{1}{d}} \quad (1)$$

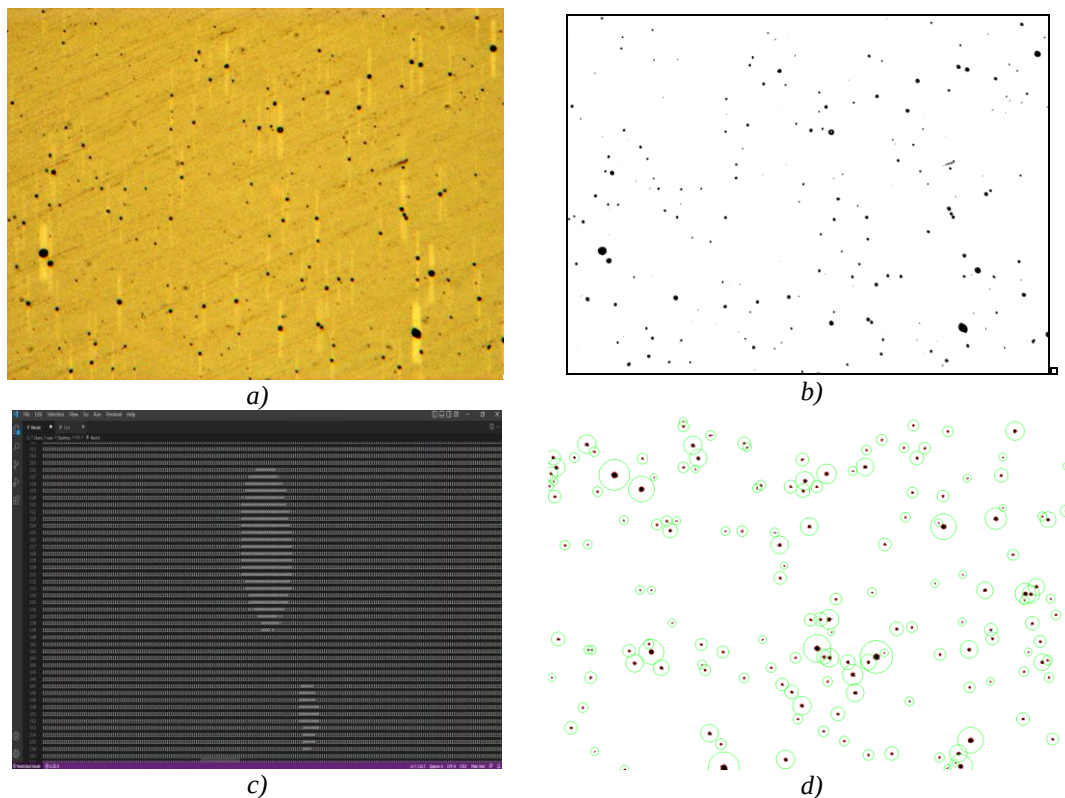


Fig. 3. Cuts of weld metal samples: a) real photo; b) photo cleared of "garbage"; c) analysis of inclusions geometry; d) identification of inclusions and their surroundings.

During the research using the specified method, data were obtained on the branching parameter of non-metallic inclusions (Fig. 4a) and the density of their distribution at a distance of less than $0.5r$ from each other

(Fig. 4b). It should be noted that the program component does not take into account the size of the inclusions, but only shows their clustering at 0 to $4\mu\text{m}$ distance on each subsequent one.

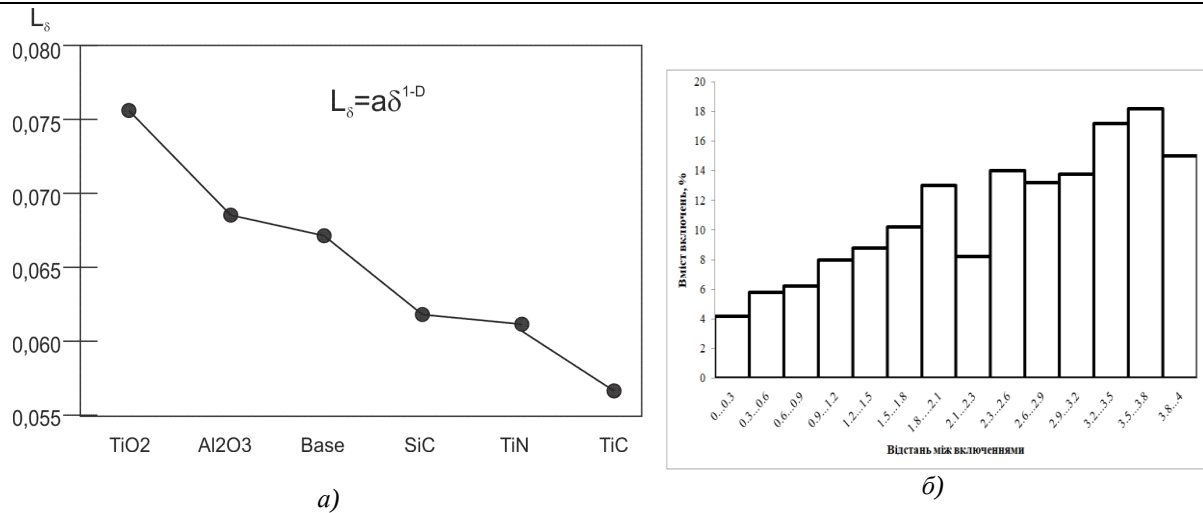


Fig. 4. Analysis of the obtained data: a) branching of non-metallic inclusions, where L is a parameter that shows the total non-metallic inclusions length on the section, taking into account the obtained photo scale and the corresponding fractal dimension D_{nm} ; b) distribution of inclusions over the section area, taking into account the maximum studied distance from each, as 5 radii of the largest inclusion being studied.

