THEORETICAL AND APPLIED ASPECTS
OF SUSTAINABLE DEVELOPMENT

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THEORETICAL AND APPLIED ASPECTS
OF SUSTAINABLE DEVELOPMENT

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PREFACE

The monograph takes a new look at various issues of science and education of European countries to ensure their sustainable development. In the modern world, with its European integration and orientation of education and science to fundamental human values, democracy, human rights, freedom to receive education, the emphasis is placed on educational and scientific tasks related to the realization of new professional tasks, answers to modern social challenges, preparation of a competitive professional etc. The entry of the world community into a new phase of cultural and historical development, the era of global and information systems and technologies, is accompanied by crisis phenomena, which touch on various spheres of human life, including science and education. Therefore, the scientific and educational issues for ensuring the sustainable development of European countries are currently relevant, and their solution will lead to scientific and educational changes, as discussed in this monograph.

The monographic research presents the scientific works of the team of authors that reveal different directions and aspects of science and education in providing sustainable development. These are: 1) The Economic Component of Sustainable Development; 2) The Role of Education in Sustainable Development; 3) Applied Aspects of Sustainable Development.

The first section of the monograph deals with issues related to economic development, with particular attention to social responsibility for business, conceptual foundations of agrarian sector, adaptive control of the personnel of the enterprises, issues of socio and ethnical marketing.

The second section of the monograph outlines the role of education in sustainable development. The authors considered the issues of methodological basis for ecological education, key competencies of education, postgraduate pedagogical education, and different innovative technologies. All the issues presented in the section have a significant impact on the improving of science and education, in each way contributing to their development.

The third section of the monograph «Applied Aspects of Sustainable Development» overviews environmental, linguistic, psychological aspects, the contribution of foreign scientists to the development of science and education.

The team of authors hopes that the monograph contains useful research results that are relevant for scientists, students and all those who are interested in different aspects of education and science taking into consideration their importance for different spheres of public life.

Yours sincerely,

Tetyana Nestorenko
Aleksander Ostenda

Part 1. THE ECONOMIC COMPONENT OF SUSTAINABLE DEVELOPMENT

1.1. SOCIAL RESPONSIBILITY FOR BUSINESS AS AN INTEGRATED SUSTAINABLE DEVELOPMENT

Sustainable development of the economy is a topical and multidisciplinary issue of every country, which is considered inseparably linked with the economic efficiency of business and the solution of social and other problems of development of public relations and human activities. *Large companies are becoming the new center of power from which society expects such social functions to be compared to the size of its resources.[1]*

The updating of research in the field of social responsibility of business is observed in the second half of the twentieth century. The cause of increasing interest in this topic is social transformation, which logically linked the sustainable development of the country's economy, improving the economic efficiency of enterprises and the social and environmental issues of improving the quality of life of a particular person and humanity as a whole. *The institute of the company is increasingly acquiring the format of "extended enterprise", which is a key element in the network of interdependent internal and external stakeholders, which create, support and expand its market opportunities.[2]* Social conformity of business is considered as a modern philosophy of behavior and a concept that promotes sustainable development, formation of a new civilization stage of development of society and business, allows to find consensus between commercial interests of business and positive expectations of society.

The reason for the emergence of the concept of corporate social responsibility is traditionally considered to be the changing role of business in society in the early twentieth century. It was then, to meet the needs of members of society, the leaders of leading companies began to apply in the conduct of business standards of social responsibility, which were subjective and dependent on the views of the businessman on these issues. In the 1950-s in order to increase the role of business in solving social problems in the United States, the Committee on Economic Development was set up, which began to formulate the concept of corporate social responsibility.

The theoretical and practical questions of social responsibility of business are devoted to the work of a large number of scientists, in particular, the monograph N. S. Orlova and A. O. Kharlamova[3], V. M. Shapoval[4], O. P. Hohulia and I. P. Kudinova[5], A. M. Kolota[6], I. M. Tsarik[7], T. R. Antoshko, P. V. Krush, Yu. V. Tyuleneva[8]. Despite considerable research, there is no common understanding of the content of corporate social responsibility as a socio-economic phenomenon in relation to the processes of transformation of society that ensures sustainable development.

Sustainable development of business, individual regions, society as a whole is impossible without effective mechanisms and instruments of influence. The object of sustainable development is a complex socio-natural, human-scale system that includes a set of interrelated natural and social

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components[9]. It should be noted that sustainable development conveys dynamic characteristics interrelated with the external and internal environment of the entity. *The emergence of the term sustainable development is associated with the name of Norwegian Prime Minister Gru Haarlem Brundland, who formulated it in the UN Commonwealth Report prepared for the United Nations and published in 1987 by the International commission on environment and development. She defined it as a development that meets the needs of the present time, but does not compromise the ability of future generations to meet their own needs.[10]* To clarify the essence of the concept of sustainable development and the components that provide it in the business process, we will analyze the views of scientists and practitioners on this issue (Table 1).

Sustainable development therefore requires responsible action in the present, which makes it possible to ensure that all present indicators can grow effectively in the future. *The main meaning of the concept of sustainable development is to find a balance between meeting the needs of present and future generations in economic well-being, a favorable environment and social well-being.[11]* In our view, sustainable development, in the course of doing business, provides a combination of economic, social, environmental and political characteristics. The essence of each characteristic is disclosed in Table 2.

Each of the above features facilitates the mobilization of the global community for sustainable development through decisive action by the governments, businesses and the public of all countries on a global scale to overcome poverty and create decent living conditions and opportunities for all across the globe.

In September 2015, at the 70th session of the UN General Assembly in New York, the UN Summit on Sustainable Development and the Adoption of the Post-2015 Development Agenda approved new benchmarks. The summit document of the Summit on "Transforming Our World: An Agenda for Sustainable Development by 2030" approved 17 Sustainable Development Goals and 169 Goals.[12]

In the general sense, the concept of business (business) means entrepreneurial, commercial or any other activity that is not contrary to the law and aimed at profit. However, such a definition should be added to the fact that the important task of business today is to promote sustainable development, both by minimizing negative impacts and maximizing positive impacts on people and the planet.

Achieving the desired results of sustainable development is only possible if innovation is not limited to technical innovation. Priority should also be given to the social (as well as environmental) aspects of innovation. Investing capital in education, science, health care, health sports, social infrastructure, that is, in everything related to human capital development, equally with technological change, are interrelated and interdependent factors of sustainable economic growth.[13]

The essence of social responsibility has changed with the evolution of social consciousness. In the late twentieth – early twentieth centuries. Corporate social responsibility becomes an integral part of the corporation's brand, increasing its capitalization. Information on the economic, environmental and social activities of a company is disclosed in non-financial reports that are voluntarily published. In the 21st century, this practice has become widespread and is enshrined in the documents of international organizations and at the legislative level of countries.

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Table 1. Definition of sustainable development in the context of doing business

Author	A judgment that reveals the meaning of the concept of "sustainable development"
Morozova, G. S.[14]	Sustainable development means balanced, balanced (which does not pass on equality of indicators) growth of both economic, social and environmental parameters in constant proportional rates, ensuring the general progress of the society in all its spheres.
Conference in Rio de Janeiro[15]	This is a development that meets the needs of today, without compromising the ability of future generations to meet their own needs. What it means to achieve four common goals at the same time in the hierarchy of their priorities: maintaining a high and sustainable level of economic growth and employment; effective environmental protection; careful use of natural resources; social progress, reflecting the needs of each individual.
Danilishin B. M., Shostak L. B.[16]	It is a system of relations of social production, which achieves the optimal balance between economic growth, normalization of the quality state of the natural environment, the growth of material and spiritual needs of the population.
Bobylev S. N.[17]	All in all, when there is a certain kind of people, it is necessary to live on business with natural capital, not victorious, the capital itself.
Daly H.[18]	*It is the economy that is being sustained, and the biosphere that is doing the sustaining. The biosphere is the total natural system of biogeochemical cycles powered by the sun. The economy is the subsystem dominated by transformations of matter and energy to serve human purposes.* In other words, it is a long-term investment in natural capital to restore it.
Doroguntsov S., Fedorishcheva A.[19]	*This is a fundamental change in production functions in relation to the environment.* That is, the organization must adapt itself in a changing environment.
Shubravska O. V.[20]	It is the ability of the economic system to maintain proportions of equilibrium both within itself and in higher-level systems.
Stepanov V. N.[21]	*Sustainable development involves the process of survival and reproduction of the nation's gene pool, enhancing the role of each individual in society, securing his rights and freedoms, preserving the environment, creating conditions for restoring the biosphere and its local ecosystems, focusing on reducing the level of anthropogenic impact on the environment and harmonizing human development in nature.*
Melnik L. G., Hat M. K.[22]	*This is the justice between generations and within one generation in the use of natural goods.*
Tregobchuk V. M.[23]	This is the development of the productive forces of the country, aimed at meeting the most important vital needs not only of the present but also of future generations, while preserving the environment in a favorable, from the point of view of human health, condition and constant maintenance in it of dynamic ecological balance.
Stepanov V. N.[24]	This is a dynamic self-sustaining development in the interconnection and adaptation of all elements of development – economic, environmental, social, political
Shevchuk V. Ya., Sakhaev V. G.[25]	It is a process of harmonization of productive forces, ensuring the guaranteed satisfaction of at least the minimum necessary needs of all members of society, provided the preservation and gradual reproduction of the holistic environment. Maintaining a balance between the potential of nature and the demands of people of all generations.
Torkatyuk V. I., Stadnik G. V.[26]	It is such a change in the state of the national economy that reflects the growth of the national product and its quality while preventing negative effects in a timely manner. The leading idea of the sustainable development concept is to ensure a high standard of living, which implies the harmonious development of the environmental and socio-economic spheres.

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Namely, from 1 January 2017, the EU Directive[27] on the mandatory disclosure of non-financial information and other information of a different nature entered into force, according to which all companies with a workforce of more than 500 persons are required to disclose in annual reports about the economic, environmental and social results of their activities, about business partners and to make them public.

Table 2. Characteristics of sustainable development in the process of doing business

Name	Essence
Economical	Must ensure optimal use of scarce resources; the use of environmentally friendly, energy- and material-saving technologies, the most efficient disposal of waste.
Social	Human-centered and aimed at ensuring the development of social and cultural values, minimizing conflict situations between people, motivating work, stimulating creativity of each individual.
Ecological	Ensures the integrity of biological and physical natural systems, especially those on which global stability of the entire biosphere depends.
Political	Contributes to strengthening relations between participants in global processes, defines the expectations of participants in the process, as well as future policy directions at the international, national and local levels.

The interpretation of the concept of corporate social responsibility by international organizations is discussed in Table 3.

Table 3. Definition of the concept of "corporate social responsibility" at the international level

International organization	Definition of the term "corporate social responsibility"
EU Green Paper[28]	It is a concept whereby companies voluntarily integrate social and environmental considerations into their daily business activities and engage with a wide range of volunteer stakeholders.
UN Commission[29]	It is the responsibility of enterprises for their impact on society.
International Labor Organization[30]	This is a voluntary initiative of the business community for activities that go beyond the simple requirement of compliance with the letter of the law.
European Corporate Social Responsibility Alliance[31]	This is the concept of involving social and environmental areas in business activities on a voluntary basis and interaction between all stakeholders (groups of influence).
International Organization for Standardization[32]	This responsibility of the organization for the impact of its decisions and activities on society and the environment, which is realized through transparent and ethical behavior, is consistent with the sustainable development and well-being of society, takes into account the expectations of stakeholders, is widespread throughout the organization and does not contradict relevant legislation and international standards of behavior.

Green Paper is the main basic document that outlines European corporate social responsibility policy. This document was adopted in 2001. The following documents were developed:
EU environmental protection plan;
- Integrated Product Policy (IPP);
- General Recommendation and Audit System (GRAS);
- European Eco-efficiency Initiative (EEEI);
- European Parliament resolution on EU standards for European businesses operating in developing countries: Towards a European Corporate Code of Conduct;
- The Europe 2020 strategy: a strategy for smart, sustainable and inclusive growth.

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[27] EU Directive: disclosure of non-financial information and diversity information, Directive 2014/95/EU of the European Parliament and of the Council. URL: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32014L0095.
[28] European Union Green Paper URL: http://www.rsppenergy.ru/main/static.asp?art_id=1552.
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[31] Official site of the European Alliance of Corporate Social Responsibility URL: https://www.businesseurope.eu/european-alliance-csr.
[32] International Standard on Social Responsibility ISO 26000 URL: http://csr-ukraine.org/ISO_26000.html.

The International Standard ISO 26000 Guidance on Social Responsibility identifies the following components of corporate social responsibility:
- protection of human rights,
- protection of the environment,
- work safety,
- protection of consumer rights,
- development of local communities,
- organizational management,
- business ethics.

The reconciliation of sustainability characteristics and the components of corporate social responsibility is shown in Figure 1.
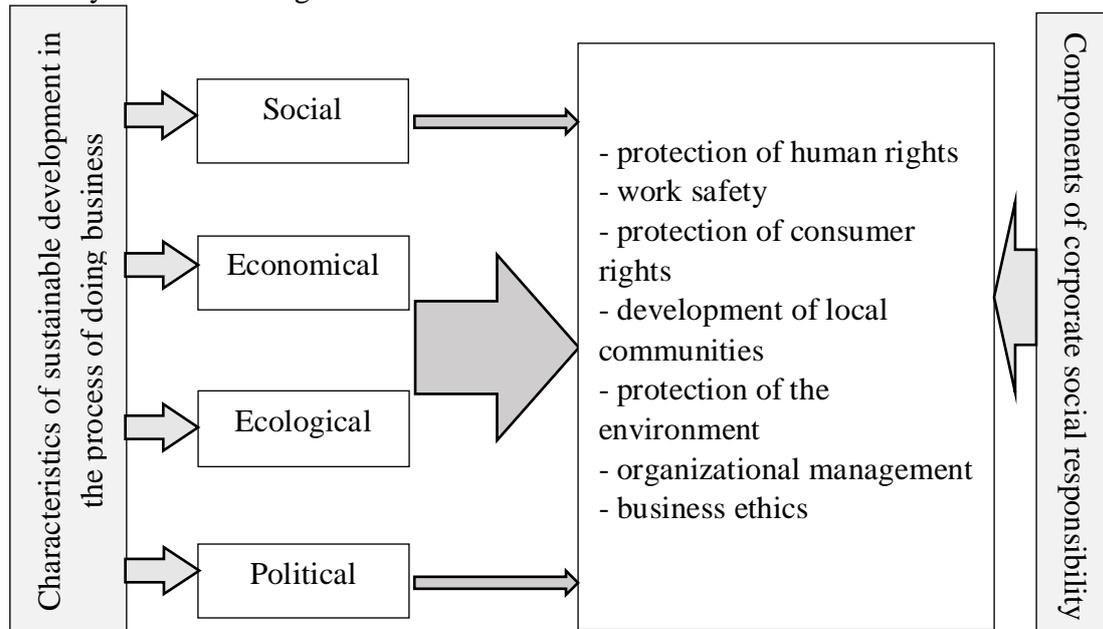
Fig. 1. Harmonization of sustainable development characteristics and components of business social responsibility

As we can see, the components of CSR highlighted by International Standard ISO 26000 are aligned with the characteristics of sustainable development by improving the well-being of society; taking into account the expectations of stakeholders, representatives of civil society; harmonization with current legislation; compliance with international norms and rules of conduct; integration into relationships with organizations and existing practices of social development. This standard is a detailed guide to understanding social responsibility not only for business entities, but also for trade unions, NGOs and government agencies. However, it should be noted that the issues of the essence of social responsibility are not static, because they take away the expectations of society at a specific point in time. Thus, the meaning of the concept of "social responsibility" changes with the problems and expectations of society.

The concept of corporate social responsibility as an idea of sustainable development is considered from two positions:
1) social activity of business in terms of interests of society and the state;
2) awareness of the business of its debt to society, collective, individual for their actions and their social consequences.

Currently, many socially responsible enterprises in Europe have established internal committees or committees on ethics and social responsibility. Their mission is to unite the interests of stakeholders in formulating a strategy for enterprise development in terms of corporate ethics and social policy.

Based on national and cultural characteristics of economic activity, the following models of corporate social responsibility are distinguished:

- American,
- European,
- British,
- Asian,
- African.

Each of these models contributes to the sustainable development of its region, taking into account its traditions, structure, mentality, natural conditions, stage of development. For example, the American model is characterized by ensuring sustainable development through the active involvement of businesses in financing nonprofit social responsibility projects through corporate foundations. The state supports such projects through legislative introduction of tax benefits, its impact is minimal. Regarding the European model, the main point here is to regulate standards, criteria and concepts of corporate social responsibility at the state level through laws and regulations.

Undoubtedly, the social responsibility of business provides competitive advantages in the market, and for the society it guarantees the solution of social issues, improvement of the level of ecological safety, efficiency of use of natural resources, establishment of cooperation of business with local communities. From the point of view of the state, corporate social responsibility promotes cooperation between the private and public sectors for the implementation of regional and national projects on state social policy, energy conservation, innovative development, greening of production and more.

Therefore, corporate social responsibility is a business concept that assumes the responsibility of enterprises for the impact of their business decisions and activities on society, the environment through transparent and ethical behavior based on voluntary correction of daily business practices, production of goods and services. social and environmental impacts, as well as interaction with all stakeholders.

The analysis makes it possible to conclude that the purpose of the concept of social responsibility of business is, on the one hand, to direct entrepreneurial activity to ensure sustainable development, on the other – to form a positive opinion of the business, quality and safety of products and services, which contributes to growth sales, increases company profits. In today's world, the introduction of the concept of corporate social responsibility significantly enhances the reputation of both a particular company and the state as a whole. The positive image thus created also promotes sustainable development.

An important further area of research regarding the use of corporate social responsibility for sustainable development is to analyze the available financing mechanisms and tools to identify the best ones that will contribute to the prosperity of business structures, the state and society.

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1.2. TENDENCIES OF FUNDING HEALTH CARE IN EU COUNTRIES: THE FEATURES AND PERSPECTIVES

Introduction. One of the important priorities of the modern society development is health of population. It is known the multiplier effect in the healthcare which means that a healthy individual is able to produce values, adding value to growth of industry and employment, that leads to growth of rents and further growth of consumption. Prevention of diseases and support of health have great importance in the healthcare, as that is less costly as treatment of the consequences[33][34][35].

For some last decades in the advanced countries of the world we observed essential progress in achievements of medical science, technologies of diagnostics and treatment that has resulted in substantial growth of life expectancy, the improvement of its quality[36]. In one hand, the high life expectancy greatly depends on the level of economic development of the country and population incomes. The high level of economic development of the country and population incomes made possible to increase the financing of national public health care system, to use modern achievements of medical science and engineering, to improve system of medical education, to attract more qualified staff etc. In other hand, aging of population is a worldwide trend, bringing a need to scrutiny use of funds, especially in social system and healthcare. Currently in many EU countries it is important to focus on healthcare finance, that needs structural changes regardless of demographic trends, in order to avoid cumulative effect of debts and secure enough funds to meet growing needs[37].

As it is noted in recent news release No. 33.2020 of Eurostat that in the EU in 2018 highest proportion of government expenditure goes to social protection (19,2% of GDP) and health (7% of GDP).

It is should be noted that the problem of the funding healthcare in EU and OECD is studied in many articles and reports, researchers try to argue the variety of financial mechanisms for funding healthcare in different countries according their socio-economic factors, traditions, institutional features, demographic characteristics and specifics of morbidity[38]. Also the equal access to medical services for all population, the needs to develop modern technologies in medical science and treatment, to improve quality of healthcare and increase quality of life should be taken into account for funding healthcare in many countries[39].

The purpose, materials and methods. The purpose of the work is to study the tendencies of total expenditure on health as percentage of GDP in the EU countries for long-term period and to develop the models for prediction of the values for these indicators for next time period.

The material of this study was data of Eurostat for period of 2010-2018, as well as we used review of articles, reports, books and papers, where the problems of funding healthcare are discussed.

In this study we formulate some hypotheses: about feature of empirical distribution of total expenditure on health as % of GDP for data of the EU countries for period of 2000-2018; about possible models for the predictions of these indicators for the different countries of EU. For the quantitative analysis the methods of descriptive statistics and time series analysis were used.

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Main results and discussion. For the purposes of the comparative analysis of funding healthcare in the different countries the several indicators are used. One of the important indicator is total government expenditure on health as a share of GDP, another indicator is the ratio of public expenses on the overall expenses for health care, total government expenditure on health per capita, etc.

In our work we focused on the analysis of the dynamics of total government expenditure on health as % of GDP in the EU and for the different countries of EU.

Health care expenditure as a share of GDP has increased in all EU Member States since the 1960, as experts note this effect was particularly ascribed to stagnation in the growth of national economies. Historical data show that health care expenditure has continued to grow in real terms throughout the 1980s and 1990s in most European countries. During the 1990s, average total health expenditure as a percentage of GDP has stabilized in the EU countries and CEE countries. But, the GDP grew faster than health care expenditure between 1995 and 1998 in some countries of the 15 current EU countries. In other countries, namely, in Denmark, Greece, Portugal, and Spain health care expenditure grew only slightly more than GDP.

The formula for the annual growth rates of total government expenditure on health as % of GDP (ρ_t) is given below:

$$\rho_t = \left(\frac{TGEH_t}{TGEH_{t-1}} : \frac{GDP_t}{GDP_{t-1}} - 1 \right) = \left(\frac{\tau\_TGEH_t}{\tau\_GDP_t} - 1 \right),$$

where $TGEH_t$ – total government expenditure in year t, $THEH_{t-1}$ – total government expenditure in previous year (t-1), GDP_t – gross domestic product in year t, GDP_{t-1} – gross domestic product in previous year (t-1), τ_TGEH_t – growth rate of total expenditure on health in year t with previous year (t-1), τ_GDP_t – growth rate of GDP in year t with previous year (t-1).

From this formula it is seen that value ρ_t may be positive (growth), negative (recession) and equals 0 (stagnation). Thus, the stabilization of health care expenditure as a percentage of GDP in some EU countries may not reflect success in controlling growth in health care expenditure but rather economic growth, where the rapid of increasing total expenditure on health and GDP is the same.

In Fig. 1 the dynamics of total government expenditure on health as % of GDP is presented for EU.
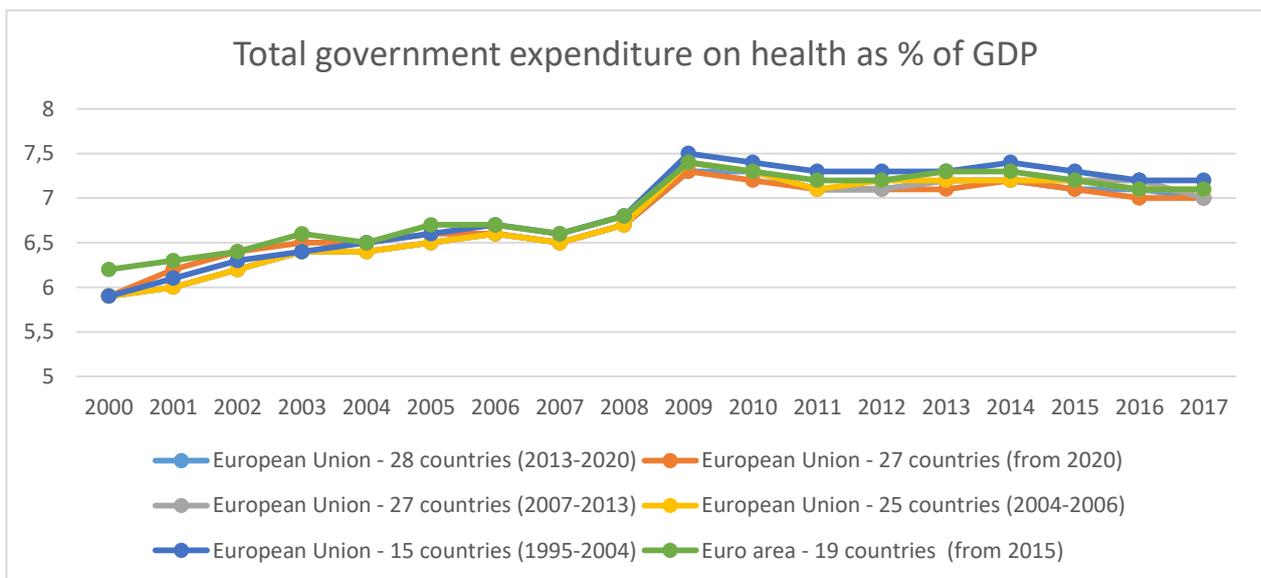

Fig. 1. The dynamics of total government expenditure on health as % of GDP in the EU
Source: data from Eurostat

As we can see that in 2000 the difference in initial level for EU-19 (Euro area) and EU-28 or EU-25 was more than later, thus in 2000 the total government expenditure on health as % of GDP was 5,9% for EU-28, but for EU-19 (Euro area) this indicator was higher, at level 6,2% of GDP. Later, over long time period, in 2017 the value of total government expenditure on health as percentage of GDP in EU-28 was 7% and for EU-19 (Euro area) this indicator was 7,1%. The highest level of total government expenditure on health as % of GDP was observed in 2009, in the period of beginning global economic crisis. In 2009 the values of total government expenditure as % of GDP reached 7,3% in the EU-28, 7,5% in EU-15 and 7,4% in EU-19 (Euro area). In comparison with 2000 in 2017 the total government expenditure on health as % of GDP has increased in 1,19 times for EU-28 and in 1,20 times for EU-19.

Nevertheless, the values of the total government expenditure on health varied for the different countries of EU (Table 1).

Table 1. The total government expenditure on health as % of GDP for EU countries

Country	2000	2005	2010	2015	2018	min	max	mean	std.dev.	Coef.of variance	max/min
Belgium	6	6,8	7,7	7,9	7,6	6	8,1	7,22	0,67	9,33	1,35
Bulgaria	3,8	4,9	4,4	5,5	5	3,8	5,8	4,65	0,62	13,41	1,53
Czechia	6,8	6,9	7,8	7,6	7,6	6,8	7,8	7,35	0,35	4,7	1,15
Denmark	6,7	7,3	8,6	8,5	8,3	6,7	8,9	7,93	0,72	9,08	1,33
Germany	6,4	6,5	7	7,1	7,2	6,3	7,2	6,77	0,31	4,61	1,14
Estonia	4,4	4,1	5,2	5,4	5,1	4,1	5,5	4,76	0,47	9,93	1,34
Ireland	4,8	6	7,5	5,3	5	4,8	7,8	6,23	0,99	15,84	1,63
Greece	5,6	6,2	6,9	4,7	5	4,7	6,9	5,78	0,68	11,69	1,47
Spain	5,2	5,6	6,6	6,1	6	5,1	6,8	5,87	0,51	8,71	1,33
France	7	7,7	8	8,1	8,1	7	8,2	7,74	0,38	4,9	1,17
Croatia	6,5	6,3	6,1	6,5	6,6	5,7	7,9	6,41	0,49	7,62	1,39
Italy	5,9	6,8	7,4	7	6,8	5,9	7,5	6,83	0,42	6,19	1,27
Cyprus	2,5	2,8	3	2,6	2,7	2,5	3,1	2,79	0,2	7,3	1,24
Latvia	3,9	4,1	4,2	3,8	4	3,2	4,6	3,85	0,38	9,95	1,44
Lithuania	4,9	4,9	6,9	5,8	5,9	4,1	6,9	5,58	0,68	12,15	1,68
Luxembourg	3,7	5,1	4,9	4,8	4,7	3,7	5,2	4,68	0,37	7,95	1,41
Hungary	5,2	5,7	5	5,2	4,7	4,7	5,8	5,15	0,35	6,73	1,23
Malta	4,7	6	5,3	5,6	5,3	4,7	6	5,44	0,33	6,14	1,28
Netherlands	4,6	5,4	7,8	8	7,6	4,6	8,1	6,78	1,25	18,38	1,76
Austria	7,1	7,4	7,9	8,2	8,2	7	8,2	7,66	0,38	4,95	1,17
Poland	3,9	4,4	5	4,7	4,8	3,9	5	4,57	0,28	6,22	1,28
Portugal	6,3	7,4	7,5	6,2	6,3	6,1	8	6,81	0,54	7,95	1,31
Romania	4,2	3,3	4,2	4,2	4,7	3,2	4,7	3,91	0,4	10,15	1,47
Slovenia	6,6	6,4	6,9	6,7	6,6	5,9	7	6,61	0,27	4,08	1,19
Slovakia	5,3	6,2	7,2	7,1	7,3	4,9	7,4	6,47	0,77	11,96	1,51
Finland	5,7	6,8	7,9	7,3	7	5,7	8,3	7,11	0,79	11,16	1,46
Sweden	5,8	6,5	6,7	6,8	7	5,8	7	6,65	0,31	4,63	1,21
United Kingdom	5,1	6,3	7,6	7,5	7,5	5,1	7,7	6,8	0,86	12,68	1,51

Source: own elaboration in Excel

Some researchers noted that international comparison of health expenditure data concerned with several methodological problems, such as problem to distinguish expenditure on health care and social care, standardizing definitions across countries, methods of data collection and organizational differences[40]. Other problems are associated with measuring and reporting expenditure as a percentage of gross domestic product due to the evaluation of impact of informal sector in the economy or health care in some countries, where transparency and accuracy of information should be improved.

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[40] Jakubowski E., Busse R. Health Care Systems in the EU. A Comparative Study. Working Paper. European Parliament. Luxembourg. 1998. 130 p.

Nevertheless, despite of this methodological problem with data, total government expenditure on health as percentage of GDP is stayed as one on the popular indicator for the comparative analysis of the development of funding healthcare in the different countries.

There are three predominant systems of health care finance in the European Union. The first or Beveridge model is public finance by general taxation. Second or Bismarckian model is based on compulsory social insurance. Third is private finance based on voluntary insurance as supplementary form of health care.

Beveridge model is based on taxes and revenues on health care go from public budget, it means that health care is provided and financed by the government through tax payments. Ensuring complete population coverage is particularly easy under such systems, and as they are under the control of the budget, the growth of overall costs has been contained more easily[41]. Nevertheless, in this system the principles of the central planning and capitation financing are implemented, but some decentralized management is possible for hospitals. One of the serious problems is weak incentives to increase output, improve efficiency, or maintain quality and responsiveness to patient needs. Beveridge model is realized in the UK, Ireland, Italy, Greece, Portugal, Spain, Sweden and Finland.

In the Bismarck model, health care is financed through social health insurance, paid at the place of employment to special funds or national health insurance companies. But as noted Dixon, in all variations of health insurance systems, the place of the government as provider and insurer is important to the care received by the consumer and the general government state of public health[42]. In the public-contract model, public payers contract with private health-care providers. The researchers noted that the more responsive reaction to patient needs exists in this system than public-integrated arrangements, but it is more difficult to control healthcare costs, requiring additional regulation and supervision by the public authorities. The Bismarck model is used in Germany, France, Belgium, Austria.

Mixed private and public system is based on private insurance through employment and public insurance through Social Security for specific vulnerable populations groups (children, elderly, poor, people with disabilities or some groups of unemployed which are officially registered and eligible for social aid).

As mentioned Docteur and Oxley these systems have featured a high degree of choice and responsiveness to patient needs, but cost control has been weak[43].

In previous post-Soviet countries, such as Bulgaria, Baltic states (Estonia, Latvia, Lithuania), Croatia, Czech Republic, Hungary, Romania, Poland, Slovenia and Slovakia the Semashko model with strong central government planning and control was realized in health care till 1990 or before to transformation of mentioned countries to the market economies[44].

These countries started to reforms of funding health care and move to national health insurance model or mixed models[45].

To analyze the feature of the distribution of total government expenditure on health as % of GDP we studied the histogram for the sample of observations contained 504 cases of the values of total government expenditure on health as % of GDP for each EU-28 countries for period of 2000-2018 (Fig. 2).

As we can see from Fig. 2, that distribution is differed from normal or Gaussian distribution, nevertheless it is not so asymmetrical or with other specific features as other well-known

[41] Funding health care: options for Europe. Edited by E. Mossialos, A. Dixon, J. Figueras, J. Kutzin. Open University Press. Philadelphia. USA, 2002. – 327 p.

[42] Dixon A. Learning from international models of funding and delivering health care. Oxford Handbook of Public Health Practice. Oxford University Press. 2006.

[43] Docteur E., Oxley H. Health-Care Systems: Lessons from the Reform Experience. OECD Health Working papers. No. 9, 2003.

[44] Boulhol H. et al. (2012), "Improving the Health-Care System in Poland", OECD Economics Department Working Papers, No. 957, OECD Publishing. http://dx.doi.org/10.1787/5k9b7bn5qzvd-en.

[45] Medved J., Nemec J., Vitek L. Social Health Insurance and its failures in the Czech Republic and Slovakia: the role of state. Praque Economic Papers No. 1. 2005. P. 64-81.

distributions, such as Chi-square, F-distribution or extremal distribution[46]. Our suggestion about histogram is also confirmed by Kolmogorov-Smirnov test, where we can reject null hypothesis about normal distribution at level $p < 0,01$[47].
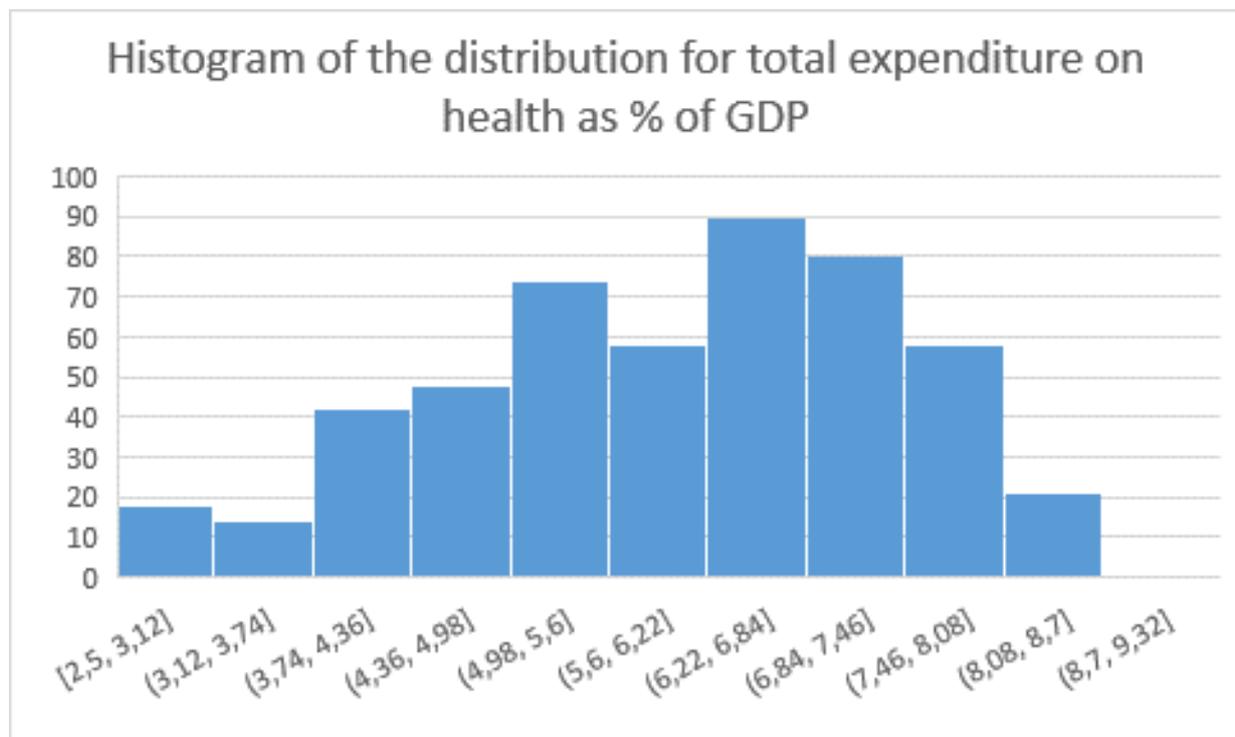
Fig. 2. Histogram of the distribution for total government expenditure on health as percentage of GDP in EU countries
Source: own elaboration in Excel

The descriptive statistics for the sample of total expenditure on health as % of GDP for 28 countries of EU for period of 2000-2018 is presented in Table 2.

Table 2. The descriptive statistics for the sample of total expenditure on health
as % of GDP for 28 countries of EU for period of 2000-2018

Mean	Confid. -95%	Confid. +95%	Me-dian	Min	Max	Lower Quartile	Upper Quartile	Variance	Std. Dev.	Std Error	Skew-ness	Kur-tosis
6,01	5,88	6,13	6,2	2,5	8,9	5	7,1	1,97	1,4	0,06	-0,4	-0,57

Source: own elaboration in Statistica

As we can see from this table, the values of mean and median are relatively closed, and the modal value is in the interval [6,22; 6,84]. The values of skewness and kurtosis are negative, but are not so far from 0.

In the Table 3 the results of grouping EU countries to quartiles of the distribution of total government expenditure on health as % of GDP are shown.

As we can see from this table for most countries of EU the slightly moving from one quartile to next quartile was observed. Some countries were stayed in the same quartile for all period, from 2000 till 2018. The former post-Socialist countries started from first quartile, where the values of the total government expenditure on health as % of GDP are significantly small. In this group other countries were as Greece, Malta or Cyprus, where economies have emerging character and essential

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[46] Боровиков В. П. Statistica – Статистический анализ и обработка данных в среде Windows / В. П. Боровиков, И. П. Боровиков. – М.: Информационно-издательский дом «Филинъ», 1997. – 608 с.

[47] Лапач С. Н. Статистические методы в медико-биологических исследованиях с использованием Excel / С. Н. Лапач, А. В. Чубенко, П. Н. Бабич. – К.: МОРИОН, 2000. – 320 с.

weaknesses of the economic systems are observed. As interesting exemption in this group is Luxembourg, the rich small country, where private expenditure on healthcare dominate and relatively low level of total government expenditure as % of GDP.

Table 3. Grouping EU countries to quartiles of the distribution
of total government expenditure on health as % of GDP

Quartiles	2000	2005	2010	2015	2018
Q1 (quartile 1) [2,5;5]	Bulgaria Estonia Ireland Cyprus Latvia Lithuania Luxembourg Malta Netherlands Poland Romania	Bulgaria Estonia Cyprus Latvia Lithuania Poland Romania	Bulgaria Cyprus Latvia Luxembourg Hungary Poland Romania	Greece Cyprus Latvia Luxembourg Poland Romania	Bulgaria Ireland Greece Cyprus Latvia Luxembourg Hungary Poland Romania
Q2 (quartile 2) [5;6,2]	Belgium Greece Spain Italy Hungary Slovakia Finland Sweden United Kingdom	Ireland Greece Spain Luxembourg Hungary Malta Netherlands Slovakia	Estonia Croatia Malta	Bulgaria Estonia Ireland Spain Lithuania Hungary Malta Portugal	Estonia Spain Lithuania Malta
Q3 (quartile 3) [6,2;7,1]	Czechia Denmark Germany France Croatia Austria Portugal Slovenia	Belgium Czechia Germany Croatia Italy Slovenia Finland Sweden United Kingdom	Germany Greece Spain Lithuania Slovenia Sweden	Germany Croatia Italy Slovenia Slovakia Sweden	Croatia Italy Portugal Slovenia Finland Sweden
Q4 (quartile 4) [7,1;8,9]	-	Denmark France Austria Portugal	Belgium Czechia Denmark Ireland France Italy Netherlands Austria Portugal Slovakia Finland United Kingdom	Belgium Czechia Denmark France Netherlands Austria Finland United Kingdom	Belgium Czechia Denmark Germany France Netherlands Austria Slovakia United Kingdom

Source: own elaboration in Excel

In fourth quartile the group of countries was concentrated, where the total government expenditure on health as % of GDP was high. In this group such countries, as Belgium, Austria, France, Denmark, Netherlands, United Kingdom, are presented. Also we can see here such less developed countries, as Portugal, Czech Republic or Slovakia.

It is should be noted, that for certain time periods some EU countries have changed their policy in funding health care and migrated from one group to another. Thus, it is possible to suggest

some regimes in funding health care, where national policy was changed according to essential impact of external or internal socio-economic or political factors.

Nevertheless, for most countries the stable increase of total government expenditure was observed for period of 2000-2017 and we analyzed the linear trend models to describe these tendencies in the different countries of EU[48].

The characteristics of linear trend models for total government expenditure on health as % of GDP are given in Table 4.

Table 4. The characteristics of linear trend models for total government expenditure on health as % of GDP

No.	Country	Estimations of the parameters in linear trend		F- Criterion	Correlation coefficient for model	Std.Error of Estimate
		Intercept (a_0)	Slope (a_1)	F(1,16)	R	σ_ε
1	Belgium	6,42	0,1	25,82	0,79	0,44
2	Bulgaria	4,36	0,03	1,54	0,3	0,63
3	Czechia	7,09	0,03	5,04	0,49	0,31
4	Denmark	7,11	0,1	20,52	0,75	0,5
5	Germany	6,43	0,04	17,33	0,72	0,22
6	Estonia	4,25	0,06	16,89	0,72	0,34
7	Ireland	6,2	0,01	0,08	0,07	1
8	Greece	6,28	-0,06	4,34	0,46	0,61
9	Spain	5,36	0,06	12,14	0,66	0,41
10	France	7,28	0,06	27,71	0,8	0,24
11	Croatia	6,54	-0,02	0,64	0,2	0,51
12	Italy	6,45	0,05	9,41	0,61	0,36
13	Cyprus	2,84	-0,0045	0,23	0,12	0,21
14	Latvia	3,76	0,01	0,36	0,15	0,4
15	Lithuania	5,1	0,06	4,26	0,46	0,63
16	Luxembourg	4,38	0,04	6,63	0,54	0,33
17	Hungary	5,44	-0,03	6,59	0,54	0,29
18	Malta	5,31	0,02	1,28	0,27	0,34
19	Netherlands	5,31	0,18	24,08	0,78	0,82
20	Austria	7,15	0,06	65,84	0,9	0,17
21	Poland	4,32	0,03	8,54	0,59	0,24
22	Portugal	7,05	-0,03	1,27	0,27	0,54
23	Romania	3,67	0,03	2,81	0,39	0,34
24	Slovenia	6,56	0,01	0,25	0,12	0,28
25	Slovakia	5,54	0,11	27,74	0,8	0,48
26	Finland	6,4	0,09	9,2	0,6	0,67
27	Sweden	6,32	0,04	14,5	0,69	0,23
28	United Kingdom	5,74	0,13	30,86	0,81	0,52

Source: own elaboration in Statistica

As we can see from this table, for many countries of EU, such as Belgium, Denmark, Germany, Estonia, France, Netherlands, Austria, Slovakia and United Kingdom, the estimations of the correlation for these models were significantly high[49], close or more than 0,8. In the mentioned countries the stable tendency to increase the total government expenditure on health as % of GDP

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[48] Trend methods. (2019). Retrieved from https://otexts.org/fpp2/holt.html.