It is known that non-metallic inclusions with a size of 0.3 to 0.8 μm have the most noticeable effect on the low-alloy steels weld metal secondary microstructure formation. Fractal analysis methods make it possible to identify the influence of a certain inclusions group on the weld metal mechanical properties. This approach made it possible to consider the effectiveness of the inclusions content with a size of 0.3...0.8 microns at a weld metal determined impact viscosity.

One of the important inclusions characteristics is their distribution in the metal structure. Inclusions, which are located more or less uniformly in the structure, do not have a great influence on the metal mechanical properties. There may be inclusions in the weld metal, which are located at a distance from each other more than five times the inclusions radius ($L \geq 5r$), or in the form of clusters ($L \leq 5r$), or are located in the form of chains at the grain boundaries. In the last two cases, such clusters can be nucleation centers of brittle

metal destruction. Unfortunately, modern metallographic studies methods do not take into account the of the inclusions distribution density in the metal matrix.

In order to assess the influence of non-metallic inclusions, using a fractal indicators method has been developed to describe the non-metallic inclusions content in the weld metal. The program [4] applies the algorithm of recursively traversing the pixels of the inclusion area in the image. Statistical and stereometric inclusions characteristics are calculated based on the assumption of the inclusions round shape. Thus, we estimate the inclusion radius as $\sqrt{S/\pi}$, where S is the area of the inclusion in pixels. After calculating the inclusions size, the program builds histograms of the inclusions distribution by area and size. The latter is used as a basis for calculating the Pearson test χ^2 value, which is used to check whether the obtained sample belongs to one of the predefined distribution types.

Table. 4.

Fractal characteristics of structural components

Weld №	Vinc	Dnm	D _{0,8}	Dgz	Lgz	Dz	Ddis
TiN	0,77	0,928	1,009	1,9387	17078	2,2101	0,2309
Al ₂ O ₃	0,37	0,962	1,067	1,8252	12949	2,1862	0,2956
TiO ₂	0,47	1,025	1,119	1,8149	13174	2,1240	0,4975
SiC	0,64	0,940	1,102	1,9316	14226	2,1370	0,5303
Base	0,62	0,952	1,252	1,9069	16112	2,1740	0,4540
TiC	0,62	0,924	1,254	1,8765	13893	2,2326	0,5423

Notes: Vinc is the content (%) of non-metallic inclusions in the weld metal, Lgz is the total length of grain boundaries, Dnm D_{0,8}, Dgz, Ddis, Dz are fractal parameters of non-metallic inclusions, inclusions clusters at a distance less than 5r from each other, grain boundaries branching, the dislocations distribution at grain boundaries, bainite grains, respectively, which were obtained as the analysis result of weld metal structure optical images.

The program also provides the ability to filter out noise in the image (for example, individual pixels that introduce a significant bias to the histograms when studying the inclusion sizes distributions and distances

between them), and also allows users to create charts with different numbers of columns.

Plasticity of metal is usually described using indicators of relative narrowing and elongation of material

samples before failure under static loading. The destruction process begins with the nucleation of microcracks and continues through their development. As a result of the accumulation of dislocations during the formation of the grain boundary structure and non-metallic inclusions in the metal matrix, they are among the most likely places for the initiation of cracks. The presence of dispersed inclusions with a size of $0.5...0.8\ \mu\text{m}$ at the grain boundaries significantly increases the risk of microcracks formation. Based on the results of the fractal analysis of the structure of welds, the tendency to fracture of metal samples under static loading (the indicator is the inverse of the plasticity of the metal) can be described by the multifractal indicator D_{pl} .

$$D_{pl} = \ln L_g - D_{in} - D_{0,8} - 1,5D_{dis} \quad (2)$$

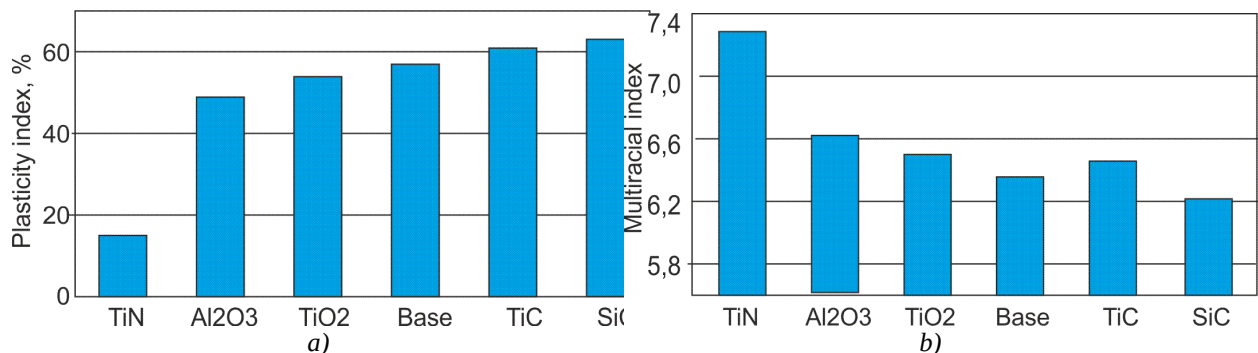


Fig. 5. The results of determination of a) relative elongation of weld metal samples and b) multifractal index D_{pl}

It should be noted that the program that was used in the research allows you to calculate the fractal parameter of the grain boundaries branching without taking into account their thickness, as well as the fractal parameter of the dislocations distribution at the grain boundaries, and this somewhat reduces the correspondence between the calculated data and the experimental results.

Thus, the given system analysis example indicates the possibility of expanding the knowledge base regarding the structural components specifics effect and non-metallic inclusions in the metal structure on such welds mechanical properties as strength indicators, plasticity and viscosity due to the use of fractal analysis methods in the of metal structures for low-alloy high-strength of steel.

Establishing stable and reliable dependencies in the "composition-structure-properties" system in relation to the welding technology parameters prediction, the welding materials requires selection, are use for an expanded knowledge base on the structure formation and non-metallic inclusions features in weld metal, and their influence on the welded joints mechanical properties. Increasing the use of fractal parameterization methods to analyze the welds structure characteristics in the "structure-fractal-properties" system will contribute to the development of research in the metallurgy and welded metal structures fields.

Conclusions

A study was conducted using the fractal analysis methods of the structural grains and non-metallic inclusions effect on the low-alloy steels weld metal mechanical properties limits indicators.

At the same time, it should be noted that this indicator allows you to take into account such generally known characteristics as the total length of the grain boundaries of the structure (L_g) and the branching of non-metallic inclusions in the metal (D_{in}), as well as the indicators of the branching of inclusions larger than $0.8\ \mu\text{m}$ ($D_{0,8}$) and the density of dislocations at grain boundaries ($1.5D_{dis}$), which do not have a numerical expression when using optical metallography methods. From the histograms shown in Fig. 5, it can be seen that the nature of the change in susceptibility to destruction (inverse dependence relative to plasticity) of the weld metal can be described using the results of fractal analysis.

As the conducted research result, it was established:

1. The use of fractal parameterization methods for the structure optical images analysis makes it possible to significantly expand the indicators scope of the metal structure and non-metallic inclusions involved in the "composition-structure-properties" dependence description.
2. The of fractal analysis methods make it possible to obtain the numerical parameterization of such structural grains parameters as the idealized ("pure") grain boundaries size (L_{gz}), the information grain boundary (D_{gz}) and the dislocation structure density at the grain boundaries (D_{dis}).
3. Fractal analysis of the optical images the non-metallic inclusions distribution in the metal matrix allows to obtain the inclusions content numerical parameters (D_{nm}) and the clusters of inclusions distribution density at a distance less than $5r$ from each other.
4. Involvement of fractal analysis in the digital of structure and non-metallic inclusions indicators parameterization in metal allows to significantly expand the information base used in modeling in the "composition-structure-properties" system, in relation to low-alloy steels welding.

References:

- 1 Holovko V.V., Yermolenko D.Yu., Stepanyuk S.M., Zhukov V.V. and Kostin V.A. (2020) Influence of introduction of refractory particles into welding pool on structure and properties of weld metal, The Paton Welding Journal, #8, p.1-7.

2 Sinha S., Kim D-I., Fleury E., Suwas S. 2015 Effect of grain boundary engineering on the microstructure and mechanical properties of copper containing austenitic steel *Mater. Sci. Eng. A* 626. p.175-185.

3 Zhang I., Lu C., Tieu K. 2016 A review on atomistic simulation of grain boundary behaviors in

face-centered cubic metals *Computer Mater. Sci.* 118 180-191.

4 Krasikov I.V. et al. Computer program «*Fraculator 2*».Certificate of copyright registration for the work No. 115438. Ukraine, 10/25/2022.

VETERINARY SCIENCES

UOT.636.

APPLICATION OF ZEOLITE AS AN ALTERNATIVE FEED SOURCE IN POULTRY

Hajiyev M.*PhD in agricultural sciences, associate professor, director,
Scientific Research Institute of Animal Husbandry, Goygol, Azerbaijan***Guliyeva Sh.***Senior researcher of the Department of Genetics, Biotechnology and Breeding
Scientific Research Institute Of Animal Husbandry, Goygol, Azerbaijan***Aslanov Y.***Head of Department of Genetics, Biotechnology and Breeding
Scientific Research Institute Of Animal Husbandry, Goygol, Azerbaijan***Mammadov K.***Researcher of the Department of Genetics, Biotechnology and Breeding Head of the
Scientific Research Institute Of Animal Husbandry, Goygol, Azerbaijan***Aliyeva E.***Junior researcher of the Department of Genetics, Biotechnology and Breeding
Scientific Research Institute Of Animal Husbandry, Goygol, Azerbaijan*<https://doi.org/10.5281/zenodo.8386098>

Abstract

One of the main conditions for the development of all areas of animal husbandry is the creation of a solid and full-value fodder base. Feed is a link between crop production, animal husbandry and industry. Intensive feeding in poultry farming is highly dependent on feeding birds with better quality and higher nutritional value feeds. So, the fodder intended for birds should be rich in macro-micro elements, vitamins and biologically active substances.