[49] Боровиков В. П. Statistica – Статистический анализ и обработка данных в среде Windows / В. П. Боровиков, И. П. Боровиков. – М.: Информационно-издательский дом «Филинъ», 1997. – 608 с.

was noted. In other countries, like Bulgaria, Czech Republic, Greece, Malta, Romania, Portugal the estimations of the correlation for linear trend models were not essentially high, but the tendency of increasing or change of regimes for funding health care should be taken into account. For some countries, such as Ireland, Cyprus, Latvia or Slovenia the estimations of the correlation for linear trend models are closed to 0, it means that no linear tendency or no change in the values of total government expenditure on health as % of GDP were observed.

In linear trend models it is possible to estimate initial adjusted level, or intercept a_0, as well as annual change of indicator, or slope a_1. To visualize the results of the estimations for intercept and slope for the linear trend models we present positions of EU countries on the diagram (Fig. 3).
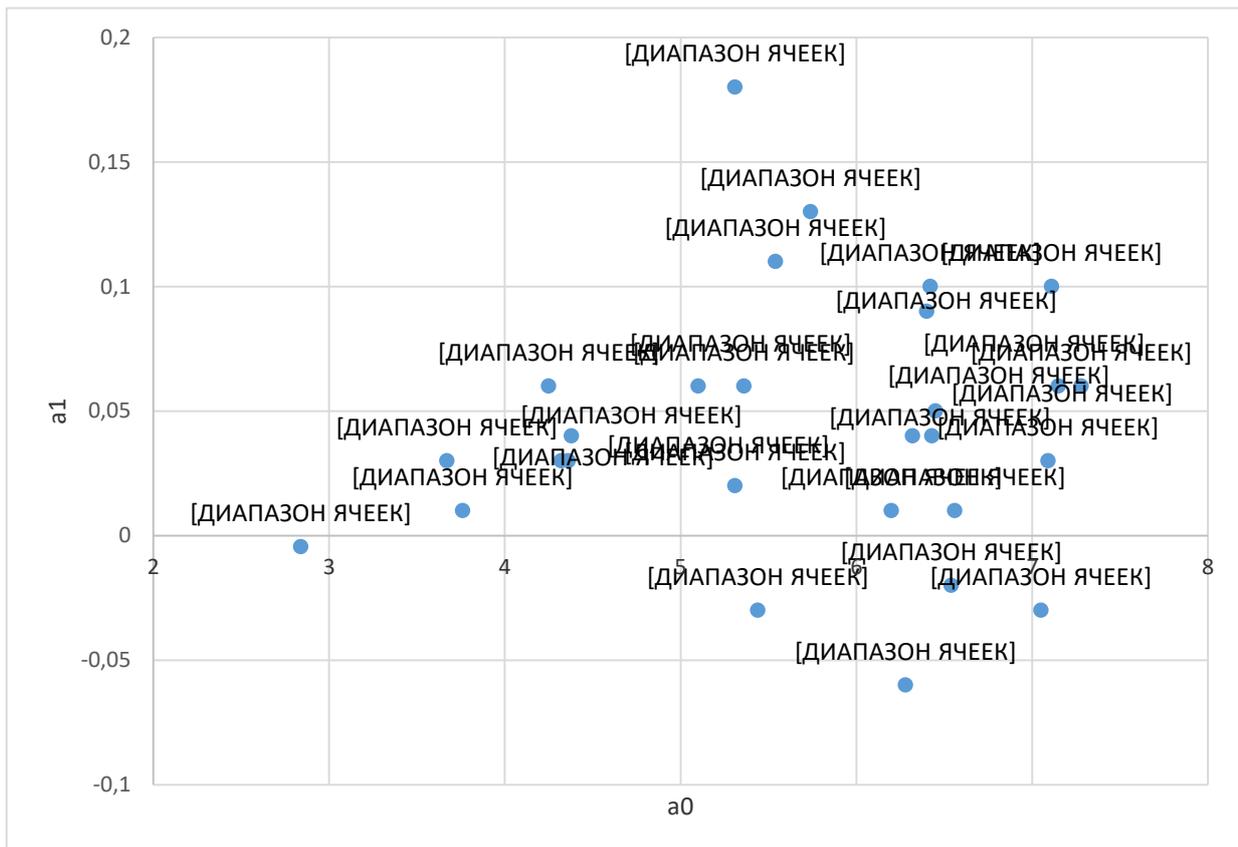
Fig. 3. Positions of EU countries in the coordinates of values
for intercept a0 (initial adjusted level) and slope a1 (annual adjusted change)
Source: own elaboration in Excel

From this diagram it is clear seen, that for the most countries the estimations for intercept were more than 5 (initial adjusted level of total government expenditure on health exceeded level of 5% of GDP), also for most countries of EU the estimations for annual change (slope) were positive. For such countries, as Slovakia, United Kingdom and Netherlands the estimations for slope were essentially high, more than 0,1 for annual change. The negative estimations for slope of these models were obtained for Cyprus, Hungary, Greece, Croatia and Portugal.

Taking into account more complicated character of the tendencies of the dynamics for total government expenditure on health as % of GDP we considered another group of models based on the exponential smoothing with linear trend, or Holt's models[50].

The results for these models are shown in Table 5.

As we can see from this table, for most countries the estimations of initial level S0 are quite closed to the estimations of intercept in linear models. Also the positive and negative estimations of parameters for T0 indicate on the increasing or decreasing character of tendency for total

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[50] Trend methods. (2019). Retrieved from https://otexts.org/fpp2/holt.html.

government expenditure on health as % of GDP. For exponential smoothing with linear trend other parameters, such as α and γ, should be taken into account. These parameters were estimated due to automatic procedure for minimization of measures of the errors in these models. As we can see from these table for most EU countries the values of m.a.p.e. (mean absolute percentage error) did not exceed 5%, it means that the quality of these models for prediction is essentially high.

Table 5. The characteristics of exponential smoothing with linear trend (Holt's model)

No.	Country	S0	T0	Alfa (α)	Gamma (γ)	Mean error (m.e.)	Mean absolute error (m.a.e)	Mean percentage error (m.p.e.)	Mean abs. perc. error (m.a.p.e.)
1	Belgium	5,950	0,1000	1,00	0,00	0	0,18	-0,03	2,52
2	Bulgaria	3,768	0,0647	1,00	0,00	0	0,41	-0,62	8,82
3	Czechia	6,779	0,0412	1,00	0,00	0	0,17	-0,06	2,3
4	Denmark	6,650	0,1000	0,840	0,00	0	0,17	-0,06	2,3
5	Germany	6,379	0,0412	0,020	0,00	-0,02	0,16	-0,33	2,35
6	Estonia	4,382	0,0353	0,00	1,00	0,03	0,29	-0,1	6,08
7	Ireland	4,791	0,0176	1,00	0,00	0	0,4	-0,31	6,4
8	Greece	5,612	-0,024	1,00	0,00	0	0,34	-0,26	5,82
9	Spain	5,176	0,0471	1,00	0,00	0	0,16	-0,06	2,59
10	France	6,971	0,0588	0,932	0,00	0	0,13	-0,02	1,65
11	Croatia	6,506	-0,012	0,030	0,00	0,01	0,33	-0,35	4,98
12	Italy	5,874	0,0529	1,00	0,00	0	0,17	-0,01	2,4
13	Cyprus	2,497	0,0059	0,948	0,00	0	0,13	-0,22	4,66
14	Latvia	3,912	-0,024	0,728	0,00	0	0,13	-0,22	4,66
15	Lithuania	4,876	0,0471	1,00	0,00	0	0,39	-0,42	7,17
16	Luxembourg	3,665	0,0706	0,736	0,00	0	0,27	-0,24	5,76
17	Hungary	5,212	-0,024	0,460	0,00	0,01	0,23	-0,14	4,33
18	Malta	4,679	0,0412	1,00	0,00	0	0,17	-0,06	3,13
19	Netherlands	4,512	0,1765	0,929	0,00	0	0,26	-0,02	3,78
20	Austria	7,068	0,0647	1,00	0,00	0	0,11	-0,04	1,42
21	Poland	3,876	0,0471	0,950	0,00	0	0,14	-0,06	3,12
22	Portugal	6,303	-0,006	1,00	0,00	0	0,24	-0,09	3,39
23	Romania	4,197	0,0059	1,00	0,00	0	0,18	-0,24	4,89
24	Slovenia	6,600	0,000	1,00	0,00	0	0,16	-0,06	2,38
25	Slovakia	5,247	0,1059	0,034	0,00	0,14	0,29	1,77	4,67
26	Finland	5,659	0,0824	1,00	0,00	0	0,24	-0,04	3,35
27	Sweden	5,768	0,0647	1,00	0,00	0	0,15	-0,03	2,29
28	United Kingdom	5,032	0,1353	1,00	0,00	0	0,18	0,03	2,53

Source: own elaboration in Statistica

Thus, using linear trend models and Holt's models we predicted the possible values of total government expenditure on health as % of GDP for period of 2020-2021 (Table 6).

These predicted values can be implemented for the development and analysis of the national strategies for the funding health care according to the different scenario. In addition, the study of the tendencies of the total government expenditure on health as % of GDP can be expanded by using econometric models, where possible socio-economic, demographic or political factors influencing the development of health care expenditure will be analyzed. Also it is important to study the relation between funding health care and efficiency of allocation of their resources, the quality of health care services, etc.

Table 6. The results of the predicted values of total government expenditure on health as % of GDP for 2020-2021

No.	Country	Real data for 2018	2020				2021			
			Predicted values for linear trend model and their confidential intervals			Predicted values for Holt's model	Predicted values for linear trend model and their confidential intervals			Predicted values for Holt's model
			Lower 95% interval	Prediction for linear trend model	Upper 95% interval		Lower 95% interval	Prediction for linear trend model	Upper 95% interval	
1	Belgium	7,6	7,85	8,39	8,93	8	7,91	8,49	9,07	8,1
2	Bulgaria	5	4,27	5,05	5,82	5,09	4,25	5,08	5,91	5,16
3	Czechia	7,6	7,33	7,72	8,11	7,62	7,33	7,75	8,16	7,66
4	Denmark	8,3	8,5	9,12	9,74	8,74	8,56	9,22	9,88	8,84
5	Germany	7,2	6,96	7,23	7,5	7,24	6,98	7,27	7,56	7,28
6	Estonia	5,1	5,07	5,5	5,93	5,12	5,11	5,56	6,02	5,16
7	Ireland	5	5,21	6,45	7,68	5,15	5,14	6,46	7,78	5,17
8	Greece	5	4,39	5,15	5,9	5,13	4,28	5,09	5,9	5,11
9	Spain	6	6,12	6,62	7,13	6,14	6,14	6,68	7,22	6,19
10	France	8,1	8,1	8,39	8,68	8,19	8,13	8,44	8,76	8,25
11	Croatia	6,6	5,56	6,18	6,81	6,26	5,5	6,17	6,84	6,25
12	Italy	6,8	6,98	7,42	7,86	6,96	6,99	7,47	7,94	7,01
13	Cyprus	2,7	2,48	2,75	3,01	2,62	2,46	2,74	3,02	2,62
14	Latvia	4	3,48	3,97	4,47	3,48	3,45	3,98	4,51	3,46
15	Lithuania	5,9	5,48	6,26	7,05	5,84	5,48	6,32	7,16	5,89
16	Luxembourg	4,7	4,72	5,13	5,55	5,1	4,73	5,17	5,61	5,17
17	Hungary	4,7	4,41	4,77	5,14	4,78	4,35	4,74	5,13	4,75
18	Malta	5,3	5,23	5,65	6,07	5,52	5,22	5,67	6,12	5,56
19	Netherlands	7,6	7,87	8,89	9,91	8,14	7,98	9,07	10,17	8,31
20	Austria	8,2	8,14	8,35	8,56	8,39	8,19	8,41	8,63	8,46
21	Poland	4,8	4,64	4,93	5,23	4,84	4,65	4,97	5,28	4,89
22	Portugal	6,3	5,84	6,51	7,18	6,18	5,77	6,48	7,2	6,18
23	Romania	4,7	3,75	4,17	4,59	4,32	3,75	4,2	4,65	4,32
24	Slovenia	6,6	6,33	6,68	7,03	6,6	6,31	6,69	7,06	6,6
25	Slovakia	7,3	7,18	7,78	8,37	7,56	7,25	7,89	8,53	7,66
26	Finland	7	7,37	8,2	9,03	7,35	7,4	8,29	9,17	7,43
27	Sweden	7	6,81	7,09	7,37	7,09	6,83	7,13	7,43	7,16
28	United Kingdom	7,5	7,67	8,32	8,97	7,81	7,75	8,45	9,14	7,94

Source: own elaboration in Statistica

Conclusions. Despite of significant growth of health expenditure as percent of GDP, public systems are gradually restricting services, which will be paid for by social insurance and national health systems, shifting the cost of these to the patient either through self-pay or private health insurance. Public health systems are outsourcing more procedures to the private sector to reduce the pressure on existing resources and meet growing patient demand. The budgeting of health care has proven to be an effective strategy in countries with a national health services. Funding of health care services through public finance is not enough, and the shift of cost from public to private is observed. The different models and approach to solution of efficient mechanism of health care funding are faced for politicians, economists and health care experts in EU countries. But the main principles of health care such as availability and efficiency should be steady for the successful development of national model of health care funding.

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1.3. EVALUATION OF THE TOURIST ROUTE OPTIONS

Summary. Tourist routes determine the cost of tourist trips. The main parameters are: the cost of passenger transportation by bus and socio-economic efficiency.

The cost of travel on the tourist route variant is influenced by road and weather conditions. Road conditions include road parameters, category and surface condition. In addition, the sections of the road with changes in the average speed of buses (horizontal curves, longitudinal slopes during ascent and downhill, settlements, pedestrian crossings) are determined.

Weather conditions include: rain, storm, snow, blizzards, icing.

The task is to develop a methodology for evaluating route options based on these factors.

Analysis of recent research and publications. In the analysis of publications, a number of researchers were studied: Vorkut T. A., Sil'yanov V. V., Smirnova N. V., Duduk K. M., Kraikn N. V., Khabutdinov R. A., Shiryaeva S. V., Prokudin G. S. The solution to the issue of the cost of transportation of goods and passengers in modern conditions needs to take into account both road and weather conditions.

Formulation of the problem. The purpose of the study is to develop a methodology for assessing the route of transportation of goods and passengers and setting their cost, taking into account road and weather conditions.

The cost of transportation of goods depends on the speed of the car and fuel consumption. The speed of the car is influenced by road and weather conditions. These conditions determine the speed of the car and, accordingly, the fuel consumption. Setting the speed change will allow you to determine the fuel consumption and the cost of transportation.[51]

The transportation of passengers is characterized by a travel time which in turn depends on the speed of the car. It is important today to determine the impact of these conditions on the speed of vehicles and the cost of transportation. Knowing the effects of weather conditions will improve the planning of transportation throughout the year and reduce the costs of the enterprise.[52]

Socioeconomic efficiency is characterized by the time spent by passengers on the road:

$$D_i = TC(N_л P_л + N_a P_a) \tag{1}$$

where: T – number of days in a year, C – Estimated cost of 1 passenger-hour, UAH,

Nл – intensity of cars (cars / day), Na – bus traffic (cars / day),

Рл – the average occupancy of cars (people),

Ра – the value of the average busy load (person).

If we consider the route of one bus then the socio-economic efficiency of one trip will be:

$$E = П \ Ц \ Pa \ t \tag{2}$$

where E – the cost of time which has been spent by passengers for travel, UAH.

П – Number of trips (per trip, per day, per year depending on the task),

Ц – the price of one hour per passenger, UAH / hour,

Ра – average bus loading depending on its type, t – time of travel (hours).

In turn, the time of the route depends on the speed and length of the route. The speed of the bus depends on many factors:

$$v = t(П, П_д, П_п, П_е \tag{3}$$

where: П – type of bus, Пд. – road parameters,

Пп. – weather conditions, Пе – performance indicators of the road.

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[51] Smyrnova N. V. Osnovnye polozhenyia rascheta zavysymosty raskhoda toplyva ot dorozhnыkh uslovyi. Naukovyi visnyk budivnytstva – Kh.: KhDTUBA, KhOTV ABU; 2014 – Vip. 77. – S. 226-230.

[52] Smyrnova N. V., Fylyppov V. P., Kyiashko D. M. Otsenka vlyianyia nerovnostei dorozhnykh pokrytyi na bezopasnost dorozhnoho dvyzhenyia. Vestnyk KhADU, 2009. – Vyp.47 – S. 63-45.

Purpose and methods. Since the speed of the bus affects the costs of fuel and lubricants, the cost of transportation through the route may be characterized:

$$Ем = Еп + Цм \qquad (4)$$

where: Еп – the cost of time spent by passengers for travel, UAH,

Цм – the cost of transportation of passengers by bus, UAH.

So, in order to determine Ем, you need to know both the length of the route and the time it takes to travel.

The length of the route is determined by road passports or by satellite interactive maps. Changing the speed along the length of the route is determined both from the geometry of the road and from the state of coverage and weather conditions.[53]

The average speed, depending on the category of road and width of the carriageway and type of car, is presented in Table 1.

Table 1. Dependence of buses' speed on the category of roads

Road category	1а	1б	11	111	1У
V km/hour	77.5	74.6	71.5	69.3	67
Width of the carriageway, m	4x3.75	4x3.75	7.5	7	6

The reduction of the average speed of buses from the longitudinal slope of the highway is given in Table 2.

Table 2. The coefficient of reducing the average speed of free traffic of buses from the longitudinal slope of the road

Longitudinal slope	0.01	0.02	0.03	0.04	0.05
The coefficient of reduction of average speed	1	0.95	0.85	0.8	0.75

The reduction of the average speed of buses from the radius of the horizontal curve of the highway is given in Table 3.

Table 3. Decrease of average speed of buses from the horizontal curve of the highway

Radius, m	100	200	300	400	500	600
Speed km / h	60	63	66	67	69	69.3

The dependence of the coefficient of adhesion of the roadway, depending on the surface, is given in Table 4.

Table 4. The coefficient of adhesion of the roadway, depending on the state of surface

Condition of coverage	Factor of adhesion
Dry	0.5-0.7
Normal	0.4-0.5
Wet	0.2-0.3
Snow	0.2
Ice	0.1

The distance of road surface visibility depending on the weather conditions is given in Table 5.

Periods with the same conditions of bus traffic are divided into:

winter period (December, January, February, March)

spring – summer period (April, May, June, July, August)

autumn period (September, October, November).[54]

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[53] Sylianov V. V., Sytnykov Yu. M.. Raschet skorosty dvyzhenyia pry proektyrovanyy avtomobylnykh doroh. Trudy Moskovskoho avtomobylno-dorozhnoho ynstytuta – 1974. Vyp. 72. – S. 47-66.

Table 5. Distance of road surface visibility depending on weather conditions

Weather conditions	Visibility distance, m.
Fog	100
Rain	150
Snow	100
Storm	15
Blizzard	6

The total impact of the coverage and weather conditions is given in Table 6.

Table 6. Total influence of the surface state and weather conditions on the speed of vehicles (km / h)

Visibility m / Factor of adhesion	150	100	50	25	15
0.6	87	70.1	48.5	32.6	22.9
0.5	79.2	62.3	49.2	29.7	20.8
0.4	70.8	57.4	39.5	26.1	18.6
0.3	61.8	48	34.5	23.1	16.2
0.2	50.2	39.4	32.1	21.6	15.1
0.1	24.6	19.3	13.7	9.2	6.5

The probability of adverse weather conditions depending on the season is given in Table 7 in the northern regions of Ukraine.

Table 7. Probability of unfavourable weather conditions in northern regions of Ukraine

Name	Winter, %	Spring-Summer, %	Autumn,%
Blizzard	2	-	0.2
Storm	1	2	1.5
Snow	40	1	2.5
Wet pavement	50	20	6
Normal conditions	7	77	89.8

Table 8. Average speeds of buses under different weather conditions

Name	Winter, km/hour	Spring-Summer, km/hour	Autumn, km/hour
Blizzard	15	-	15
Storm	15	15	15
Snow	39.4	39.4	39.4
Wet pavement	48	48	48
Normal conditions, road I category	77.5	77.5	77.5
Normal conditions, road II category	71.5	71.5	71.5
Normal conditions, road III category	69.3	69.3	69.3

Table 9 shows average moving speeds in different periods, taking into account the probability of unfavourable conditions.

Table 9. Average speeds in different periods taking into account the probability of unfavourable conditions

Category of road	Winter, km/hour	Spring-Summer, km/hour	Autumn, km/hour
First (I)	45.6	69.9	73.7
Second (II)	45.2	65.3	68.3
Third (III)	45.1	63.6	66.3
Fourths (IV)	45.1	63.6	66.3

Fuel consumption under normal conditions (bus Mersedes Benz).
Fuel consumption at an optimum speed of 60 km / h – 27.2 l per 100 km.
Speed 60 km / h – costs per km – 0.272 l.

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[54] Dodukh K. M. Vyznachennia serednoi shvydkosti vilnoho rukhu transportnoho potoku. K: NTU, 2013, № 69, s. 188.

Speed 50 km / h – costs per km – 0.299 l.

The speed of 67-69 km / h – the cost per km – 0.299 l.

Results and explanation. For example, a comparison of three variants of the tourist route from Kyiv to Pereyaslav-Khmelnytskyy. The beginning of each variant is located near the "Kharkivs'ka" metro station and the final point is the centre of Pereyaslav-Khmelnytskyy.

Figure 1 shows possible routes for both bus and tourist routes.
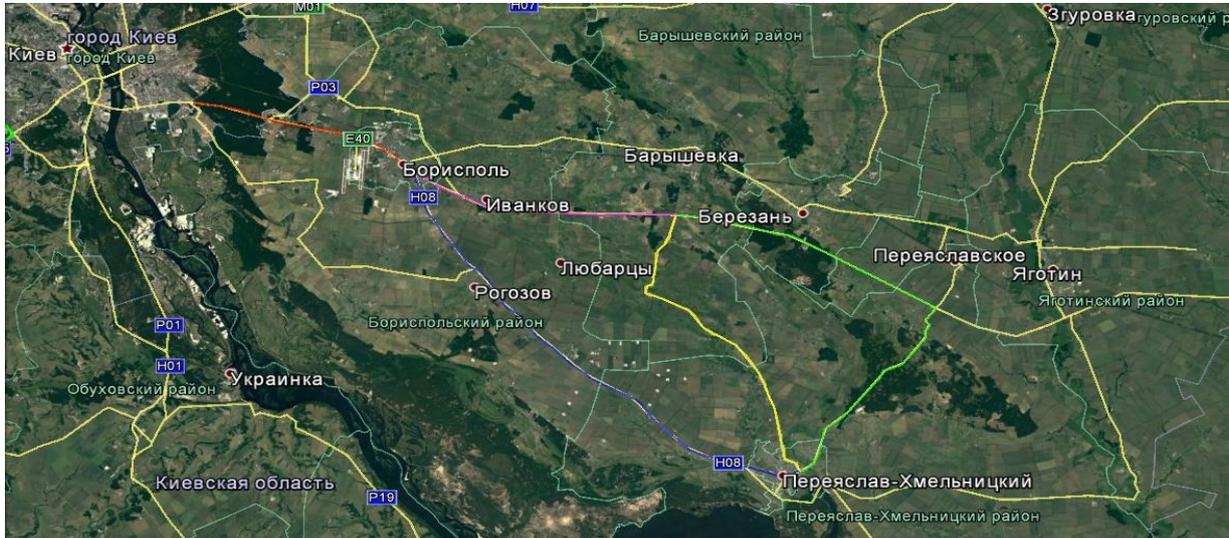
Fig. 1. Scheme of tourist route options

The first variant: Kyiv – Boryspil – Rogozov – Peryaslav-Khmelnytskyy.

The second variant: Kyiv – Boryspil – Ivaniv – Vesselinovka – Podillya – Pereyaslav-Khmelnytskyy.

The third variant: Kyiv – Boryspil – Ivaniv – Borshchov – Zhytomyr – Chirskoe – Pereyaslav-Khmelnytskyy.

Road conditions (length, mileage, settlements, horizontal curves, road category, width of the roadway) are determined using the Googl Earth program for each option and a longitudinal profile is constructed. For example, the section of the road is given in the second variant. Figure 2 shows the plot of the second option in the plan.
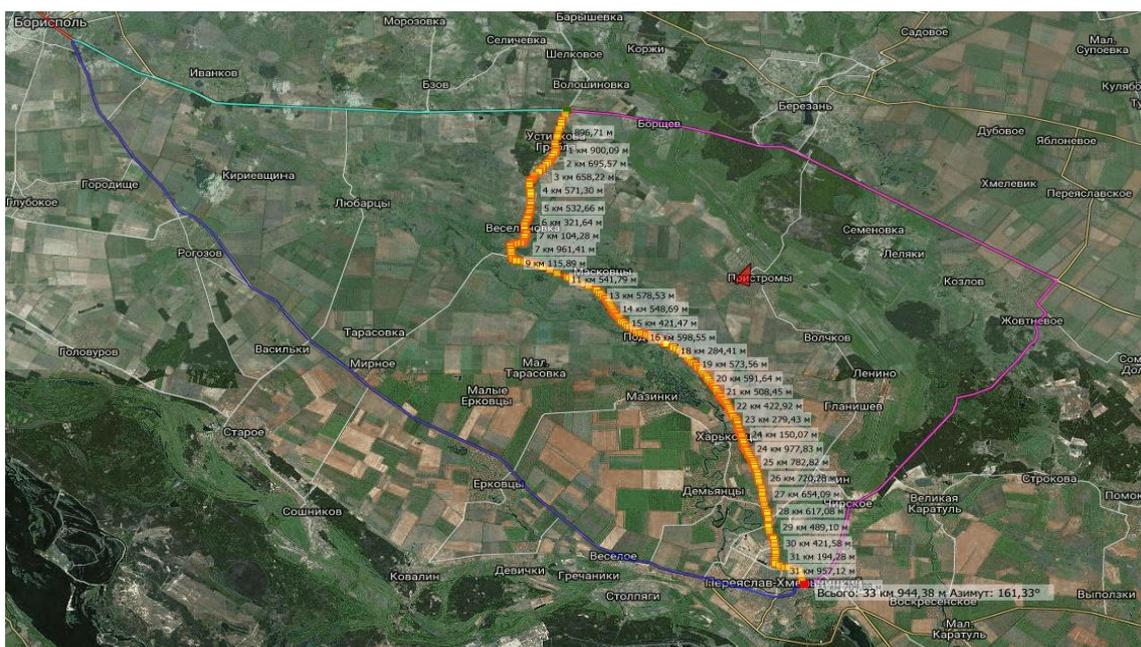

Fig. 2. Plan of the road section
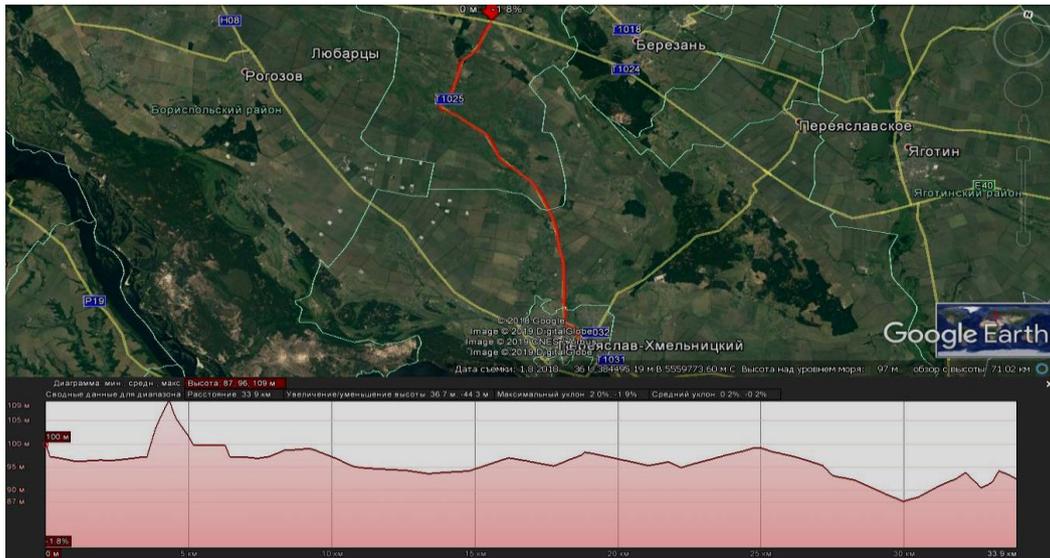
Fig. 3. Longitudinal section of the road section in the second variant

The program establishes: the beginning and the end of settlements, horizontal curves, ascents and descents, pedestrian crossings.

The table of the variant of the route with segregated areas with the same conditions of movement is prepared.

Table 10. Road characteristics in the route options

Road category	Length outside settlements, km	Length in settlements, km	Horizontal curves outside settlements, km	Horizontal curves in settlements, km	Pedestrian crossings km	Elevation in settlements, km	Total km
Option number 1 Kyiv – Boryspil – Rogoziv – Pereyaslav-Khmelnitsky							
1	16	5.8			-		72.16
11	22.16	8.24		0.1	3.5	15.4	
Option number 2 Kyiv – Boryspil – Veselinovka – Pereyaslav-Khmelnitsky							
1	33.6	12.76					80.3
111	13.94	12.2	0.2	0.6	2.0	5.0	
Option number 3 Kyiv – Boryspil – Ivankiv – Studenyky – Pereyaslav-Khmelnitsky							
1	49.8	14.5	0.3	0.4	3.0	1.9	94.4
111	8.8	9.1			0.5	6.1	

Table 11. Average speeds on individual sections of route options under normal conditions

Road category	Outside settlements km, h	In settlements km, h	Pedestrian crossings km / h	Horizontal curves outside settlements in km / h	Horizontal curves in settlements in km / h	Elevation outside settlements km / h	Elevation in settlements km / h
1	77.5	50	50	60	40	73.6	47.5
11	71.2	50	50	60	40	67.6	47.5
111	69.3	50	50	60	40	56.3	47.5

Table 12. Travel time by variants under normal conditions

Road category	Length outside settlements, year	Length in settlements, year.	Horizontal curves outside settlements, h.	Horizontal curves in settlements, h	Pedestrian crossings, year	Elevation in settlements, h	Total, year
Option number 1 Kyiv – Boryspil – Rogoziv – Pereyaslav-Khmelnitsky							
1	0.206	0.116			-		1.1
11	0.311	0.165		0.003	0.07	0.228	
Option number 2 Kyiv – Boryspil – Veselinovka – Pereyaslav-Khmelnitsky							
1	0.433	0.255					1.28
111	0.201	0.244	0.003	0.015	0.04	0.089	
Option number 3 Kyiv – Boryspil – Ivankiv – Studenyky – Pereyaslav-Khmelnitsky							
1	0.642	0.29	0.005	0.01	0.06	0.026	1.451

Fuel consumption by 100 km – 27.2 litres. For one km – 0.272 l at the speed of 60 km / h.

Table 13. Average speeds and fuel consumption per 1 km

Road category	Outside settlements km / h / l	In settlements km / h / l	Pedestrian crossings km / h / l	Horizontal curves outside settlements in km / h / l	Horizontal curves in settlements in km / h / l	Elevation outside settlements km / h / l	Elevation in settlements km / h / l
1	77.5/0.315	50/0.297	50/0.297	60/0.274	40/0.324	73.6/0.320	47.5/0.345
11	71.2/0.326	50/0.297	50/0.287	60/0.274	40/0.324	67.6/0.280	47.5/0.345
111	69.3/0.295	50,0.297	50/0.297	60/0.274	40/0.324	56.3/0.280	47.5/0.345

Table 14. Fuel consumption depending on the speed of the car in terms of options

Road category	Length outside settlements, l	Length in settlements, l	Horizontal curves outside settlements, l	Horizontal curves in settlements, l	Pedestrian crossings, l	Elevations outside settlements, l	Total, l
Option number 1 Kyiv – Boryspil – Rogoziv – Pereyaslav-Khmelnitsky							
1	5.12	1.72			-		21,9
11	7,22	2.45		0.03	1.04	4.31	
Option number 2 Kyiv – Boryspil – Veselinovka – Pereyaslav-Khmelnitsky							
1	10.6	3.79					24.32
111	4.11	3.6	0.05	0.19	0.6	1.4	
Option number 3 Kyiv – Boryspil – Ivankiv – Studenyky – Pereyaslav-Khmelnitsky							
1	15.7	4.31	0.08	0.13	0.9	0.61	28.9
111	2.6	2.7			0.15	1.7	

The cost of wages for 1 hour (10500: 22): 8 = 59.6 UAH. The cost of passenger costs for 30 passengers (tourists) is 1788 UAH per hour.

On the routes: 1 – 1966 UAH, 11 – 2288 UAH, 111 – 2592 UAH. The cost of fuel is 30 UAH per 1 litre. The cost of fuel on routes: 1 – 657 UAH, 11 – 729 UAH, 111 – 867 UAH.

Cost of transportation: 1 – 1314 UAH, 11 – 1458 UAH, 111 – 1734 UAH.

Total Expenses: 1 – 2.653 UAH, 11 – 3746 UAH, 111 – 4326 UAH.

When performing transportation during the year it is necessary to take into account the change of fuel consumption in the winter

Table 15. Average speeds taking into account weather conditions in winter and fuel consumption per 1 km

Road category	Outside settlements km / h / l	In settlements km / h / l	Pedestrian crossings km / h / l	Horizontal curves outside settlements in km / h / l	Horizontal curves in settlements km / h / l	Elevation outside settlements km / h / l	Elevation in settlements km / h / l
1	45.6/0.310	45.6/0.310	45.6/0.310	45.6/0.310	40/0.324	45.6/0.310	46.6/0.310
11	45.2/0.309	45.2/0.309	45.2/0.309	45.2/0.309	40/0.324	45.2/0.309	45.2/0.309
111	45.1/0.308	45.1. 0.308	45.1/0.308	45.1/0.308	40/0.324	45.1/0.308	45.1/0.308

Travel time, fuel consumption, cost of transportation, time spent by passengers depending on options. Listed in Table 16.

Table 16. Results of calculations on routes

№	Route	Travel time, year	Cost of passengers time, UAH	Fuel consumption, l	Cost of transportation, UAH	Total UAH
Winter period						
1	1	1.58	2830	22.37	1242	4072
2	2	1.78	3161	24.82	1489	4650
3	3	2.09	3744	29.03	1742	5486
Spring-summer and autumn periods						
4	1	1.1	1966	21.9	1314	2633
5	2	1.28	2289	24.3	1458	3746
6	3	1.45	2592	28.9	1734	4326

Conclusions:

1. Option 1 will be the best on the socio-economic indicators.

2. Overall costs in the winter period increase due to reduction of the average speed of the bus.

3. Fuel costs in the winter period differ little from the costs in other periods. Speed decrease does not reduce fuel consumption.

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1.4. INVESTMENT ATTRACTIVENESS OF UKRAINIAN REGIONS IN CURRENT CONDITIONS

An important component of the economic growth of the country is investment; they are the basis for the development of regions, their attractiveness at the international level, strengthening economic potential. The issue of attracting foreign investments is important and urgent for Ukraine as they affect the economic development of the country. The deterioration of the investment climate, the ability of budgets of all levels, the decline in business activity of business entities have led to instability in the investment attractiveness of the regions and the country as a whole. Investments play an important role in ensuring the effective functioning of the region and the country as a whole. They are a mechanism that provides GDP growth, determines structural changes in domestic and foreign policies, optimizes the use of domestic resources, and allows shaping the dynamics and development of the national economy. Effective investment activity of the state provides opportunities for the development of promising industries and regions of the economy, the promotion of goods on international markets.

The notion of investment attractiveness is an important component of economic development and the provision of interregional and interstate capital movements.

The main components of investment attractiveness are investment potential, legislation and risks. An important factor of investment potential is the rating of the country's investment attractiveness. In addition to ratings, the country's investment attractiveness is determined by: macro indicators, in particular, gross domestic product; debt of the country; state revenues and reserves of the country, etc. The stable economic development of certain branches of economy, as well as the economy of the country as a whole depends on the investment attractiveness of the regions[55]. The algorithm for determining the integral evaluation of the investment attractiveness of the region presented in Fig. 1.

Stage 1	Determination of the factors of IPR and indicators that characterize them
Stage 2	Calculation of values of indicators for each of the factors of IPR for the studied region
Stage 3	Determination of benchmark values for each of the factors of the IPR
Stage 4	Determination of the weight of each of the factors of IPR in the total IPR
Stage 5	Calculation of the integral coefficient for each of the factors of YPD
Stage 6	Determination of the total integrated index of IPR by all identified factors of IPR for
Stage 7	Determining ways to increase the IPR of the studied region

Fig. 1. The algorithm for determining the integral evaluation of the region's investment attractiveness (IPR)

In determining the investment attractiveness of the region, the development indicators are first calculated according to certain factors (production, macroeconomic, export, resource-raw material, investment, innovation, labor, social, infrastructure, consumer, environmental), under which the investment and regional investment are formed investment resources. Each of the factors determined by the totality of indicators presented in Table 1, which have weights for the integral

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[55] Sydor H. V. Investytsiina pryvablyvist rehioniv / H. V. Sydor, H. I. Davydovska // Stalyi rozvytok ekonomiky. – 2015. – № 2. – S. 184-189.

index of the YDP estimate. These weights are determined using the expert method by the experts of the Ukrainian Center for Foreign Investment Promotion Invest Ukraine[56].

Investment attractiveness is a set of objective and subjective minds that contribute to / hinder the process of investing the national economy into micro-level and macro levels[57]. Investment attractiveness of the region could be described as a set of economic, political, legal, social and environmental factors that determine the behavior of potential subjects of investment activity to invest in the development of the region's economy. The main essence of investment attractiveness is the receipt of maximum profit from the invested capital. When developing and making investment decisions, investors carry out research on the competitiveness of the economy of a particular region and invest in those regions that are more attractive[58]. As noted above, investing in a particular region characterized by an acceptable level of risk and return and the opportunity to carry out production and commercial activities with a further profit.

Table 1. Base of factors and indicators that determine the investment attractiveness of the region

№ p/p	Indicator characterizing the influence of the factor	Weight
1	Production factor	0,328
2	Macroeconomic factor	0,12
3	Export factor	0,082
4	Raw material factor	0,082
5	Investment factor	0,052
6	The innovation factor	0,04
7	Labor factor	0,09
8	Social factor	0,048
9	Infrastructure factor	0,045
10	Consumer Factor	0,02
11	Environmental factor	0,03

From the point of view of the region: all investments (foreign and national) need; investor competition for the opportunity to invest in a particular region is a positive phenomenon for the region; the region can compete for investment with other regions of the country and the world. Due to the significant territorial unevenness of the distribution of economic resources and the capital of the individual, the regions and countries are competitors in the fight against free factors of production[59].

In the Table 2 shows the dynamics of capital investments by regions of Ukraine for the period 2013-2017. Analyzing the Table 2 we observe that Ukraine is characterized by a significant uneven development of capital investments in the regional context. More than a third (UAH 200.3 billion, or 34.6%) of the total amount of investments made is spent on the city of Kyiv. Significant amounts of capital investments come to: Dnipropetrovsk, Kyiv, Lviv, Poltava, Kharkiv, Vinnytsia regions, least: Kirovograd, Lugansk, Rivne, Sumy, Chernivtsi. This is related to the regions' productive activities and the profits that investors expect.

A particular investor evaluates only those economic characteristics of the territory that are critically important in terms of the company's strategy and the specifics of its manufacturing and commercial activity. Thus, for natural resource companies, the availability of mineral deposits in appropriate volumes and proper quality, a developed transport network are the main factors for choosing the investment area[60]. At the same time, this factor is irrelevant to the light industry.

[56] Palyvoda K. V. Problemy formuvannia pryvablyvoho investytsiinoho klimatu yak zasobu podolannia destruktsii v ekonomitsi Ukrainy. Ekonomika ta derzhava № 3. 2018. S. 4-9.

[57] Hrynova V. M., Koiuda V. O. Investuvannia – pidruchnyk / V. M. hrynova, V. O. Koiuda. URL: http://pidruchniki.com/1584072013163/investuvannya.

[58] Investuvannia: navch. posibnyk / H. B. Pohrishchuk, V. V. Rudenko. Ternopil. Ekonomichna dumka. 2014. 277 s.

[59] Karkich I. O. Investytsiina pryvablyvist rehioniv Ukrainy / I. O. Karkich// Naukovi zapysky Natsionalnoho universytetu «Ostrozka akademiia». Seriia «Ekonomika»: naukovyi zhurnal. – Ostroh: Vyd-vo NU«OA», berezen 2017. № 4 (32). S. 88-91.

[60] Kapitalni investytsii v Ukraini. Derzhavna sluzhba statystyky Ukrainy. URL:

Table 2. Capital investments by regions of Ukraine, in actual prices, million

	2013	2014	2015	2016	2017	2018
Ukraine	249873	219420	273116	359216	448462	578726
area						
Vinnytsia region	6110	5675	7373	8302	11744	17626
Volyn region	3327	3390	6167	6384	7042	8687
Dnepropetrovsk region	21290	20357	25920	33169	42909	60288
Donetsk region	27912	13155	8304	11902	17269	26979
Zhytomyr region	3005	2905	4044	5574	7722	8742
Zakarpattia region	2646	2639	3778	4663	5624	7500
Zaporizhia region	6839	7035	7794	11040	15880	15732
Ivano-Frankivsk region	4797	6837	9609	7948	9708	9394
Kiev region	20697	19653	24359	33411	34495	40713
Kirovohrad region	3224	3122	4057	6355	7321	7182
Lugansk region	11369	5223[1]	2060[1]	4122[1]	3330	3219
Lviv region	9817	9555	13387	18605	24106	28996
Mikolaev region	5009	3771	5990	9730	11178	10099
Odessa region	11872	9361	9984	16729	22300	23788
Poltava region	9536	8828	8338	15265	15856	18637
Rivne region	2837	2805	4334	4324	6127	7228
Sumy region	2721	2798	3663	5763	6947	7750
Ternopilsk region	2976	2590	3828	4888	7151	8375
Kharkiv region	9293	8032	11247	16546	19362	23551
Kherson region	2125	2208	3107	4591	7362	8853
Khmelnytsky region	3638	4078	6809	9123	10500	11275
Cherkasy region	3413	3262	4486	6499	8144	11110
Chernivtsi region	2257	1687	2789	2669	2992	3720
Chernihiv region	2842	2621	3550	5318	7351	8971

Source[61]

The volume of direct investments (share capital) from EU countries to the economy of Ukraine in the cross-section of regions is presented in Table 3.

For this purpose, statistics are compared on the volume of capital investments, the volume of foreign investments and construction works. In order to avoid the influence of a number of market and non-market factors (inflation, seasonality, change of legislation, etc.), all raw data are taken as an arithmetic mean over four quarters. At the end of the quarter, the first value for period is replaced. This approach allows for a more accurate assessment. The obtained figures for the quarter correlate with the number of inhabitants of the region. Based on this, an estimate is made for each position per capita and the growth rate of the respective indicator. The higher the position, the higher the rating[62].

Instead, the list of areas showing high investment performance has expanded. According to the results of April-June, there are Odessa, Zaporizhia and Ivano-Frankivsk regions. The first one retained the previous quarter's estimate, the other two improved. Recall that in the first quarter of this year, investment activity of Zaporizhia region was recorded at the level of "above average" (category ineC), Ivano-Frankivsk – at the average level (ineD). Instead, the number of regions whose rating ranges from 161-180 points (ineC) has halved Lviv (down one category) and Ternopil (up the stairs) were added to the Kiev region, which is here for the second quarter and if for Ternopil such a move is a clear success, for the other two regions it is more likely a failure.

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http://www.ukrstat.gov.ua/operativ/operativ2018.

[61] Kapitalni investytsii v Ukraini. Derzhavna sluzhba statystyky Ukrainy. URL:
http://www.ukrstat.gov.ua/operativ/operativ2018.

[62] Momot T.V. Investytsiina pryvablyvist aktsionernoho tovarystva: udoskonalennia suchasnykh metodyk otsinky
[Tekst] / T.V.Momot // Menedzher. Visnyk Donetskoho derzhavnoho universytetu upravlinnia. – 2005. - № 4(34). – S.
117-122.11

	(million USD / million USD) Direct Investment on		Absolute deviation, +/-	Relative deviation,%
	01.01.2017	01.01.2018		
total in Ukraine	37513,6	39144,0	1630,4	104,3
total From EU countries	26203,6	27465,5	1261,9	104,8
Vinnytsia region	139,2	164,2	25	118,0
Volyn region	242,0	257,0	15	106,2
Dnepropetrovsk region	2527,4	2890,5	363,1	114,4
Donetsk region	1127,3	1093,3	-34	97,0
Zhytomyr region	177,2	189,9	12,7	107,2
Zakarpattia region	245,1	254,3	9,2	103,8
Zaporizhia region	644,7	700,8	56,1	108,7
Ivano-Frankivsk region	752,1	831,7	79,6	110,6
Kiev region	1352,4	1411,0	58,6	104,3
Kirovohrad region	39,5	42,4	2,9	107,3
Lugansk region	416,7	421,9	5,2	101,2
Lviv region	930,9	1002,4	71,5	107,7
Mikolaev region	158,0	158,7	0,7	100,4
Odessa region	809,0	817,9	8,9	101,1
Poltava region	199,6	200,5	0,9	100,5
Rivne region	130,9	139,5	8,6	106,6
Sumy region	167,2	167,2	0	100,0
Ternopilsk region	45,9	42,4	-3,5	92,4
Kharkiv region	475,9	479,5	3,6	100,8
Kherson region	159,8	174,5	14,7	109,2
Khmelnytsky region	148,4	162,0	13,6	109,2
Chernivtsi region	46,5	48,0	1,5	103,2
Chernihiv region	225,6	408,3	182,7	181,0
Kiev	14889,6	15246,2	356,6	102,4

It is interesting that for the second quarter in a row the Kyiv region cannot return to the group of leaders. The Lviv region was added to it, however, as already noted, Kharkiv quickly returned to the top. The tendency to the next deterioration of results in the Mikolaev area is increasing. If this region does not return to its former positions, and at present it seems unlikely, it will not be considered at all among the leading regions of Ukraine at all. The Ivano-Frankivsk region (which was included in the list after the fourth quarter of 2015) returned to the number of regions with high investment attractiveness and entered the Zaporizhia region.

As for capital investments, in the second quarter of 2017 they increased in all regions of Ukraine. In the first quarter of 2017, they amounted to UAH 56.2 billion (average for 12 months for 22 regions included in the rating list), for April-June of this year – UAH 59.6 billion. The increase of this indicator to the previous quarter was 6.1%, (by reference, in Ukraine – 6.5% over the same period). The highest figures were recorded in Dnepropetrovsk and Kyiv oblasts – UAH 9.0 and 7.8 billion in accordance. In three regions – Lviv, Odesa and Kharkiv, capital investments (average value over twelve months) amounted to UAH 4.3-4.9 billion. The Chernivtsi region – just over UAH 600 million, which is almost twice less than in the Rivne and Transcarpathian regions that follow – is a clear outsider – just over UAH 1.1 billion for each. In terms of population in the region, these figures look a little different, as the chart below shows[64].

The best growth rates for the second quarter in a row in Zaporizhia and Ternopil regions (14.5% to the previous quarter for each). The Kyiv oblast achieved an increase of only 0.2 pp, Poltava – 1.3 pp, Cherkasy and Chernivtsi – 3.2 and 3.5 pp, respectively in accordance.

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[63] Investytsiina pryvablyvist oblastei URL:
http://ua-ekonomist.com/16310-nvesticyna-privablivst-oblastey-harkvschina-znovu-v-lderah.html.
[64] Investytsiina pryvablyvist oblastei URL:
http://ua-ekonomist.com/16310-nvesticyna-privablivst-oblastey-harkvschina-znovu-v-lderah.html.
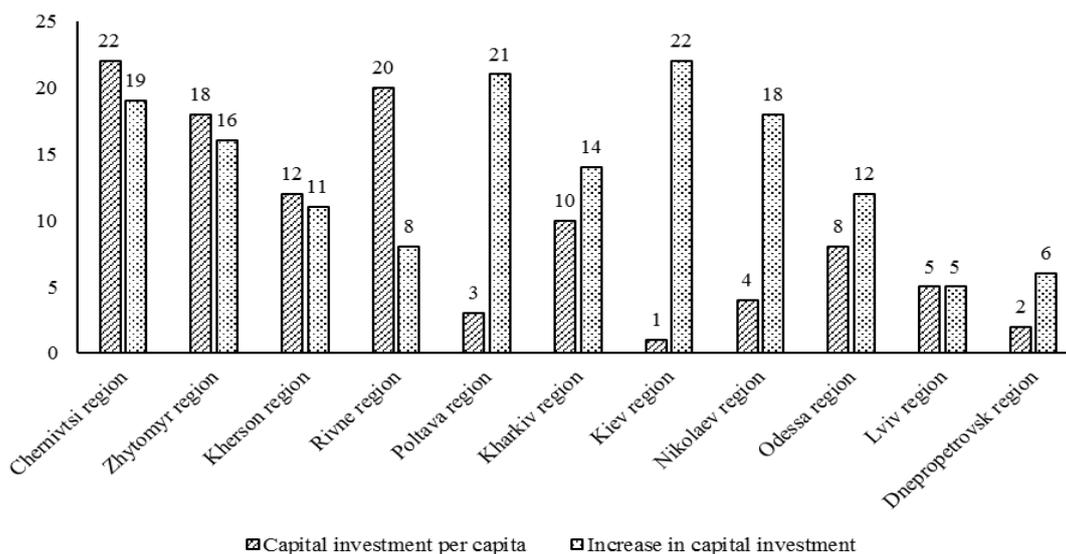
Fig. 2. Places of individual regions of Ukraine for capital investment appraisal

It should be noted that the evaluation of foreign investments is carried out by the agency in a slightly different way than is accepted in Ukraine. Instead of comparing the data on the change in the share capital with the cumulative result, the calculation uses the indicator of the net increase of the share capital for the period. Therefore, in the second quarter, the highest average figures for the 12 months were in the Chernihiv region: $ 72.7 million, which is almost double the value of the first quarter. This result was made possible by a further increase in the authorized capital of the Pryluky tobacco factory by $ 200 million, of which $ 140 million has already been registered.
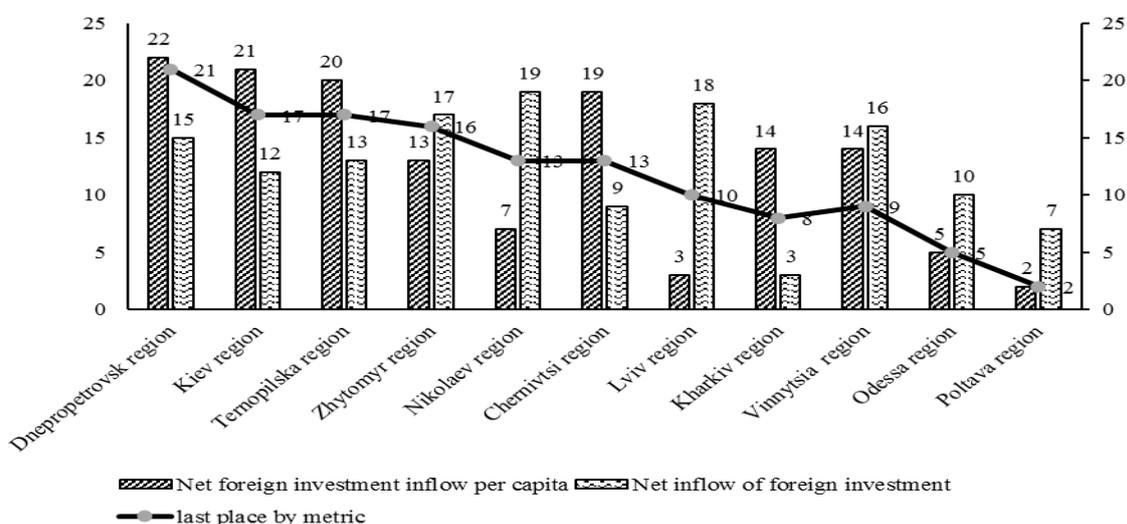
Fig. 3. Sites of selected regions of Ukraine on estimation of net inflow of foreign investments

In order to get a high rating, the region must not only successfully attract investments, but also use them wisely. This is possible only in case of improvement of socio-economic indicators characterizing the level of well-being of the population of the region.

As we can see, Kharkiv and Poltava regions were able to show high results both in terms of attracting funds to the economy and in terms of their use. The result was somewhat worse in the Dnipropetrovsk region, due to the outflow of capital from non-residents. Lviv and Odessa regions, for the second consecutive quarter, are very similar in their results. Unlike its predecessors, the

Kyiv region has secured high standards due to the effect of attracting investments in past periods. However, it has not been able to increase investment activity. Consequently, the rating is low, as in such a region, by three steps down the ranking.

At the same time, Ternopil and Rivne regions show upward movement. After improving investment activity in the first quarter, they have received a return in the form of increased socio-economic indicators. It is difficult to predict whether they will be able to stay at the top of the rating for a longer period, because investment activity has not yet taken a steady form.

Among the "newcomers" at the top of the rating is the Zaporizhia region, which for the first time climbed so high. It is with the improvement of the investment component that the upward movement of the region begins. The most typical example is the already mentioned Mykolaiv region. High rates of investment activity here have not been converted into a result for the inhabitants of the region. It is likely that the Kyiv and Lviv oblasts will be able to improve their final grades. You can expect more from the Vinnytsia, Kirovograd and Volyn regions.

Ukraine is characterized by a significant uneven development of capital investments in the regional context. More than a third (UAH 182.1 billion or 34.6%) of the total amount of investments made came to the city of Kyiv, which amounted to UAH 62.8 thousand per capita. ($ 2,200). The smallest amount of investments was recorded in the Luhansk region – UAH 2.9 billion or UAH 1.3 thousand per person ($ 48).
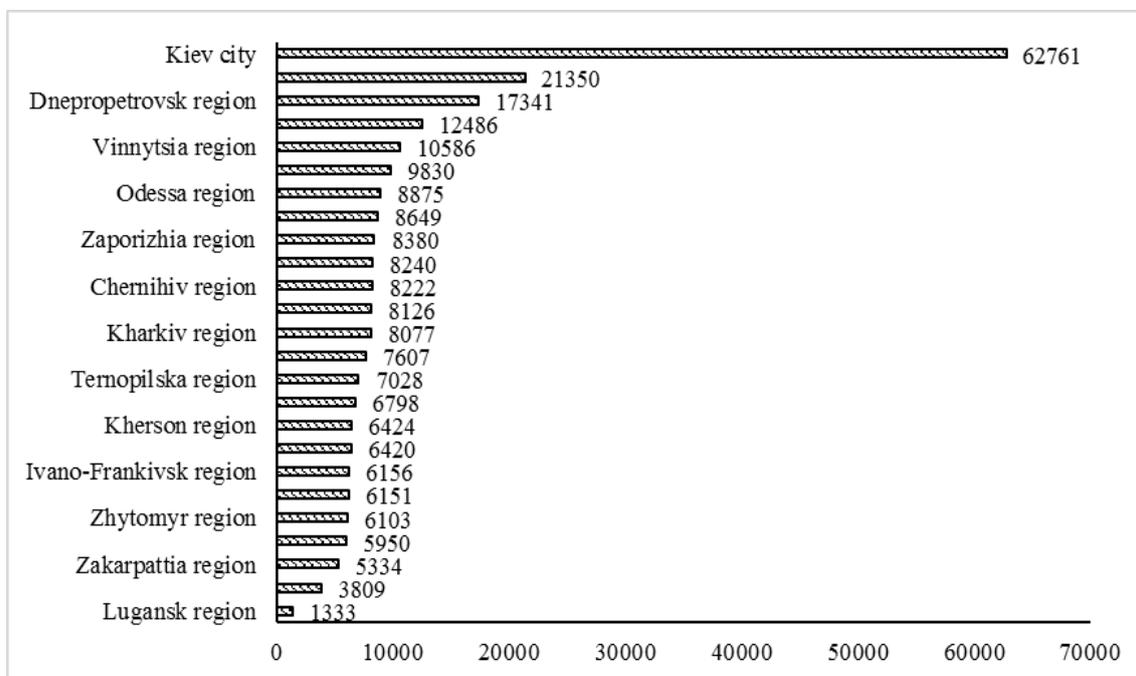

Fig. 4. Capital investment per 1 person, 2018, by region

In terms of assets structure, 93% of investments are investments in tangible assets. In the structure of tangible assets, 44% invested in buildings and structures, 33% invested in machinery and equipment, 12% invested in vehicles (Fig. 5).

By type of economic activity, the priority area for investing in Ukraine is the industrial sector, whose share in the total structure in 2018 amounted to 34% (UAH 179.7 billion), followed by the agricultural sector (12.5% or 65.9 UAH billion), the third – construction (9.9% or UAH 51.9 billion)[65].

However, the number of areas that will form the pools of "leaders" and "outsiders" will not change significantly, as the overall economic situation begins to improve, it will be difficult for those in the middle to break into the leadership group. This is due to losses incurred earlier in the

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[65] Kapitalni investytsii v Ukraini. Derzhavna sluzhba statystyky Ukrainy. URL: http://www.ukrstat.gov.ua/operativ/operativ2018.

pace of development. However, given the density of ratings, one should expect an "exchange" between "middle-class" and "outsider" groups[66]. Despite some negative factors that impede investment processes and create high investment risk, Ukraine remains an attractive investment region for both domestic and foreign investors.
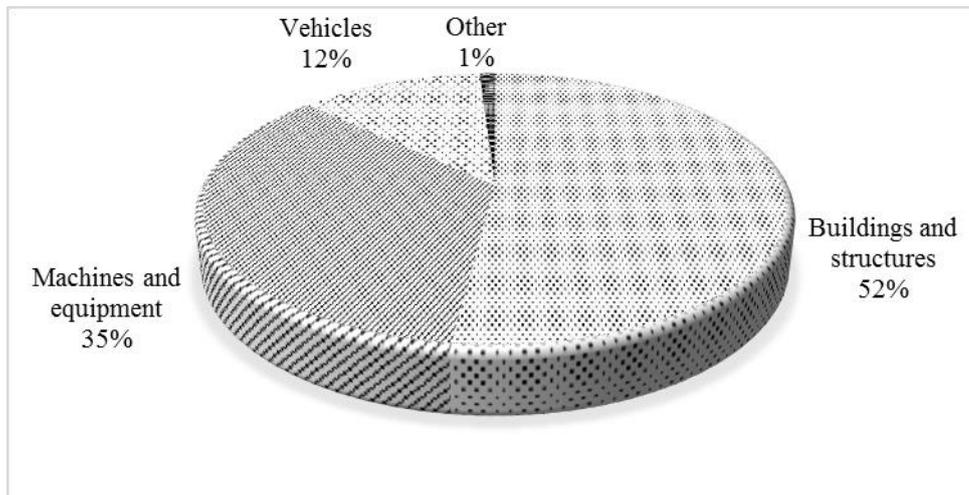

Fig. 5. Structure of capital investments by tangible assets

Considering the potential strengths and weaknesses of investment activity, we believe that a set of measures should be taken at the state level to stimulate investment processes in the economy of Ukraine, in particular in the framework of improving the macroeconomic and political situation, improving the legislative framework[67]. Therefore, in order to improve the investment attractiveness of the national economy, we consider it advisable to formulate basic targets in terms of timing, dividing them into short, medium and long-term goals (Table 4).

Table 4. Strategic goals-benchmarks for increasing the investment attractiveness
of the national economy

Short-term goals (up to 1 year)	Medium-term goals (1-5 years)	Long-term goals (more than 5 years)
Priority changes in the legislation regarding simplification of investment activities	Creating a favorable investment climate for increasing foreign investment on favorable terms	Forming an effective mechanism for managing the country's investment climate
Bring national legislation in line with international law to stimulate foreign investment	Overcoming bureaucratic obstacles and corruption during investment activities, transparency of tender policy	Sustainable growth of the national economy to generate broad investment opportunities
Formation of political and macroeconomic stability	Improvement of information infrastructure of investment infrastructure	Increase of economic indicators of investment climate of Ukraine in the world market
Introduction of tax and customs privileges, subsidies		

The policy of regulation and promotion of investment activity in Ukraine requires improvement and considerable efforts. In our opinion, the state, in the context of its macroeconomic policy, must create the proper conditions for the formation of a favorable investment climate for both domestic and foreign investors.

Thus, the investment attractiveness of a region is defined as a set of certain features and factors that may influence investors' opinions about the possibility of investing their funds in the economy of a particular region.

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[66] Investytsiina pryvablyvist oblastei URL:
http://ua-ekonomist.com/16310-nvesticyna-privablivst-oblastey-harkvschina-znovu-v-lderah.html.
[67] Kapitalni investytsii v Ukraini. Derzhavna sluzhba statystyky Ukrainy. URL:
http://www.ukrstat.gov.ua/operativ/operativ2018.

To further improve the investment climate of Ukraine, the question today is to improve the legal and organizational framework to increase the capacity of mechanisms to ensure a favorable investment climate and to form the basis for preserving and improving the competitiveness of the domestic economy.

The conditions for attracting foreign direct investment in Ukraine are political, economic and financial stability, investment guarantees, improvement of legislative acts on regulation of investment activity and general improvement of the investment climate.

As can be seen from the Table 5 Vinnytsia region is one of the leading positions among the regions of Ukraine. in particular, the volume of investments is in 9th place and the investment index is in 2nd place. Also in 2018, capital investment inflows increased by 42.4% compared to 2017. In 2018, foreign investors invested $ 32.0 million in the economy of the region. US direct investment and $ 2.1 million withdrawn In terms of foreign direct investment, the region ranks eighteenth among the regions of Ukraine, and third in terms of growth rat.

Table 5. The Vinnytsia region is one of the regions of Ukraine
by volume of capital investments in 2018

	Used at actual prices million UAH	% to		total volume	
		total volume	to the previous period	by volume of investments	by investment index
Ukraine	337045,6	100,0	119,9	x	x
Vinnytsia region	10486,3	3,1	142,4	9	2
Volyn region	5250,3	1,6	112,4	16	10
Dnepropetrovsk region	36780,9	10,9	134,6	2	4
Donetsk region	15583,2	4,6	184,9	5	1
Zhytomyr region	4762,8	1,4	112,6	18	9
Transcarpathian region	4621,8	1,4	124,7	19	7
Zaporozhye region	8870,7	2,6	83,3	10	24
Ivano-Frankivsk region	5557,3	1,7	96,1	15	20
Kiev region	23757,0	7,0	105,3	3	17
Kirovohrad region	4180,8	1,2	91,0	22	22
Lugansk region	1770,5	0,5	96,9	25	19
Lviv region	15632,9	4,6	107,2	4	16
Mikolaev region	6288,0	1,9	82,2	11	25
Odessa region	14559,1	4,3	108,2	6	15
Poltava region	11465,3	3,4	108,3	8	14
Rivne region	4447,6	1,3	128,1	20	6
Sumy region	4344,5	1,3	103,3	21	18
Ternopilsk region	5032,4	1,5	108,4	17	13
Kharkiv region	13700,9	4,1	109,5	7	12
Kherson region	3731,0	1,1	92,9	23	21
Khmelnytsky region	6249,6	1,9	90,5	12	23
Cherkasy region	5994,3	1,8	117,0	13	8
Chernivtsi region	1991,5	0,6	111,1	24	11
Chernihiv region	5586,2	1,7	133,1	14	5
Kiev	116400,7	34,5	135,2	1	3

The investment came from 50 countries. The vast majority of investments (83.6% of total equity) came from EU countries – USD 186.1 million, from other countries – USD 36.5 million. (16.4%).

The top five investor countries, which account for 74.8% of total direct investment, are: Poland, Austria, Cyprus, France and Germany[68].

The most attractive for foreign investors are industrial enterprises, which focus $ 181.4 million. United States (81.2% of total non-resident capital). Agriculture, forestry and fisheries accumulated $ 18.4 million. (8.3% of total volume) of direct investments, in organizations

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[68] Ofitsiinyi sait Holovnoho upravlinnia statystyky u Vinnytskii oblasti URL: http://www.vn.ukrstat.gov.ua/.

engaged in real estate transactions – 7.6 million. (3.4%), wholesale and retail trade; repair of motor vehicles and motorcycles – $ 6.8 million. (3.0%).

A significant share (60.9%) of foreign capital is concentrated in Vinnitsa – $ 135.5 million Also significant volumes of foreign investments are concentrated in Kozyatyn district – $ 19.1 million (8.6%), Barsky – $ 9.1 million (4.1%), Vinnytsia – $ 7.2 million (3.2%), Kalinovsky – $ 7.4 million. (3.3%), Tulchynsky – $ 6.7 million (3.0%), Tivrivsky – $ 6.9 million (3.1%)[69]. The most successful investment projects of Vinnytsia region are Barlinek (Poland investor country, three-plate board production), Agrana Frut (Austria, canned fruit and vegetables), Vinnitsaapobthim (Cyprus, household chemicals), Luksky agriculture (Austria) products), Tulchinmyaso (Latvia), Pfanner-Bar (Austria, natural juices), El-Tour (Turkey, trade). Experts believe that there is a large field of activity for the oblast authorities in terms of attracting foreign investments, setting up appropriate agencies, building new businesses, supporting energy-saving and environmentally friendly projects, etc.[70]

According to the information of the Main Directorate of Statistics in Vinnytsia region, the volume of foreign direct investments made in the economy of the region since the beginning of investment on December 31, 2018 amounted to $ 223.3 million. The USA, which is 12.3% more than the volume of investments at the beginning of the year and per capita amounted to $ 143.1[71].

It is necessary to create conditions for the implementation of investment projects. Support requires private investment projects. As part of discussions with the EU on the need for a Marshall Plan for Ukraine, the EU leadership suggested that the country be prepared for possible accession to the EU External Investment Plan, and such preparations are already underway[72].

For effective use of mechanisms of formation, extension and optimization of utilization of the investment potential of the region, the characteristics of the components of the mechanism have been developed (Table 6).

Table 6. Types, directions and tasks of mechanisms for realization
of investment potential of the region

Type of mechanism	The task of the mechanism	The direction of action of the mechanism	The nature of the involvement of regional authorities in regulating investment processes
Mechanism of formation of investment potential of the region	Form an IPR, determine the region's priority areas and investment objects, attract maximum investment from all possible sources, create an investment image of the territory and position it in the domestic and world capital markets, form the investment infrastructure of the region	Formative	Organization, planning and forecasting of processes of formation of IPR, constant control and monitoring, introduction of instruments of encouragement of investment, granting of preferences to strategic investors
Mechanism of increasing the investment potential of the region	To increase the level of utilization of the generated investment potential of the territory, to find additional tools for attracting investments in the region, to adjust the directions of investment marketing of the region, to improve the investment infrastructure	Increasing	Analysis of possibilities of growth of investment investments and their effectiveness, research of unused reserves of investment growth, regulatory and legislative establishment of interaction between elements of investment infrastructure
A mechanism for optimizing the use of the region's investment potential	Ensure a sufficient level of investment security of the region, create tools for the transfusion of investment flows into the areas of highest priority for the sustainable development of the region, ensure the priority consideration of social and environmental interests of the population and the region	Optimizing	Ensuring financial autonomy and investment security of the region, redistribution of investment flows into areas that are strategically important for sustainable development, investment of social and environmental projects

[69] Ofitsiinyi sait Holovnoho upravlinnia statystyky u Vinnytskii oblasti URL: http://www.vn.ukrstat.gov.ua/.

[70] Ofitsiinyi sait Vinnytskoi oblasnoi derzhavnoi administratsii URL: http://www.vin.gov.ua.

[71] Ofitsiinyi sait Vinnytskoi oblasnoi derzhavnoi administratsii URL: http://www.vin.gov.ua.

[72] Palyvoda K. V. Problemy formuvannia pryvablyvoho investytsiinoho klimatu yak zasobu podolannia destruktsii v ekonomitsi Ukrainy. Ekonomika ta derzhava № 3. 2018. S. 4-9.

The basic components of building a system of investment marketing in the region are defined: defining the mission, main tasks and target groups of the investment marketing of the region, positioning the region in the investment market, forming a system of marketing mix of investment potential and investment image of the region.

The mission and main objectives of the region's investment marketing will vary, depending on the level of investment potential generated in it (Table 7).

Table 7. Mission and main tasks of investment marketing of regions

Groups of regions	Mission	Main tasks
With low level of IPR	Attracting maximum number of investors	formation of the investment image of the region; selection of investment marketing target groups and initial positioning; development of marketing measures for the formation of IPR
With an average level of IPR	Ensuring a steady increase in the IPR	improvement of the investment image of the territory; implementation of a differentiation strategy for the sale of IPR entering new investor markets and developing new forms of investment attraction
With a high level of IPR	Ensure maximum efficiency of use of IPR	investment rebranding of the region; positioning the region in the segment with significant expenditures in social and environmental security of the region; ensuring the long-term competitiveness of the region

The main criteria for characterization of the target groups of investment marketing of a region are accepted: the number of subjects of the group and the volume of its investment resources, the accessibility and attractiveness of the segment for the region, the security of the segment from the competing regions, etc.

Based on the importance of institutional development of the formation and expansion of the investment potential of the region and the requirements of its compliance with the conditions of the modern market environment, the principles of formation of the investment infrastructure of the region have been developed (Fig. 6).

Diagnosis of the investment infrastructure of the region	→	Selection of regional priorities for development of investment infrastructure of the region	→	Choosing a model of investment infrastructure of the region	→	Financing the creation and development of investment infrastructure	→	Mechanism of control over the development of investment infrastructure of the region

Fig. 6. Stages of the process of development of investment infrastructure of the region

The largest FDI inflows by investor country in 2018 were Cyprus, the Netherlands, Austria, France, Poland, and the United Kingdom. 58, 2% invested in financial and insurance, 10.6% in industry, 8.2% – wholesale and retail trade, 6.6% IT technology, 5.7% real estate operations, 4.8% professional, scientific and technical activities.

In general, Ukraine's low level of investment attractiveness necessitates the implementation of the country's development strategy, defining the tasks that need to be addressed in the medium and long term. Objectively, it is necessary to develop the "Program of development of economy of Ukraine and restoration of standard of living of people" for the period till 2025. It is worth noting that to accelerate economic growth, increase investment activity and enhance the pace of development of investment processes is very important implementation of investment and innovation policies of the state, state regulation of the stock market, the development of stock exchanges, the promotion of foreign investment in the domestic economy and banking's national economy and innovation.

Therefore, the effectiveness of the state's investment policy is a determining factor in the formation of investor confidence and positive investment expectations about the ability of invested

capital to generate stable income at minimal risks that are not directly related to the effectiveness of their activities. Improving the investment climate and balanced investment attractiveness of the regions will contribute to the development of the Ukrainian economy, solving urgent social, environmental, infrastructural and other problems, which should result in improving the quality of life of citizens, which will ultimately create the image of a financially independent, economically self-sufficient and innovative state, adapted to the current geopolitical challenges and demands of the European and world markets.

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1.5. CONCEPTUAL FOUNDATIONS OF UKRAINE AGRARIAN SECTOR DEVELOPMENT

Formulation and implementation of the paradigm of sustainable development of the domestic agrarian sector will help overcome the ecological crisis, reduce anthropogenic impact on the environment, create conditions for social and economic well-being of the population, economic development and competitiveness of agricultural producers, strengthen the state's position at the international level.

Agrarian production raises the question of solving a complex of social and environmental problems, since the dominance of only economic interests causes irreparable damage to the environment, affects the quality of life of citizens, indirectly reduces the level of food security of the country and ultimately destroys the national security of the state. The combined interaction of the three main components (economic, environmental and social) is an effective way of ensuring the sustainable development of the agricultural sector of the national economy.

A modern development strategy should be understood as a generalized model of action, presented in the form of a set of developed measures and aimed at achieving long-term goals through changes and transformations in activity, taking into account market opportunities and available resources[73].

Strategy is a very important management mechanism, but the existence of an "ideal" strategy is impossible.

First, it is impossible to develop a "single" strategy for all enterprises or sectors of the economy, since the development strategy must take into account the unique features that will depend not only on the scale of strategic measures, but also on the development mechanisms embedded in the strategy.

Secondly, there are major changes over time, both internally and externally, which also require changes, often dramatically, in the development strategy. Despite the uniqueness of each development strategy, in modern science, a number of basic types of strategies, the most optimal for implementation in certain conditions, are identified, which undoubtedly facilitates and streamlines the process of forming a development strategy. At this stage of strategic management development, the formation of a development strategy is based, above all, on the choice of several alternative strategies. In this case, each of the options considered is formed by the scripting method, or based on standard solutions for widespread situations. Harvard School scholars (M. Porter, K. Prahalad, K. Andrews, G. Hemel), who remain the leader in this field, are the most comprehensive questions on the methods of forming the development strategy[74]. M. Porter considered the process of formulating a strategy in terms of the competitive position of the company, based on the analysis of five forces of competition, which gives the developer an idea of the strengths and weaknesses of the company in the market and the most favorable position[75].

The process of developing a development strategy can be divided into three stages.

In the first stage, the main guidelines for development are identified, goals are set to be achieved.

The second stage involves gathering and analyzing information, identifying opportunities and limitations, identifying strengths and weaknesses.

In the third stage, more precise goals are defined[76].

Strategic planning involves the development of a baseline version of a development strategy as well as major alternatives. Then the developed variants are analyzed, and the most optimal of

[73] Gordienko P. L., Didkovskaya L. G., Yashkina N. V. (2011) Strategic analysis. 3 te ed., Remaking. et al., K: Allerta, 2011. 520 p.

[74] Bayura D. O., Petruk V. V. (2014) Theoretical Aspects of Development of Strategic Planning at Enterprises in the Conditions of Market Instability. Scientific Works of NSFI, 2014. Vol. 2 (67). – P. 153-158.

[75] Porter E. Michael (2005) Competitive Strategy: A Method for Analyzing Industries and Competitors; Trans. with English. M.: Alpina Business Bux, 2005. 454 p.

[76] Zhalilo Ya. A. (2009) Theory and practice of forming an effective economic strategy of the state: monograph. K.: NISD, 336 p.

them is selected, or the developers go back to the previous stage if none of the proposed variants was accepted. Once the development strategy is approved, the stage of its implementation begins, but the development of the strategy should not end there, it should be constantly adjusted to the changes that have occurred, and if necessary, promptly prepare a new version of the development strategy, laying in it the associated transition from the old version.

Ukraine's entry into the world economic space is seen as a new stage of development of the country, which should position itself as a state with an open economy, while at the same time protecting its internal market with acceptable methods. On the whole, the prospects for the agro-industrial complex of Ukraine will depend on the successful formation of conceptual bases of the strategy of development of the agrarian sector..

The agrarian sector of the national economy is regarded as a driving force and one of the main areas of implementation of the sustainable development concept.

The development of the agro-industrial complex is a large-scale task for Ukraine and is based on the implementation of different strategies: environmental, investment, innovation, integration, marketing, foreign economic strategies[77].

The ecological strategy is aimed at ensuring ecologically balanced development of the agricultural sphere of production, restoration of natural systems. It is an integral part of the overall competitive strategy, complementing and operating in conjunction with food strategies. The main tasks are to achieve positive changes in the safety and quality of food, to prevent soil degradation, water and air space, to promote the conservation of natural resources, to reorient the agrarian sector to the ecological vector of development. The result of the implementation of this strategy is a balanced use of natural resource potential; implementation of a unified policy on the rational use of natural resources and their reproduction; ensuring environmental security as a component of national security; implementation of international environmental agreements; integration of environmental and natural principles into sectoral and sectoral development programs; conservation of land resources; creation of technologies for the production of alternative energy sources based on agricultural raw materials; minimizing the adverse impact of production processes on the environment by stimulating the introduction of energy-saving technologies[78]. The main strategic goal of the investment strategy is to achieve economic growth and sustainable socio-economic development through the implementation of a number of scientifically sound strategic and tactical objectives.

The formation of an effective economic mechanism to regulate the investment development of the agricultural sector as a driving force of socio-economic progress is considered as one of the most important components of the process of ensuring competitiveness in the context of the impact of the processes of globalization of the world economy, integration of Ukraine into the EU and systemic crises in the national economy. The implementation of this strategy envisages expansion of directions and sources of financing, reorientation of investment demand, improvement of forms and methods of investing, selection of the most progressive ones that take into account the interests of all parties, maximize their expected benefits and minimize and distribute risks.[79].

The aim of the innovation strategy is to achieve economic, organizational and social impact through the introduction of state regulation mechanisms. The most important of them are:

- raising to a reasonable level the volume of state support for scientific research and mastering their results in agricultural production;

- establishment of a national system of information and advisory services for farmers on the availability and feasibility of using agronomy;

[77] Zavadiak R. I., Popovich V. V., Tsitsak L. M., Didovich Yu. O., Fedorovich O. A. (2010) Strategy as a Central Element of Strategic Management. Scientific Bulletin of Uzhgorod University. – Uzhgorod, 2010. Vol. 31: Series: Economics. P. 154-158.

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- formation within the national agrarian innovation system of effective infrastructure (in particular, special agro-economic zones, agro-technical parks, agro-logistic complexes, information centers, etc.);

- formation of a system of training of specialists of the branch, capable to perceive and effectively put into practice the latest developments[80].

Implementation of agro-innovations implemented in the agrarian sphere provides growth of economic, environmental and social effects. The peculiarity of agro-innovation is the use in the innovation process of natural factors and components, which in this case act as direct objects of agro-innovation activity. In this context, the main tasks of an innovative strategy for the development of the agricultural sector are its technical and technological modernization, ensuring resource conservation in the industry, improving the quality characteristics of products produced, improving the environmental component of agricultural development.

Important in ensuring the development of the agro-industrial complex of Ukraine is the formation of the image of the state through the implementation of an appropriate strategy, the main tasks of which is to overcome the negative perception of Ukraine in the world, the formation and promotion of a unique image, brand. The competitive advantages of development include natural products that can be easily obtained in any village. The foreign economic strategy prioritizes attracting foreign investment and business development not only with traditional partners and leading countries of the world, but also reorientation to the needs of other trade relations agents.

The main tasks include:
- formation of optimal commodity and geographical structure of export of products;
- expanding the nomenclature of exports and increasing the production of the most competitive products in the world agri-food markets;
- neutralizing the risks of geographical diversification;
- preservation of traditional and attraction of new perspective markets of production.

In Ukraine there is no single clear strategic program for the development of the agro-industrial complex. However, there are a large number of approved agreements, programs and strategies that address the development of exports of agricultural products. Section 4. "New Economic Policy" of the Program of activity of the Cabinet of Ministers of Ukraine for 2015-2020 provides actions for active promotion of export and protection of the internal market:
- maximizing the benefits of the free trade regime with EU Member States;
- signature of free trade agreements with Canada, Turkey, Israel, the Gulf Arab Cooperation Council, and the West African Economic Community (by 2018), taking into account national interests;
- offensive policy by the Trade Representative of Ukraine;
- double the volume of exports of domestic production by 2019.

The Ukraine 2020 Strategy for Sustainable Development envisages the implementation of 62 reforms and government programs. Among the reforms and programs that have the greatest impact on the development of the export potential of the agro-industrial sector, the following should be noted:

Reform of the state customs and integration into the customs community of the European Union;
- Agriculture and fisheries reform;
- Land reform;
- Tax reform;
- Ukrainian Export Development Program;
- Ukraine branding program.

The Ministry of Agrarian Policy and Food (Ministry of Economic Development, Trade and Agriculture) of Ukraine has developed a single comprehensive strategy for the development of

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[80] Concept of the State Target Program for the Development of the Agricultural Sector for the Economy until 2020 (Project) [Electronic resource]. Official Website of the Ministry of Agrarian Policy and Food. – Access mode: http://minagro.gov.ua/apk?nid=16822.

agriculture by 2015-2020. The purpose of the State Target Program for the Development of the Agricultural Sector for the Economy until 2020 is to create organizational and economic conditions for effective socially oriented development of the agricultural sector, stable provision of high quality and safe domestic agricultural products and industry with agricultural raw materials, production of high value added products, and high value added. in the world market of agricultural products and food. This strategy defines that the development of the agricultural sector of the economy can occur in two ways.

The first option is characterized by insufficient funding for the development of the agricultural sector, declaration of social, economic and environmental measures, in the absence of real mechanisms for their implementation. Provided that this option is implemented, the main problems of agricultural production development, including its integration into the world economic space, the formation of an efficient, socially oriented agricultural sector of the state economy, and the destructive processes of social infrastructure in rural areas are not ensured.

The second option involves identifying, developing and implementing the directions of development of the agricultural sector of the economy based on optimization of its production and social infrastructure, increasing the competitiveness of agricultural production, increasing its volume, improving the quality and safety of agricultural products, environmental protection and reproduction of natural resources, increasing the level of employment in rural areas, creating new jobs.

The second option is optimal, which will allow the agricultural sector of the economy to meet the needs of the internal market and secure a leading position in the world through stable export of agricultural products and products of its deep processing.

According to the estimates of the Ministry of Economic Development, Trade and Agriculture, the implementation of the State Target Program for Development of the Agrarian Sector will enable to ensure:

- increase in production of gross agricultural products by households;
- cessation of economic use of ecologically dangerous and economically inefficient land for a fixed term and their afforestation or afforestation;
- creation of a national seed and nursery system with efficient export potential;
- improving the breeding and productive qualities of animals;
- establishment of a state register of farm animals;
- increase in consumption of basic foodstuffs by 3-7 percent;
- ensuring efficient use of fisheries water bodies for fish production in aquaculture and bringing the total production of fish and other aquatic bioresources up to 130 thousand tons per year;
- increase in food production by 6-8 percent, including baby food by 9 percent;
- prevention of infections and protection of the population and territories in case of their occurrence;
- reduction of consumption of traditional energy resources by 8-10 percent;
- expansion of the base of formation of own financial resources and improvement of conditions of access to external sources, as a result of which the available volumes of financial resources will increase by 5-7 percent, and their cost will be reduced by 2.5-3 percentage points;
- improvement of the system of state support of agricultural production, ensuring its transparency;
- increasing the share of rural households engaged in value-added chains in the corporate sector;
- increase in the number of farms with annual sales of agricultural products in the amount equivalent to $ 1 thousand. USA;
- saturation of the domestic market with high quality agricultural products at affordable prices;
- raising the average monthly wage of agricultural workers to the average level by economic sectors;

- creation of an effective information and marketing system;
- annual growth of export of domestic agricultural products up to 3-4 percent;
- increase of export opportunities of the food and processing industry of Ukraine due to the production of deep processing produced with the use of the latest innovative parameters, in particular, in the EU market by 5-7 percent.

The results of the analysis of the current state of Ukraine's export activity make it possible to determine the key task of state policy in the sphere of foreign economic activity to create an effective export support system that will ensure the sustainable development and realization of the country's export potential. The strategic goal of state support for exports is to strengthen Ukraine's position in the world markets for high-tech products, diversify supplies and ensure the competitiveness of domestic products in foreign markets through the effective use of economic, legal and political levers of influence.

It is worth noting that strengthening the cooperation of Ukraine in the agricultural sector is one of the main directions of the export support strategy. Implementation of the Export Development Strategy of Ukraine provides for:
- implementation of special export support programs at the expense of the state and local budgets, other sources, etc. taking into account the WTO norms and commitments made by Ukraine at the WTO accession;
- improvement and development of financial instruments to support Ukrainian exporters;
- functioning of effective export insurance and credit systems aimed at creating conditions for increasing volumes and increasing the share of exports of high-tech products (engineering, aviation and space, defense-industrial complex, etc.);
- reducing the risks associated with exporting Ukrainian goods and services;
- financing and insurance of export operations at the expense of public and private funds;
- assisting Ukrainian exporters in facilitating access to the markets of WTO member countries;
- implementation of systematic measures aimed at preventing the application of restrictive measures to domestic producers in the foreign market;
- creation of new markets for Ukrainian products, in particular in the countries of the Middle East, Africa, Latin America and the Asia-Pacific region;
- participation in the development and improvement of a system of world trade-oriented rules and requirements for WTO negotiations;
- support of Ukrainian exporters at the highest level of bilateral and multilateral negotiations and consultations;
- effective protection of interests of Ukrainian enterprises abroad;
- creating additional competitive and / or political benefits for Ukrainian exporters.