Keywords: poultry, breeding eggs, incubation, feed ration, macro-microelements, vitamins, zeolite.

Introduction

Poultry is one of the most developed, economically promising and profitable branches of agriculture. [1]. Today, the successful development of the poultry industry has been achieved by the direct application of the achievements of science and advanced practice to production. [2]. One of the main factors of increasing the production, number and productivity of birds in poultry farming is the production of complete ration feed. [3]. An imbalance of minerals and other biologically active substances in the fodder leads to a disturbance in metabolism, a decrease in productivity, as a result, a decrease in quality.

A special attention is paid to feeding birds with high metabolism and productivity with foods rich in minerals in reproductive poultry farms. [4].

One of the ways to increase the productivity and resistance of animals is to use biologically active substances, including minerals that are metabolic catalysts. Numerous studies have determined their important role in tissue, respiratory tract, hematopoiesis, reproductive processes, functions of nervous and endocrine systems, and in the processes of strengthening the natural defense of the animal body.

One of the main conditions for the development of all areas of animal husbandry is the creation of a solid and full-value fodder base. Feed is a link between crop production, animal husbandry and industry. Intensive feeding in poultry farming is highly dependent on feeding birds with better quality and higher nutritional value feeds. So, the fodder intended for birds should be

rich in macro-micro elements, vitamins and biologically active substances.

Food security issue of the constantly growing world population remains a priority also for Azerbaijan. In recent years, the year by year fall and rise in the price of oil in the world market, and the rise in the exchange rate of the currency in the world exchange, have brought the development of the non-oil sector to the agenda in our republic. From this point of view, the production of livestock products is one of the priority areas of the republic's economy because most of the population's demand for food products is obtained from livestock products. As in many fields, increasing productivity by applying intensive technologies, advanced feeding and nutrition in animal husbandry is one of the most important tasks facing agricultural science.

People's healthy lifestyle is closely related to the provision of environmentally friendly products. Considering the high demand for livestock products, it is necessary to develop poultry farming in the republic. Development of animal husbandry by intensive methods is one of the most important issues facing scientists and experts working in this field. Because meat, milk, eggs and other such food products, which are the most important and high-quality protein of the population, are obtained from the livestock sector. Therefore, there is a great need for scientific research to provide the people of Azerbaijan with sufficient ecologically clean livestock products. Taking into account this need, we started carrying out scientifically based research works.

One of the main conditions for the development of all areas of animal husbandry is the creation of a solid and full value fodder base. Feed is a link between crop production, animal husbandry and industry. Intensive feeding in poultry farming is highly dependent on the feeding of birds with better quality and higher nutritional value feeds. So, the fodder intended for birds should be rich in macro-micro elements, vitamins and biologically active substances.

Targeted use of zeolite as a mineral preventive and therapeutic supplement for the development of poultry farming allows not only to increase the productivity of birds, but also to ensure the prevention of diseases. It was determined that the use of natural zeolite as a feed additive has a positive effect on the morphological composition of blood, its redox and respiratory functions.

It was determined that one week after starting to feed with zeolite in experiments, digestive processes stabilize, general acidity, peptic activity of stomach contents, proteolytic and aminolytic activity of pancreatic juice, absorption of calcium and phosphorus in the intestine increases.

The main direction in the use of zeolite as an alternative feed in the poultry industry is to increase growth and productivity, reduce morbidity and feed consumption, and remove toxic metals (lead, cadmium, quicksilver, etc.) from food chains.

The use of natural zeolite as a feed additive in poultry has the following results:

- the nutritional properties of the feed are improved
- has a positive effect on digestive processes in the bird's body, increases the efficiency of nutrient absorption
- has a positive effect on the physiological condition of birds
- increases the vitality of animals, prevents some diseases
- increases the productivity of adults
- adsorbs radionuclides, ammonia oxide and carbon dioxide, hydrogen sulfide and salts of heavy metals and removes them from the body.

Urgency of the research work: Due to the disruption of the centralized supply of mineral feed additives in modern times, the use of natural mineral zeolite in poultry farming has become relevant. In

accordance with the theme and calendar plan of our scientific research work in 2021-2025, expanding the use of alternative feed sources in feeding animals and birds, increasing digestibility by using zeolite feed additive in feeding newly created lines and crosses, researching egg productivity and yield percentage, protection and preservation of local bird gene pool are the main goals for achievement.[1]

Justification of the topic: In poultry feeding, as in other areas of livestock farming innovative technologies and various feed additives have recently been widely used. Mainly, there is a need to use alternative sources of feed in newly created lines of different types in egg breeds of chicken. Feed intended for birds should be rich in macro-microelements, vitamins and biologically active substances. Thus, since it is expensive to import feed additives and premixes from foreign countries, the use of zeolite, which is considered a natural mineral available in our country, allows us to satisfy the need of birds for macro and micro elements.