It is also advisable to take into account the agreed priorities of the EU Common Agricultural Policy for 2014-2020 in the formulation of national agrarian policy and regulation of agricultural practices, standardization of schemes and mechanisms of state support for agricultural producers. Focusing the development of Ukraine's agrosphere on the latest priorities identified by the European Community will update the principles of domestic agriculture, will allow to suspend the strengthening of disadvantaged socio-ecological processes in this area.

The most important direction of development of the national economy of Ukraine is the development of export potential of the agro-industrial complex. The agrarian sector of the Ukrainian economy has high potential, which can be strengthened by improving the mechanisms of distribution and utilization of resources in the industry and increasing the efficiency of inter-branch communications, which will allow to enter the foreign market. The agrarian sector of Ukraine, the basic component of which is agriculture, which forms food and within certain limits economic, environmental and energy security, ensures the development of technologically related sectors of the national economy and creates socio-economic conditions for rural development.

Ukraine's agriculture is not only a supplier of foodstuffs for the population and raw materials for processing enterprises, but also an important source of foreign exchange earnings to the country,

and forms the basis of Ukraine's foreign trade. As the global food problem intensifies and the search for ways to solve it intensifies, the role and importance of world trade in agricultural products and food is increasing. For Ukraine, with its strong agro-industrial potential, favorable natural and climatic conditions, vast area of agricultural land, developed transport network and other favorable factors, foreign trade activity on the world market of agricultural products can become the basis for overcoming the economic crisis. Given that the dynamics and effectiveness of export transactions with agricultural products depends to a large extent on the global agricultural market, the relevance of the analysis of these processes and the search for sources of increasing export volumes is increasing.[81].

During 2012-2018, there was a reduction in the export of goods with a simultaneous decrease in the export of agro-industrial products. Based on data from the State Statistics Service of Ukraine in 2018, there was an increase in exports, including agricultural products, compared to 2017. In 2018, total exports amounted to $ 47.3 billion. United States, up 9.2% from 2017. As of the first half of 2019, total exports of products from Ukraine amounted to $ 23.3 billion. USA, which is 3% less than in the same period last year. The dynamics of the agrarian sector showed a similar trend as the rest of export commodities, but the rate of decline in agri-food exports was lower than the general one and despite the decline after the crisis years of 2012 and 2013.

The record volume of agri-food exports in 2018 was $ 22.2 billion. USA. The share of agricultural products and food in total Ukrainian exports is 29.7% in 2012 and 46.9% in 2018. Since the beginning of the two thousandths, the value of exports of Ukrainian agricultural products has increased fourfold (from $ 4.3 billion in 2005 to $ 22.2 billion in 2018), and its share in the structure of exports of goods has tripled. (from 12.5% to 46.9%) (Fig. 1)[82]. Total exports of goods from Ukraine over the period decreased by 31.25%, due to unfavorable global market conditions, changing priorities for foreign trade partnerships, reducing cooperation with historically priority importers, increasing foreign market requirements for quality of domestic products, strengthening foreign exchange controls over import operations.
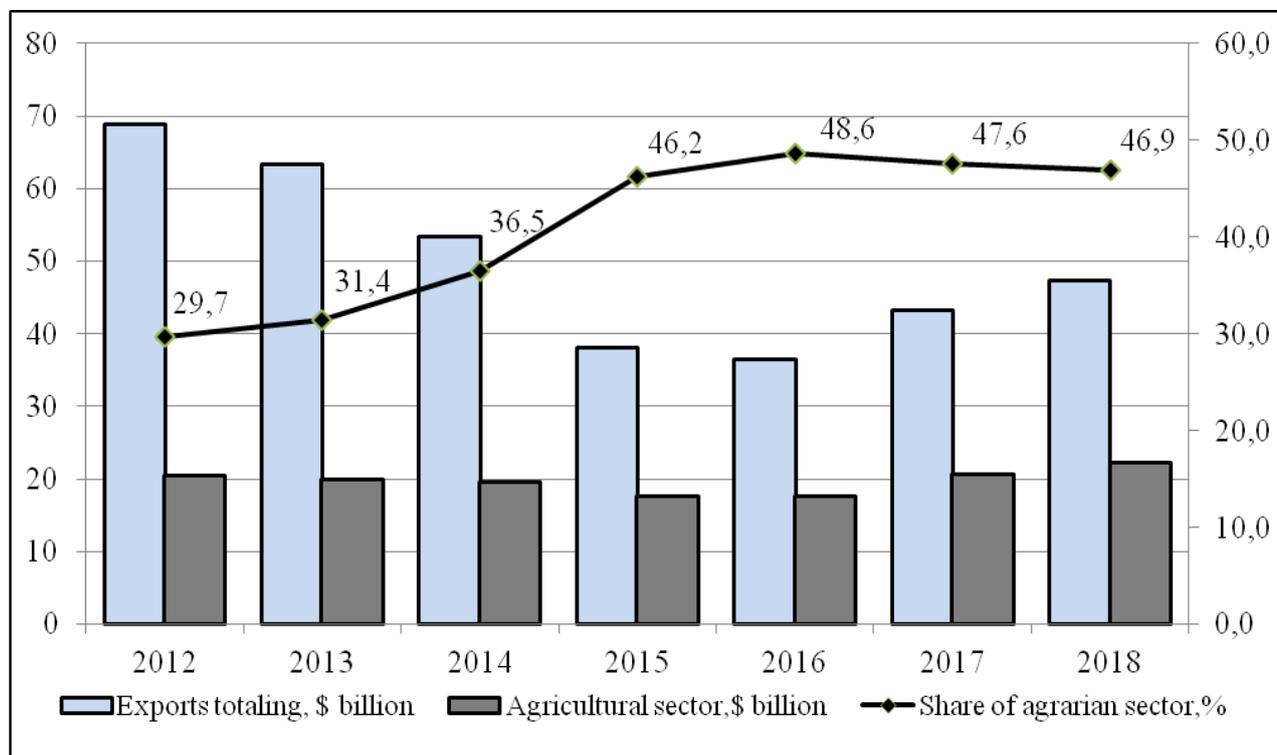

Fig. 1. Dynamics of Exports and Agricultural Sector of Ukraine, 2012-2018

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[81] Matalka S. M. Managing the efficiency of foreign economic activity of enterprises: a monograph. Lugansk: Nowledge, 2011. – P. 47.
[82] Official site of the State Statistics Service of Ukraine. URL: www.ukrstat.gov.ua.

Imports for the development of the economy of the state are also of great importance for the import of goods, which ensures filling the national market with scarce goods; access to cheap and high quality finished products, raw materials, assemblies and components; Establishment of stable industrial relations in cooperation with foreign partners; introduction of new technologies through expansion of import of high-tech goods; increasing competition and stimulating increased production in the national territory[83].

Instead, the dynamics of agricultural imports to Ukraine have not undergone significant changes in volume and structure, such as agricultural exports. In 2018, the share of imports of agricultural products and food to Ukraine in the total volume of imports amounted to 8.6% (in 2005 – 7.5%), and the total value of imports decreased for the period 2012-2018 from 8.3 to 4, $ 9 billion USA. The volume of agricultural imports to Ukraine is 8.49% lower than the volume of total imports and less than the volume of exports (Fig. 2). In general, the analysis of the structure of imports is characterized by a narrowing of its product range, which is due primarily to a decrease in household incomes, its purchasing sentiment, a decrease in the need for high-tech imports caused by devaluation processes, intensification of protection measures, and aggravation of military conflicts in the industrial conflict territories. The balance of foreign trade in agricultural products has remained positive for many years, while the total value of all imported goods, in the vast majority of periods, exceeded their export volume.

In particular, according to current data, in 2018, the overall balance of foreign trade in goods is negative ("-" $ 9.6 billion), while the agricultural balance is positive ("+" $ 13.6). The influence of geographical orientation of foreign trade on economic growth can be found in a wide analytical range: dependence of trade volumes and structure on distance to the trading partner country, traditional economic and socio-political ties, openness to investment from a certain region, intensity of scientific and technical cooperation etc[84].
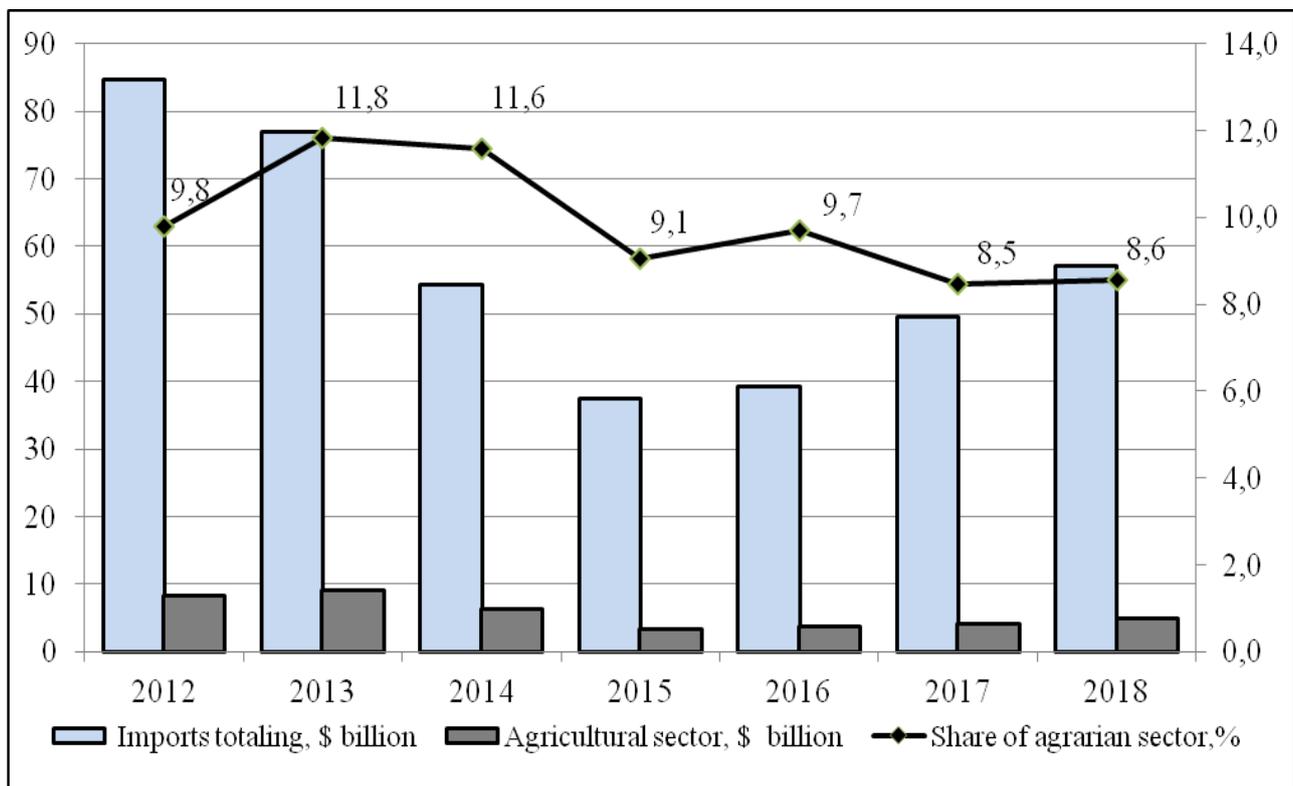

Fig. 2. Dynamics of Imports and Agrarian Sector of Ukraine, 2012-2018

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[83] Dyba O., Osadchy E. (2014) The Impact of Globalization on the Socio-Economic Situation of Ukraine. The Securities Market of Ukraine. 2014. Lov. 7. P. 19-28.
[84] Foreign Trade of Ukraine in Goods and Services in 2018: Stat. Sat. / [for edit A. O. Frizorenko]. K.: State Statistics Service of Ukraine, 2018. 155 p.

Foreign trade deficit and overall GDP decline are also the result of changes in the geographical structure of international trade. The main instrumental factor in the effectiveness of geo-economic development of the countries of the world is the diversification of exports on the modern technological basis. The disadvantages of the structure of the national economy is the prevalence of commodity industries, so the gradual complication of the technological structure of exports is favorable to accelerate the dynamics of its development.

EU countries remain Ukraine's largest trading partners (Tab. 1.). The share of these countries in Ukraine's foreign trade in goods and services in 2018 amounted to 18.8%. The share of European countries in Ukraine's foreign trade in goods and services in 2018 was the share of Asian countries in Ukraine's foreign trade in goods and services made up 12.8% in 2018. In 2018, foreign trade in goods and services with Turkey increased by 7.7% ($ +332.9 million) and amounted to $ 4.6 billion externally foreign trade in goods and services with China in 2018 increased by 27.3% (+2.2 billion USD) and amounted to 10.1 billion USD.

Table 1. Ukraine's main trading partners in export of goods in 2018

Country	Exports of goods, billion USD	Share of the country in total goods,%	Growth rate 2018 to 2017,%
CIS countries	7	6,5	1,4
Europe	20,6	19,1	15,1
EU countries (28 countries)	20,2	18,8	15,4
Asia	13,8	12,8	6,2
Africa	4,1	3,8	2,5
America	1,6	1,5	33,3
Other countries in the world	40,3	37,5	11,0

The geography of agricultural supply over the last decades has significantly expanded, and today Ukrainian food is, in one way or another, represented on all continents of the planet. However, the main connoisseurs of products from Ukraine are the countries of Europe and Asia. The geographical structure of deliveries of the most common types of Ukrainian food is shown in Figs. 3.
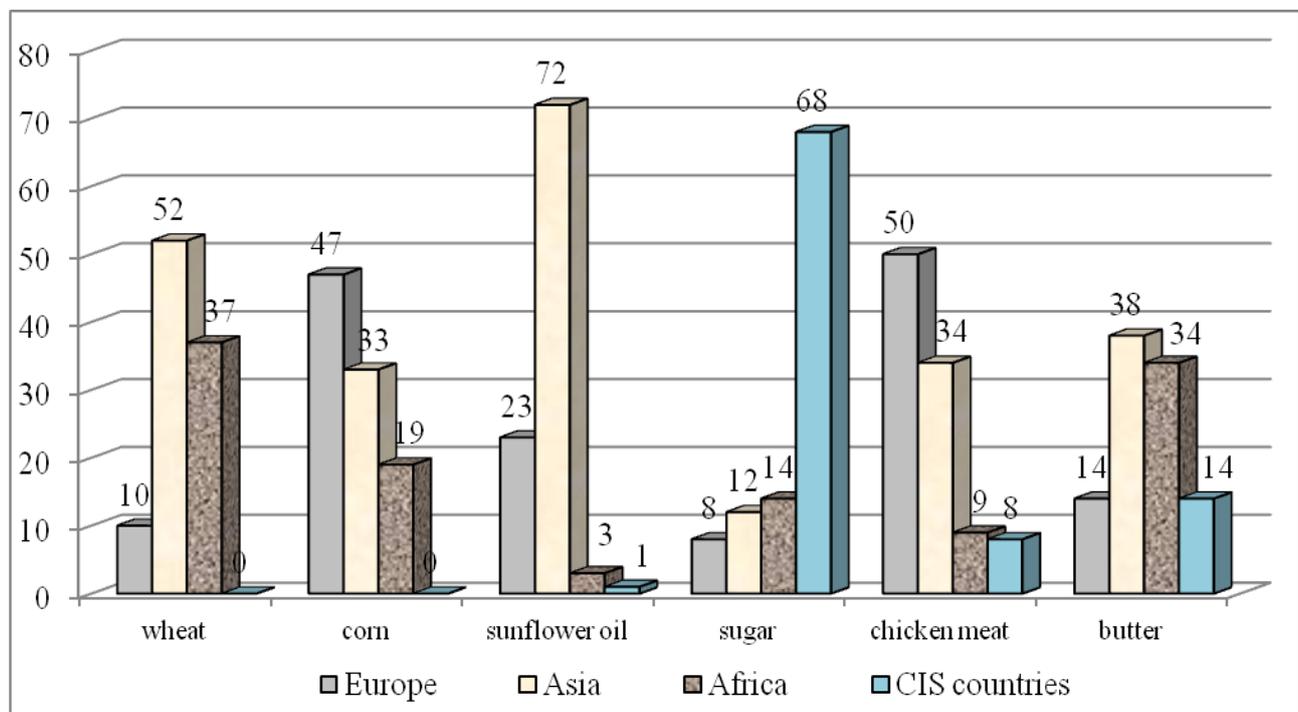

Fig. 3. Geographical structure of agricultural exports in 2018

Positives of Ukraine's foreign trade are: stable positive balance of export-import of services, reduction of the share of trade with the CIS countries due to the expansion of operations with other countries: Europe, first of all with the countries of the EU, Asia, Africa. Ukraine will have the opportunity to increase duty-free exports to the EU of wheat, corn, barley, oat and barley cereals and pellets. This proposal will also promote duty-free exports to the EU of more tomatoes, natural honey and grape juice. Exporters of industrial products also benefit from these trade preferences. In particular, they are Ukrainian manufacturers of footwear, fertilizers, aluminum products and consumer electronics.

In Ukraine, there are a number of factors that impede the strengthening of the competitiveness of agricultural products in foreign markets, the main ones being: low level of development of the financial and credit system, underdevelopment of insurance against industrial and credit risks, underdevelopment of agro - industrial infrastructure, which increase the cost of production. Ukrainian agricultural products are of poor quality and as a result the prices for them are decreasing[85].

To strengthen foreign trade security in the agrarian market in Ukraine, it is necessary to provide conditions for increasing the competitiveness of agricultural products: to create conditions for expanding integration and technological links between agricultural producers and food processing enterprises to form complexes that unite in a single technological chain grain production, pig production, cattle production and processing of raw materials into food products with high export preparedness; provide information support to investments in agricultural production development, simplify the process of registration of agricultural investments and provide guarantees of protection of land use to investors. Despite the growing volume of Ukraine's trade with the EU, the share of trade in agricultural products with Ukraine in the total foreign trade turnover of the EU countries remains extremely small.

The main products of Ukrainian export are cereals and oilseeds. The total value of all imported goods, in most periods, exceeds their export volume. On the whole, geographical and commodity structural shifts in Ukraine's foreign trade reflect the reorientation of exports and imports to more developed markets, which, on the one hand, widens the potential for increasing foreign trade turnover and, on the other, leads to increased competition, new procedural barriers. of high quality requirements. The main measures to strengthen the position of domestic agricultural products in foreign markets are the development of marketing infrastructure, state support and expansion of sources of financing, improvement of price relations for agricultural products and other sectors of the economy, regulation of land relations. Further research needs to attract investment to implement projects in the agro-industrial complex, which will be aimed at stimulating the production and export of agricultural products with maximum added value.

The largest importer of agricultural products from Ukraine is EU countries ($ 4.55 billion). The most exported products to these countries are cereals ($ 1.71 billion), vegetable oils ($ 1.48 billion) and industrial seeds ($ 1.1 billion). The EU countries that import Ukraine's most agricultural products are the Netherlands, Spain, Germany, Italy, Poland and Belgium. India in 2017 was the largest importer of agricultural products from Ukraine. Total exports to India amounted to $ 1.85 billion. The export of sunflower oil alone amounted to $ 1.58 billion. USA. The next most exported Ukrainian agricultural product is Egypt ($ 1.17 billion). Egypt mostly imported cereals ($ 0.83 billion), industrial seeds ($ 0.16 billion), vegetable oil ($ 0.10 billion) and animal products ($ 0.07 billion) United States). In 2017, China imported agricultural products from Ukraine for $ 1.03 billion. USA. In the commodity structure, China's largest exports were vegetable oil ($ 0.51 billion) and cereals ($ 0.45 billion). It should be added that in recent years, there has been a negative trend in the export of agricultural products from Ukraine to China, so in 2015, grain exports amounted to $ 0.68 billion. USA.

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The largest importers of wheat from Ukraine were: Egypt ($ 438.3 million), Indonesia ($ 327.8 million), Bangladesh ($ 308.8 million), India ($ 257.3 million), the Philippines ($ 135.7 million), Tunisia ($ 132.3 million) and the Philippines ($ 102.9 million). Egypt remains the largest importer of Ukrainian wheat since 2011. Indonesia is growing its imports of wheat from Ukraine every year, with exports amounting to $ 64.4 million in 20113. USA, that is 5 times smaller. Bangladesh is also the country that is increasing its imports of Ukrainian wheat, which in 2013 was ranked 7th among importers with import volumes of USD 75.6 million. USA. It should be added that India started importing Ukrainian wheat only in 2017. The largest importers of rye were countries such as Poland (US $ 1.1 million), Spain (US $ 0.8 million), Bangladesh (US $ 0.6 million), Indonesia (US $ 0.5 million) and Belarus ($ 0.4 million). Spain started importing Ukrainian rye only in 2014 and immediately became its largest importer – $ 5.1 million. However, in 2015, exports of rye to Spain significantly decreased (17 times). Before Bangladesh, Ukraine started exporting rye only in 2015, and to Indonesia in 2017. Barley Ukraine exports most to Saudi Arabia (US $ 295.2 million), China (US $ 123.9 million), Libya (58.4 thousand tonnes), Turkey (US $ 34.4 million) and Israel ($ 27.1 million).

It is noteworthy that the share of barley exports to Saudi Arabia is 42% of total barley exports. USA. Ukraine started exporting barley to China in 2014 alone – $ 38.1 million. US, the growth rate of barley exports to China is 325%. Oats Ukraine exports mainly to Pakistan ($ 0.6 million), the Netherlands ($ 0.1 million) and Germany ($ 0.1 million). It should be noted that in 2015, oat exports to Pakistan amounted to $ 4.8 million. US exports, ie exports to Pakistan have decreased by 8 times. The Netherlands started importing Ukrainian oats only in 2017, and Germany in 2015 – $ 0.01 million. The US has increased imports by 10 times.

The largest corn importer from Ukraine was the Netherlands – $ 435.6 million. USA. The Netherlands has increased its imports of Ukrainian corn almost twice compared to 2015. Egypt was the second country in terms of imports – $ 394.5 million. The following are: Spain ($ 336.5 million), China ($ 323.3 million). China started exporting corn only in 2013 ($ 26.1 million), so exports increased 12-fold. Corn exports to Italy totaled $ 265.1 million. USA. It should be added that the growth rate of corn exports to Italy was 590%. In 2016, SGS Group (Switzerland) presented the grain quality requirements of some exporting countries, including the EU, Egypt, Indonesia, Israel, Bangladesh. According to the study, the quality of Ukrainian corn has improved in recent years. The moisture content in August 2015 was 13.9 versus 14.2 in August 2014, the amount of impurities decreased from 2.89 to 1.72, and in the analysis of exported corn it was found that none of the lots examined contains GMOs greater than 0, 1%, and more than 15% of corn does not contain GMOs at all. Buckwheat in 2015, Ukraine exported most to Poland ($ 1.6 million), Germany ($ 1.4 million), and South Africa ($ 1.4 million).

The positive is that exports of some crops are increasing every year. For example, oat exports grew 3.5 times in 2018 compared to 2012, rye 1.5 times, wheat 1.2 times, buckwheat 1.1 times. Therefore, it is understandable that Ukraine is increasing its export capacity in this field every year and is also significantly reducing its import volumes. In the commodity structure of exports, animal products account for 3.2% of the total. Azerbaijan is the main importer of Ukrainian beef – $ 20.2 million. The share of beef exports to Azerbaijan is 17% of total beef exports in Ukraine. Also Kazakhstan ($ 18.6 million) and Belarus ($ 17.6 million). In Ukraine, beef production is declining every year, due to a lack of production due to low demand and domestic prices. Therefore, the opening of EU markets for Ukraine could be a stimulating factor for the production of these products. Ukraine has not yet received a permit to export beef and pork to EU countries, although duty-free quotas for beef exports of 12,000 tonnes have been set within the EU's Free Trade Area.

The largest pork importers are Georgia ($ 6.1 million) and China ($ 2.1 million). However, pork exports decreased 5-fold compared to 2012. The largest poultry meat importers from Ukraine in 2018 were: the Netherlands ($ 78.3 million), Egypt ($ 65.2 million), Iraq ($ 42.8 million), Germany ($ 7 million) and China ($ 21.0 million).

On the plus side, Ukraine has been authorized to export poultry meat to EU countries, but a high import duty on poultry meat does not allow chicken producers to enter EU markets with

volumes exceeding the very limited quota allocated to them – 16,000 tonnes. Ukraine exports most dairy products to Kazakhstan ($ 40.5 million), Morocco ($ 28.2 million) and Georgia ($ 18.7 million) to Moldova ($ 14.5 million) and Azerbaijan ($ 12.5 million). In 2017, Ukraine entered new markets such as Qatar, Saudi Arabia, Morocco. Since January 2016, Ukrainian producers have the right to export dairy products to the EU, but the share of this market is quite small.

Exports of eggs from Ukraine decreased 1.5 times. The largest egg importers from Ukraine are the United Arab Emirates (US $ 29.6 million), Iraq (US $ 11.9 million) Qatar (US $ 5.0 million), Sierra Leone (US $ 3.5 million) Liberia ($ 3.1 million). It is worth noting that the UAE is increasing its exports of eggs every year from Ukraine.

Aggregate exports of honey increased more than 4 times. In 2018, Ukraine exported natural honey to 43 countries. Germany's largest honey importer in 20187 was $ 34.2 million. United States, followed by the United States ($ 27.0 million), Poland ($ 21.8 million), France ($ 10.9 million), Belgium ($ 8.2 million), Spain ($ 6.5 million), Turkey ($ 4.0 million), Denmark ($ 3.8 million), Italy ($ 3.0 million). Ukraine ranks second in terms of honey exports in Europe after Germany and fifth in the world. A positive trend is observed in the export of vegetable oil. For several years, Ukraine has been the world's largest exporter of sunflower oil; in 2018, its exports amounted to $ 4,309.0 million. The United States, accounting for almost 40% of the world's sunflower oil exports. The largest importers of sunflower oil were: India, China, Spain, the Netherlands, Italy, Iran, Turkey and Egypt. It should be added that sunflower is the most marginal crop. There is a tendency to increase the processing of oilseeds, so in the current processing capacities 98.8% of the sunflower crop, 22.8% of rapeseed, 37.1% of soybean were processed this year.

Ukraine is not on the list of the world's largest exporters of agro-industrial products, but the increase in production capacity (production of agricultural products in recent years is decreasing) and entering new markets, full realization of export potential can significantly strengthen the position of Ukrainian producers in foreign markets. The task of this task may be to increase the output of crop and livestock production, provided that crop yields and livestock productivity are increased. The processes of formation and functioning of the agricultural market cannot be considered outside the context of European integration, which creates new opportunities for farmers in terms of providing preferential trade regime, overcoming tariff and non-tariff barriers, diversifying exports, accessing resources and more.

Thus, much attention is paid today to the European course of foreign economic activity of Ukraine both at the micro level and at the state level. Our research shows that Ukraine has significantly increased its exports to the EU after the signing of the Agreement. The European Union remains the largest importer of agricultural products from Ukraine. Although the Deep and Comprehensive Free Trade Area Agreement with the EU entered into force in January 2016, unilateral European preferences came into force from the end of April 2014, thus, in 2014, Ukrainian agricultural producers managed to save EUR 220 million in unpaid duties under the quota and in 2015 – EUR 280 million. As a result, the share of agricultural exports to EU countries was 28.2%.

For many products at the current stage of development of the respective industries, the problem is not so much the extremely limited annual quotas as the inability to meet the quality and safety requirements for EU export licenses. No less important is the region of Central Asia in terms of foreign trade relations in the agricultural sector. Central Asia is one of the largest importers of agricultural products in Ukraine. Our analysis shows that in recent years Ukraine has managed to increase its presence in these very promising markets. The attractiveness of increasing exports of agricultural products of Ukraine to this region is to increase the solvency of Central Asian countries, relatively fast transportation of products, as well as growing demand and the inability to meet its own resources. Also, the North African region is attracting Ukraine's attention, due in large part to its rich hydrocarbon reserves and good geographical location. North African countries are the richest in the continent. The geographical proximity to Europe led to their close socio-economic ties

with European countries. The increase in agricultural imports has led to the increase in demand for food in North Africa and the inability to meet its own resources, as well as an increase in the solvency of the region's population.

It is important for Ukraine and its agricultural sector to expand its external markets for agricultural products. In this regard, taking into account the results of our study, it is not in doubt that it is advisable to intensify cooperation with the countries of the North African region. Moreover, this activity is not linked to the introduction of various restrictions and procedures, such as those required by EU countries. Therefore, there are now prerequisites for expanding exports of Ukrainian agro-industrial products to the markets of North Africa. This is facilitated by the relative geographical proximity of Ukraine to the countries of the region, and thus the relatively rapid transportation of Ukrainian products, as well as the more favorable conditions for export.

Therefore, Ukraine is an active participant in world trade, so there are problems in optimizing the mechanism of institutional regulation of agricultural production in accordance with European standards. Ukraine needs to form new institutions for implementing market regulatory mechanisms. Adaptation of the domestic agrarian market to the modern landmarks of the globalization economy implies activation of the whole set of factors aimed at effective support of the industry, introduction of significant changes in the foreign trade policy of protection of producers, in accordance with the WTO and aimed at opening multifunctional agriculture[86]. It is possible to characterize the tendencies of state support of agriculture in individual countries based on the data of the Organization for Economic Cooperation and Development. For the most accurate comparison of state support for agriculture in different countries and Ukraine, an approach has been chosen, which compares indicators not in absolute terms but in percentages to other indicators. Namely: an estimate of the support of farmers (PSE) to the total revenue of farmers; General Services Support Assessment (GSSE) to Aggregate Agriculture Support; transfers to producers from consumers of agricultural products (CSE) to the value of consumed products at domestic prices; total agricultural support (TSE) to gross domestic product.

Table 2. Dynamics of evaluation of support of agricultural producers (PSE)
of Ukraine in comparison with individual countries

Country	2011	2012	2013	2014	2015	2016	2016 deviation from 2011, (+, -)
Ukraine	-1,91	1,5	-3,18	-8,22	-7,53	-9,46	-7,55
Russia	14,87	15,28	11,58	8,88	12,21	16,07	1,2
EU (28 countries)	18,35	19,13	20,47	18,36	19,14	20,99	2,64
USA	8,02	7,89	6,91	9,8	9,59	8,71	0,69
Japan	51,35	55,08	52,56	49,2	44,07	48,05	-3,3
China	10,31	17,84	19,49	20,21	15,67	14,51	4,2
Australia	3,12	1,97	2,07	2,27	1,81	1,95	-1,17
Canada	14,98	13,94	10,58	8,98	8,44	10,74	-4,24
Brazil	5,61	3,55	3,02	4,39	2,56	4,86	-0,75

The basic principles of state support are aimed at ensuring the sustainable development of the agricultural sector national economy, consistency and complexity implementation of state agrarian policy by local authorities self-government and state executive bodies. State support is based on national support priorities and is consistent with Ukraine's integration into the EU and the world's only economic space. The main elements of the state support system are a set of organizational, economic and legal measures, that are designed to improve performance agrarian sector of the economy, providing comprehensive and sustainable rural development, decoupling problems of social infrastructure[87].

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The Producer Support for Agricultural Producers (PSE) reflects all transfers to producers, both from consumers and from taxpayers. Includes direct budget payments and MPS. In Ukraine, PSE has been negative since 2011, so in 2016 PSE is -2 536.1 million USD, and in relation to the gross income of agricultural producers is -9.46%. Consequently, direct budget transfers are not directed to the benefit of agricultural producers. In addition, a sharp decline in this indicator in 2014 may be caused not only by a decline in government support, but also by macroeconomic factors, in particular the depreciation of the national currency, which has caused a significant gap between domestic and world agricultural prices. As can be seen from the table, in the EU countries, PSE accounts for about 20% of agricultural producers' revenues, nearly 10% in the US and 50% in Japan.

The Consumer Support Index (CSE) is a general indicator of the impact of government support measures on agricultural conditions on agricultural consumption. In absolute terms, it represents the annual cost of transfers to consumers of agricultural products, and in relation to the value of consumed products - the rate of implicit tax (in the case of negative value) or subsidizing consumers (in the case of positive value). In Ukraine, the CSE indicator has been positive since 2011. The PSE and CSE indicators clearly reflect the state's implementation of policies towards producers and consumers, indicate how much the state balances and aligns the interests of producers and consumers in the agri-food market.

Table 3. Dynamics of support for agricultural producers (CSE)
of Ukraine compared to individual countries

Country	2011	2012	2013	2014	2015	2016	2016 deviation from 2011, (+, -)
Ukraine	3,44	3,09	5,63	12,78	11,34	14,54	11,1
Russia	-14,44	-10,75	-6,84	-5,08	-9,29	-15,77	-1,33
EU (28 countries)	-2,74	-4,34	-5,79	-3,63	-4,0	-5,53	-2,79
USA	15,43	14,62	17,77	14,53	6,33	17,74	2,31
Japan	-44,24	-47,77	-43,12	-41,99	-38,57	-41,28	2,96
China	-6,79	-15,27	-17,06	-18,99	-12,12	-11,16	-4,37
Australia	0						0
Canada	-13,9	-15,81	-13,48	-8,83	-9,15	-11,67	2,23
Brazil	-3,6	-2,24	-1,35	-0,27	0,81	-1,81	1,79

Comparing Ukraine with other countries, it can be observed that in Ukraine in recent years PSE has acquired a negative value and CSE is positive, that is, state support is directed at consumers of agricultural products, while at the same time, in other countries, the opposite is true. effect (in the US, state support policies target both consumers and agricultural producers).

Table 4. Dynamics of General Services Support Assessment (GSSE)
of Ukraine in comparison with individual countries

Country	2011	2012	2013	2014	2015	2016	2016 deviation from 2011, (+, -)
Ukraine	-971,6	58,1	-89,0	-11,3	-	-	971,6
Russia	17,7	11,6	19,7	16,3	14,12	12,50	-5,2
EU (28 countries)	15,4	13,7	13,3	14,3	11,34	9,78	-5,62
USA	6,9	7,0	11,9	8,2	11,47	10,53	3,63
Japan	17,2	15,0	16,3	15,2	18,29	17,31	0,11
China	17,3	11.6	11,1	10,5	17,11	14,07	-3,23
Australia	40,8	53,5	50,7	46,8	52,46	49,23	8,43
Canada	24,9	24,0	29,6	30,1	31,67	25,27	0,37
Brazil	13,9	18,4	18,6	14,0	28,48	21,66	7,76

The General Services Support Assessment (GSSE) reflects the total amount of government funding for research:
- in the field of agricultural development;
- agrarian education;
- training;
- innovation; inspection and control of the quality and safety of food, agricultural resources and the environment;
- infrastructure development and maintenance;
- marketing and product promotion;
- maintenance of public institutions and financing of other general services.

These transfers do not have a direct impact on farmers' incomes and consumer spending, but they do have a comprehensive effect on agricultural development. In Ukraine, GSSE has averaged $ 150 million a year over the past 5 years. In other countries, this indicator is important in shaping overall support for agriculture.

Based on the above data, it can be observed that since 2011 in Ukraine, the GDP-related aggregate support for agriculture (TSE) has become negative, indicating that the country's ineffective strategic and tactical agricultural development policy, ie agriculture is becoming a donor to other sectors of the economy. Aggregate support for agriculture (TSE) is defined as the sum of three other indicators, namely the agricultural producer support (PSE), the consumer support index (CSE) and the general services support indicator (GSSE). It can be concluded that in developed countries, the agricultural sector is attracted by a sufficiently high level of government support. Particular attention is paid to the expenditures from the budget for the development of agricultural production. In Ukraine, the support of the agricultural sector from the state budget is characterized by a low level of budget financing.

Table 5. Dynamics of Aggregate Support for Agriculture (TSE)
of Ukraine in comparison with individual countries

Country	2011	2012	2013	2014	2015	2016	2016 deviation from 2011, (+, -)
Ukraine	-0,043	0,756	-0,406	-2,226	-2,1	0	0,043
Russia	1,007	0,865	0,772	0,575	0,84	1,09	0,083
EU (28 countries)	0,742	0,764	0,817	0,707	0,66	0,68	-0,062
USA	0,54	0,533	0,52	0,549	0,42	0,49	-0,05
Japan	1,236	1,299	1,239	1,12	1,04	1,09	-0,146
China	1,858	3,004	3,212	3,268	2,52	2,23	0,372
Australia	0,173	0,138	0,144	0,136	0,13	0,14	-0,033
Canada	0,559	0,536	0,433	0,371	0,37	0,42	-0,139
Brazil	0,554	0,38	0,339	0,468	0,39	0,6	0,046

Currently, a new technological wave is unfolding in the world economy, which will be characterized by the development of robotics; biotechnologies based on the latest developments in molecular biology and genetic engineering; nanotechnology; systems of artificial intelligence. The relevance of flexible automation of production is increasing, the volumes of the use of renewable energy sources are significantly increasing, biotechnologies will become the basis for the development of agroindustrial complex. All this creates the preconditions for the formation of a new structure of markets for the means of production and production of the agro-industrial complex.

Ukraine has considerable potential to develop agro-industrial complex at the global level. This is due to strengths such as favorable agronomic conditions, the availability of multi-sectoral infrastructure, and the availability of knowledgeable working human capital. However, low levels of wages, high levels of corruption, a high level of inflation, import dependency, the use of outdated

production methods and technologies, and the imperfection of the financial and credit system remain the main constraints to the development of the agro-industrial complex.

In our opinion, there are two possible scenarios for the development of agroindustrial complex of Ukraine at the global level. The Local Development scenario envisages the achievement of stable growth of the sector and specialization in those segments of markets where the agricultural products of Ukraine are already competitive. According to our estimates, by 2030 Ukraine may increase its share in world exports of agricultural products, by the first scenario up to 1.5% and by the second scenario by 3.5%. The main drivers of the development of agro-industrial complex of Ukraine in the scenario "Local development" will be a gradual recovery of the economy, import substitution and further development of traditional export niches. Improving investment conditions will be driven by the effects of monetary and fiscal stimulus.

The main condition for the implementation of the Global Breakthrough scenario will be to accelerate the growth of the Ukrainian economy in the medium term by increasing public investment. This scenario involves additional investment in the development of scientific and innovative activities, support for agricultural exports and stimulate consumer demand for domestic products.

The main objective of the scientific and technological development of the agro-industrial complex of Ukraine is to ensure the competitiveness of Ukrainian products in the foreign and domestic markets, primarily through the creation, dissemination and application of the latest achievements of science and technology. The realization of this goal is intended to ensure the transition to high-productive (accelerated selection, active substances for modern veterinary preparations and plant protection products, etc.), high-tech (synthetic biology, food biotechnology, functional food, etc.), resource-efficient (rational, efficient), climate adaptive (regional varieties and breeds, irrigation complexes of new generation, vertical farms, etc.) production of agricultural raw materials and products from ysokym level processing. Mass production and export of competitive, high value-added products will be possible thanks to sustained growth in labor productivity and resource efficiency.

Therefore, important conditions for the development of agroindustrial complex will be:

- overcoming the scientific and technological backlog of the domestic agroindustrial complex from the level of the leading countries of the world and cost-effective reduction of its dependence on technology imports;

- formation of an innovative system in the agroindustrial complex, which ensures the creation and development of advanced domestic developments, as well as the adaptation of imported technologies where necessary;

- priority development of basic and applied research in perspective areas (including by attracting private investment);

- increasing the availability of new technologies for small and medium-sized businesses, farms and individual producers;

- leveling of technological level of large and medium-sized industries;

- prioritizing innovation in resource efficiency, storage, processing and logistics.

This scenario calls for international cooperation to be stepped up. This will be facilitated by the interest of a number of countries with limited agro-climatic capacities in the stable supply of agricultural products, raw materials and food, the creation of agricultural production in other countries with favorable agro-climatic conditions, including in Ukraine.

The forecast of the scientific and technological development of the agro-industrial complex lays the foundation for the formation of the sectoral system of technological forecasting. This system should be geared towards meeting the sector's demanding needs, taking into account the development of key manufacturing technologies.

The main functions of the technological forecasting system of agroindustrial complex of Ukraine in the future should be:

- regular monitoring of global technological trends, identification of technological threats and opportunities, formation of scenario conditions of scientific and technological development of agroindustrial complex;

- organizing the search and analysis of information on the level and results of research and technological development of domestic and foreign agricultural organizations, including breakthrough technologies that can have a radical impact on the complex structure of agricultural markets, to change the demand for agricultural products;

- provision of regular correction of directions of scientific and technological development and industry critical technologies of agroindustrial complex, as well as industry technological roadmaps;

- methodological support of the activities of the Ministry of Agrarian Policy and Food of Ukraine in the field of forecasting the scientific and technological and innovative development of the sector through a network of branch centers of forecasting on the basis of leading specialized universities;

- Ensuring the integration of the results into the national level strategic planning system.

The Ukrainian economy is facing the challenge of finding new sources of growth, one of which is to become a high-tech, global and competitive agro-industrial complex. Advancement in this direction requires improvement of the scientific and technical policy in the agroindustrial complex, improvement of the quality of methodological, informational and expert-analytical support of the relevant management decisions. In order to achieve this, it is important to ensure the effectiveness of the implementation of sectoral regulatory instruments. It is also necessary to increase the scale of funding for agricultural education and agrarian science, which is at an insufficiently high level today. The development of the agro-industrial complex of Ukraine will provide significant changes in the socio-economic sphere, will have a positive impact on the stability of economic growth, ensuring the economic security of the country, improving the level of employment and quality of life of the population.