The purpose and task of scientific research work: The main goal is to apply innovative feeding technologies in poultry farming and to expand the use of zeolite, which is considered a natural mineral in our country.

The objective of the research work is to satisfy the demand of poultry for macro and microelements, to improve the quality indicators of breeding eggs and improve the quality of incubation. [2]

Methodology of scientific research work: The methodology of the research work was carried out in accordance with the maintenance technology approved by the All-Russian Scientific Research and Technology Poultry Institute (B.F. Bessarabov. " Poultry meat and egg production technology based on industry". 2012). [3]

The object of research work: Lider-55 is a meat-ovarian line bred at AEF of the SRIAH.

Discussion of the results of the study: During the research work, experimental and control groups were created with 20 heads in each group, the control group was fed with normal feed, and the experimental group was fed with sample feed.

Composition and nutritional value of basic feed for 35-45 days old birds, %, gr

Table 1

Feed	Amount of feed, %
Wheat	50,0
Corn	15,0
Sunflower seed	10,0
Soy meal	19,0
Sunflower oil	1,0
Mineral feed and vitamins	
Salt	0,3
Shell	1,7
DKF	2,0
Premix	1,0
In 1 kg of feed	
Feed unit	116,87
Exchange energy, MC/kg	77,36

Energy feed unit	7,74
Crude protein, %	18,7
Crude cellulose, %	2,81
Phosphorus, %	0,7
Calcium, %	1,2
Crude oil, %	2,81

Composition and nutritive value of the sample feed

Table 2

Feed	Amount of feed, %
Wheat bran	58,5
Counter feed	37,5
Green feed	1,0
Mineral feed	
Lime	0,5
Zeolite	2,0
Marble dust	0,5
In 1 kg of feed	
Feed unit	113,68
Exchange energy, MC/kg	77,23
Energy feed unit	7,72
Crude protein, %	18,45
Crude cellulose, %	1,26
Phosphorus, %	0,25
Calcium, %	0,52
Crude oil, %	1,09

Dynamics of changes in the live mass of birds raised in the I control group, on average per head

Table 3

Age of birds, days	Live mass, gr	Live mass growth during the period, gr	Daily increase, gr	The amount of feed eaten during the day, gr	Feed cost per live weight gain, gr	Feed conversion , 1 kg of live weight gain kg
	M _{±m}					
35	860,0 _{± 0,15}	-	-	-	-	-
45	1160,0 _{± 1,26}	290,0	29,0	45,0	450	1,55

Dynamics of changes in the live mass of birds raised in experimental group II

Table 4

Age of birds, days	Live mass, gr	Live mass growth during the period, gr	Daily increase, gr	The amount of feed eaten during the day, gr	Feed cost per live weight gain, gr	Feed conversion , 1 kg of live weight gain kg
	M _{±m}					
35	852 _{± 0,34}	-	-	-	-	-
45	1210,3 _{± 0,94}	351,60	35,16	45,0	450	1,28

As can be seen from the table, the experimental group gained 50.3 g more weight than the control group. From the conversion of feed, it is known that 270 g less feed was consumed per 1 kg of live weight gain in the experimental group compared to the control group. (table 5).

Table 5

Economic efficiency of scientific research work

Indicators	Feed	
	Counter feed	Sample feed
Amount of eaten feed, kg	6,75	6,75
Cost of 1 kg of feed, man	0,70	0,38
Total cost of feed, man	4,72	2,56

The total cost of 6.75 kg of feed consumed during the 10 days breeding period is 2.31 manats. Economic efficiency has been achieved.

Result:

1. During the experiment, 50.3 g more weight was obtained from the birds raised with the sample feed than the control group.

2. It is known that 270 g less feed was used for 1 kg live weight increase in the experimental group compared to the control group from the feed conversion.

3. 2.31 manats in total cost of 6.75 kg of feed consumed during 10 days breeding period. Economic efficiency has been achieved.

The research is ongoing.

References:

1. <http://abc.az/mobile/view.php?id=39919&lng=az>
2. www.foodinfo.az › 2020/04/18
3. Mirzayev F.M., Gozalov Y.Q. Feeding technology of young birds in entrepreneurial poultry farms, ADTU. Ganja-2010
4. Hacıyev M.H. Genetic basis of hybridization in poultry. Ganja:, AKTA, 2006, p-32-34
5. Hacıyev M.H. Restoration and improvement of chicken gene pools in Azerbaijan. //AKTA:, Ganja-Kars symposium materials, 2003, 177-180 p.
6. V. I. Fisinin. Feeding farm poultry. M.:, ГЕОТАР-МЕДИНА, 2011, 344 с.
7. Galpern I.L. New principles of creation of domestic cross country chickens. // M.:, 2002, Pticevodstva, No. 1, p. 10-14.

COMPARATIVE STUDY OF MILK PRODUCTIVITY OF HYBRID OF SCHWYZ × LOCAL AND LOCAL BREED**Mamedova A.***Scientific Secretary**Scientific Research Institute of Animal Husbandry, Goygol, Azerbaijan***Jabbarov T.***Director of Sheki Support Point**Scientific Research Institute of Animal Husbandry, Shaki, Azerbaijan***Agabalaev T.***Researcher of Sheki Support Point**Scientific Research Institute of Animal Husbandry, Shaki, Azerbaijan***Soltanov I.***Senior Assistant of Sheki Support Point**Scientific Research Institute of Animal Husbandry, Shaki, Azerbaijan***СРАВНИТЕЛЬНОЕ ИЗУЧЕНИЕ МОЛОЧНОЙ ПРОДУКТИВНОСТИ ШВИЗА × МЕСТНОГО ГИБРИДА И МЕСТНОЙ ПОРОДЫ****Мамедова А.***Ученый секретарь НИИ Животноводства**Научно-исследовательский институт животноводства, Гейгель, Азербайджан***Джаббаров Т.***Директор Шекинского Опорного Пункта**Научно-исследовательский институт животноводства, Шеки, Азербайджан***Агабалаев Т.***Научный сотрудник**Научно-исследовательский институт животноводства, Шеки, Азербайджан***Солтанов И.***Старший лаборант**Научно-исследовательский институт животноводства, Шеки, Азербайджан*<https://doi.org/10.5281/zenodo.8386124>**Abstract**

From the first periods of the creation and formation of society and until now, livestock farming has always developed, improved and, if necessary, specialized as the main source of meat, milk, fat, eggs and honey.

Artificial insemination of animals, improving their breed composition and increasing productivity is one of the most important issues in our republic. By widely applying this advanced method, inseminating female animals with seeds from high-class sires, it is possible to prevent infertility, and at the same time a number of diseases that can be sexually transmitted during mating. The main goal of artificial insemination is the creation of new productive breeds and the replacement of unproductive local breeds with more productive breeds [6].

Аннотация

Животноводство всегда развивалось, совершенствовалось и специализировалось как основная отрасль, удовлетворяющая потребности населения в мясе, молоке и жирах на разных уровнях.

Искусственное осеменение животных, улучшение их породного состава и повышение продуктивности – один из важнейших вопросов в нашей республике. Широко применяя этот передовой метод, осеменяя животных-маток семенами быков-производителей высших классов, можно предотвратить бесплодие, а вместе с тем и ряд заболеваний, которые могут передаваться половым путем во время спаривания. Основная цель искусственного осеменения – создание новых продуктивных пород и замена малопродуктивных местных пород более продуктивными породами [6].

Keywords: artificial insemination, sire, seed, breed, productivity, biotechnological method, crossbreed, breeding herd

Ключевые слова: искусственное осеменение, бык-производитель, семя, порода, продуктивность, биотехнологический метод, помесь, племенное стадо

Введение. Биотехнологические методы и приемы широко применяются как в животноводстве, так и во всех областях сельского хозяйства.

Применение биотехнологических методов позволяет ускорить развитие роста и экстерьерных показателей животных, повышение их продуктивно-

сти за счет улучшения генетических и воспроизводительных качеств, повысить уровень перевариваемости кормов, обеспечить качество и безопасность пищевых продуктов, здоровья и благополучия людей и животных, а также снизить потери за счет более эффективного и экономичного использования имеющихся ресурсов [4].

Решение продовольственной безопасности, являющейся важнейшей проблемой нашей Республики и наших регионов, невозможно без развития сельского хозяйства и животноводства, которые являются ее ведущей сферой. Наша республика имеет очень хорошие экономические и географические возможности для решения этой проблемы. Применение современных технологий для развития животноводства уже сегодня становится реальностью сегодняшнего дня. В настоящее время для полного удовлетворения спроса населения на продукцию животноводства во всех странах ведется серьезная работа в области повышения ее продуктивности, устойчивого и эффективного воспроизводства, охраны окружающей среды, сохранения ресурсов животноводства путем широкого использования новейших достижений биотехнологии, а не за счет увеличения поголовья животных.

Сохранение существующего генофонда животных, приобретение новых помесей и гибридов, создание новых пород, внедрение новых инновационных технологий в животноводстве должно осуществляться только на научных основаниях.

В целях проведения селекционно-племенной работы на научной основе в направлении повыше-

ния продуктивности в животноводческих хозяйствах и улучшения породного состава поголовья, продолжен импорт из зарубежных стран племенных животных с высокой продуктивностью и расширены работы по искусственному осеменению животных.

Важной задачей, стоящей перед нашими учеными, должно стать повышение уровня прикладных и фундаментальных исследований, ускорение научных открытий, повышение эффективности науки в области экономики, генетики, биотехнологии и экологии.

Родиной Швицкой породы является Швейцария. Порода мясо-молочного направления. В основном распространена в Австрии, Германии и Италии. В начале прошлого века швицкая порода начала распространяться в Америке. Лучшими чертами породы являются их высокая адаптивность. Конституция швицких коров крепкая. Вес средний. Цвет бурый, встречаются также пепельной и сероватой масти. Носовое зеркало свинцовое. Еще одна особенность окраса — светлая полоса, идущая от холки до основания хвоста. Эта полоса бывает широкая, узкая, сплошная и срезанная.