Conclusions. The complex of measures that the state plans to take to develop the export potential of the agro-industrial sector in the long term is considered. We have analyzed strategic programs for the development of this sector, which are intended to meet the needs of the internal market and to secure leading positions in the world through stable export of agricultural products and products of its deep processing

On the basis of the analysis of agricultural export trends, three main foreign trade priorities of the agro-industrial complex of Ukraine were identified. One of the most important areas of cooperation is the development of trade relations with EU countries. This is due to the large volume of exports to the country, geographical proximity, high solvency of the population and unconditionally trade preferences. The analysis also shows that it is advisable to step up cooperation with the countries of the North African region and Central Asia. Our analysis shows that there is a growing demand for agricultural products and that in recent years Ukraine has managed to increase its presence in these very promising markets.

In our opinion, the use of a systematic, well-thought-out state approach for the introduction of a new generation of digital technologies and financial technologies into agriculture should become an important and promising part of the agricultural development strategy of Ukraine. Based on the scenario forecasting, we envisaged the development of the agro-industrial complex in the medium term. We have identified two major scenarios for the development of the agro-industrial complex of Ukraine until 2030. According to the first major drivers of development of Ukrainian agriculture will be: gradual economic recovery, import substitution and further development of traditional export niches. Improving investment conditions will be driven by the effects of monetary and fiscal stimulus. The second scenario, Global Breakthrough, involves the development and implementation of science and technology policy in the field of agriculture. The main objective of the scientific and technological development of the agro-industrial complex of Ukraine is to ensure the competitiveness of Ukrainian products in the foreign and domestic markets, primarily through the creation, dissemination and application of the latest achievements of science and technology. Thus,

the formation of a single strategy for the development of agro-industrial complex of Ukraine will give grounds to determine the keys to the state policy in the sphere of foreign economic activity, the creation of an effective export support system that will ensure the sustainable development and realization of the export potential of the agro-industrial complex of Ukraine.

Sustainable development is possible under the conditions of formation of long unity and interconnection in the reproduction of production potential, human resources and the environment. The decisive role in ensuring the sustainability of the agricultural sector and its individual industries is played by adjusting the effects of external and internal factors, as well as taking into account the need to combine the components involved. Therefore, sustainable development should be seen not as a solution to anthropogenic problems, but also as a basis for the most efficient use of the sector's potential.

The formulation of a strategy for sustainable development of the agricultural sector should be based on a set of factors and cover a series of stages in order to achieve strategic directions, economic efficiency, social significance, environmental security of the agricultural sector of the national economy, on the basis of which the introduction of public-private partnership.

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1.6. ADAPTIVE CONTROL OF THE PERSONNEL OF THE ENTERPRISES: THE THEORETICAL ASPECT

The world is changing permanently and rapidly. It should be noted that the activity of all market participants is performed under VUCA, the acronym of the first letters of the following English words volatility, uncertainty, complexity and ambiguity. It appears, that under such conditions it is impossible to perform control or it is even impractical, but in our opinion, namely the specified conditions require transformation of the approaches and methods of management. In order to be at the top under the conditions of VUCA-world, enterprises should permanently adapt. The mentioned statement determines the relevance of the research in the in the field of the adaptive control.

Furthermore, the modern transformations of economic and social systems, which take place under the principles of the exponential development, highlight increasingly larger role of a person in all life spheres. For this reason, managing a person in the process of work that has various identification depending on a stage, place and aim of control, and definition of his essential status in employment at the current stage obtain an important role.

Therefore, the research of characteristics of adaptive control of a person in the process of work is an important scientific task, that shall be resolved through the number of interrelated problems: consideration of the essence of the categories "adaptive control" and "personnel", as its object, and also formation of conceptual basis of the process of adaptive control of the personnel.

The term "adaptation" came into the economic sphere from the biological sciences (natural sciences) and was defined as an ability of living organisms to adapt themselves to permanently changing external conditions[88]. Furthermore, the given term is used in the technical, medical and social sciences. In the medical sphere this term characterizes preferable life activities and normal sociobiological development of a human; in the technical one it characterizes various self-adjusting technical systems with the closed loop[89].

The etymological and semantic analysis of the category "adaptation" signifies that the indicated term has the Latin origin (adaptatio, from adapto – adapt). The English variant of this term is conveyed with the words "adaptation", "adjustment" and translated as adaptation, adjustment, correction.

Thus, etymologically the category "adaptation" is derived from the Latin term, that means adjustment, adjusting process in translation. The semantics of the given concept depends on the sphere of its application and is limited to its understanding under the lexical approach as "adaptation of organisms, sense organs to the living conditions, to the environment"[90]; "adaptation of a human to the environmental conditions (first of all social environment)" and the result of this process"[91]; "adaptation of organisms to environmental conditions"[92]; "adaptation of a human or a group of people to new social environment, and partially adaptation to them of this environment with the purpose of coexistence and cooperation"[93], where the key point is adaptation.

Furthermore, in the national science field the concepts "adaptation" and "adaptability" are quite often used, which are interpreted either equal or as interrelated terms, but not as identical ones. It should be noted that the categories "adaptation" and "adaptability" should not be considered identically, despite the common root. The morphological analysis, performed in the piece of work[94], allows to identify common and different. Thus if adaptation is considered as the adjusting/changing

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[88] Tsyhanova, O. S. (2017) "Adaptive Enterprise Management: A Bionomical Aspect", available at: http://bit.do/e5jan.

[89] Ovsiannikova, V. V. (2013) "Problems of psychological adaptation of organization staff", Problemy suchasnoi psykholohii, № 2. Pp. 85-91.

[90] Dictionary of the Ukrainian language, available at: http://sum.in.ua/s/adaptacija (Accessed 15. 08. 19).

[91] An electronic dictionary of the Ukrainian language, available at: http://slovopedia.org.ua/39/53392/260654.html.

[92] Dictionary of foreign words, available at: http://bit.do/e5jg6 (Accessed 12. 08. 19).

[93] Sociology is a short encyclopedic dictionary, available at: https://subject.com.ua/sociology/dict/2.html (Accessed 16. 08. 19).

[94] Iachmenova, V. M., Osmanova, Z. O. "The essence of the concepts of "adaptation" and "adaptability"", available at: http://ena.lp.edu.ua:8080/bitstream/ntb/18798/1/72-346-353.pdf (Accessed 17. 08. 19).

process, then the adaptability is considered as a property/ability/characteristic. In the meantime, the specified categories characterize the necessary conditions (components) for effective operation of complex dynamic economic and social systems under the conditions of external environment changes.

Having defined the terms "adaptation" and "adaptability", we proceed to interpretation of "control" as a part of the category "adaptive control". The specified category is popular and largely studied, but then it has a polemical character

The performed analysis allows to formulate own understanding of control as the activity of the control system (management entity) as relating to management object to ensure its development through achieving goals. Taking into consideration the sustainable development concept, which has determining value for economic and social systems' activity of any hierarchy levels, and which the author refers on in his researches, categorization of "control" takes the form "activity of the controlling system (management entity) relating to the controlled system (management object) to ensure its sustainable development through achieving goals".

The research of "adaptive control" concept (English adaptive control) found out its consideration as a subtype of situational control, synonymous correlation with "adaptable", "reflexive". Such understanding is logic, as VUCA conditions require prompt management activities in accordance to unpredictable transformations, which occur in the sphere of an enterprise. In such conditions nothing is sustainable, in other words it is spoken of sustainable unsteadiness, and enterprises and any other economic and social systems have the only chance for precarious existence that is an uninterrupted adaptation to new conditions.

The conceptual basis of adaptive control is a wide range of the theories and concepts, which are dedicated to the organizational development, self-organization, randomized transformations, etc. Regarding the definitions of the given category, there is a wide range of definitions, which are uncoordinated between themselves.

The morphological analysis of the adaptive control definitions, which are in the scientific field, allows to separate the given category for the specific approaches, where there is a word, defining the essential difference[95]:

1) management decision making process;
2) management or management activity;
3) control system or response system;
4) adaptation;
5) interaction process;
6) set of actions and methods, or concerted efforts complex.

Considering the first and second approaches, it should be noted that its difference with common control is incomprehensible. Meanwhile adaptive or operative, or any other type of control takes into account peculiarities of its determiner (in the present case – adaptation). Hence, it should be agreed that the adaptive control is an activity but, to our opinion, it is reasonable to take into account not only external process – adaptation, adjustment, interconnection (4th and 5th approaches), but also an internal capability or a property of a system.

The third approach contradicts with the essence of control, as it has a particular system, regardless of its type. In other words, the availability of the control system is an obligatory condition of control, but the specified categories cannot be equated.

Similarly, regarding the 6th approach, the control has a complex of activities and methods, but is not equated with them. Meanwhile the author agrees with the part regarding availability of the internal capability of the system to adapt.

For this reason, based on the own understanding of control and necessity in accounting of internal properties of the system – adaptability, it is reasonable to consider the adaptive control as the activity of the controlling system (management entity) against the controlled system (management object) regarding adjustment, changing of parameters, components and the entire

[95] Nalyvaiko, T. (2019), "Identification of conceptual and categorical apparatus adaptive management", Ekonomika ta derzhava, vol. 9, pp. 95-102. DOI: 10.32702/2306-6806.2019.9.95.

system itself on the base of its properties, capabilities and characteristics to ensure its sustainable development through achieving goals under VUCA.

The structural and logic scheme of the adaptive control in the author's interpretation is presented in Fig. 1.
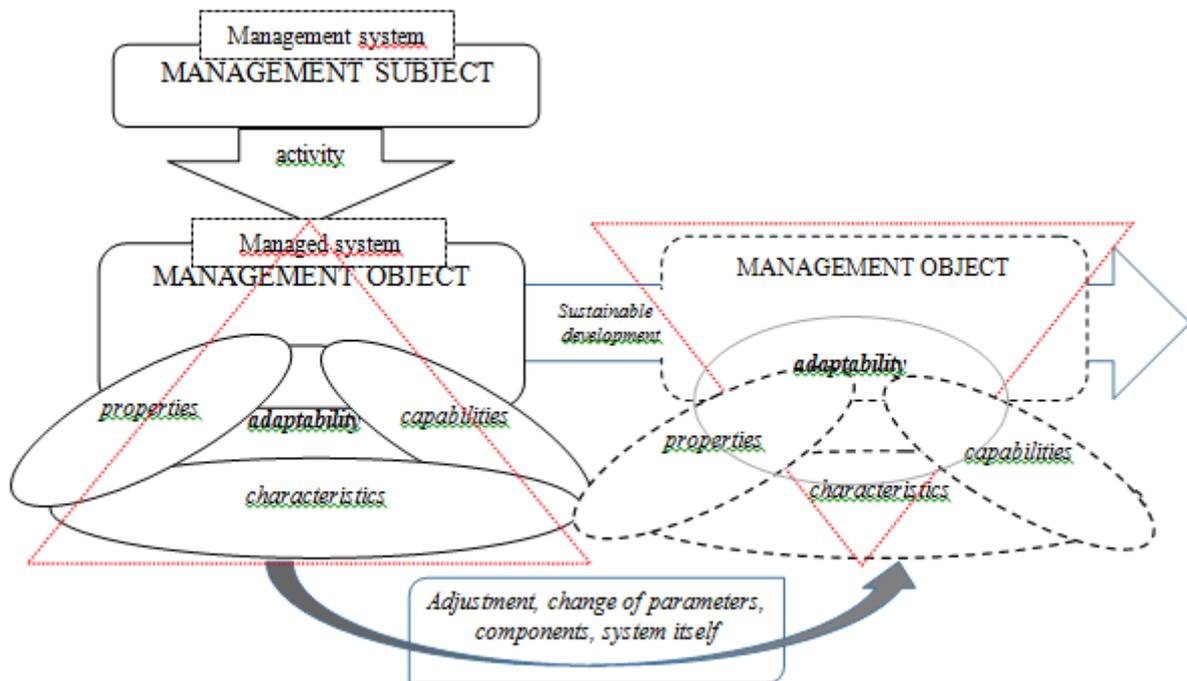

Fig. 1. The structural and logic scheme of the adaptive control
Source: developed by the authors

The given figure shows, that under the influence of the management entity adjustment, change of the parameters, components and the system itself occur responding to change, that allows to adapt to the transformations of the various level (internal, external), and to change on the base of the adaptive capability. Such permanent adaptation to the changes is a base of the sustainable development of the system.

Having defined the essence of the first category, the essential duty of the management object of control regarding its goal and tasks of the research – the economic and social category "personnel" shall be considered. Study of the scientific basis in the human control sphere, its evolution highlights its multilevel system, complexity and disambiguate of perception. But, certainly it can be said that the person's role has always been particularly important.

It should be noted that there is a great variety of terms which characterize a person in the working process at each evolutional stage and at each hierarchy level of the economic and social system. The most popular category for characterizing a person in the working process is a category "personnel" that has an ambiguous and not sharply defined essential duty.

Firstly, the etymology of the given concept originates from Latin: personalis – personal, that is the base is a person (Latin persona – person). The semantics of the given concept is highly questionable and unascertained. It should be noted that the English variant of the word "people" is expressed in several words «staff» and «personnel». The first word is reasonably used when we talk about the service staff or office workers, and the second one, when we characterize the workers of an enterprise in total. Accordingly there is a set expression personnel management, though the term human resource management is popular and commonly used in the western literature regarding control of the personnel.

It is considered that the category "personnel" in the Ukrainian scientific turnover came from the researches of the western economists and it includes not only regular staff of an enterprise, but also the people out of the staff and owners[96].

Secondly, within the legal framework of Ukraine the identification of such complex economic and social category as "personnel" is absent.

Thirdly, it should be noted that in national educational materials the personnel of the enterprise is both identified with labor forces[97], and is differentiated[98]. Furthermore, both the work force[99], and the labor collective of the enterprise[100] are identified

We consider that the regulatory field, where the established general concept personnel is absent, and also the scientific and economical field, where the concept personnel is widely used, should be differentiated.

Having performed the analysis of the definitions, presented in the scientific field of Ukraine, it was found that in the current definitions the legal and regulatory framework is highlighted through such concepts as "worker", "labour collective", "record number of regular staff", "pay roll", main, regular, staff composition (personnel), "work force". The specified categories are found out in the laws and regulations of Ukraine.

Having summarized, we have several approaches to the understanding of the personnel, formed on the bases of the morphologic analysis, that is presented by the authors in the article [13]: the set of regular staff, permanent skilled workers; pay roll; regular, permanent staff composition of skilled workers; set of workers; personal/work force; basic staff composition, work force, pert-time employees, people who work under the civil law contract.

The performed study allows to present the author's vision of the personnel: they are physical persons, that have job relationships with an employer on the base of the employment agreement/contract, that is all workers of the employer in terms of interpretation of the worker himself.

By reference to specific features of business's activities in Ukraine (physical entities-employers do not carry out the record of regular staff number, and enterprises are corporate bodies), the personnel of the enterprise is a set of physical persons, that have job relationships with the employer on the base of employment agreement/contract and in amount represent the grand total of record number of the regular staff of the enterprise and the external part-timers.

In relation with control and development of the personnel, that involves investments, reasonableness of investing in the personnel, that have unsteady job relationships with the employer, is suspicious, but control of the external part-timers category has a direct place at the enterprise. Thus, in spite of such collision, the specified personnel should be taken into account of staff number, but they are well-considered in the control process.

Having defined the personnel category, as a control object, we form the author's vision of the category "adaptive control of the personnel of the enterprise". For this purpose we analyse the existing definitions of the complex category that exist in the scientific turnover.

Thus, in works[101][102] the adaptive control of the personnel is considered as "interrelation, that causes mutual behavior adjustment of each particular specialist of the enterprise on the dialogic

[96] Smachylo V. V., Korpan M. V. (2016) Definitsiia katehorii, yaki vyznachaiut rol liudyny v sotsialno-ekonomichnykh protsesakh. Traektoryia nauky: elektronniy nauchniy zhurnal. № 1 (6), available at:
http://pathofscience.org/index.php/ps/article/view/34.

[97] Nesterenko V. Iu., Tokar I. I. (2012) Ekonomika vyrobnytstva. Konspekt lektsii, Kharkiv, available at:
https://buklib.net/books/37312/.

[98] Hetman O. O., Shapoval V. M. Ekonomika pidpryiemstva. available at:
https://pidruchniki.com/15060913/ekonomika/personal_pidpryiemstva.

[99] Ekonomika pidpryiemstva. available at: https://buklib.net/books/24836/.

[100] Hetman O. O., Shapoval V. M. Ekonomika pidpryiemstva. available at:
https://pidruchniki.com/15060913/ekonomika/personal_pidpryiemstva.

[101] Tolochko, V. M., Artiukh T. O., Zarichkova M. V. (2014) Defining the nature and content of the concepts of adaptation and adaptive management of pharmacy staff. Ukrainskyi visnyk psykhonevrolohii, № 22, vol. 2 (79), pp. 263-267.

[102] Yelnykova H. Adaptive HR Management Technology. available at: http://tme.umo.edu.ua/docs/2/09yelmtp.pdf.

(poly)logic base and is ensured by the mutual production by the personnel of the enterprise the realistic goal with further combination of efforts and acts for its achievement." In this definition the stress is done on the internal self organization of each employee of the collective separately and the collective as a whole regarding achievement of the common goal by means of mutual adjustment, we consider regarding both the representatives of the collective, management, other internal factors, and the external conditions, where the activity process occurs and thus control.

In the research[103], that maintained in the work[104] much attention is given to optimization and enhancing the efficiency of the control process, that can be achieved through adaptation and adaptability.

The adaptive control of the personnel of the enterprise, in the author's opinion should be considered as the activity of the controlling system (management entity) regarding the controlled system (management object), which are the employees of the enterprise, regarding their adjustment and transformations generally on the base of personal capabilities, abilities and characteristics to ensure mutual sustainable development through goals achievement of the participants of management process.

The managers and top managers of the enterprise/organization department act as the controlling system, and employees of the enterprise/organization department act as controlled one.

The basis of the adaptive control is theories and concepts, which ensure flexibility of the control components: organizational structure, control methods, models, mechanisms, principles. It is important that the filling of the adaptive control has to have a flexible character, to react not static patterns on the environmental changes, but to have an opportunity to change the reaction through the adaptation. Correspondingly, the object itself also has to change, that is it has to adapt.

In the works[105][106] it is said, that the management object has to adapt not only to changes, occurred in the external environment, but also to have its own adaptabilities, that is a capability to adapt to the adaptation process itself, to be ready for the permanent changes.

Furthermore, in our opinion, among all objects of control, which can be considered as subsystems of the enterprise, it is the staff that is the most complex, important and specific, because it is a live economic and social system.

And each individual, which forms it, has his interests and personal responses to changes, level of adaptability to them, and correspondingly individual properties may not coincide with collective ones and not meet purposes of the enterprise, its responses to changes and interests, that causes conflicts and correspondingly failure to achieve or problem achieving goals.

Thus, we can agree with the researcher[107], who says about the multilevel adaptation and separates the control level system, business processes level, environmental factors level.

We consider that it is reasonable to highlight the individual level of adaptive control.

In accordance with the foregoing, the hierarchy of the adaptive control of the personnel at the enterprise is presented in Fig. 2.

The first adaptation level (Aext) – adaptation to the environmental changes has the highest level in the hierarchy. The external environment (SENV) in its uncertainty, unsteadiness, random combination of the factors influences the enterprise generally and its each separate subsystem (SNm), where, in our opinion, it is reasonable to separate the control subsystem (SM) and the subsystem "personnel", according to the research objective.

[103] Tretiak O. (2014) Modern personnel technologies in the personnel management system at the enterprise. Naukovyi visnyk NLTU Ukrainy. vol. 244. pp. 389-397. available at: http://nbuv.gov.ua/UJRN/nvnltu_2014_24.
[104] Borysiak O. V. (2017) Assessment of optimization effect of technologies of formation of the personnel of the enterprises. Ekonomika i suspilstvo vol. 12, pp. 193-197. available at: http://economyandsociety.in.ua/journal/12_ukr/31.pdf.
[105] Socio-economic systems: genesis and development problems (2003) edited by A. I. Tatarkin. Ekaterinburg Institut Ekonomiki UrO RAN.
[106] Gaisina L. M. (2015) Adaptive management in conditions of social change. Sovremennye problemy nauki i obrazovaniia. № 1. part. 1. available at: http://www.science-education.ru/ru/article/view?id=19583.
[107] The same.
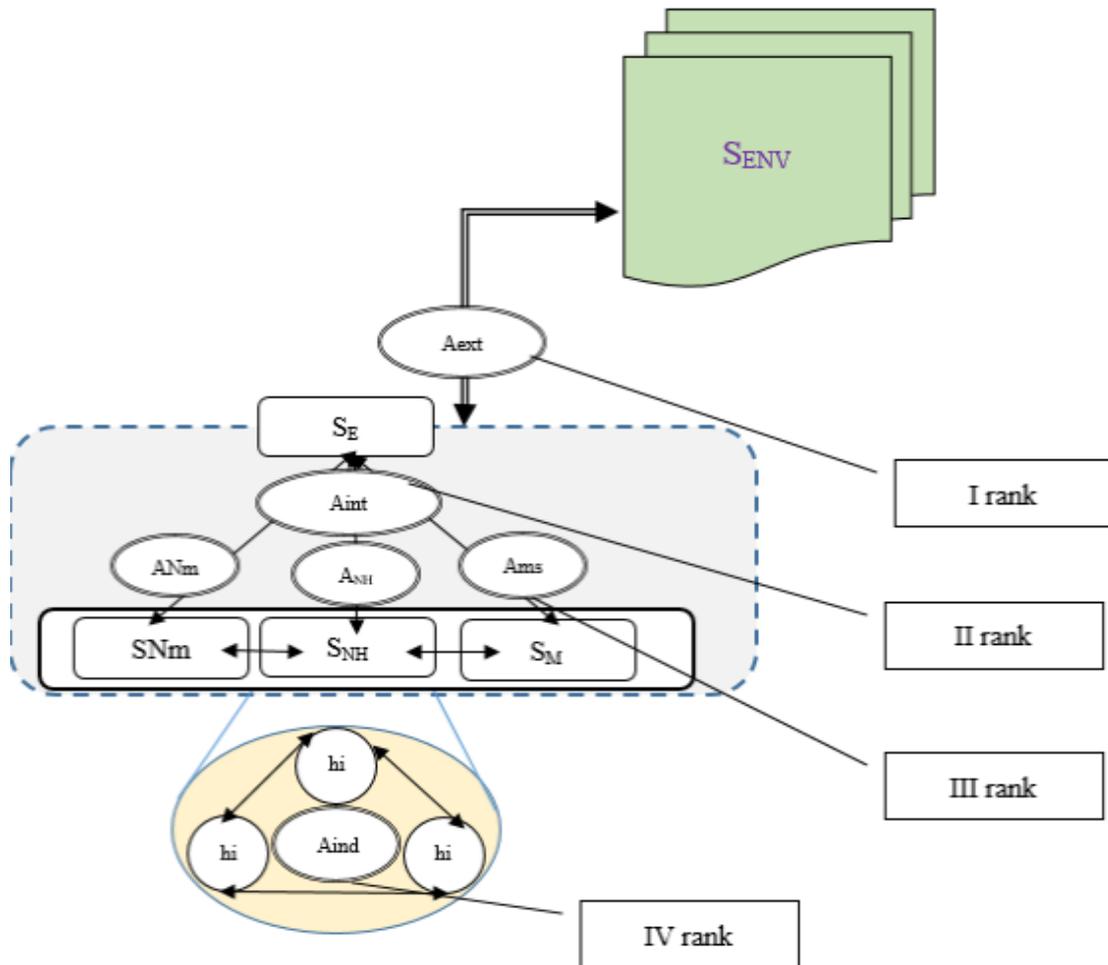
Fig. 2. Hierarchy of the adaptive control of the personnel at the enterprise

Legend:
SENV – system of environment with lots of undetermined factors;
SE – system of the enterprise;
SM – control subsystem of the enterprise;
SNm – subsystem of the enterprise from N1 to Nm, depending on structuring (production, finances, logistics, etc.);
SNH – subsystem of the enterprise "personnel";
hi – separate employee as a representative of the subsystem of the enterprise "personnel";
Aext – adaptation to environmental changes;
Aint – adaptation to the internal environment changes;
Ams – adaptation to the changes of the control subsystem of the enterprise;
ANH – adaptation to the changes of the subsystem of the system "personnel";
Aind – adaptation to the changes of the separate individual;

It should be noted that the change of system is influenced by the internal and external environment, composed of various subsystems, forming it. Thus it may be said about system adaptation of higher and lower level relative to the internal environment (Aint) – another level of adaptation.

We shall note that the control system (SM) as well as the personnel system (SNH) comes under other subsystems (parity) and the systems of the enterprise generally (SE), and also the systems of lower level – separate representatives of the personnel, employees (hi). In this case, the control system (SM) has to adapt to the influences of higher and lower levels that governs its adaptation (Ams) and adaptation of the subsystem "personnel" (SNH) – the third level of adaptation.

The representatives of the personnel – separate employees influence each other and the systems of higher levels, are changed under the influence of various factors of the internal and external character, thus it can be said that the adaptation to the changes of the separate individual (Aind) is the forth level of adaptation.

Furthermore, it should be noted, that each control object has particular capability for adaptation – level of adaptation to demands of external environment in relation to it.

At the same time, the enterprise also has influence on the external environment, as an open system, that requires the environmental reaction to its influence. This influence is based on the managerial decision regarding the appliance of the particular behaviour pattern – basic, known or innovative for the enterprise. Such decision arises in the particular period, which can be considered as a change point (bifurcation point) of the entire system, as the system is renovated on the base of external and internal actions. Thus, the result of the adaptive control is such managerial decision, that is based on the results of all levels adaptation, that leads to the mutual transformation of the system and involves appliance of the changed behaviour pattern as a reflection to impacts.

Conclusions. Thus, in the course of research:

- essential duty of the conceptual and categorical framework of the adaptive control is determined, that is reasonable to consider as activities of the control system (management entity) in relation to the controlled system (management object) regarding adaptation, parameters change, components and the entire system in general on the base of its capabilities, abilities and characteristics to ensure its sustainable development through goals achievement;

- the author's understanding of the economic and social category "personnel of enterprise" is presented, as an object of control: the personnel of the enterprise is a set of physical persons, which have job relationships with the employer on the base of the labour agreement / contract and numerically form the amount the record regular staff of the enterprise and the external part-timers;

- the structural and logic scheme of the adaptive control at the enterprise is presented, where it is indicated, that the adaptation as a response to change ion the base of adaptability is a formula of sustainable development of the system;

- the hierarchy of the adaptive control of the personnel of the enterprise is presented, where 4 levels are highlighted: adaptation of a particular individual; adaptation of subsystems; adaptation of the enterprise as a system to the internal changes; adaptation of the enterprise as a system to the external changes.

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12. Ekonomika pidpryiemstva. Available at: https://buklib.net/books/24836/.

13. Smachylo V. V., Nalyvaiko T. (2019) Identification of socio-economic category "enterprise personnel". The Journal of ZSTU: Economics, Management and Administration, № 4, pp. 189-194.

14. Tolochko, V. M., Artiukh T. O., Zarichkova M. V. (2014) Defining the nature and content of the concepts of adaptation and adaptive management of pharmacy staff. Ukrainskyi visnyk psykhonevrolohii, № 22, vol. 2 (79), pp. 263-267.

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1.7. THE COMMUNICATION COMPETENCE AS THE BASIS OF PROFESSIONALISM IN SOCIO-ETHICAL MARKETING

The communicative competence as the basis of professionalism in social and ethical marketing. Social communications network expansions is a universal processes that takes place in all activities and all social institutions of modern society. Nowadays the fulfilling o various international projects in economics, science, politics and finance makes the scope of the process just evident. Now in each sphere of social life the social communications (SC) acquire such specific functions that are adequate to the peculiarities of a particular type of activity. In science, professionally oriented communication of scientists has become an indispensable component of the collective production of modern scientific knowledge. In the culture the SC, they are regarded not only as a means of mutual spiritual enrichment of people and peoples, but also as a major factor of social stability in the multicultural sphere. In industry, commerce, service and marketing, social communications are becoming economically viable. Alvin Toffler says, "In a post-industrial, service-oriented economy, there is a process of demassification of production and sale of goods". The symbol of an industrial society, a conveyor that produces huge volumes of identical products for "equal" consumers, is slowly disappearing into the past. It is being squeezed out by a computerized flexible production line that is adapted not only to continuous technological progress but also to the individualization of the market for goods and services. Following the industrial pipeline, the "pipelines" of mass culture, mass education, mass propaganda and advertising will gradually disappear into the past (however, the latter can be said that social communications in the modern advertising business have already acquired a pronounced address character). In the early 1980 Alvin Toffler wrote, "New styles of work, new values, a new diversity and individualization are in perfect agreement with the demassification of production, consumption, communications and family structure"[108]. In conditions of production reorientation from mass to individual consumer; In a context where job creation in manufacturing is usually preceded by market research into individualized demand, the SC begin to fulfill the functions of the "central nervous system", which the economics activity ensures as a whole organism. At the beginning of the 21st century, as M. Vasilyka notes, the situation on the labor market is characterized by an increase in the number and the growing role of the SC professions, in which the criterion of a specialist's competence "is the ability to communicate and interact properly with people"[109]. On the markets of Western countries the communicative competence of a manager or sales agent was highly appreciated in the industrial civilization time. T. Lukyanets quotes J. Rockefeller, Jr., "The ability to communicate with people is the same commodity that can be bought for money, such as sugar or coffee. And I am ready to pay for this skill more than for any other product in this world"[110]. In the post-Soviet countries, including Ukraine, the "communicative and economic" professions have gained tremendous popularity over the last two decades. Here it is enough to point out the fact that many major domestic universities have for many years maintained a high competition for such specialties as management of organizations, business administration, public relations, advertising business. T. Dibrova notes, in Ukraine much attention is paid to the development of marketing communications theory and practice (MK). There are objective prerequisites in the country for optimizing the communication activity of each market entity ... Under these conditions, the activity of domestic marketing practitioners should be directed to the search for effective marketing communication tools....[111] The development of new theoretical models of MK and practical recommendations that take into account the specifics of the Ukrainian market, today occupies a large group of specialists, in particular T. I. Lukyanets, T. O. Primak, A. V. Voychak,

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[108] Toffler O. The Future of Labor / The New Technocratic Steering Wheel in the West, p. 258.
[109] Vasilika M. A. Fundamentals of Communication Theory: Tutorial / M.: Gardariki, p. 3.
[110] Lukyanets T. I. Marketing Communication Policy [Text]: Educ. tool. – K.: KNEU, p. 263.
[111] Dibrova T. G. Marketing Communication Policy (2009): Strategies, Domestic Practice: Educ. tool. – K.: Publishing House « Professional», 2009, p. 3.

T. G .Dibrova, Ye. V. Romat, B. A. Obrytko, V. O. Moiseev, I. L. Vikentiev, K. L. Keller, A. F .Pavlyuchenko, V. G. Korolko and others.

Nowadays, in the era of globalization and the transition of society from industrial to post-industrial stage of civilizational development, the concept of socio-ethical marketing is at the center of scientific interests of market economists. T. I. Lukyanets writes, "Social and ethical marketing differs from purely industrial in that the task of meeting the needs and interests of the target markets is combined with the need to preserve or even improve the well-being of the consumer and society as a whole" [112]. The term "social" in the name of the concept indicates the social responsibility of the business, and the word "ethical" refers to the priority of the moral aspect of business activity of the subjects of the target market. The slogan of social-ethical marketing (SEM) could be Kant's categorical imperative: a person can only be a goal, not a means of solving any problems, including commercial ones. Therefore, within the framework of the SEM strategy, any aggressive or manipulative influences on the clients of the market are considered not only ethically unacceptable, but also as economically unprofitable as they threaten the long-term interests, image and business reputation of the marketing organization. From a scientific point of view, this strategy is not a "zero-sum game" in which winning one player is equal to losing another. The activities of a market operator within the framework of the SEM strategy are not aimed at achieving instantaneous benefits of anything, but at assisting the customer in choosing and making a purchasing decision – a decision that would be equally acceptable to both parties of marketing communication.

The SEM concept is interdisciplinary in nature, but as it follows, it's fundamental component is a social and psychological model of communicative interaction between the Operator and the Client, which reflects the process of reconciling the market entities motives and coordinating their actions aimed at a jointly chosen goal. This article aims to identify and analyze the socio-psychological aspects of a functional model of personal selling in the field of tourism marketing. The choice of tourism business in this case is due to the fact that for this area of business activity is the most organic and economically justified strategy of social and ethical marketing. In turn, the choice of the personal selling model is explained by the fact that it's analysis is of prototypical importance for the theoretical description of all other components of the marketing communications complex (MCC).

T. Lukyanets believes, "The communication model of personal sale of goods has three components: source (sales agent), message, message recipient (customer)" [113]. This functional scheme is more suitable for advertising or direct marketing, but not for personal sale (PS), since it lacks the most important and most characteristic of PS, the component of the functional model is the communicative interaction between the Operator (sales agent) and the Client – buyer of goods (in this case, travel agency services). T. Lukyanets writes "The message is a coded idea, in fact, that wants to bring a sales agent to a client" [114]. Within the framework of the social and ethical marketing strategy, the Client is not only the "recipient". Moreover, the information that the PS Operator must receive from the Client is of fundamental importance for the effectiveness of personal communications marketing communications. Thus, the Operator must not only, and even not so much "inform", how to be able to ask questions to his Client, it be able to formulate adequate requests for communication in a social and ethical plan for providing information which is not enough and necessary for a joint search, the choice and decision to buy (and accordingly sell) a specific product. T. Primak says, "At every stage of the communication process of seller-buyer communication there are obstacles and distortions of appeals, because of which part of the information that is transmitted and perceived can be lost. Therefore, the seller must constantly monitor the reaction of the buyer" [115]. In this regard, it should be noted that in the modern marketing communications management literature, carried out by the Operator in the act of personal sale, is often interpreted as a dominant position. In the SEM concept, such an interpretation is

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[112] Lukyanets T. I. Marketing Communication Policy [Text]: Educ. tool. – K.: KNEU, p. 263.
[113] Lukyanets T. I. Marketing Communication Policy [Text]: Educ. tool. – K.: KNEU, p. 263.
[114] Lukyanets T. I. Marketing Communication Policy [Text]: Educ. tool. – K.: KNEU, p. 263.
[115] Primak T. O. (2003) Marketing Communications: Educ. tool. K.: Elga, Nika-Center, 280 p.

unacceptable, and it is obvious that the seller's dominance position is unacceptable when it comes to selling a tourist product or service. In Tourism Marketing, the Operator and the Personal Sales the client are regarded as absolutely socially equal entities. However, in comparison with the client, the Personal Sales Operator must be communicatively competent and therefore not only a specialist in the tourism business but also a professional communicator. In this case, the communicative competence of the Operator means his ability to dominate, that is, without suppressing the will of the client, to organize cooperation with him, the effectiveness of which can be determined by the formula "social and psychological contact – business contract".

From the socio-psychological point of view the communicative interaction between the Operator and the Client in the PS process has three active phases: mutual perception of the subjects of communication (perceptual contact), achievement of mutual understanding (cognitive interaction), and completion of the communicative act (in the case of effective marketing communication and making a shared decision). From this point of view the communicative interaction between the Operator and the Client represents the unity of interpersonal and social-role communication. Therefore the socio-psychological analyses of the functional model of personal selling involves, first, a differentiated study of the psychological and social factors of marketing communication and second the study of the mutual influence of these factors on each other. In this regard it should be noted that in the modern literature when describing the initial phase of marketing communication PS often focuses on the psychological, and not always clearly perceived by the Client of his interlocutor. T. Lukyanets writes, "Of course that the personality of the sales agent weighs a lot in securing the sale, because the factor of perception sympathy (often subconscious) to the personality of the sales agent and largely determines the result of his meeting with the client"[116]. Despite the importance of unconscious preferences which may or may not arise from a client to a sales agent, it should be noted that the effectiveness of marketing communication is much more dependent on factors that are fully understood and controlled by the subjects of communication. However the meeting between the Operator and the Client begins with psychological contact and the formation of their mutual positive perception of each other is really an important condition for the effectiveness of business communication. The leading role here is assigned to the Operator, the ability to express the friendliness, kindness, willingness to assist the Client in solving his problem through verbal and non-verbal communication actions is an important component of the specialist's communicative competence. The operator's personal communication experience helps him to "evaluate" the client's psychological state at a glance, to choose an appropriate style of language and to identify a common, favorable for the results of the meeting psychological "picture" of the conversation. An experienced communicator, as a rule, not only has a high culture of language, but is also able to use various psychologically significant linguistic and paralinguistic means, from intonation and tempo of language, to "eye contact" in addition to meaningful argumentation. It should be noted here that in order to achieve the psychological comfort of the subjects of marketing communication, proxemics is important – the spatio-temporal organization of communication. G. Andreeva believes, the studies in the field of proxemics according to "are of great applied importance especially in the analysis of the success of various discussion groups"[117]. Finally instead of relying on the client's unpredictable and subconscious sympathy, it is appropriate for the Operator to use empathy a fully conscious ability to respond emotionally to the problems of a communication partner. G. Andreeva says, "The mechanism of empathy is in certain ways oriental to the mechanism of identification: there and here there is an ability to put oneself in the place of another, to look at things from his point of view"[118].

This opens the field of compatible competence in social psychology and sociology, since self-identification of subjects in addition to personal-psychological determines the socio-role and status aspects of communication. T. Lukyanets writes, "One of the prerequisites for understanding the

[116] Lukyanets T. I. Marketing Communication Policy [Text]: Educ. tool. – K.: KNEU, p. 283.
[117] Andreeva G. M. Social psychology. – Moscow: Moscow Publishing House. Univ., p. 111.
[118] Andreeva G. M. Social psychology. – Moscow: Moscow Publishing House. Univ., p. 111.

actions of a partner is awareness of his position"[119]. The operator of the sale of the tourist product-service must take into account that the Client in the communication act of the PS presents not only himself as a "unique personality" but how many one or more reference groups with which he identifies himself. The problematic situation for the Operator is complicated by the fact that the Client may position the social status which he actually owns. Therefore a professionally trained Operator of PS must be both a psychologist, sociologist and marketer-practitioner in order to determine which offers will meet the Client's real capabilities and, at the same time, will prove attractive to him in terms of the declared status of self-identification. Thus a lot depends on the sales agent, especially when he is able to help the client to realize the real needs that can be met with the help of this product.[120] The peculiarity of the tourist product-service is that it's quality and, at the same time, the quality of work of the operator-consultant the client will be able to evaluate only sometime after purchase. The subjectivity of the valuation in this case is obvious but the Operator must make every effort to ensure that the Customer is satisfied with his purchase. Such motivation of the Operator is due, first of all, to the fact that in the process of personal sale he represents not himself but the "face" and long-term interests of the travel agency of which he is an employee. Another feature of tourism marketing lies in the fact that the choice of the Client product-service is largely influenced by the thoughts of third parties – advice, stories and impressions of his friends, acquaintances, colleagues. In this regard, the communicative competence of the consultant salesman implies his ability in the conversation to determine the personal preferences of the Client, change, if necessary, his orientation to other people's thoughts and tastes, thus preventing the possible and most unfavorable situation for any marketing unjustified expectations. Finally, if a tourist ticket is purchased by a married couple, then for PP Operator the problem situation is complicated and simplified at the same time. It is complicated by the fact that the polylogist in this case is psychologically more difficult to dialogue, since the consultant is forced to find a compromise solution that will equally satisfy both clients. At the same time, the situation is simplified as customers, choosing and making a purchase, equally share responsibility for the joint choice and then neither of them will impose another subjective-negative evaluation on the purchased product-service.

The president of the National Guild of Professional Consultants (Russia) V. Dudchenko writes, "I assert that the key competence of a professional consultant is communication competence, the ability to build a communication situation, manage communication and receive long-term positive effects from any communication".[121] It is necessary to emphasize, the basis of communication competence of the specialist is his ability to provide mutual understanding with the partner of communication. The language communication, such as consultant and client dialogue can't be regarded as merely an exchange of information or as a process of transmitting and receiving any constantly repeated messages. The understanding of the subjects of dialogue is interpreted that an interaction as a complex interaction of the two "cognitive worlds", whereby the simultaneous changes occurring in these "worlds" mutually reflect one another. V. Dudchenko writes, «In the process of communication the both parties are undergoing changes that are caused by the redistribution of information and its interpretations in the system of their interaction ... From this point of view communication is considered not as a series of repeated influences of the parties on each other, but as a process simultaneous mutual and self-change, mutual and self-development of the two parties. When this does not happen on one side, it is a case of degenerate, inferior interaction and is not an actual interaction"[122]. The theoretical description of the interaction will be incomplete and therefore incorrect if one does not take into account that the subject, while communicating with another subject, is aware of his or her own language actions and therefore

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[119] Lukyanets T. I. Marketing Communication Policy [Text]: Educ. tool. – K.: KNEU, p. 285.
[120] Lukyanets T. I. Marketing Communication Policy [Text]: Educ. tool. – K.: KNEU, p. 287.
[121] Dudchenko V. Communication competence is a key competence of a professional consultant. – Marketing department (literal edition) – Kiev, № 9, p. 24.
[122] Dudchenko V. Communication competence is a key competence of a professional consultant. – Marketing department (literal edition) – Kiev, № 9, p. 24.

"communicates" with himself. The well-known Ukrainian logician and philosopher A. Ishmuratov writes, "Interpretation of one's own actions involves an even greater degree of experience of cognitive influence and self-control constitutes just such an impact on one's own cognitive world, the subject" informs himself of his intentions, plans, suffering, condemns himself, angry with himself etc."[123] The theoretical model of understanding of the subjects of language communication is complicated because of the need to take into account the phenomenon of reflection. G. M. Andreeva says, "In social psychology reflection means the awareness of the active individual of how he is perceived as a communication partner"[124]. It is necessary to distinguish between two levels of reflection and in fact two levels of understanding. If it is a language of communication then of course the subject to continue the conversation must "understand that they understand", that is to be sure that his interlocutor correctly understands the meaning of words and the meanings of the utterances. If it is a matter of understanding linguistic communicative actions that are of practical importance and directly related to the motives of the subjects of this communication, then the second-level reflection takes effect. In this case, it is important for the communication subject to understand approve or disapprove and in general how his partner relates to what he is currently doing proposing, asking, advising, demanding, stating, etc. As a result of interaction, due to the reflection of the second level, "the beliefs of one can not only become the beliefs of the other, but also change expectations, excite emotions, form estimates and self-esteem".[125]

In the theory of social communication, it is customary to distinguish between the practical and the actual communicative effectiveness of social interaction. For example, a subject acts effectively in a communicative way if his or her communication partner, without being able to solve a practical problem, still correctly understands the motives, the reasons and the nature of the request with which he or she is approached. Compared to general UK theory, in the concept of social and ethical marketing and, in particular, in the context of a functional model of personal sale, the evaluation of the effectiveness of the practical (business) and communicative interaction of the Operator and the Client, for the most part. As already mentioned, the effectiveness of the personal sale operator is determined by his ability to practically implement the chain "social and psychological contact – professionally oriented communication – positive completion of the contact – business contract". The conclusion that communication competence is the basis of professionalism in the field of social and ethical marketing.

The global integration of labor and capital markets not only impedes but also significantly contributes to the growth of diversity of activities, and at the same time, it leads to the unification of requirements related to human business activity. In any country, in any geographical or cultural coordinates, if a person works in a modern production or modern service area the identity of technology means the identity of the employee's special knowledge and practical skills his ability to adequately perceive the situation and find contact with other people. In such circumstances, the professionalism becomes the norm of attitude in any type of activity a norm that ensures the effectiveness of cooperation, the effectiveness of business exchange at all its stages.

The global integration is characterized by the expansion and consolidation of the social communications network (SC), covering all spheres of activity and all social institutions of modern society. However, if in Western Europe and in the United States complex research in marketing communications has more than half a century of history, in our country such research has not yet acquired the level of systematicity required for modern science. In particular insufficient attention is paid to structural and functional analysis of individual MK strategies research, the results of which could be widely used in the professional training of specialists in various fields of modern marketing. All domestic and foreign specialists agree that the basis of professionalism of the marketing practitioner, in particular the personal sale operator (PS) is his communication

[123] Ishmuratov A. T. (1997) Introduction to Philosophical Logic: A Textbook for Students and Graduate Students in the Humanities of Higher Education. – Kiev: Abris, p. 185.

[124] Andreeva G. M. Social psychology. – Moscow: Moscow Publishing House. Univ., p. 111.

[125] Ishmuratov A. T. (1997) Introduction to Philosophical Logic: A Textbook for Students and Graduate Students in the Humanities of Higher Education. – Kiev: Abris, p. 185.

competence. At the same time, the problem remains of determining the dependence of the effectiveness of marketing communication not only on the social marketing knowledge of the operator of PS but also on his personal qualities, motivations and psychological characteristics.

This article aims to substantiate the theoretical definition of communication competence as a systemic unity of a number of personally-determined factors: communication knowledge and experience, creativity, initiative and responsibility of the specialist. To solve this problem, it is advisable to conduct a socio-psychological analysis of the functional model of personal selling in the field of tourism marketing. The choice of the PS model is explained by the fact that its analysis is of prototypical importance for the theoretical description of all other components of the marketing communications complex. The choice of tourism business in this case is due to the fact that in this area of business activity the most organic and economically justified is the strategy of social and ethical marketing (CEM). In turn, the concept of social-ethical marketing is nowadays considered as the most appropriate for the target markets, adapted to the new economics Within the framework of the CEM strategy, aggressive or manipulative influences on clients are considered not only ethically unacceptable but also economically unprofitable because they threaten the long-term interests and business reputation of the marketing organization In this connection, the task is to substantiate the unity of criteria of professionalism and communicative competence of the operator of personal sale of the tourist product-service. Within the framework of the SEM strategy, the Operator and the Client are absolutely socially equal actors of the market. However, in comparison with the Client, the Operator must be not only a specialist marketing in the field of tourism business, but also a professional communicator.

S. Kolyada writes, "All people have communicative abilities but the nature of the modern manager's activity requires him to have developed communicative competence, which includes the free possession of all the set of skills and abilities necessary for effective verbal and non-verbal communication and interaction..."[126] In the most general form the communicative competence of a specialist can be characterized as a certain level of formation of personal and professional experience of interaction with others which is required for the individual to function successfully within the professional environment and society within the limits of his abilities and social status.[127] The communicative competence is a complex of communicative knowledge and skills, which includes: knowledge of the rules and rules of communication; high language culture and ability to understand non-verbal communicative actions; the ability to interact with people based on their gender, socio-cultural and status characteristics; ability to behave adequately to the situation; ability to draw the other party to his side and convince him of the strength of his arguments; the ability to properly evaluate the other party as a person and to choose their own communication strategy, depending on this assessment. In spite of its grandeur, this list of abilities, knowledge and skills cannot be considered as complete and even more systematic when it comes to communication as the most important component of a specific profession when analyzed in particular the functional structure of professional marketing communication.

Within the framework of social and psychological analysis of the functional model of the PS marketing communication is not a messaging, but a joint activity of the Operator and the Client, the product of which subject to the effectiveness of MK is a jointly made decision to buy (and accordingly to sell a tourist product-service). The social roll aspects of marketing communication determine the overall "scenario" and the regulatory structure of the Operator and Client's business interaction. Within the framework of the socio ethical marketing strategy, the Operator is assigned the role of a consultant to carry out so called "supporting activities" for the Client, while at the same time the role of a professional communicator, who takes the initiative to manage the MC and be responsible for its effectiveness. Within the framework of the SEM strategy of marketing communication management involves not the dominant position of the Operator, not manipulation and moreover no pressure on the Client but rather the ability of the Operator to organize business

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[126] Svetlana Kolyada. Managerial communicative competence. Journal of Management and Manager, p. 18-23, p. 4-5.
[127] Dibrova T. G. Marketing Communication Policy (2009): Strategies, Domestic Practice: Educ. tool. – K.: Publishing House « Professional», 2009, p. 59.

communication to ensure consistent implementation of it's main stages and as a result to close the chain "social contact communicative interaction contract". It is obvious that in the process of MK the Operator presents himself not as a personal but business reputation and commercial interests of a marketing organization (in this case – a travel agency). At the same time he needs to take into account that in most cases the Client represents not so much himself as an individual but how many one or more reference groups with which he identifies himself. Therefore, the Operator's communicative competence in this aspect of the MC implies his ability to conduct a social role analysis of the communication situation and to organize the management of marketing communication in accordance with the results of such analysis.

The term "social perception" was coined by J. Bruner, one of the founders of cognitive psychology in 1947. G. Andreyeva notes, "If this term was originally defined as the social determination of perceptual processes, today is social perception is interpreted as "the process of perception of so called social objects by which people, social groups, large social communities are understood."[128] If the object of perception is an individual the meaning of the concept of "social perception" is revealed as "the perception not only of physical but also behavioral characteristics of a person, it as the formation of ideas about his intentions, thoughts, abilities , emotions, settings, and more. In addition, the content of this concept includes forming an idea of those relationships that link the subject and the object of perception.[129] Finally, it should be borne in mind that "since a person always communicates as a person, so much is perceived by another person – a partner in communication – as well as a person".[130]

Therefore, the interpersonal perception is the initial stage of marketing communication between the Operator and the Client in the process of personal sale. It should be noted that the intention of the marketing organization to retain and increase the number of regular customers, in addition to economic and commercial reasons is justified by the fact that meeting with a familiar person significantly facilitates the Operator's tasks in communicative terms. The professionalism of the salesperson is fully evident during the first meeting with the client. In such a situation, the communicative competence of the Operator implies his ability to consciously prevent the possible negative effects of the main effects of interpersonal perception the effects of halos, primacy and novelty and stereotyping. The essence of the halo effect "is that when perceived by an unfamiliar person, the image is created not on the basis of the directly perceived, but embedded in some preliminary information about the person who surrounds him with a particular halo (positive or negative). The effect of the halo is manifested in the formation of the first impression when there is minimal preliminary information about the person being perceived. The halo acts as a filter through which only a limited number of qualities, either positive or negative, are passed. Two other effects are related to this effect – the primacy and novelty effects, which cause the image of a person to be perceived, depending on the order in which information about him is presented."[131] The negative effect of these effects is that the Operator's communication error, which he made at the beginning of the meeting with the Client, can with great difficulty be corrected in the future. The effect of stereotyping can be seen as a generalization of the previous ones. The stereotyping in the process of knowing people by each other can lead to two different consequences. On the one hand, the use of stereotypes greatly simplifies and accelerates the process of perception; but on the other hand, stereotypical perception can (and very often does) lead to biases and "erroneous attributions", that is attribution to a partner of communicating those qualities that he does not really have.

An effective "weapon" that can be used by a professional communicator against all the negative effects of social perception is critically reflective, creative thinking. Creativity is a personal quality that is closely linked to one's creative abilities and capabilities, but is not identical to the creative talent in the arts or sciences. This quality is not only among scholars, poets, artists and actors, but also many other professionals in various fields of activity. The creativity is a quality

[128] Andreeva G. M. Social psychology. – Moscow: Moscow Publishing House. Univ., p. 22.
[129] Moskalenko V. V. (2005) Social Psychology: A Textbook. Kyiv: Center for Educational Literature, p. 140.
[130] Andreeva G. M. Social psychology. – Moscow: Moscow Publishing House. Univ., p. 22.
[131] Moskalenko V. V. (2005) Social Psychology: A Textbook. Kyiv: Center for Educational Literature, p. 491.

for which Third Wave economics will reward workers who are able to find new solutions to professional problems and set new goals in conditions that have no analogies in the past.[132,133] Creative thinking in everyday life is called non-standard, original, deep, which is based on intuition, etc. From the point of view of cognitive psychology, such thinking is characterized by two main features. First, creative thinking involves a high logical culture and a large amount of systematic professional knowledge. However, contrary to popular belief, indisputable possession of logic and knowledge does not contradict professional prescience, but on the contrary, is its basis. What seems to be a manifestation of intuition on the part of it is, in fact, accelerated, in comparison with ordinary thinking, in constructing a solution to a problem, by a cognitive process based on the "semi-automatic" use of a large arsenal of heuristic techniques and effective systematization in long-term expert knowledge. Secondly, creativity is impossible without critical thinking, without the ability to critically evaluate the reliability of the background information and the validity of the solution found. It should be emphasized here: the processing of information in the decision process and the use of different methods of deduction, induction and reduction can also occur in a "semi-automatic" mode. However, ascending the truth of the ascending links and proving the correctness of the result, the specialist must carry out with complete critical self-control over his cognitive actions, fully aware that not everything that seems true or true is so true.

The creativity in this sense is a necessary component of the communication competence of a specialist in the field of marketing communications. A critical component of creative thinking is a robust "cognitive tool" that helps the Operator to block the negative effects of stereotyping perception and to prevent communicative error associated with erroneous attribution. Creativity as a heuristic to find solutions to problems that arise in the communication process, provides the so-called situational adaptability of the communicator and at the same time helps him to hold in his hands the initiative and management of marketing communication. T. Prymak notes, "At every stage of the seller-buyer communication process there are obstacles and distortions of appeals, so that some of the information that is transmitted and perceived can be lost. Therefore the seller must constantly monitor the reaction of the buyer"[134]. Here it is necessary to emphasize that the basis of the communication competence of the specialist is his ability to provide mutual understanding with the communication partner.

The specificity of the tourist product-service is that its quality and with it the quality of work of the operator-consultant PS client will be able to evaluate only sometime after purchase. Another feature of tourism marketing is that the client's choice of the product-service is largely influenced by the thoughts of third parties advice, stories and impressions of his friends, acquaintances, colleagues. The subjectivity and eclecticism of the ratings in this case are obvious, but the Operator must make every effort to ensure that the Customer is satisfied with his purchase. In this regard, the communicative competence of the Consultant Operator implies his ability in the process of conversation to determine the personal preferences of the Client, change, if necessary; it's setting for other people's thoughts and tastes, thus preventing the possible and most unfavorable situation for any marketing unjustified expectations.

Thus the communication competence of the personal sale operator is defined as the systemic unity of four factors: communication knowledge, creativity, responsibility and initiative.

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[132] Stavska Yu. V. (2019) Marketing tools and their influence on the stabilization of the economic state of the enterprise. Modern Economics. №. 13. P. 227-232.

[133] Stavska Yu. V. (2019) Areas of innovative development of tourism in Ukraine. Economy. Finances. Management: Topical Issues in Science and Practice, Issue 2'2019 (42). – P. 83-95.

[134] Primak T. O. (2003) Marketing Communications: Educ. tool. K.: Elga, Nika-Center, p. 93.

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Part 2. THE ROLE OF EDUCATION IN SUSTAINABLE DEVELOPMENT

2.1. THE CONCEPT OF SUSTAINABLE DEVELOPMENT AS A METHODOLOGICAL BASIS FOR THE ECOLOGICAL OF EDUCATION IN HIGHER PEDAGOGICAL INSTITUTIONS

For the first time, the term sustainable development was used in a report by the International Union for the Conservation of Nature and Natural Resources in the 1980 World Strategy for Nature Conservation, which stated that nature conservation is the management of human use of biosphere resources, which can bring other sustainable profits to the current generation without compromising the potential to meet the needs of future generations. However, this concept has received particular attention since the publication of the report Our Common Future (1987) by the United Nations Commission on the Environment and Development (Brundtland Commission). It was the conclusion of this commission that formed the basis for the decisions made about the need for society to reach a level of sustainable development at a conference in Rio de Janeiro in 1992.

During the last quarter of a century, the scientific community has been debating the meaningful implementation of sustainable development strategies and ways of implementing them in the educational, scientific, economic and environmental systems of all countries. Consider what scientific concepts have become the basis for formulating the fundamental provisions of sustainable development of nature and society and the mechanisms for its implementation.

Analyzing the doctrine of the noosphere V. V. Vernadsky, we can conclude that it is his fundamental principles that underpin the understanding of the further development of civilization as a result of the interconnection of natural phenomena of the biosphere and social processes caused by human activity. In the noospheric concept of V. V. Vernadsky proclaims the dialectical unity of the evolutionary process of mankind and the biosphere, whereby human consciousness and activity are given the role of one of the leading geological factors on a planetary scale.

Based on the concept of V. V. Vernadsky, N. N. Moiseev treats sustainable development as a transition strategy, which may result in a mode of coevolution of man and nature, which maintains stability and balance in the system «Nature – Human – Society».[135]

The concept of «sustainable development» O. K. Drejer, V. A. Los` is offered to be considered in narrow and broad interpretations. In the narrow sense, attention is paid to the need to optimize human activity in the environment while preserving the natural resource potential of the biosphere, that is, to envisage such activity management, which calculates not only the economic effect, but also the social and environmental consequences of activities at local and regional level. In a broader interpretation, the authors consider the approach to the level of sustainable development as the result of a new type of functioning of civilization, based on a radical change in the historical structure of its basic parameters: economic, social, environmental, cultural and other.[136]

Despite the large number of approaches to understanding the phenomenon of sustainable development, they are united by several common features, including understanding the need:
• conservation of the environment, its natural resources and biodiversity;
• limiting the growth of quantitative consumption of natural resources while preserving the quality of life on the basis of balanced environmental management;
• redesigning the environmental model of industrial countries as leading to degradation of the biosphere;
• changes in traditional consumer attitudes towards nature, which primarily implies the transformation of the ecological worldview and consciousness of humanity in general, and individually of each individual in particular.

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[135] Moiseev N. N. (1993): XXI century – an age of accomplishment.
[136] Drejer O. K., Los` V. A. (1997): Ecology and Sustainable Development: Study Guide, p. 10-11.

According to the authors of the manual «Philosophy of Education» «... new ways of world awareness, the development of multivariate social imagination, the extremely developed ability of the individual to self-organization and social responsibility before himself and society – these are the most powerful tool for the co-evolution of man and society in the XXI century ...».[137]

In the context of our study, the point of view of L. N. Nemecz, according to which, at the stage of transition to sustainable development, the mental-forming function has a major role to play. Its task is to reorient social consciousness to universal values, to the awareness of the self-worth of all living things on the planet, including the human.[138]

Therefore, the civilization of the 21st century is forced to refocus on a new way of life, the formation of an ecocentric ecological worldview, which relies on environmental value orientations in relation to the environment. The question of the dominance of ecological and ethical values over material needs has become an unconditional issue for the survival of mankind, and «the model of the educational system of the 21st century should be guided by the model of sustainable development of society».[139] Therefore, greening education is now a priority mechanism for socio-economic progress and sustainable development of any state.

During the last decades, at the International Conferences and World Environmental Forums dedicated to the problems of overcoming the ecological crisis and defining the main vectors for the safe development of society (Rio de Janeiro, 1992; Johannesburg, 2002; Vilnius, 2005; Kyiv, Environment for nature, 2003; Rio de Janeiro, 2012), the conceptual bases of our civilization's approach to the level of sustainable development are substantiated and, accordingly, it is proposed to make changes in the content of higher professional education in order to increase the environmental competence of the future and their readiness for effective professional, including management activities. The resolutions adopted emphasize that the main cause of the destructive relationship between nature and society is the low level of ecological culture and ecological outlook of specialists who, as a consequence, are not able to successfully address the urgent environmental problems of their region and the country as a whole on the basis of balanced nature.

In order to fulfill the objectives of the Agenda for the 21st Century, approved by the UN Conference on Environment and Development in Rio de Janeiro, a Strategy of education for sustainable development was adopted in 2005, emphasizing the need for its inclusion in the system of education and development of principles and methodological principles for its reform.

Thus, it was proclaimed the need to reorient the vector of society's development from consumer attitude towards the natural environment and resources to the formation of ecologically safe world economy based on co-evolutionary development of the system «Nature – Human – Society» and harmonization of the interrelations of its constituent elements. In this case, special status should be acquired by ecological education of the population. In this regard, noted that ecological education will be able to take a proper place, provided that it itself becomes a postulate orientation to sustainable development.

Ecological education and upbringing in higher education institutions is an extension of the previous stages of environmental education (kindergarten, secondary school, family) and the next, higher level in the system of continuous multi-stage ecological education. Higher education institutions should cultivate a sense of high responsibility for the conservation and reproduction of natural resources by students on the basis of a balanced use of nature and the idea of sustainable development of nature and society.

Therefore, it is of particular importance that continuous ecological education is focused on the conservation and reproduction of natural resources on the basis of balanced environmental management and providing of sustainable development of nature and society. A significant component of this education is the professional training of an ecologically competent teacher, able to implement adequate ecological education and upbringing of pupil youth in accordance with the requirements of today.

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[137] Philosophy of Education: Tutorial / For the General. ed. V. Andrushchenko, I. Peredborska (2009), p. 265.
[138] Nemecz L. N. (2003): Sustainable development: Socio-geographical aspects (for example, Ukraine), p. 232.
[139] Ursul A., Romanovich A. (2002): Educational Perspectives and the Security Problem, p. 14.

The introduction of a competent approach to ecological education in higher education today is extremely relevant and in demand, because it allows to reveal the current world trends in the development of education on the one hand, and on the other, to modernize the environmental training of future teachers in accordance with the new social and ecological environment and the transformation of public environmental views and attitudes. And if the first task involves the construction of an organizational and content structure of environmental education, then the second task is to understand its general conceptual basis, ideology, and axiological bases. In our opinion, these determinants determine the fundamental problems and tasks of the development of ecological education in higher education institutions and determine the prospects for further research in this field.

Thus, ecological education is essential in building the content of the higher education system to ensure the sustainable development of society. And if the strategic task of ecological education in higher education institutions is the formation of ecocentric ecological outlook of students, then the tactical is to gain experience of using the system of acquired ecological knowledge and skills and the formation of spiritual needs of a person who self-improves, self-fulfills, seeks and professes ecologically high values ethical principles of behavior and activity in the environment. In other words, we are talking about the creation of a certain educational environment in institution of higher education, which implements all the conditions for the formation and development of environmental competence of a future specialist.

Group of authors headed by M. I. Drobnokhod proposed model of education based on the national concept of Ukraine's transition to sustainable development and should include all groups and levels of education. Scientists define the functions of ecological education by the following provisions:

1) reveal human communicative capabilities by explaining concepts that are a necessary component of each individual's modern communication minimum, regardless of their educational and social status;

2) performs an informative function as citizens acquire data about the natural environment, natural resources, the place of man in nature, its connection with it and the universe;

3) shapes the personality of the student, young man and citizen, revealing its emotional and intellectual spheres, the ability to think logically, the ability to anticipate the consequences of their behavior in nature and society.[140]

Despite the urgency of the tasks set, the implementation of the education for sustainable development strategy in Ukraine is slow. A group of authors headed by O. I. Bondar a draft concept of a national education system for sustainable development was developed, which remains to be considered at the state level to this day.[141] Scientific analysis of a wide range of issues related to sustainable development and the role of education in this process, its tasks and directions of improvement at each stage of continuous education and upbringing was carried out in fundamental collective work, edited by V. G. Melnyk.[142]

However, there is no consensus on the form of educational support for the concept of sustainable development: some authors believe that education for sustainable development should be implemented in the educational process as an independent industry, others – within the environmental education, enriched by the basic provisions of the education for sustainable development. Most domestic scientists are working to give ecological education a qualitatively new status, when the formation of a system of environmental values based on moral and ethical attitude to the environment is of particular importance. N. A. Pustovit developed educational and methodological approaches for the formation of environmental competences of students in the context of education for sustainable development. After all, the formation of environmental

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[140] Drobnokhod M. I., Volvach F. V., Ivashchenko S. H. (2000): The conceptual basis of the environmental education and health needs of people who will be in harmony with nature.

[141] The concept of the national system of education for sustainable development / O. I. Bondar, T. V. Tymochko, H. B. Marushevskyi and others (2011).

[142] Sustainable development: theory, methodology, practice: textbook / Under. ed. L. G. Mel`nik (2009).

competence of students has become an integrated indicator of the quality not only of school ecological education for sustainable development, but also the willingness of teachers to implement its basic tenets in their professional activity.[143]

With regard to the introduction of education for sustainable development into higher education practice, there are currently a number of scientific developments to train future environmental specialists and students of technical higher education institutions.

In particular, a number of disciplines devoted to the study of the basics of sustainable development are included in the educational and professional training programs of bachelors and masters of the specialty «Ecology» and for some administrative specialties of technical higher education institutions: «Development of strategies for sustainable development of settlements», «Socio-economic potential of sustainable development»,«Monitoring of Sustainable Development Indicators»,«Sustainable Development Strategy» and others. Scientific and educational support of the teaching of these disciplines is carried out by the works of O. I. Bondara, T. V. Timochko, G. B. Marushevsky, G. O. Bilyavsky, Yu. M. Satalkina, V. G. Melnika, M. Z. Zgurovsky et al. Teaching these courses is an extremely important task: not only to provide a certain amount of knowledge, but also to teach students to think, to instill the right moral and ethical values in relation to nature, to develop management decision-making skills, consistent with the principles of the concept of sustainable development.

However, building up the content of ecological education on the basis of sustainable development in higher education institutions has remained beyond the reach of scientists. At the same time, the higher professional pedagogical school faces the task of social importance – to ensure the formation of environmental competence and readiness of future educators for ecological education and upbringing of the younger generation.

It should be noted that a characteristic feature of the education for sustainable development is its interdisciplinarity, which in turn imposes its imprint on the integration of educational ideas for sustainable development into the educational process. In particular, one of the core objectives of the education for sustainable development is to acquire teachers knowledge that allows them to integrate sustainable development into the content of the disciplines they teach and essentially pursue two goals: to ensure the harmonization of curricula with key topics of sustainable development and to train and retrain teaching staff. Measures aimed at achieving this goal offer curricula to properly reflect key themes of sustainable development, such as poverty eradication, gender equality, health, environmental protection, rural development, human rights, sustainable production and consumption, promotion of ecocentric determinants, taking into account national peculiarities of mentality and culture, settlement of armed conflicts, etc. The methodological support of the educational process is based on a continuous, consistent, progressive and logical presentation of the concept of sustainable development, focused on preventing the emergence of new and solving existing problems.

In order to substantiate the mechanisms of introducing ecological education on the principles of sustainable development into the higher education system in Ukraine, we analyzed the experience of foreign countries in the implementation of sustainable development ideas in the educational process of higher education institutions.

The UNECE Strategy states that ecological education plays a fundamental role in the long-term process of becoming an integrated system of education for sustainable development. Over the past 20 years, new approaches to sustainable development education have been introduced in different countries of the world. In particular, since 2003, the University of Ulster (Northern Ireland) has started a distance master's program «Education for Sustainable Development» for secondary school teachers. The program includes four modules:
  • education theory and principles for sustainable development;
  • methodology and practical exercises on education for sustainable development;
  • economic, legal and political aspects of sustainable development;

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[143] Pustovit N. A. (2010): Ecological competency as a goal of education for balanced development.

• sustainable development management.

The final result of the master's program is the completion of a diploma thesis on the implementation of education for sustainable development at the local level.

The Danish Ministry of Education organizes seminars for teachers from the Baltic region related to sustainable development in agriculture, energy and green tourism; each seminar focuses on one aspect of sustainable development. For example, the seminar «Sustainable Energy Consumption: New Millennium Energy» discussed the issues of alternative energy, energy efficiency, environmental impact and human health. Practical classes analyzed the daily use of energy at home, developed recommendations for savings, made an excursion to a local power plant, evaluated the economic feasibility of its work and environmental impact.

At the Russian University of Chemical Technology named after D. Mendeleev since 1995 lectures are given on the course «Sustainable Development», which include the following issues:

• basic concepts and principles of the Sustainable Development Concept;

• information about the Earth's biosphere and the concept of the biosphere as a dynamic system;

• the concept of stability and balance of dynamic systems;

• quantitative and qualitative criteria for sustainable development;

• modeling of social development;

• decision-making problems.

In Bulgaria, there is a network of eco-schools that has received the support of the Bulgarian Ministry of Education and the municipalities. Since 1998, the annual Education for Sustainable Development conferences have been held for members of the network, attended by teachers from schools, non-governmental organizations and staff from the Ministry of Education. The topics of the conferences are cultural, historical traditions and interfaith relations as important components of sustainable development, the role of educational institutions in the dissemination and perception of environmental information.

In the UK, sustainable development education is seen as a synthesis of ecological education and development education. The field of education for development has expanded significantly due to the persistent actions of some non-governmental organizations, such as Oxfam. Ecological education, development education, and environmental education disciplines share leading positions in the concept of sustainable development.

At the Baltic University (Uppsala, Sweden), a group of authors from the Baltic region has developed and implemented an Education for Change project aimed at helping teachers and other education workers introduce the concept of sustainable development into the educational process. As a result of his work, a manual was created with the same name for teaching and learning about sustainable development strategies. The guide sets out practical recommendations for teachers of schools, teachers and students of pedagogical institution of higher education on the study of the concept of sustainable development and the development of methods for its implementation in the educational process. The authors of the project believe that the introduction of environmental component in formal education, which became widespread at the end of the twentieth century, can not fully meet all the challenges facing the education for sustainable developmentand needs to be supported by means of non-formal education (training courses, trainings, rounds experience to improve the qualifications of educators on education for sustainable development).[144]

Thus, there is no consensus on the form of educational support for the concept of sustainable development: some authors believe that education for sustainable development should be implemented in the educational process as an independent industry, others – within the framework of ecological education enriched by the basic provisions of the education for sustainable developmen. It should be noted that in Ukraine the vast majority of representatives of national pedagogy are supporters of the latter approach.

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[144] Education for Change: A Handbook for Teaching and Studying Sustainable Development / under. ed. Gitte Yutvik, Inese Liepina (2012).

Similar dual tendencies are observed in the development of education for sustainable development in other countries. For example, a group of American scientists identified the following approaches in implementing the concept of sustainable development in the education system:

• recognize sustainable development as a paradigm for educational change;
• to fill with ecological content all subjects;
• develop ecological education programs for specialization in most colleges and universities;
• intensify research on a wide range of environmental and cultural issues;
• to compare education reforms with the development of ecological education at the national and international levels.[145]

Most domestic scientists are working to give ecological education a qualitatively new status, when the formation of a system of environmental values based on moral and ethical attitude to the environment is of particular importance. A significant component of this education is the professional training of an environmentally competent teacher, able to implement adequate ecological education and upbringing of student youth in accordance with the requirements of today. The opinion of L. B. Lukyanova: «…ecological education is not a part of education, but a new meaning and purpose of the modern educational process – a unique means of preserving and developing human beings and continuing human civilization».[146]

In Ukraine, not only is the greening of the education system, but also the greening of all sectors of the economy. Therefore, the problem arises of the training of pedagogical staff for ecological education of specialists in various fields of economy and social sphere, able to implement the ideas of sustainable development in their professional activities and daily life. There was a need to saturate educational and professional training programs for future teachers of all, without exception profiles with environmental content, adapted to the relevant subject area of education.

Analysis of the current state of environmental literacy of future teachers shows that a large part of this category of young people is dominated by a utilitarian approach to nature, environmental problems are not included in the system of personal values, are not part of their moral convictions, and for many of them there is a passive-consumption level by nature. Often environmental knowledge obtained in the process of education are disordered, haphazard in nature, skills and skills of environmental orientation are mainly narrow conjunctural color, do not correlate with the axiological vitality – the harmonization of society and the nature of human values, necessity environment.

Analyzing the educational programs and curricula of training of specialists of the educational qualification level «Bachelor» in the specialty 014 «Secondary education» in the subject specialties: Mathematics, Informatics, Physics, Chemistry, Biology, Geography, History, Ukrainian language and literature, Foreign language, Physical education , we came to the conclusion that there are no norms in the plans for environmental education. It should be emphasized that 5-7 years ago the discipline «Fundamentals of ecology» was included in the list of compulsory university courses, and in the National Strategy for the Development of Education in Ukraine until 2021 one of the strategic directions of development is the general greening of higher education.[147]

At the same time, only in some institutions of higher pedagogical education the variant component of educational and professional programs contains the disciplines «Ecology», «Fundamentals of ecology», «Socioecology», the amount of which is only 3 ECTS credits. There are no environmental components at all in the curricula for the training of specialists of the educational level «Master of Science» in the specified specialty. It is clear that this is not enough for the formation of a system of environmental knowledge and skills of students necessary for the

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[145] Berbenet W. G. (1989): Education for sustainable development: A call for reform, p. 123.
[146] Lukianova L. B. (2006): Theory and practice of ecological education at professional technical mortgages: dis. dr pedagogical of sciences, p. 54.
[147] Presidential Decree of June 25, 2013 No. 344/2013.

effective preparation of the future teacher for the organization of ecological education and upbringing in general educational institutions.

Thus, in order to accomplish these tasks, it became necessary to identify ways to implement the ecological education system on the principles of sustainable development in all higher education institutions, including pedagogical ones. The priority in this is the greening of the educational process, which, in our opinion, should provide the conditions and opportunities for students to acquire scientific knowledge about the interconnections in the system «Nature – Human – Society»; nurture an understanding of contemporary environmental issues, an awareness of responsibility at global, regional and local levels; to develop the ability to make responsible decisions about environmental problems, to master the norms of environmentally sound behavior and activities in the environment and to develop the value-motivational sphere of personality in relation to nature.

Mechanisms for implementation of the ecological education system on the principles of sustainable development in the educational process should consist of the following steps:

• integrating the concept of sustainable development into all future teacher education programs;

• inclusion of sustainable development issues into the work programs of vocational-oriented humanities and socio-economic training cycles;

• inclusion of sustainable development issues in the curricula of general, professional and practical training courses;

• inclusion in the curricula of preparation of bachelors in specialty 014 «Secondary education» of the disciplines «Fundamentals of ecology», «Ecological education and upbringing in school» with a volume of at least 6 credits and courses «Concept of sustainable development in education» and «Methodology of environmental work in educational institutions» for the preparation of masters;

• taking into account local, regional and national environmental conditions and problems while studying these disciplines;

• involvement of student self-government bodies in carrying out environmental actions and activities, participation in the work of the student scientific society on education issues for sustainable development, public environmental organizations.

The teaching of these courses should be based on the following principles: integrity, continuity, systematic and systematic, which are generally aimed at forming a coherent scientific picture of the world, which is revealed in the interaction of natural science and socio-humanitarian knowledge; interdisciplinarity and integrativeness, which will promote awareness of the universal value of nature and itself, as an integral part of it, by means of both humanities, social, and natural and technical disciplines; principle of regionality – provides coverage of environmental problems not only at the global, regional, but also at the local lore; principles of orientation of training for development of value-motivational and activity-practical sphere of personality - ensure formation of comprehensively educated socially active personality.

In the course of teaching the offered academic disciplines, new approaches to education for sustainable development are introduced and students' abilities to acquire communicative competence are realized: to express and defend their own point of view; think critically; make informed choices between alternatives; learn to work as a team, negotiate and respect democratic decisions.

Student youth are an active part of society, which is usually well aware of the environmental problems of their region and takes an active public position to raise and resolve them. However, given today's realities, to overcome the environmental crisis it is necessary to have environmental competence based on a new ecocentric value system in relation to nature. Currently, ecological knowledge, environmental thinking, environmental ideas are transformed into the material force of the progressive development of science, technology and culture and become the driving force for the sustainable development of society.

Thus, in the current context, questions are being raised not only about the development and improvement of environmental education, but about its new status and important role in the

development of education systems for sustainable development, when the formation of environmental ethics and morals are of particular importance and increasingly concern the world community. Pedagogical institutions of higher education have an extremely important task: not only to provide access to knowledge, but also to teach them to think and to instill the correct moral principles accepted by society. It is the habit of caring for the environment that should be the basic norm of any person's behavior, which must be developed from an early age.

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9. Pustovit N. A. (2010): Ecological competency as a goal of education for balanced development. Balanced (Sustainable) Development of Ukraine – National Policy Priority: Proceedings of the All-Ukrainian Scientific Ecological Conference. Kyiv: Center for Environmental Education and Information.

10. Education for Change: A Handbook for Teaching and Studying Sustainable Development / under. ed. Gitte Yutvik, Inese Liepina (2012).

11. Berbenet W. G. (1989): Education for sustainable development: A call for reform. Los Angeles.

12. Lukianova L. B. (2006): Theory and practice of ecological education at professional technical mortgages: dis. dr pedagogical of sciences: Київ, 2006.

13. Presidential Decree of June 25, 2013 No. 344/2013. URL: http://zakon3.rada.gov.ua/laws/show/344/2013.

2.2. KEY COMPETENCIES IN THE CONTEXT OF EDUCATION FOR SUSTAINABLE DEVELOPMENT

It is common knowledge that today's world is facing some of the most serious challenges in human history. With the rapid depletion of the Earth's resources, the ongoing degradation of land, water and air, and the loss of species and ecosystem biodiversity, it will become increasingly difficult to support a prosperous, secure and equitable life for people on the planet. This alarming situation is being intensified by a changing climate, with scale and impact hard to predict in the medium and long term. Now more than ever, education has a critical role to play, not only in providing learners with knowledge and skills to address these challenges, but also in promoting the values that will in still respect and responsibility towards others and the planet itself.

It requires fundamental changes in the way we think, act, and relate to other biotic and a biotic systems. Arguably, education is the most important tool to reshape worldviews and values and has enormous potential to address the sustainability challenges facing humanity. It can empower learners to embrace sustainability as a lifestyle choice. However, lifestyle choices are often the outcome of external influence by institutions, structures and practices that are beyond the control of the individual and so personal responsibility needs to be seen in a dialectical relationship with collective responsibility.

Nowadays, modern education is considered to be the main driving force behind the transformation of society to sustainability: the purpose of education in accordance to the Law of Ukraine «On Education» (2017)[148] is «comprehensive human development in order to ensure the sustainable development of Ukraine and its European choice» (Law of Ukraine «On Education»), and in the Law of Ukraine «Higher Education» (2014)[149] the first principle of public policy in higher education is to promote the sustainable development of society through the preparation of competitive human capital and the creation of conditions for lifelong learning (Law of Ukraine «On Higher Education»).

The scientific discourse on education for sustainable development has more than 30 years of history and began at the end of the twentieth century in the works of such foreign researchers as D. Wortman, R. McKeown, T. Simkin, D. Tilbury, C. Hopkins, M. Fernari, K. Shepard, K. Sherren and others. The role of sustainable development in education has been the subject of a heated debate. Critics have argued that sustainable development is an in appropriate focal point for developing curriculum as it is too normative, ambiguous and ineffective at solving the complex problems that will face the next generation.

The analysis of the world's normative documents, recommendations allows us to define the essence of the meaning «education for sustainable development». Sustainability Education is often referred to as Education for Sustainable Development (ESD), which has been interpreted as: «Education for Sustainable Development lets every human being acquire the knowledge, skills, attitudes and values necessary to shape a sustainable future. Education for Sustainable Development means including key sustainable development issues into teaching and learning; for example, climate change, disaster risk reduction, biodiversity, poverty reduction, and sustainable consumption. It also requires participatory teaching and learning methods that motivate and empower learners to change their behaviour and take action for sustainable development. Education for Sustainable Development consequently promotes competencies like critical thinking, imagining future scenarios and making decisions in a collaborative way. Education for Sustainable

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[148] Law of Ukraine «On Education» of 05/09/2017 No. 2145-VIII, adopted by the Verkhovna Rada of Ukraine // Database «Legislation of Ukraine» / Verkhovna Rada of Ukraine. – Access mode: http://zakon5.rada.gov.ua/laws/show /2145-19 (accessed: 05/03/2018).

[149] Law of Ukraine «On Higher Education» of 01. 07. 2014 № 1556-VII, adopted by the Verkhovna Rada of Ukraine // Database «Legislation of Ukraine» / Verkhovna Rada of Ukraine. – Accessmode: http://zakon2.rada.gov.ua/laws/ show /1556-18 (accessed: 05/03/2018).

Development requires far-reaching changes in the way education is often practised today» (UNESCO, 2014)[150].

In the context of our study it is necessary to mention that the UN 2030 Agenda acknowledges Quality Education (SDG №4) as a means for achieving the remaining Sustainable Development Goals, with sustainability as a goal for Education in target 4.7 (UNESCO, 2017)[151].

The concept of Quality Education is based on the premise that educational aims are met and purposes fulfilled, with quality seen «in light of how societies define the purpose of education» (UNESCO, 2017)[4].While education, including formal, informal and non-formal awareness and training has been recognised as «a process by which human beings and societies can reach their fullest potential», for years, the purpose of education in industrialized countries has been to educate a workforce, aiming at excellence in a few core disciplines (UNESCO, 2017)[152].

So Education for Sustainable Development (ESD) aims to develop competencies that enable and empower the individuals to reflect on their own actions by taking into account their current and future social, cultural, economic and environmental impacts from both a local and a global perspective. It requires individuals to act in complex situations in a sustainable manner in order to explore new ideas and approaches and participate in socio-political processes, with the objective of moving their societies progressively towards sustainable development.

Recently there has been growing interest in ESD which directs to enable learners to take responsible actions that contribute towards creating sustainable societies now and in the future. It develops the skills, values and attitudes that enable citizens to lead healthy and fulfilled lives, make informed decisions and respond to local and global challenges (UNESCO, 2017: IV)[153].

However, ESD should be understood as an integral part of quality education and lifelong learning. All educational institutions ranging from preschool to tertiary education and including both non-formal and informal education should consider it their responsibility to address sustainable development and to foster the development of key cross-cutting competencies related to sustainability.

The development of these competencies is an essential contribution to efforts to achieve the Sustainable Development Goals (SDGs). ESD equips the individuals not only with the knowledge to understand the SDGs, but also with the competencies to engage as informed citizens in promoting the transformation to a more sustainable society (UNESCO, 2017)[154].

It has been noted that ESD consists of holistic and transformational education that addresses learning content and outcomes, pedagogy and the learning environment. In addition to including and prioritizing content on climate change, poverty and sustainable consumption in the curriculum, ESD also creates interactive, learner-centered teaching and learning settings. In essence, ESD requires a shift from teaching to learning. This takes the form of an action-oriented transformative pedagogy, characterized by such elements as self-directed learning, participation and collaboration, problem-orientation and inter and transdisciplinarity, as well as the linking of formal and informal learning. Such pedagogical approaches are essential for the development of competencies vital for promoting sustainable development.

It goes without saying that societies across the globe are facing new challenges arising from the pace of technological progress and globalization. These include growing complexity and uncertainty, increasing individualization and social diversity, expanding economic and cultural uniformity, degrading ecosystem services upon which societies depend, and heightened

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[150] UNESCO. Global Monitoring Report 2013/4: Teaching and Learning: Achieving Quality for All; UNESCO: Paris, France, 2014.

[151] UNESCO.Education for Sustainable Development Goals. The Global Education 2030 Agenda; UNESCO: Paris, France, 2017.

[152] UNESCO.Education for Sustainable Development Goals. The Global Education 2030 Agenda; UNESCO: Paris, France, 2017.

[153] UNESCO.Education for Sustainable Development Goals. The Global Education 2030 Agenda; UNESCO: Paris, France, 2017.

[154] UNESCO.Education for Sustainable Development Goals. The Global Education 2030 Agenda; UNESCO: Paris, France, 2017.

vulnerability and exposure to natural and technological hazards. Additionally, these societies now have a vast and continuous stream of information at their disposal. The complexity of these challenges (including the variety of actors involved, the situation and the courses of action) does not allow for straightforward problem-solving processes and instead necessitates creative and self-organized action.

In order to contribute to sustainable development, the individuals need to learn how to understand the complex world in which they live, and how to deal with uncertainties, trade-offs, risks and the high velocity of societal (global) change. They need to be able to collaborate, speak up and act for positive change within the world (UNESCO, 2014)[155]. These people might be called 'sustainability citizens' (Wals, 2015)[156]. Since the late 1990s, the discourse on how to educate such sustainability citizens has shifted from an input orientation, focusing on the lists of essential educational content, to an outcome-based competence approach (Adomßent and Hoffmann, 2013; Wiek, Withycombe and Redman, 2011)[157,158]. Such outcomes include enabling people to engage effectively in this increasingly complex world and contribute to transforming its structures.

So, the competence approach is based on establishing which approaches work best in the real world and then identifying how to foster the necessary learning. As it is noted above, in the context of current global challenges, it is argued that ESD should enable individuals to reflect on their own actions by taking into account their current and future social and environmental effects from a global perspective. This then enables them to intervene productively in shaping them in a more sustainable manner. The competence-based approach can help here to bridge the gap between knowledge and action.

The emancipatory ESD approach aims to identify key competencies needed for the learners to become sustainability citizens. Accordingly, the Global Action Programme highlights the learning outcomes that stimulate learning and promote core competencies, such as critical and systemic thinking, collaborative decision-making, and taking responsibility for present and future generations(UNESCO, 2014)[159].