Рисунок 1. Швицкая порода коров

В хороших условиях кормления удой молока составляет 9000 л в год, жирность 4%. Средне-скоропелый. Живая масса коров 650 кг, быков 800-1200 кг. Качество мяса высокое. Он вынослив и хорошо адаптирован к местным условиям.

Телята швицких коров при рождении имеют живую массу 40 кг. При создании оптимальных условий кормления и содержания растут очень интенсивно. Так, 12-месячные телята весят 200 кг, а 18-месячные - 350-370 кг. Молодняк, поставленный на откорм, прибавляет 800-1000 граммов веса в сутки. Выход мяса составляет 50-60%.

С использованием этой породы в России созданы костромская, лебединская, ала-тауская, карпатская бурая породы, а в Азербайджане - кавказская бурая порода. Эта порода имеет особое значение для нашей республики.

Материалы и методы.

Научно-исследовательская работа проводится в полужакрытых условиях, начиная с 2020 года на территории частного фермерского хозяйства, расположенного на площади 8 га в селе Тала

Загатальского района. На территории имеется коровник площадью 150 м², отвечающая санитарно-гигиеническим нормам. Здесь созданы благоприятные условия для содержания и кормления животных. Цель научно-исследовательской работы осеменение низкопродуктивных местных коров в хозяйстве семенами швицкой породы молочно-мясного направления для повышения показателей продуктивности и улучшения породного состава, а также приобретение помесных животных 4-го поколения и в конечном итоге создать племенное стадо высокопродуктивных помесных коров.

Научные исследования, проводятся по методике М.В.Назарова, Е.А. Горпинченко, Б.В.Гаврилова(2018) «Искусственное осеменение сельскохозяйственных животных».

Помеси имеют более высокую динамику роста, чем их родители. Мясная и молочная продуктивность помесных коров F1 выше, чем у местных пород. Помеси экологически устойчивы, скороспе-

выращены с особой заботой, они достигли зрелости в возрасте 15-16 месяцев, в 2022 году их оплодотворили семенами швицких быков, в результате чего в 2023 г были получены помесные телята поколения F2. (табл. 1).

Таблица 1

s/s	Коровы	Идентификация N	Порода	Дата осеменения	Дата рождения
1	Сарыдаг	inv№ 107767	Помесь	23.05.2022	02.03.2023
2	Кызыл	inv№67806	Помесь	15.04.2022	25.01.2023
3	Даглар	inv№85781	Помесь	02.06.2022	14.03.2023

следят. Стельные животные находятся под постоянным наблюдением и уходом. Животных выводят на прогулку каждый день. Кормят качественными сбалансированными кормами (табл. 2).

Таблица 2

Название кормов	Количество	Стоимость, ман.
Крупа ячменная	2,0	0,96
Пшеничные отруби	4,0	1,28
Хлопковый шрот	1,50	0,66
Кукурузная крупа	0,50	0,27
Клевер	8,0	2,0
Зелёная трава	20,0	2,0
Всего:	36,0	7,17

Ниже приведены промеры тела местных и помесных телят в 3-месячном возрасте (табл. 3).

Таблица 3

Промеры тела	Местная тёлка	Местный телёнок	Тёлка (inv№036182) F2	ТелёнокF2 (inv№067322)
Прямая длина туловища	94	96	101	105
Косая длина туловища	79	80	82	86
Высота в крестце	82	83	85	90
Высота в холке	80	81	82	86
Ширина груди	20	20	23	25
Ширина зада в седалищных буграх	21	22	26	28
Обхват груди	88	92	96	98
Ширина лба	9	11	12	13
Длина лба	20	22	24	26

В нижеследующих таблицах (таблицы 4,5) показано сравнение надоев помесей поколения F1 с местными скотами.

Таблица 4

[illegible]

Таблица 5

Контрольное доение у Швицких х Местных помесей (литр)

Инвентарный номер		Дни															Всего мо-лока, litr
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
107767	Утром	7,1	7,3	7,8	7,5	7,7	7,4	7,5	7,8	7,5	7,1	7,4	7,9	7,8	7,3	7,5	112,6
	Вечером	8,0	8,8	8,5	8,9	8,2	8,6	8,6	8,1	8,5	8,8	8,9	8,4	8,3	8,7	8,6	127,9
		Дни															
107767	Утром	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
		7,3	7,8	7,5	7,6	7,0	7,8	7,4	7,7	7,3	7,8	7,7	7,2	7,1	7,5	7,8	
	Вечером	8,6	8,4	8,7	8,1	8,5	8,9	8,5	8,4	8,3	8,2	8,9	8,7	8,8	8,6	8,5	128,1
	Всего																481,1

Как видно из таблицы, помесные животные по сравнению с местным скотом сохраняют способность регулярно давать молоко. То есть за день надой составляет 15-17 литров молока.

Разница в удоях местных и помесных животных в течение 1 месяца

Таблица 5

	Показатели	У местных скотов, на голову	У помесей, на голову	Разница
1	Потребление корма за 1 месяц, кг	1080	1080	-
2	Надой молока за 1 месяц, л	204.4	481.1	276.7
3	Стоимость корма, ман	214.92	214.92	-
4	Цена реализации 1 литра молока, ман.	0,75	0,75	-
5	Доход, полученный от реализации молока за 1 месяц, ман	153.3	360.8	207.5

Как видно из таблицы, стоимость кормов, потребленных местным скотом за 1 месяц, не покрывается доходом, полученным от реализации молока от этих животных. При этом убыток составил 61,62 ман. Однако, при таком показателе у помесных животных получена прибыль на 145,88 ман.

За месяц от помесных животных по сравнению с местными получено на 276,7 литров молока больше и получен дополнительный доход на сумму 207,5 манат.

На следующем этапе научно-исследовательской работы был изучен рост и развитие телят, и вновь проведено контрольное доение в течение 1 месяца.

Вывод: В 2020 году 12 местных коров на ферме в период случки оплодотворили семенами швицких быков, контролировали рост и развитие полученных помесей. Живую массу этих телят взвешивали и проводили внешние измерения в разном возрасте 1, 3, 6, 9 и 12 месяцев. Параллельно с этим, на сравнительной скорости изучались сроки окраски, прирост живой массы, расход корма на кг прироста живой массы, а также экстерьерные показатели помесей F1 с чистокровными телятами полученных от местных коров. Полученные в 2021 году телята поколения F1 выращивались с особой заботой, к 15-16 месяцам у них пробудилась половая охота, в 2022 году их оплодотворяли семенами швицких быков, в результате чего были

получены помесные телята поколения F2. Изучено сравнение молочной продуктивности помесей поколения F1 с местными породами. Изучена динамика роста потомства полученного поколения F2.

Полученные помеси и телята имеют более высокую динамику роста, чем их родители. Помеси имеют более высокую мясную и молочную продуктивность, чем местные породы. Исследовательские работы на группах животных в эксперименте продолжается.

Список литературы:

1. Сельское хозяйство Азербайджана. Статистический сборник. Баку: Изд. малое предприятие №9, 2020, 654с.
2. Аббасов И. Приоритетные направления продовольственной безопасности и сельского хозяйства. / Баку, «Наука и образование», 2011, с.215-220.
3. Абдуллаев Г.Г. Разведение сельскохозяйственных животных. Баку, 2018, стр. 3-6.
4. Латифова Е.Н. Применение биотехнологий в животноводстве- //Современные проблемы и инновационные концепции животноводства//Материалы международной научно-практической конференции, Гянджа-2021.
5. Анохин, Н. Голштинизированные первотёлки различных генотипов. / Н. Анохин // Животноводство России. - 2005. - № 6. - С. 33.

6. Антипов, В. А. Проблемы адаптации импортного молочного скота. / В. А. Антипов, А. Я. Сапунов, А. Н. Турченко, Н. Ю. Басова // Вестник РАСХН. - 2009. - № 5. - С. 70 - 72.

7. Багиров, В. Генетические ресурсы животноводства [Текст] / Вугар Багиров // Животноводство России. - 2008. - № 2. - С. 10-12.

№117/2023

Norwegian Journal of development of the International Science

ISSN 3453-9875

It was established in November 2016 with support from the Norwegian Academy of Science.

DESCRIPTION

The Norwegian Journal of Development of the International Science, established in 2016 with support from the Norwegian Academy of Science, offers a platform for global researchers, academics, and students. Publishing 24 times annually, it covers current science topics. Submitting your article provides exposure to a diverse audience, enhancing your career. Our commitment to research and SEO ensures timely visibility. Submit to the Norwegian Journal of Development of the International Science today and join esteemed authors.

Editor in chief – Karin Kristiansen (University of Oslo, Norway)

The assistant of the editor in chief – Olof Hansen

- James Smith (University of Birmingham, UK)
- Kristian Nilsen (University Centre in Svalbard, Norway)
- Arne Jensen (Norwegian University of Science and Technology, Norway)
- Sander Svein (University of Tromsø, Norway)
- Lena Meyer (University of Gothenburg, Sweden)
- Hans Rasmussen (University of Southern Denmark, Denmark)
- Chantal Girard (ESC Rennes School of Business, France)
- Ann Claes (University of Groningen, Netherlands)
- Ingrid Karlsen (University of Oslo, Norway)
- Terje Gruterson (Norwegian Institute of Public Health, Norway)
- Sander Langfjord (University Hospital, Norway)
- Fredrik Mardosas (Oslo and Akershus University College, Norway)
- Emil Berger (Ministry of Agriculture and Food, Norway)
- Sofie Olsen (BioFokus, Norway)
- Rolf Ulrich Becker (University of Duisburg-Essen, Germany)
- Lutz Jäncke (University of Zürich, Switzerland)
- Elizabeth Davies (University of Glasgow, UK)
- Chan Jiang (Peking University, China) and other independent experts

1000 copies

Norwegian Journal of development of the International Science

Iduns gate 4A, 0178, Oslo, Norway

email: publish@nor-ijournal.com

site: <https://nor-ijournal.com>



© 2023 The Norwegian Journal of Development of the International Science

nor-ijournal.com