A great number of the researchers are examining the many interconnecting aspects of ESD and their associated competencies (de Haan, 2010; Glasser and Hirsh, 2016; Rieckmann, 2012; Wiek, Withycombe and Redman, 2011; Wiek et al., 2016)[160,161,162,163] Between them, they outline the key competencies essential for individuals to transform their own lifestyles and to contribute to societal transformation towards sustainability.

In our study we shall make an attempt to analyze the key competences. In the OECD project «Definition and Selection of Competencies» (DeSeCo) the key competencies are classified into three categories: using tools interactively (the ability to use language, symbols and texts interactively, the ability to use knowledge and information interactively and the ability to use

[155] UNESCO. Roadmap for Implementing the Global Action Programme on Education for Sustainable Development; UNESCO: Paris, France, 2014.

[156] Wals, A. E. J. Beyond unreasonable doubt – Education and Learning for Socio-Ecological Sustainability in the Anthropocene. Inaugural Address Held Upon Accepting the Personal Chair of Transformative Learning for Socio-Ecological Sustainability; Wageningen University; Wageningen University: Wageningen, The Netherlands, 2015.

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[163] Wiek, A., Withycombe, L. and Redman, C. L. 2011. Key competencies in sustainability: a reference framework for academic program development. Sustainability Science, 6 (2), 203-218.

technology interactively); interacting in heterogeneous groups (the ability to relate well to others, the ability to cooperate and the ability to manage and resolve conflicts) and acting autonomously (the ability to act within the big picture; the ability to form and conduct life plans and personal projects; and the ability to defend and assert rights, interests, limits and needs) (Rychen, 2003)[164].

The next framework Gestaltungskompetenz (shaping competencies) consists of the following key competencies for shaping or transforming the future: gather knowledge in a spirit of openness to the world, integrating to align with the other imperatives (think and act in a forward-looking manner); acquire knowledge and act in an interdisciplinary manner; deal with incomplete and overly complex information; cooperate in decision-making processes; cope with individual decision-making dilemmas; participate in collective decision-making processes; motivate oneself as well as others to become active; reflect upon one's own principles and those of others; refer to the idea of equity in decision-making and planning actions; plan and act autonomously; and show empathy for, and solidarity with, the disadvantaged (de Haan, 2010)[165].

The following list of key competencies has been compiled as part of a Delphi study by ESD experts from Chile, Ecuador, Germany, Mexico and the United Kingdom: systemic thinking and handling of complexity, anticipatory thinking, critical thinking, acting fairly and ecologically, cooperation in (heterogeneous) groups, participation, empathy and change of perspective, interdisciplinary work, communication and use of media, planning and realizing innovative projects, evaluation, and ambiguity and frustration tolerance (Rieckmann, 2012)[166].

The researcher A. Wals (2015)[167] distinguishes the following competence-based dimensions of sustainability: the dynamics and content of sustainability, the critical dimension of sustainability, the change and innovation dimension of sustainability, and the existential and normative dimension of sustainability.

Recently A. Wiek, L. Withycombe and C. Redman et al. have updated their framework, which comprised five key competencies, adding a sixth (problem-solving competence) in 2016: systems thinking competence, anticipatory competence, normative competence, strategic competence, interpersonal competence and integrated problem-solving competence. Their work has played an important role in drawing together many of these concepts and lists, and in providing a structure for facilitating discussion about the competencies considered critical for sustainability (Wiek, Withycombe and Redman, 2011, Wiek et al., 2016)[168,169].

The scholars H. Glasser and J. Hirsh (2016)[170] have identified five additional key competencies: affinity for life, knowledge about the state of the planet, wise decision-making, modelling sustainable behaviour and transformative social change.

While these lists exhibit certain differences, they also coincide with a number of key sustainability competencies. There is a general agreement within the international ESD discourse that the following key sustainability competencies are of particular importance for thinking and acting in favour of sustainable development:

[164] Rychen, D. S. 2003. Key competencies: meeting important challenges in life. D. S. Rychen and L. H. Salganik (eds), Key Competencies for a Successful Life and Well-functioning Society. Cambridge, MA: Hogrefe and Huber, pp. 63-107.

[165] De Haan, Gerhard. 2010. «The development of ESD-related competencies in supportive institutional frameworks». International Review of Education, 56: 315-328.

[166] Rieckmann, M. Future-oriented higher education: Which key competencies should be fostered through university teaching and learning? Futures 2012, 44, 127-135. [Cross Ref].

[167] Wals, A. E. J. Beyond unreasonable doubt – Education and Learning for Socio-Ecological Sustainability in the Anthropocene. Inaugural Address Held Upon Accepting the Personal Chair of Transformative Learning for Socio-Ecological Sustainability; Wageningen University; Wageningen University: Wageningen, The Netherlands, 2015.

[168] Wiek, A.; Withycombe, L.; Redman, C.; Mills, S. B. Moving forward on competence in sustainability research and problem solving. Environment 2011, 53, 3-12. [Cross Ref].

[169] Wiek, A., Withycombe, L. and Redman, C. L. 2011. Key competencies in sustainability: a reference framework for academic program development. Sustainability Science, 6 (2), 203-218.

[170] Glasser, H. and Hirsh, J. 2016. Toward the development of robust learning for sustainability core competencies. Sustainability: The Journal of Record, 9 (3): 121-134.

1. Systems thinking competency: the ability to recognize and understand relationships, to analyze complex systems, to perceive the ways in which systems are embedded within different domains and different scales, and to deal with uncertainty.

2. Anticipatory competency: the ability to understand and evaluate multiple futures – possible, probable and desirable – and to create one's own visions for the future, to apply the precautionary principle, to assess the consequences of actions, and to deal with risks and changes.

3. Normative competency: the ability to understand and reflect on the norms and values that underlie one's actions and to negotiate sustainability values, principles, goals and targets, in a context of conflicts of interests and trade-offs, uncertain knowledge and contradictions.

4. Strategic competency: the ability to collectively develop and implement innovative actions that further sustainability at the local level and further afield.

5. Collaboration competency: the ability to learn from others; understand and respect the needs, perspectives and actions of others (empathy); understand, relate to and be sensitive to others (empathic leadership), deal with conflicts in a group; and facilitate collaborative and participatory problem-solving.

6. Critical thinking competency: the ability to question norms, practices and opinions; reflect on own one's values, perceptions and actions; and take a position in the sustainability discourse.

7. Self-awareness competency: the ability to reflect on one's own role in the local community and (global) society, continually evaluate and further motivate one's actions, and deal with one's feelings and desires.

8. Integrated problem-solving competency: the overarching ability to apply different problem-solving frameworks to complex sustainability problems and develop viable, inclusive and equitable solution that promote sustainable development – integrating the above-mentioned competencies.

This list highlights the competencies that are particularly essential for sustainability and which have not been the main focus of formal education. While each competency has its own qualities and areas of relevance, they are mutually interdependent. That is why the integrated problem-solving competency is of particular importance. In addition, basic competencies such as communication skills are crucial for dealing with sustainable development. Furthermore, these key sustainability competencies have to be developed in conjunction with basic competencies (Wiek, Withycombe and Redman, 2011)[171].

However, while competencies describe the capacity or disposition to act to address complex challenges, they do not necessarily imply that an individual will act in a certain way in a specific situation. Hence, to transform capacities into real sustainable actions, the individuals need corresponding values and motivational drivers.

Furthermore, sustainability performance is related to an individual's environment, understood as opportunities to perform that are beyond the individual's control. From this perspective, opportunities are environmental and contextual mechanisms that enable action. In other words, they are the conditions that provide the necessary support and avenues for sustainability-driven action.

Leaning on the capability approach, M. Nussbaum (2000)[172] emphasizes the crucial importance of governance institutions in providing opportunity structures that give the individuals the capability to act. In other word the term capabilities could be understood as the set of real opportunities to be what they have reason to value (Lozano et al., 2012)[173]. According to this approach, sustainability performance depends on the interplay of knowledge and skills, values and motivational drivers, and opportunities. The interrelation of these dimensions influences personal behaviour.

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[171] Wiek, A., Withycombe, L. and Redman, C. L. 2011. Key competencies in sustainability: a reference framework for academic program development. Sustainability Science, 6 (2), 203-218.

[172] Nussbaum, Martha C. 2010. Not for Profit: Why Democracy Needs the Humanities . Princeton: Princeton UP.

[173] Lozano, R.; Merrill, M. Y.; Sammalisto, K.; Ceulemans, K.; Lozano, F. J. Connecting competences and pedagogical approaches for sustainable development in higher education: A literature review and framework proposal. Sustainability 2017, 9, 1889. [Cross Ref]

ESD is not just a matter of teaching sustainable development and adding new content to courses and trainings. Schools and universities, for instance, should see themselves as experiential places of learning for sustainable development, and should therefore orient all their processes towards principles of sustainability. For ESD to be more effective, the educational institution as a whole has to be transformed. Such a whole-institution approach aims to mainstream sustainability into all aspects of the educational institution. It involves rethinking the curriculum, campus operations, organizational culture, student participation, leadership and management, community relationships and research (UNESCO, 2014)[174].

Existing experiences with whole-institution approaches in the areas of higher education and secondary schools need to be scaled up and expanded to other levels and types of education, such as early childhood education, technical and vocational education and training (TVET), and non-formal education for youth and adults. The key elements for a whole-institution approach are the following.

1. An institution-wide process is organized in a manner that enables all stakeholders – leadership, teachers, learners, administration – to jointly develop a vision and plan to implement ESD in the whole institution.

2. Technical and, where possible and appropriate, financial support is provided to the institution to support its reorientation. This can include the provision of relevant good practice examples, training for leadership and administration, the development of guidelines, as well as associated research.

3. Existing relevant inter-institutional networks are mobilized and enhanced in order to facilitate mutual support such as peer-to-peer learning on a whole-institution approach, and to increase the visibility of the approach to promote it as a model for adaptation. UNESCO (2014)[175].

While all elements of the whole-institution approach are important, interactive, integrative and critical forms of learning are at the core of delivering ESD in the classroom and other learning settings, making this approach an action-oriented transformative pedagogy.

Thus, ESD is about developing sustainability competencies and, thus, empowering and motivating learners to become active and critical sustainability citizens able to participate in shaping a sustainable future. The pedagogical approaches needed to achieve this end should be learner-centered, action-oriented and transformative.In our research we give the characteristics of different approaches.

1. A learner-centered approach. Learner-centered pedagogy sees the students as autonomous learners and emphasizes the active development of knowledge rather than its mere transfer and/or passive learning experiences. The learners' prior knowledge as well as their experiences in the social context is the starting points for stimulating learning processes in which the learners construct their own knowledge base. Learner-centered approaches require learners to reflect on their own knowledge and learning processes in order to manage and monitor them. The educators should stimulate and support those reflections. Learner-centered approaches change the role of an educator from that of an expert who transfers structured knowledge to that of a facilitator of learning processes (Barth, 2015)[176].

2. Action-oriented learning. In action-oriented learning, learners engage in action and reflect on their experiences in relation to the intended learning process and personal development. The experience might come from a project (in-service learning), an internship, facilitation of a workshop, implementation of a campaign and so on.

Action-learning draws on D. Kolb's learning cycle of experimental learning, which has the following stages: having a concrete experience; observation and reflection; formation of abstract

[174] UNESCO. Roadmap for Implementing the Global Action Programme on Education for Sustainable Development; UNESCO: Paris, France, 2014.
[175] UNESCO. Global Monitoring Report 2013/4: Teaching and Learning: Achieving Quality for All; UNESCO: Paris, France, 2014.
[176] Barth, M. 2015. Implementing Sustainability in Higher Education: Learning in an Age of Transformation. London: Routledge.

concepts for generalization and application in new situations (Kolb, 1984)[177]. Action-learning increases knowledge acquisition, competency development and values clarification by linking rather abstract concepts to personal experience and the learners' life. The role of the educator is to create a learning environment that prompts learners' experiences and reflexive thought processes.

3. Transformative learning. Transformative learning can be defined primarily by its aims and principles, not by a concrete teaching or learning strategy. It aims to empower learners to question and change their ways of seeing and thinking about the world, in order to further develop their understanding of it (Mezirow, 2000; Slavich and Zimbardo, 2012)[178,179]. The educator acts as a facilitator who empowers and challenges learners to change their worldviews. The related concept of transgressive learning (Lotz-Sisitka et al., 2015)[180] goes one step further – it states that learning in ESD has to overcome the status quo and prepare the learner for disruptive thinking and the co-creation of new knowledge.

While such pedagogical approaches describe the general character or guiding principles for designing learning processes in ESD, specific methods in line with these principles are needed to facilitate the learning process. ESD favours the methods that foster sustainability competencies through active learning.

In our research we might name some methods which are particularly recommended for ESD:

– collaborative real-world projects such as a service-learning project and campaigns for different sustainability topics;

– vision-building exercises such as future workshops, scenario analyses, utopian/dystopian story-telling, science-fiction thinking, and fore and back-casting;

– analysis of complex systems including community-based research projects, case studies, stakeholder analysis, actor analysis, modelling and systems games;

– critical and reflective thinking including through fish-bowl discussions and reflective journals.

These participatory teaching and learning methods empower the learners to take action to promote sustainable development. When teaching and learning methods for a specific setting are chosen, they have to match the needs of the learner group (based on age, prior knowledge, interests and abilities), the context in which the learning takes place (space in the curriculum, pedagogical climate and cultural traditions), and the resources and support available (teacher competencies, teaching materials, technology and money).

To sum it up, we would like to mention that ESD can help to facilitate sustainable development by developing the cross-cutting sustainability competencies needed to deal with a wide range of sustainability challenges. To empower people worldwide to take action in favor of sustainable development, all educational institutions should undertake to deal intensively with sustainable development issues and foster the development of sustainability competencies. Therefore, it is crucial not only to include sustainability-related content in the curricula, but also to employ an action-oriented transformative pedagogy.

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[177] Kolb, D. A. 1984. Experiential Learning: Experience as the Source of Learning and Development. New Jersey: Prentice-Hall.

[178] Mezirow, J. 2000. Learning as Transformation: Critical Perspectives on a Theory in Progress. San Francisco: Jossey-Bass.

[179] Slavich, G. M. and Zimbardo, P. G. 2012. Transformational teaching: theoretical underpinnings. Basic principles and core methods. Educational Psychology Review, 24 (4), 569-608.

[180] Lotz-Sisitka, H., Wals, A. E., Kronlid, D. and McGarry, D. 2015. Transformative, transgressive social learning: rethinking higher education pedagogy in times of systemic global dysfunction. Current Opinion in Environmental Sustainability, 16: 73-80.

2.3. IMPROVEMENT OF PROFESSIONAL COMPETENCE OF PHYSICAL CULTURE TEACHER IN THE SYSTEM OF POSTGRADUATE PEDAGOGICAL EDUCATION

Dynamic social and cultural transformations, profound transformations in the educational sphere, accompanying Ukraine's integration into the European educational community, are driving changes in the professional activities of the modern Teachers. Requirements for a modern specialist are largely subject. This means that the improvement of training is not solved today only by expanding its substantive content. Preparing for professional activities in today's environment is not limited to broadcasting a systemic body of knowledge and skills. It requires the development of certain social and professionally significant qualities and personality traits. This objectively leads to a reorientation of education systems towards a competency paradigm[181].

Integration competency approach in training system is an objective necessity, formed in education as a response to social, economic, political, educational and pedagogical challenges of the market economy under globalization. Modern experts are required, which cannot be prepared only by expanding the subject matter of training, because they are different in nature and unsubjects some versatility. Preparedness for professional work, so the system is not limited body of knowledge and skills – it requires certain socially and professionally significant qualities formed motives and perceived need for professional growth and self. The new requirements of higher education in Ukraine and the many changes occurring in the field of physical education and sport, clearly outline the wide range of issues related to the problems of improvement of professional skills, in particular this applies to different aspects of improving the professional competence of teachers of physical culture[182].

Attention from the state physical education and sport determined by their difficulty in introducing the modified terms of socio-cultural and politico-economic development of the modern, new requirements for professional skills of teachers of physical education. Formation of professional competence, which is accompanied by significant quantitative and qualitative structural transformation of the individual, to ensure the normal functioning of the human subjects of labor, requires specific conditions and future career during training. In terms of today's sports and the sports movement is an important component of social and cultural life; is a multifunctional phenomenon, which is a leader in physical and spiritual culture; stands relatively independent sector of the national economy; making a contribution to the economy[183].

The urgency of finding effective ways to improve the professional competence of teachers of physical training is determined by the needs of society in a new generation of teachers, which at high levels can realize the health, educational and training objectives consistent with the priorities of state educational policy of Ukraine. An important role in achieving a high level of professional competence given to postgraduate education system, which creates favorable conditions for process optimization training teaching staff, continuing professional development, self-development and self-improvement.

In modern teaching science developed a theoretical basis for solving this problem[184]. Structural and logical analysis of the scientific literature shows that significant attention to improving the professional competence of teachers of different specialization in terms of

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[181] AZAROV, V. Rozvytok profesiynoyi kompetentnosti vchytelya fizychnoyi kultury v systemi metodychnoyi roboty zahalnoosvitnoho navchalnoho zakladu [Development of professional competence of physical education teacher in the systematic work of a comprehensive educational institution].

[182] CHAYKA, V. M. Pidhotovka maybutnoho vchytelya do samorehulyatsiyi pedahohichnoyi diyalnosti [Preparing the future teacher for self-regulation of pedagogical activity], p. 16.

[183] KHRYSTOVA, T. E. Upravlinnya protsesom u sferi fizychnoho vykhovannya [Process Management in Physical Education], p. 11.

[184] BOHDANOVA, H. S. Kharakterystyka pedahohichnykh umov pidvyshchennya rivnya profesiynoyi kompetentnosti vchytelya fizychnoyi kultury [Characterization of pedagogical conditions for increasing the level of professional competence of a physical education teacher], p. 20.
HAYDUK, N. O. Teoretychni peredumovy formuvannya profesiynoho imidzhu maybutnikh uchyteliv fizychnoyi kultury [Theoretical background for the formation of professional image of future teachers of physical culture], p. 24.

postgraduate education paid F. Baybanova, I. Grishin, N. Wood, N. Stone, A. Onats, M. Polishchuk, V. Sayuk, E. Sof'yanu, V. Strelnikov, L. Shevchuk and others. However, it was established that the problem of increasing and improving the level of professional competence of teachers of physical education in the postgraduate education is considered only in certain works of G. Bogdanova, L. Pyevitsynoyi, T. Pankratovych.

The value of competency approach to teacher training is that within it focuses on the practical component of training, directed activities to ensure readiness and capability specialist to perform a variety of social and professional functions, to act in changing and complex situations of professional activity[185]. Thus, to determine the content and ways of forming professional competence can be subject to a thorough definition of the features of professional activity, typical tasks and functions of professional, determined in accordance with regulatory requirements.

In modern scientific and pedagogical literature it is not given enough attention to research of various aspects of the problem of raising the level of professional competence of the physical culture teacher in the system of postgraduate pedagogical education.

On the basis of aforesaid, the purpose of the work was to provide characteristics of pedagogical conditions that will increase the level of professional competence of the physical culture teacher in the system of postgraduate pedagogical education.

According to modern ideas, professional competence is a normative complex and integrative characteristic of a personality that defines its readiness and ability to perform functions of professional activities and effective solution of typical professional Tasks, focuses her on the constant professional self-improvement and self-realization based on the creative use of acquired knowledge, professional and life experience, values, abilities and professionally important qualities. It is defined as the quality of the employee's activity, which ensures the effectiveness of the solution of professional-pedagogical problems and typical professional tasks that arise in real situations of pedagogical or scientific-pedagogical activity, and depends on Qualifications, generally accepted of values, morality and ethics, possession of educational technologies, technologies of pedagogical diagnostics (surveys, individual and group interviews) and psychological and pedagogical correction, life experience, Permanent Improvement and implementation of the ideas of modern pedagogy, methods of teaching and teaching of disciplines and subjects, use of scientific literature and other sources of information to create modern forms of teaching, implementation Evaluation and value proposition reflection[186].

The professional competence of the physical culture teacher is defined as the complex integral state of his/her personality, which is characterized by a high level of theoretical, methodical, practical and psychological readiness to carry out professional and pedagogical Activities in accordance with the qualification requirements. The high level of personal qualities of the teacher and the ability to display a high level of social and pedagogical activity also acquires an important importance[187]. This definition is fully disclosed content fullness of professional competence.

Specificity of professional activity of the teacher of physical culture is manifested in the complex solution of the health-improving educational tasks in the context of formation of physical, psychological, spiritual and social health of pupils in educational The modern school process. Based on the results of the systematic analysis of scientific and methodological literature, generalization of own experience, you can state that the peculiarities of professional activity of the teacher of physical culture manifests itself in complex generation and combination Theoretical knowledge, methodological approaches, motive skills and skills, free possession of the content of the curriculum and physical and health technologies. Taking into account the above theoretical and

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[185] VÁLKOVÁ, HANA, GÓRNY, MIROSŁAW. Personality of physical education teachers and adapted physical activity, p. 108.
[186] BUGAYENKO, T. V. K voprosu formirovaniya individual'nogo stilya professional'noy deyatel'nosti v protsesse pedagogicheskoy praktiki [On the issue of the formation of an individual style of professional activity in the process of teaching practice], p. 185.
[187] KURNYSHEV, Y., PALAGNIUK, T. Professional self-progress of the future physical education teacher: criteria and components, p. 87.

methodological positions, the professional competence of the teacher of physical culture should be understood as an integrative professional personality characteristics, which includes the combination of theoretical, psychological and pedagogical Knowledge, methodical approaches, motive skills, professionally important personal qualities, which allow the teacher of physical culture to effectively solve the pedagogical tasks in the educational process of a comprehensive educational institution.

To improve the level of professional competence of a physical culture teacher, it is necessary to create pedagogical conditions that will contribute to the effective implementation of this process. In a large explanatory vocabulary of the modern Ukrainian language, the term "condition" is defined as the necessary circumstances, features of real reality that allow the implementation, formation of something or contribute to something[188]. This concept is quite widespread in scientific writings, emphasizing its significance for modern pedagogical science. In the context of our research, we will consider pedagogical conditions as important factors contributing to raising the level of professional competence of the physical culture teacher in the system of continuous pedagogical education.

The analysis of psychological and pedagogical literature allows us to assert that the notion of "pedagogical conditions" is considered in different aspects, while many authors cite their interpretation. So, G. Bogdanova believes that pedagogical conditions constitute a meaningful characteristic of the components (the content, organizational forms, means of training and the character of the relationship between the teacher and pupils), which simulate the pedagogical system[189]. V. Chaika examines the pedagogical conditions as specially created real circumstances of the professionally oriented work of those who are studying[190]. According to T. Sorochan Pedagogical conditions is the peculiarities of the preparation of school principals to managerial activity in the system after the Diploma of Pedagogical education, which contribute to the development of professionalism[191]. In our opinion, pedagogical conditions are specially created circumstances that involve the choice of content, forms, methods of teaching and contribute to achieving a high level of professional competence.

It should be noted that pedagogical conditions are different from other conditions, for example, social, psychological, and organizational[192]. Social conditions reflect the peculiarities of society's attitude to the problems of professional competence of pedagogical workers, requirements to attestation of teachers. Psychological conditions are based on the laws of development and self-realization of a teacher and provide psychological comfort taking into account individual characteristics. Organizational conditions define the general requirements for the structure and order of training by teachers of refresher courses[193].

Based on the peculiarities of continuous training and retraining of pedagogical staff, taking into account the theoretical and methodological provisions of increasing the level of professional competence of the physical culture teacher in the system of postgraduate pedagogical education, We have substantiated and defined the pedagogical conditions that contribute to the increase of the level of specified quality in specialists of physical culture, as well as the ways of their implementation in the practice of continuous pedagogical education.

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[188] Velykyy tlumachnyy slovnyk suchasnoyi ukrayinskoyi movy: 250000 [The Great Interpretive Dictionary of Modern Ukrainian: 250000], p. 1296.

[189] BOHDANOVA, H. S. Kharakterystyka pedahohichnykh umov pidvyshchennya rivnya profesiynoyi kompetentnosti vchytelya fizychnoyi kultury [Characterization of pedagogical conditions for increasing the level of professional competence of a physical education teacher], p. 21.

[190] CHAYKA, V. M. Pidhotovka maybutnoho vchytelya do samorehulyatsiyi pedahohichnoyi diyalnosti [Preparing the future teacher for self-regulation of pedagogical activity], p. 71.

[191] SOROCHAN, T. M. Pidhotovka kerivnykiv shkil do upravlinskoyi diyalnosti: teoriya ta praktyka [Preparing School Managers for Management: Theory and Practice], p. 134.

[192] BOZHYK, M. V. Profesiyni ta osobysti yakosti vchyteliv-predmetnykiv i osoblyvosti yikh formuvannya zasobamy profesiyno-prykladnoyi fizychnoyi pidhotovky [Professional and personal qualities of subject teachers and peculiarities of their formation by means of vocationally applied physical training], p. 19.

[193] KHRYSTOVA, T. E. Upravlinnya protsesom u sferi fizychnoho vykhovannya [Process Management in Physical Education], p. 38.

The first pedagogical condition – ensuring positive dynamics of development value proposition the attitude of teachers of physical culture to professional self-improvement and self-development during training. The basis of pedagogical conditions laid the conscious, purposeful choice of a teacher of physical culture regarding value proposition attitude to own creative self-development and self-improvement. This is because the value proposition of the physical culture teacher's attitude to professional improvement is one of the most important factors in improving the level of professional competence. The presence of a value proposition attitude of the teacher to professional self-improvement and self-development is the motivation that is needed to carry out certain actions that will lead to positive results in professional activities and personal development[194].

To enhance the value proposition attitude, motivation and interest of the teacher to the professional self-improvement, we introduced a "portfolio of professional achievements of the teacher of physical Culture", which was to encourage participation in various activities with Improvement of professional training, independently plan own activities, the ability to choose measures to improve the level of vocational competence in accordance with their own needs. Another component of providing a positive dynamics of development value proposition the attitude of teachers of physical culture to professional self-improvement and self-development is the creation of the appropriate environment and atmosphere in the pedagogical team, which supports and Creative pedagogical Search is encouraged, qualified methodological assistance is provided.

The second pedagogical condition consists in expansion and enrichment of practical experience of physical culture teachers with the competent of solving pedagogical situations that arise in professional activity, based on the use of interactive teaching methods. In this context, it is assumed the formation of cognitive skills, communication abilities in the process of solving specially modeled professional situations; development of ability to interact with all participants of the teaching and educational process taking into account the principles of humanistic pedagogy; Creating comfortable conditions for teaching teachers of physical culture, in which each participant feels equal partner, successful and intellectually capable; exchange of professional practical experience, which helps to find an adequate way of solving pedagogical situations, which arise in professional activity of the teacher of physical culture.

Based on the specifics of the professional activity of physical education teachers, we highlighted as a third pedagogical condition for improving the mastering process by teachers of modern physical and health technologies and preparing for their implementation in Educational-educational process of secondary school. Raising the level of professional competence of the teacher of physical culture includes accumulation of not only theoretical information, but also mastering practical skills in modern technologies of physical and recreational activities. According to the above, we have introduced a project of professional development, which aims to increase the musculoskeletal experience of physical education teachers and master classes to create skills to elect and implement modern fitness technologies in Teaching and educational process during the lessons of physical education and extracurricular activities with students of secondary school.

The university-type higher education institution is the tip of the education system and is traditionally regarded as the center of intellectual and spiritual formation of the students. Therefore, the third pedagogical condition requires students to provide information on forms, methods and means of development and improvement of vital motive qualities, preservation and strengthening of health, increase of level of physical preparedness. The urgency of the problem of the student's health is associated with the need to instill her to a healthy lifestyle, to increase its physical activity as an important part of intellectually creative personality. There is a contradiction between the need of society in healthy citizens, able to realize its physical, intellectual forces in the sphere of production, science, culture and low level of public health and indifferent attitude of people, in

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[194] AZAROV, V. Rozvytok profesiynoyi kompetentnosti vchytelya fizychnoyi kultury v systemi metodychnoyi roboty zahalnoosvitnoho navchalnoho zakladu [Development of professional competence of physical education teacher in the systematic work of a comprehensive educational institution].

particular, significant Number of subject teachers, to a healthy lifestyle. Consequently, the urgent need to prepare higher education applicants, which are aware of the significance healthy lifestyles and health-saving technologies, is overdue.

Today there are no generalizing works of scientists from Ukraine and abroad, which discusses theoretical and methodical foundations of forming positive attitude to physical culture among students of universities and outlined and previously documented these principles. The modern complex socio-economic situation in Ukraine, as well as the state of general culture and spirituality of population brings to the national Higher School a new extremely important task. Its essence is the need to review the conceptual bases of the organization of training of specialists and appropriate definition of its content and technologies that would provide a qualitatively new level of their professionalism[195].

Participation of the teachers of physical culture in the projects of professional development contributes to the level of professional competence, formation of thorough knowledge and skills in teaching methods of physical education, use of innovative. Health-saving technologies of studying in physical raising and physical-cultural and health-improving direction of physical culture lessons. Attracting specialists of physical culture to professional improvement projects positively influences the increase of their motivation to creativity, self-education and self-improvement.

Master classes provide a possibility for teachers of physical culture to get acquainted with the practical experience of leading teachers and master professional skills of conducting lessons using a variety of fitness programs. During the master classes, teachers have the opportunity not only to see, but also independently perform those exercises and techniques that the master teacher applies in his practice. This is positively reflected on the professional growth of the teacher and his level of professional competence.

Master classes are an interesting form of organization of training for teachers who exhibit an active position on finding ways of their professional growth, and for teachers who passively refer to their own professional development. The important value of the master classes are also for the master teacher, because he develops and improving his professional skills and skills. Master classes are designed for a certain group of physical culture teachers, who are united by a common goal – to adopt his work experience, professional and personal qualities, skills, etc. in the teacher-master. Most often, this transmission is carried out by direct display of tricks to explain each action. The Master class includes a set of methodical techniques, original pedagogical actions on effective solution of educational tasks, which only this teacher owns. The positive result of training in the Master class is that: the teacher, having mastered the proposed master teacher with the mechanism of learning, activates his pedagogical experience and finds ways to update it; the passive teacher, performing a certain action algorithm, is included in the active cognitive activity.

During the preparation of master classes it is necessary to rely on the algorithm of the technology of its realization:

1. Presentation of the pedagogical experience of master teacher.
    1.1. The brief description of pupils of the chosen contingent.
    1.2. Short substantiation of the main ideas of technology that is effective in working with this category.
    1.3. Description of achievements of the Master Teacher's experience.
    1.4. Defining problems and perspectives in the teacher's work.
2. Presenting the lessons system.
    2.1. Description of the lessons system in effective pedagogical technology.
    2.2. Defining the main methods of work, which the teacher-master will demonstrate to the audience.
3. Simulation game.

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[195] BOZHYK, M. V. Profesiyni ta osobysti yakosti vchyteliv-predmetnykiv i osoblyvosti yikh formuvannya zasobamy profesiyno-prykladnoyi fizychnoyi pidhotovky [Professional and personal qualities of subject teachers and peculiarities of their formation by means of vocationally applied physical training], p. 22.

3.1. The Master Teacher conducts a lesson with the teachers (participants of the Master Class), demonstrating the methods of effective work with pupils.

3.2. During the master class, the participants simultaneously act as the students, who are actively involved in work, as well as experts analyzing and evaluating the proposed actions and measures.

4. Modeling.

4.1. Independent work of the participants of the Master class on developing their own model of lesson in the technology of teacher-master lesson.

4.2. The teacher-Master performs the role of consultant, organizes independent activity of participants and manages it.

5. Reflection.

5.1. Discussion on the consequences of joint activity of the master and participants.

5.2. Achievement of goals in the work of master-class is determined according to the set goal.

Thus, characterized by pedagogical conditions is a favorable basis for achieving a high level of professional competence of physical education teachers, their professional growth and self-improvement. Especially we focus on the application of interactive forms of learning and implementation of master classes that most effectively influence the dynamics of professional competence development.

Prospects for further research in this direction will be aimed at presenting the experimental results of the proposed pedagogical conditions for the development of professional competence of physical education teachers in the postgraduate pedagogical Education.

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2.4. COMMUNICATIVE COMPETENCE IN THE SYSTEM OF EDUCATIONAL TRAINING OF FUTURE ENGINEERS-AGRARIANS

At the present stage of social development the new tasks caused by the needs of the time appeared before the professional education of Ukraine. The problem of forming a personality that can appropriate to use the knowledge and skills, able to apply them in new working conditions, capable to the self-development and self-improvement is particularly urgent. The rapid economic development of Ukraine, scientific and technological progress and accession to the Bologna declaration stipulate the necessity to improve the professional education of engineers-agrarians. Thus one of the main tasks of modern engineering education is the formation of the communicative competence of the engineer on the basis of mastering the system of knowledge about nature, man, society, mastering the means of cognitive and practical activity.

The analysis of recent studies and publications. The analysis of the psychological and pedagogical literature shows that the development of key competencies advanced by the society to higher engineering education, among which are the competence in professional communication as one of the directions of the improvement of the specialists' professional competence. The importance of professional communication in the activities of future specialists was studied by L. Baranovska, O. Larionova, N. Nichkalo, Y. Tatur. D. Godlevskaya, T. Hordon, Y. Zhukov, I. Zimnya, S. Kozak, L. Petrovska pay attention to the research of the specialists' communicative competence.

The formulation the purposes of the article. The purpose of the article is to analyze the concepts "competence", "communication", "professional competence", "communicative competence". The article examines the structure of the professional competence and proves the importance of development its components, in particular, communicative competence. The main purpose of the article is to demonstrate that the communicative competence promotes the professional development and career development of future engineers-agrarians.

The presenting of the main material. At present the concepts "competence" and "competency" are at the epicenter of the world thought because they open new perspectives on understanding the results of the educational activity. The idea of upbringing of a competent person and an employee which not only has the necessary knowledge, professionalism, high moral qualities, but also is able to act adequately in appropriate situations, applying this knowledge and taking responsibility for certain activities lies in the basis of their concept.[196] The various sources include the concepts similar to their semantics: "competence and "basic competencies".

The interpretation of the concept "competence" is found in studies of various authors. I. Chemeris considers that the difference in the translation of the English word "competency" can be one of the reasons for existence of for the concepts similar by the semantics. The word "competency" was mistakenly translated as "competence" by calculating in Ukrainian. Besides, two Ukrainian equivalents *"компетентність"* and *"компетенція"* correspond to one English *competency(e)*. **Competency (e)**: a) competence; b) legal term – competence, legal capacity.[197]

The substance of the concept "competence" was deeply developed by the British psychologist J. Raven in his writings "Competence in Modern Society" and "Pedagogical Testing". In his opinion, "competence is the specific ability that is required to effectively performance of a specific action in a specific subject area that covers the professional knowledge, subject skills, ways of thinking and understanding of the responsibility for their actions". He understands the complex of the cognitive and emotional components of effective human life by "competence" and interprets this concept as motivated abilities.[198] A. Savenkov, a Russian scientist, addressing to the interpretation of the concept "competence", separates its two types: formal and real.[199] By the first

[196] Taranenko I. (2000): Development of vital competence and social integration: the experience of European countries, p. 38-40.
[197] Muller V. (2003): New English-Russian Dictionary, p. 326.
[198] Raven J. (2002): Competence in Modern Society: Identification, Development and Realization, p. 214.
[199] Savenkov A. (2004): Aspects of competence, p. 62.

interpretation the author understands the competence associated with the field of diplomacy, management, where the presence of the personality of certain official powers to perform certain functions is often in the first place. At the same time the real competence is knowledge and experience in a particular industry. The author continues the research of such scientists as D. Groot, J. Raven, R. Sternberg, I. Lerner, J. Anderson, J. Broadbent and separates four levels of competence:

1) knowledge and their organization;

2) skills for apply of the knowledge;

3) intellectual and creative potential of the personality (R. Sternberg considered it as a variant of competence – "practical intelligence");

4) focus on the positive, emotional and moral potential of the personality.

During the analysis and systematization of the competences in pedagogy we often meet the concepts "basic" and "key" competences. D. Ivanov interprets the concept "key competences" as the most general (universal) abilities and skills that allow a person to understand the situation and achieve the results in personal and professional life in the conditions of the growing dynamism of modern society. The key competences are gained during the educational process and in independent social life (in professional and personal) as a result of their successful application for solving of the educational and professional tasks and problems.[200]

One of the ways of the improvement of the specialists' professional competence is to develop the key competences advanced by society to higher engineering education, among which we should separate the competence in professional communication. The importance of the professional communication in the activities of future specialists was studied by L. Baranovska, O. Larionova, N. Nichkalo and Y. Tatur.

Y. Tatur, exploring professional competence, characterizes it as revealing by a specialist in practice the desire and ability (willingness, and, consequently, readiness) to realize his potential (knowledge, ability, experience, personal qualities, etc.) for the successful creative (productive) activity in the professional and social spheres, understanding the social importance and personal responsibility for the results of this activity, the necessity of its continuous improvement.[201]

O. Larionova divides all competencies of the specialist into five groups:

1) informational and methodological;

2) social and communicative;

3) operational and technological;

4) personal and valeological;

5) theoretical.

Each of the mentioned above groups of competencies includes a set of interrelated and interdependent individual competencies that manifest in the form of specific knowledge, skills and competences.

According to D. Ivanov the professional competence is a component of professional qualification and is characterized by the technical and practical skills, skills of the information processing and communication skills. According to the topic of the article we are interested in the aspect of communication, namely the communicative professional competence. The communication is a polyhedral process that is studied by philosophy, sociology, general and social psychology, linguistics, pedagogy and other sciences.

The conceptual bases for the study of the phenomenon of communication were developed in the works of V. Bekhterev, O. Leontiev and other psychologists which regarded communication as a necessary condition for the human development, its socialization and individualization. A. Derkach and N. Kuzmina indicate that communication is not only the informational exchange; it is a process of interaction and interplay. At the process of the communication as a result of systematic contacts during the joint activity its participants gain various knowledge about

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[200] Ivanov, D. (2007): About key competencies and competence approach in education, p. 51-61

[201] Tatur, Y. (2004): The competence approach in describing results and designing standards for higher professional education: materials for the second session of the methodological seminar, p.13.

themselves, their friends, ways of the most rational solution of the tasks. According to O. Leontiev although communication is a specific form of the activity it still has an active nature. At the same time the processes in which communication is a joint activity were separated. The difference between them is as follows: in the first case the fulfilling of needs is done in the activity whose organization requires the communication. In other case the communication is an independent value for the subject.[202]

Taking account all diversity of approaches of the scientists to the role and function of the communication we can say that all of them are based on the exclusive role of the communication both in development and functioning of the personality. The scientists pay great attention to the communication problems, pointing to its special role in solving of the educational and professional problems, to the ability of the managers to effectively collaborate with their labour collective.

So the communication can be considered as a certain type of activity which is an important component in the development of the specialist's professional qualities. The unity of the activity and communication causes the importance of analysis of the communicative competence in communication as one of the conditions for the efficiency of the professional activity of the engineer and interaction of people in the manufacturing collective.

According to the educational-qualification characteristics of the specialist of engineering profile, the students should have not only general technical and special skills, but also be able to find common ground with colleagues and perform a number of management functions. The ability to improve the psychological climate of the labour collective, to resolve labour conflicts causes to improve the labour discipline cause the necessity for the high-level communicative competence. The highly qualified specialist should be free to express the opinions, defend his or her point of view and have good knowledge. The communicative competence is one of the conditions for the intellectual and professional growth of a specialist and a mean of self-improvement and self-education.

The possession of scientific terminology plays an important role in the professional activities of the engineer for the development and presentation of the results of research activities. The ability to analyze the scientific theories, to clarify thoughts and hypotheses, to express thoughts in the form of reports, articles, textbooks – all this requires a sufficient level of speaking and writing.

"Skills" of the specialist of engineering profile assume possession by:

- the means and techniques of establishing, maintaining and terminating the speech contact; rules of oral and written speech; ability to collect, analyze and generalize the information;

- communicative culture, rules of intercultural conventions, rules of etiquette, rules of work with mass media, rules of registration of documents, ability to operate with knowledge of the current legislation of Ukraine;

- methods of research of the conflicts; ability to resolve conflicts; strategies of the conflict resolution, means of influencing the audience and impression techniques; techniques of image formation.

The specialist's "personal qualities" are universal, professional qualities and value attitudes. The ability to collect, analyze and generalize the information is one of the obligatory general qualification requirements for future engineers. They also should have perfect command of the state language. Besides, their future professional activity requires the basics of business communication in a foreign language, both verbally and in writing in typical professional situations of communication or working with the documents in a foreign language.

The professional communicative training of future engineers should include the linguistic and communicative-psychological aspects. Exploring the professional competence of the specialists of the technical profile, V. Petruk separates the basic competences that are part of its structure. The basic competencies which the modern specialist of technical profile should be developed together with the motivational and cognitive-creative should include the communicative competence based

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[202] Leontiev, A. (1974): Psychology of communication, p. 178.

on the ability to communicate, communication skills, ability to interact and use them in the process of work according the specialty.[203]

O. Ignatyuk separates the following components in the professional competence of the engineer: motivational-willed, functional, communicative and reflexive, where under the communicative component the scientist means "the ability of the clear expression of thoughts, convince, argue, analyze, express judgments, transmit rational and emotional information, coordinate the actions with colleagues, organize and maintain a dialogue.[204]

Thus, after the considering the opinions of scientists we can conclude that it is possible to separate communicative competence in the structure of professional competence. It is a necessary component of the professional development of a future engineer. The communicative competence promotes the professional success and career growth of engineers, helps to meet the modern requirements of society.

D. Godlevskaya, T. Gordon, Y. Zhukov, I. Zimnya, S. Kozak and L. Petrovska pay attention to the study of the specialist's communicative competence. The criteria for the communicative competence were firstly formulated by T. Gordon. He defined her as an ability to get out of any situation without losing an inner will and at the same time preventing it from losing it by the partner of communication. Thus, a partner position is the criterion of competence in communication or communication on "equal" (unlike to "top-down" or "bottom-up"). Y. Yemelyanov by "communicative competence" means the ability of a person to navigate the situations of communication that are based on knowledge, sensory experience and free possession of the means of communication. In his opinion, the communicative competence is acquired in society.

V. Kan-Kalik defined the communicative competence as an integral part of the human existence and activity. He emphasized that in order to communicate one should have certain skills and abilities. The target installation for the formation of the communicative competence of the personality should be determined in advance in the learning process of training. Besides, the methods and means of formation should also be determined.[205]

The various conceptual approaches to the communicative training of the specialists and formation of their communicative competence are represented in the scientific literature. Scientists E. Varlamov and S. Stepanov justify the reflexive-innovative approach to management training. They propose the orientation of each element of the educational programs not only to develop the professional communication skills of the manager, but also to ensure the development of his reflective and creative capabilities in the field of management as the leading didactic principle.

The formation of need of the future specialists to improve their communicative competence causes the contextual approach to the organization of learning which consists of the modelling of methods and means of subject and social content of future professional activity with the help of didactic forms. The behavioural and situational approaches are most widespread in the practice of the communicative training of future specialists. The main focus is based on the formation of skills and abilities of professional interaction, mastering the "technique" of communication, modelling and analysis of specific situations.

In order to meet professional needs and ensure a proper culture of professional communication, future specialists need to have a high level of communicative competence. Future specialist should organize training and professional development of employees, provide continuous improvement of personnel training, coordinate work on patent and inventory activities, unify, standardize and certify products, organize research and experimentation, as well as work in the field of scientific and technical information, rationalization, invention, distribution of advanced production experience. I think that possibility of realization of these functions, as well as the resolution of labour conflicts, the ability to improve the socio-psychological climate in the

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[203] Petruk, V. (2008): Theoretical and methodological bases of formation of basic professional competences in the future specialists of technical specialties, p. 27.

[204] Ignatyuk, O. (2009): Formation of future engineer readiness for professional self-improvement: theory and practice, p. 78.

[205] Kahn-Kalyk, V. (1987): Teacher about pedagogical communication, p. 114.

collective – all these tasks are successfully implemented if the student has a communicative competence at a high level. Communicative competence is a key in the structure of basic competences and an important component of the formation of professionally significant qualities of future specialists.

High-level communication skills of the specialists help to create a positive microclimate at the job, establish partnership relations, and achieve success in professional, organizational and managerial activities and successful adaptation in a transformational society.

The specialists' communicative competence should include knowledge of professional terminology, the ability to use it in linguistic, oral and written professional speech, based on their own internal motivation and experience, recognizing the need for self-improvement.

In the article we define the model of formation of the communicative competence of a student. It includes motivational-emotional, gnostic, conative and reflexive components and pedagogical conditions of formation of communicative competence.

The motivational-emotional component includes motives, needs and goals, which form cognitive interest to the interlocutor, readiness to start the conversation with him. This component develops the ability of a student to communicate, dispute, prove their point of view, and build a constructive conversation, while taking into account the emotional state of the interlocutor, his level of attention and the degree of physical and mental fatigue.

The gnostic component is aimed at forming of theoretical knowledge about the essence, structure, form, means, functions, types, and features of communication, understanding of the importance of communication in future professional activity, creating of analytical thinking through which communication is considered as a kind of social creativity.

Conative component involves mastering of the student by general and specific communicative skills that make it possible to establish contact with the interlocutor, control the situation of interaction with him, as well as perceptual skills that facilitate the penetration to the inner world of the communication partner.

This component of the model is aimed at developing of the ability to communicate effectively, conduct discussions, choose a strategy of behavior during a conversation, establish contacts with people, use verbal and nonverbal means of communication, predict the behavior of the partner, understand his emotional state.

The reflexive component is aimed at creating of the ability to work analytically, understand the importance and peculiarities of communicative competence for self-improvement and effective professional activity. One of the objectives of my study is to identify pedagogical conditions of the formation of communicative competence of students. In general I think that the most important pedagogical conditions are the application of a person-centered approach, modeling in the learning of communicative situations of future professional activities, the formation of professionally significant motivation of training.

So majority of approaches concerning the formation of the specialists' communicative competence are based on apply of the active methods and group forms of training aimed at mastering of the knowledge, skills and skills of professional communication by the future specialists. The organization of the communicative preparation in the conditions of educational process of the institution of higher education and use of the active methods of training is one of the ways of formation of the communicative competence of future specialists. The communicative training of specialists should be based on the integration of the disciplines of the humanitarian direction, improvement the skills of oral and written language, receptions of analytical thinking that require knowledge of languages. The communicative professional training of labor frames is one of the stages of general continuous professional training. The graduate's communicative competence anticipates: high level of practical possession of the language (state and first foreign); possession of oral and written language, means and techniques for successful business communication; possession of the second foreign language at a basic level. The graduate should have the ability to public broadcasting used in the various situations of professional activity in order to establish contacts, enter into agreements or intensify the general interest in a particular problem.

Thus, the search for the reserves of adaptation of the specialist of the technical profile to the modern level of socio-economic requirements is characterized by the idea of the communicative orientation of the system of the professional education. As a result the most appropriate communicative training for the specialists of the technical profile should provide its conceptual aspects.

The communication training has several levels. At the general level there are following sublevels: *worldview and philosophical* (formation of a humanistic communicable personality with an open consciousness for dialogue); *social* (as a means of the personality's socialization with the help of interaction with the world and himself).[206] At the professional level there are the following sub-levels: *psychological* (formation of the positive psychological microclimate in collectives, interaction of subjects of the production process on the basis of communication); *production* (more complete and qualitative performance of the production tasks based on the communicative and professional competence); *methodological* (active approach to training and certification training, synergetic-dialogical basis of the educational process); *didactic* (development of all spheres of personality in the process of formation and development of the communicative and professional competence, and its operation); *methodological* (adequacy and effectiveness of the choice of the forms and methods of training and certification training in the development of the communicative competence in accordance with the requirements of a position in the sectoral system of specialists' continuing professional education). Above all the training of future engineers to implement these aspects anticipates the improvement of the effective system of the communication training as dynamic, relevant and variable in its opportunities.

Conclusions. Summarizing the mentioned above information we can note that the communicative competence is one of the key competences of future engineers and a necessary component of their professionalism. The possession of the communicative competence at the high level helps to establish relationships in the collective and get a career growth.

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[206] Zazulina, L. (1999): Didactic-dialogical model of teacher's certification training, p. 123-127.

2.5. TOURISM EDUCATIONAL PRACTICES AS THE TOURISM INDUSTRY SUSTAINABLE DEVELOPMENT GUARANTEE

The 21st century reveals a wide range of sustainable development strategies, where the leading education that prepares the future experts able to realistically assess the challenges of today and to dynamically transform their knowledge for the coherence of the country's overall development[1] plays the key role.[207]

In recent decades the concept of sustainable development has been the leading vector in the economic, social and environmental sectors of society. The solution of these problems enables the future generations' harmonious education.[208]

In spite of the considerable economic and social difficulties arising in the country and society, the higher education institutions try to introduce the ideas of sustainable development during the educational practices that are the transition from theoretical to practical education component. The formation of future specialists in the field of tourism includes both personal and professional abilities, creativity, psychological training and the ability to apply knowledge and skills for the solution of contemporary issues of tourism and recreation development.

On the base of Kryvyi Rih State Pedagogical University the education of experts in the field of tourism, Specialty 242 Tourism is performed. According to the Law of Ukraine "On Education"[209] and the industrial component of the State standard of Ukraine for higher education in the specialty "Tourism"[210] the practical training is the compulsory component of educational and professional preparation of students of higher education institutions.

The practical training is a complex educational practice completed after the theoretical courses in teaching tourism disciplines and it is an integral part of the practical training of tourism scientists, guides, etc.

The educational practice "Introduction to the Specialty" being a part of the thorough specialty training program[211][5] is held over a period of three weeks after the theoretical studies and examination completion. The practice lays the foundations for the future activities of tourism professionals and the opportunity to integrate their knowledge and skills into the future professional activities.

The students should practically realize that their future activity sphere is becoming more and more important in the independent Ukraine economic development and in the globalized world, gradually becoming a highly profitable economy sector and an important tool for the citizens' cultural development. An important prerequisite for the specialty mastering is the need to acquire a complex of fundamental and professional knowledge, awareness of the tourism business enterprises functioning specifics in the consumer goods and services market, the establishment of active creative and social attitude.

The scientific and methodological content of the practice is the educational and professional training program and tourism experts and guides educational and qualification characteristics in accordance with the sectoral component of the state standard for higher education in the specialty "Tourism".[212]

[207] Lanovenko, O. G., Ostapishina, O. O. (2013): Kontseptsiia stiikoho rozvytku suspilstva. Slovnyk – dovidnyk z ekolohii [The concept of sustainable development of society. Dictionary – guide to ecology]. Kherson, 2013.

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[209] Zakon Ukrainy «Pro osvitu» [Law of Ukraine "On Education"]. Available online: https://zakon.rada.gov.ua/laws/show/2145-19.

[210] Derzhavnyi standart Ukrainy z vyshchoi osvity za spetsialnistiu «Turyzm» [State standard of Ukraine for higher education in the specialty "Tourism"]. Available online: https://mon.gov.ua/ua/npa/pro-zatverdzhennya-standartu-vishoyi-osviti-za-specialnistyu-242-turizm-dlya-pershogo-bakalavrskogo-rivnya-vishoyi-osviti.

[211] Shiyan, D. V., Patsyuk, V. S. (2020): Prohrama navchalnoi praktyky «Vstup do fakhu» dlia studentiv spetsialnosti 242 Turyzm [Program of educational practice "Introduction to the specialty" for students of specialty 242 Tourism]. Krivyi Rih, KSPU, 2020.

[212] Osvitno-profesiina prohrama «Turyzm» [Educational and professional program "Tourism"]. Available online: https://www.tneu.edu.ua/pdf/zvit2018/turizm.pdf.

The organization and learning materials of the educational practice "Introduction to the Specialty" are provided in accordance with the requirements of the Regulations on the practice of students of higher education institutions of Ukraine, approved by the Ministry of Education and Science of Ukraine.[213]

The educational practice program "Introduction to the Specialty" is organized with the consideration of all the above legislative, statutory, regulatory and methodological documents and is the main educational and methodical document, where under the organizational measures are performed and the content of different activities of students' educational practice is directly defined.

The chair holder and leading teachers of the considered specialty department, managers, experts of tourism enterprises, organizations and institutions are involved in the management and accomplishment of the educational practice "Introduction to the Specialty".

The educational practice bases include the business entities of the tourist services market main segments: hotels of various types, tourism enterprises, restaurants, leisure and entertainment enterprises in different regions of Ukraine.

The main purpose of the educational practice "Introduction to the Specialty" is the first-year students familiarization with the content of their future profession, the nature and scope of their professional activity, the peculiarities of tourism enterprises practical activity, with the role of tourist services experts in the business activity of tourist business enterprises and forms of business entities, their competitive status in the domestic market and the image of the national tourist product in the tourist services world market.

The objectives of the educational practice "Introduction to the Specialty" are:
- cultivation of love of the future profession;
- familiarization with the professional requirements to the expert, the necessary practical skills, the future professional activity scope, the list of the main types and categories of entities serving the tourists and the local population;
- involvement in the future professional activity field through the familiarization with the structure, consistency and interrelations between the subjects of the regulatory cycle, professional direction subjects and special subjects forming the expert;
- determination of the tourist services expert place and role in the development of the tourist services market and the enterprise financial and economic activity;
- to consider directly and practically the list of positions that may be held by the bachelor of tourism at the tourist industry enterprises and to find out the students' capabilities of obtaining these professions;
- to characterize the latest innovative and computer technologies used in the tourism industry.

The results expected after the practice completion are:
- the provision of the students' social adaptability in the tourism industry;
- practical participation in various links at the tourist industry enterprises;
- the possibilities to apply the latest innovative and computer technologies for the tourism needs;
- self-consciousness enhancement in the determination of the place and role of the tourist service expert in the tourist services market development and the enterprise financial and economic activity;
- to acquire the skills of direct spatial orientation with the help of tourist maps, guides, applicative mapping programs, etc.;
- skills for the cooperation with educational institutions and tourism industry enterprises with further establishment of scientific relations and with further development of the common information space;
- the development of personal ecological culture aimed at careful attitude towards the environment and patriotic education

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[213] Polozhennia pro provedennia praktyky studentiv vyshchykh zakladiv osvity Ukrainy [Regulations on the practice of students of higher education institutions of Ukraine]. Available online: https://zakon.rada.gov.ua/laws/show/z0035-93.

According to the purpose and objectives of the practice, the main territories of its implementation are the regions outside of permanent residence: Western, Southern and Central Ukraine.

The leading practice tour is the tour through the territory of western Ukraine: Kryvyi Rih (Dnipropetrovsk Oblast) – Lyadova (Vinnytsia Oblast) – Khotyn (Chernivtsi Oblast) – Kamianets-Podilskyi (Khmelnytskyi Oblast) – Borshchiv (Ternopil Oblast) – Chernivtsi (Chernivtsi Oblast) – Kolomyia, Vorokhta, Mykulychy, Yaremche (Ivano-Frankivsk Oblast) – Kvasy, Dilove, Solotvyno, Mukachevo, Chynadiyovo, Synevyr, Mizhhiria (Zakarpatska Oblast) – Urych, Lviv, Olesk, Zolochiv (Lviv Oblast) – Medzhybizh (Khmelnytskyi Oblast) – Uman (Cherkasy Oblast) – Kryvyi Rih. This route takes two weeks to complete.
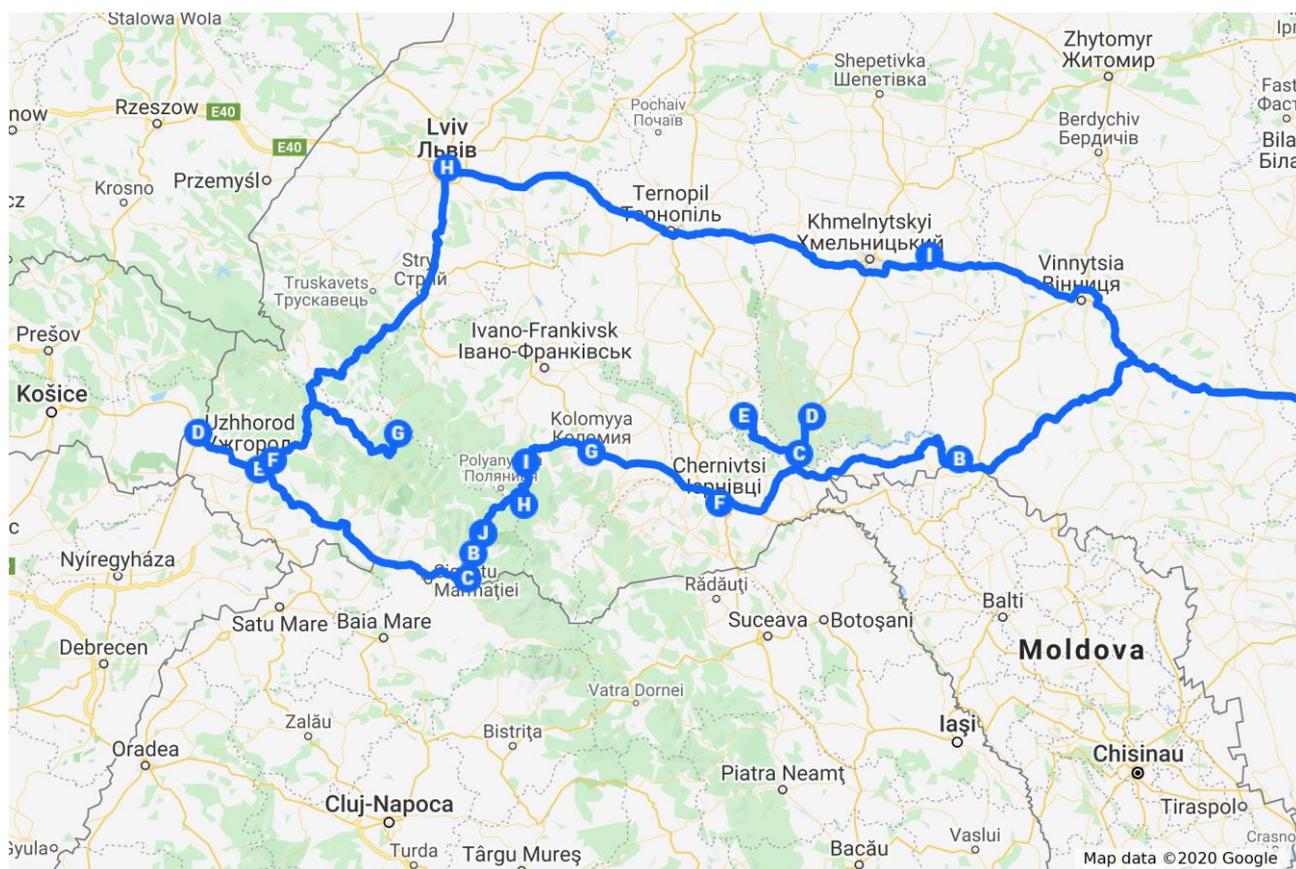
The practice is completed in three stages: *preparatory, practical-explorative and reporting-cameralistic.*

At the first *preparatory stage* the academic, organizational and technical preparation for the practice is performed. First of all the practice program and the route map are drawn up, the tourist sites for visiting and tourist organizations for further cooperation are determined, the preliminary arrangements with tourist establishments are made, the means of transportation are chosen, the accompanying transport documents are prepared, accommodation and food outlets are booked, the costs are calculated and the corresponding documentation package is prepared.

The students draw up individual practice programs, study professional literature on tourism geography, travel organization, excursion activities, museology, etc., explore the tourism resources and the territories potential, the region tourist enterprises and infrastructure, receive the supervisor's counselling on the specific issues of this practice stage performance and get the individual tasks to perform during the practice.

Safety induction and health inspection are an important part of the preparatory stage.

The *practical-explorative practice stage* includes the practice route passing for different tourism types: cultural and educational, event, health (medical tourism), gastronomic, sports, educational (excursion) tourism and sacral (religious) tourism.

On all the practice routes certain sites are considered in different tourism directions. The most numerous are cultural and educational objects, the main requirements whereto are their importance as the main area landmarks, their accessibility and informative value.

The main *cultural and educational sites* visited during the educational practice are: Khotyn Fortress; Kamianets-Podilskyi, Medzhybizh, Zolochiv, Olesko, Pidhirtsi, Shonborn, Mukachevo (Palanok) Castles; Lviv (Potocki) Palace; J. Kobrynsky National Museum of Hutsulshchyna and Pokuttya Folk Art and Pysanka Museum, Forest and RaftingMuseum within the National Nature Park Synevir, Tustan History Museum in the village of Urych, Lviv History Museum, Lviv Arsenal Museum; Chernivtsi National University – the former Residence of Bukovinian and Dalmatian Metropolitans; Lviv, Mukachevo, Chernivtsi Town Halls as well as a large number of monuments included in the sightseeing tours around cities and towns.

Sacral (religious) sites: Lyadova Monastery, Jesuit Church, Armenian Church, Holy Spirit Cathedral in Chernivtsi, St. George's Cathedral, Church of Sts. Olha and Elizabeth, Jesuit Church, Bernardine Monastery, Armenian Cathedral, St. Anna's Church, Dominican Church in Lviv, etc.

Sports tourism: Hoverla mountain climbing, visit to the Pozhizhevskaya weather station – Turkul mountains – Nesamovyte mountain lake.

Event tourism: Balloon Festival, Kamianets-Podilskyi May Days Festival, Knights Tournament at Tustan, Jazz Music Festival, Lviv Chocolate Festival.

Cultural and entertaining tourism: visit to the Solomiya Krushelnytska Lviv State Academic Theatre of Opera and Ballet, Olga Kobylianska Chernivtsi Academic Regional Ukrainian Musical and Drama Theater, Mukachevo Drama Theater

Health (medical tourism): Solotvyno, Kvasy, mineral springs of the Carpathians.

Gastronomic tourism: Handmade Chocolate Shop, Lviv Coffee Mine, tasting at Yaremche cheese factories, visits to Rakhiv wine cellars.

Ecological tourism: National Nature Park Synevir, Brown Bear Rehabilitation Center, Carpathian National Nature Park, Gorgany Nature Reserve, Skole Beskids National Nature Park, Vyzhnytsia National Nature Park, *visits to the natural sites:* Prutetsky Waterfalls; Huk, Probiy, Hurkalo, Shypit Waterfalls; ecological trails in Yaremche, Mykulychy, Gorgany, Urych; Kryshtaleva Cave, etc.

Ethnographic Tourism: Klymentiy Sheptytsky Museum of Folk Architecture and Ethnography in Lviv – Shevchenkivsky Hay ethnopark.

Kryvyi Rih State Pedagogical University cooperates with the educational institutions training tourism experts that provide various services for the educational practice organization, assist in the students accommodation, excursion activities, etc. The students communicate with one another, get acquainted with the scientific and technical base of educational institutions expanding their professional horizons.

The students' acquaintance and analysis of the region tourist infrastructure, namely, the hotels and restaurants of Chernivtsi, Lviv, Kamianets-Podilskyi, Yaremche, Vorokhta, etc. is an important component of the tourism practice.

The students perform tourism industry enterprises individual researches, study and describe the enterprise general characteristics, join excursions, analyze the guides' activities at various tour sites and provide recommendations on the guide's work improvement.

The *reporting-cameralistic stage* covers several days at the end of the practice. At this time the students organize the practice materials, draw general conclusions about the study subjects, prepare reports on the practice, and prepare video presentations. They submit a written report to the department and defend it publicly. During the report the students demonstrate short videos of the practice sites in addition to the main achievements and an extensive discussion is held that allows assessing the level of knowledge and skills gained. The teachers, students and invited future applicants present at the open defence receive the information about the professional skills acquired during the practice, interesting tourist sites, and familiarize themselves with the profession and specialty of Tourism at Kryvyi Rih State Pedagogical University. This knowledge is the mainstay of the career guidance of the Department of Physical Geography, Local History and Tourism.

The educational practice individual tasks performance begins on the moment the means of transportation starts to move. The students calculate the advertising load along all the practice route highways. They find out the quantitative characteristics for hotels, foods, tourist sites and other tourism infrastructure advertising. It allows to assess the degree of tourism development in the area as well as its tourist potential.

Along the route a detailed map of the region, cities and towns of the educational practice is compiled, with the route and a list of the practice objects, architectural and natural sites, with dates and places of visit. This is done with the use of smartphones and downloading the necessary online and offline maps of MAPS.ME application, Googlemaps, Booking.com, Hotels.com, Hotelscan.com hotel booking sites, krystynopol.info travel maps, www.auc.org.ua, etc.

With the aid of network technologies the students have the opportunity to analyze the hotels booking and reservation system, find food outlets, characterize the transportation system, tourist sites of the territory, perform online excursions.

Each student has the opportunity to try on the role of a guide preparing the report on the practice tourist sites, may demonstrate videos, photos and presentations that will be used in the future practical works on the Introduction to the Tourism and Excursion Activities Organization. This helps the students to get a holistic idea on future practice tourist sites and the speaker may feel like a tour guide.

The city tours are conducted by qualified tour guides and professors of the departments of Tourism of Yuriy Fedkovych Chernivtsi National University, Kamianets-Podilsky Ivan Ohienko National University, Mukachevo State University providing close cooperation and interaction with their colleagues, familiarization with their experience and informational space expansion. The Department of Tourism of Lviv City Council provides the opportunity to conduct various excursions around the city and its neighborhoods, provides diligent assistance in the students' accommodation and catering, information provision and promotional materials.

The visits to various excursion sites are accompanied by the guide's activity analysis on the following criteria: informative value, charismaticness, attitude towards the excursionists, ability to catch the interest, manner of speaking, use of story and description excursion methods, public speaking skill, the guide's appearance, recommendations to each guide on their performance improvement.

In addition the tourism appeal of each of the visited tourist sites is rated on a scale of 1 to 5, taking into account the following criteria:
1. Historical significance;
2. Aesthetic value;
3. Informative value;
4. Drives quality;
5. Informational signs availability;
6. Souvenir merchandise;
7. Printed promotion products;
8. Attractions;
9. Toilets.

The students independently survey the tourist industry enterprises on the practice route, the survey of these objects is finalized with the enterprise general characteristics compilation according to the following plan:
1. Company name; legal address;
2. Range of basic services and (or) products provided to the consumers;
3. Prices of services and (or) products;
4. The enterprise interior and exterior;
5. The enterprise advertising;
6. The service level;
7. The main consumers contingent, etc.

Every day the students have free time for the tourist sites independent review and analysis. A real godsend for the students and teachers is finding the objects not included in the practice plan. This is how the private museums and collections have appeared – the students found them, and now they are in the list of obligatory study sites.

During the practice the students should learn how to analyze the accommodation establishments and food outlets for different categories of visitors.

The accommodation establishments are characterized according to the following plan: location, contact information, accommodation cost (in detail), services range, infrastructure.

The accommodation name	Accommodations		
	VIP	Middle class	Budget hotel

Food outlets are analyzed as follows: advertising, location, interior, menu and services range, the outlet pricing policy.

Each practice day ends with a general meeting where the day is summarized, the positive and negative points are outlined, the possible remedial actions are discussed, the plan for the next day is announced, people responsible for each activity are appointed, the practice diary completion and tourist sites intermediate review are checked. The students work as a team in groups where the outcome of each one depends on teamwork skills, mutual assistance and understanding, it forms and develops the students' group communication skills and team problem solving.

The students' practice result is not primary but processed and analyzed information, generalized and reliable for the practice report and presentation performance that may be used for the course and qualification papers completion.

During the educational practice with the unusual working and living conditions the students acquire such qualities as discipline, responsibility, industriousness and humor, tact and respectful attitude towards the local population. Within a relatively short period of time the practices form the students' character, develop their professional qualities and interest in their future profession, educate truly qualified professionals, ability to work in a team, responsible and creative attitude towards work.

The students acquire the knowledge of tourism products manufacturing processes, tourism establishments structure, document production, mechanisms of all the tourism industry departments interaction, practically improve the ability to collect, process and analyze the collected material, to analyze the tourist enterprise information support and master the professional and practical production process organization skills and abilities, communication culture, customer service technology and management activity skills.

Substantial responsibility rests with the practice supervisors who perform round-the-clock supervision and communication with students, establish appropriate and safe conditions during the educational practice, are responsible for their life and health, supervise and advise all the practice stages completion and keep the students interested in it, coordinate the work of all the links along the route. The teachers try to fill the practice route with as many important and interesting sites as possible so that the students will remember them for life!

The key to sustainable tourism development provides the opportunity to harmonize the natural, economic and social environment that allows identifying both positive and negative aspects of tourism impact on the Ukrainian territory development. Educational tourism practice enables the students of specialty Tourism to gain managerial skills in the tourism sphere organization and development, develops systematic, critical and creative thinking, understanding of the country's problems in the use of tourism resources and infrastructure development.

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2.6. THE PROBLEM OF COGNITIVE PROCESSES STUDY THROUGH THE USE OF COMPUTER TECHNOLOGIES

Topicality. One of the principles of the dialectical-materialistic understanding of the psyche is the statement that the development and structure of the brain with its psychophysical functions act as a result of mental development, due to changes in the way of being. The thesis of the unity and interrelation of structure and function should be added to this, as S. L. Rubinstein pointed out in his works: "Not only structure determines function, but function determines structure".[214] This statement is very relevant for the modern school in the context of the content of curricula and the development of teaching methods.

The conditions of formation and development of the psyche of modern children are very different from those in which their parents studied and were brought up. The prevalence of computer games and mobile applications for smartphones and tablets has a great influence on the formation of values and interests of the younger generation, and, unfortunately, contributes to the formation of disrespect for the book, to the very process of reading. Previously, books "taught" to seek information, to analyze, to generalize, to draw conclusions, to formulate certain judgments. Nowadays, modern technologies allow us to find the information we need, even without the ability to read. It is enough to be able to voice the object of search. Scientists say that the process of reading ensures the unity of the functioning of all cognitive processes that are the basis of cognitive activity, as well as they identify the danger of a trend for the future of our society – the lack of intellectually developed people seeking to change the world for the better.

Among all cognitive functions, attention ensures optimum human interaction with the environment. The peculiarity of this process is its inseparability from other cognitive processes, such as sensation, perception, thinking and memory. It is impossible to purposely pursue certain actions, to select information, to feel the world, to memorize and store information and to think without attention. K. D. Ushinski compared attention to the door through which everything that enters the soul of a person from the outside world passes.

This article is devoted to the problem of attention development at school age and the problem of developing methodological tools for studying its properties, too. Modern methods and techniques for the study of cognitive processes are very diverse. However, most techniques are complex in processing empirical data. The processing of results takes considerable time, requires the use of special tables, requires the use of additional tools and materials (stopwatch, color markers, many types of decryption keys). Taking these difficulties into account, we consider it important to create computer programs that facilitate the study of attention and analysis of diagnostic results.

Presenting the main material. Attention is of great importance for human life. This was proved and substantiated by S. L. Rubinstein: "The presence of the highest forms of attention in a person means that as a personality he separates himself from the outside world, opposes himself to it and gets the opportunity ... to transform it, distinguishing in it significant qualities of one moment or another one"[215]. Without attention as the form of mental activity, it is impossible to organize human interaction with the world. Man feels this world, perceives it, remembers and analyses events, dreams about the future, experiences certain feelings and makes decisions. All these processes are part of mental activity and are inseparable from attention.

Attention is a form of organization of consciousness, the basic condition for successful activity, educational above all. This is manifested in the productivity of the human mental work, is reflected on his working state and concentration on the process of learning. Attention increases the clarity of information, acts as a factor of its organized mastering. The study of the properties of attention facilitates the development of various training programs, as well as psychological programs for personal development. If a person cannot concentrate on something, cannot learn, think, analyze, direct his own activity, then he will not be able to control himself, will not be able to

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[214] Рубинштейн С. Л. Основы общей психологи, с. 96.
[215] Рубинштейн С. Л. Основы общей психологи.

develop as a personality, will not be interesting for others. Only with the help of the developed attention the person is able to work at himself, achieve goals, open the world and make it better.

There are many techniques for studying the properties of attention, but most of them are characterized by the inconvenience and volume of the data processing process. That's why we designed a computer-based version of the "Corrective Test" that simplifies the research process and makes it easier to process results.

Testing of the computer variant of the technique of studying the peculiarities of development of attention properties of high school students was conducted on the basis of secondary school № 5 in the town of Slov'yansk, Donetsk region. The survey was conducted in December 2019 among 11th grade students in the group of 25 people.

In our study, we assumed that the success level of schooling is related to the level of development of students' attention properties: the higher the average school score, the higher the concentration and distribution of attention are.

We tested the hypothesis when solving the following tasks:

- to use the computer program "Corrective Test" to determine in the 11th grade students the values of concentration, switching and distribution of attention, namely: "speed index of information processing", "performance index", "accuracy index" and "endurance ratio";

- determine the average student achievement score for the first semester of the school year;

- analyze the links between learning achievement and attention rates.

Let's take a closer look at the main components of computer methods.

Traditionally, research of productivity of attention and the speed of information processing using the paper method has three steps.

At the first stage of the study the purpose is to determine the level of stability (concentration) of attention, which is interpreted in psychology as the ability to long-term focus on a subject or any activity. This feature is characterized by the time during which human activity remains purposeful. Stability of attention depends on the characteristics of the objects to which it is directed, as well as on the activity of the individual. The examination is usually carried out with the help of special forms containing a random set of rings with gaps turned in different directions (Landolt's rings). People under examination are suggested to look through the rows and cross out the specific kind of ring specified by the instruction. Work is carried out for 10 minutes with stops every two minutes. The results of the work are estimated by the volume of the work correctly done and by the number of missing (not crossed out) symbols.

At the second stage, the volume of attention distribution is evaluated. This property of attention is defined as the simultaneous focus on two or more objects (or observation of them). Tables with Landolt's rings serve as stimulating material, too. The examivee is asked to find and cross out two types of rings, which have gaps in different places, for example, top and left. In this case, the first ring should be crossed out in one way and the second one in another way. Work is carried out for 10 minutes with stops every two minutes.

At the third stage of the study attention switching is measured – the ability to switch attention from one object to another. The examinee is offered to find the rings of one type and cross them out in one way during the first minute, looking through the rings in rows. And during the next minute to find the rings of another type and to cross them out in another way. The filling in the forms is carried out for 10 minutes with stops every minute.

Our "Corrective Test" was created in Microsoft Visual Studio 2017 with C# programming language. All the disadvantages of the paper tables were taken into account.

This project allows to create tables in size of 33×22, where the rings on the labels are placed at random and to choose one mode of operation out of suggested several ones, which differ in the time of fulfilment the task (5 or 10 minutes). Below are given the algorithms for calculating the indices of attention properties received during the fulfilment of the task for 10 minutes (five results every two minutes). When processing the results obtained during work within 5 minutes, the program calculates the results for each minute and the corresponding average value for five minutes.

1. The number of rings viewed for every two minutes Q (if the test is performed for 10 minutes) or for each minute (if the test is performed for 5 minutes).

2. *Accuracy index* for every two minutes $A = M\text{-}N / M$:

M - is the number of rings that should be crossed out every one / two minutes;

N - the number of missed and incorrectly crossed out rings every two minutes.

3. *Productivity index of work* for every two minutes - $P = A \times Q$.

4. *Average productivity index* for 10 minutes $P_T = \dfrac{P_1 + P_2 + P_3 + P_4 + P_5}{10}$

5. *Information processing speed index* $S = \dfrac{0,5436 \times Q_T - 2,807 \times N_T}{600}$:

Q_T - is the total number of rings viewed during 10 minutes;

N_T - number of missed and incorrectly crossed out rings during 10 minutes;

600 seconds - test run time;

0,5436 -average value of information of each ring;

2, 807 - the value of loss of information that comes to one ring.

6. *Endurance index* - $Kr = P_1\text{-}P_5 / R_T \times 100\%$:

P_1 - productivity during the first two minutes;

P_5 - productivity during the last two minutes.

7. *Accuracy coefficient* - $T_a = A_1\text{-}A_5 / A_T \times 100\%$:

A_1 - accuracy for the first two minutes;

A_5 – accuracy for the last two minutes;

A_T – average accuracy for 10 minutes ($A_T = \dfrac{A_1 + A_2 + A_3 + A_4 + A_5}{10}$).

8. *Productivity amplitude* – $P = P_{max}\text{-}P_{min}$.

When interpreting the results, it should be remembered that in this investigation the productivity of the nervous system is measured, that is, the basic, primary productivity that underlies any activity. In other words, the study allows to determine the capabilities of the human nervous system, how long it can work, without getting tired, upon which the effectiveness of professional activity will depend.

The following is a table for the translation of raw scores of the *Information processing speed index (S)*.

Index S	<0,57	0,57-0,63	0,64-0,73	0,74-0,83	0,84-0,91	0,92-1,04	1,05-1,19	1,20-1,34	1,35-1,36	1,37
Standard Scale	1	2	3	4	5	6	7	8	9	10

This index characterizes the functional mobility of the nervous system (the rate of the nerve impulses spreading as well as substitution of excitation by inhibition and vice versa). The speed of movement of the nerve impulse is directly related to the conditionally reflexive, behavioral activity. The speed of processes spreading in the neural complexes of the cortex determines such an integral characteristic of the brain as the rate of central processing of information.

Interpretation of standard points:

10 points - high speed of information processing (highly mobile);

8-9 points - information processing speed is higher than average (mobile);

4-7 points - average speed of information processing (mobile);

< 4 points - low speed of information processing (inert).

Productivity (value of information (work) processed (executed) per unit of time) is estimated on the following scale:

> 330 – high level of productivity;

250-330 – higher than average productivity level;

150-250 – average productivity;

< 150 – low productivity.

Consequently, individuals with high level of functional mobility of the nervous system have a high rate of thinking, processes and the rate of information processing, which is the basis for their

high productivity, the ability to perform a large amount of work per unit of time. Such features will contribute to the success of activities in the professional fields where the speed factor is crucial. They will be able to perform work operations at an increased pace, will be successful in performing complex algorithmic operations.

Persons with inert (< 4 points) nervous system fulfil high speed work poorly. An individual style of activity aimed at compensating for insufficient mobility may consist of various preparatory and preventive techniques that allow performing individual high-speed operations. However, in general, nervous system inertia limits the ability to form high-speed motor skills, which is a contraindication for teaching professions associated with high motor speed (drivers, work on the conveyor).

Persons with an inert nervous system always "lose" in high-speed situations. They can show their strengths (abilities, skills, habits) only in calm circumstances, acting at their own pace, which corresponds to neurophysiological characteristics.

The "Corrective Test" project consisted of the following software modules.

1. The "startSettings" script saves the first name, last name and age of the user, type of test by time (5 minutes, 10 minutes, trial), type of test by content (distribution of attention, switching of attention, concentration of attention).

2. The "lobbyHelper" script manages the menu and registration.

3. The toggleHelper script defines the type of test by time (5 minutes, 10 minutes), content (attention distribution, switching of attention, concentration of attention).

4. The script "toggleHelper1" sets the type of test "trial", determines the content (attention distribution, switching of attention, concentration of attention).

5. The ButtonProcess script tracks down of the button click.

6. The ChoseSettings script fixes the symbol that the user must select during the test

7. The messageTextHelper script controls the display of text at the beginning of a trial test.

8. The OnStart script manages all the processes that run during the test.

9. The processMake script stores the data needed to calculate the results.

10. The "results" script counts the results, displays them on the screen, saves them in a text document.

To familiarize readers with the interface of the program "Corrective Test" we offer examples of several pages of the project.

Registration page


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The main page

Trial Test

This trial test lasts for 2 minutes

Next

Find symbol

Timer: 120

Choice of the main test

Full test
(10 minutes)

Shortened test
(5 minutes)

Attention stability

Attention switching

Attention distribution
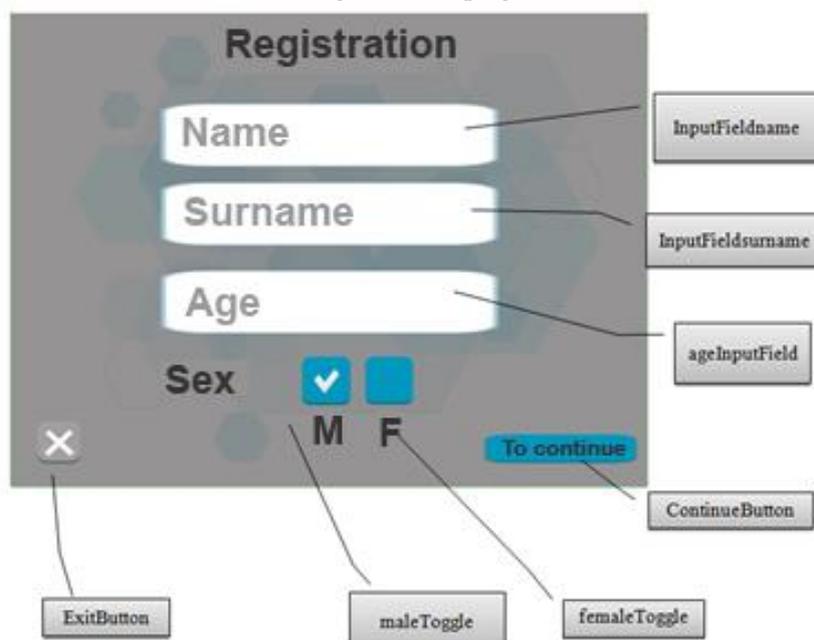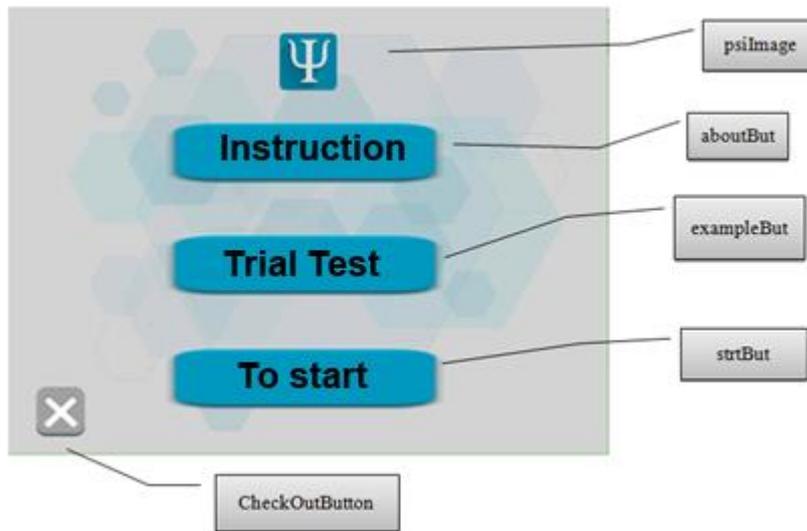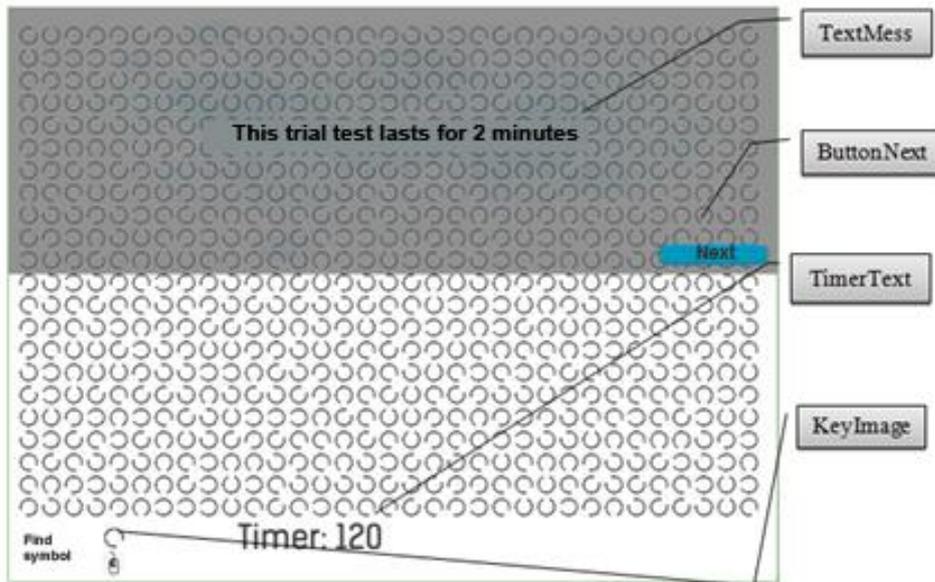
<-   Start
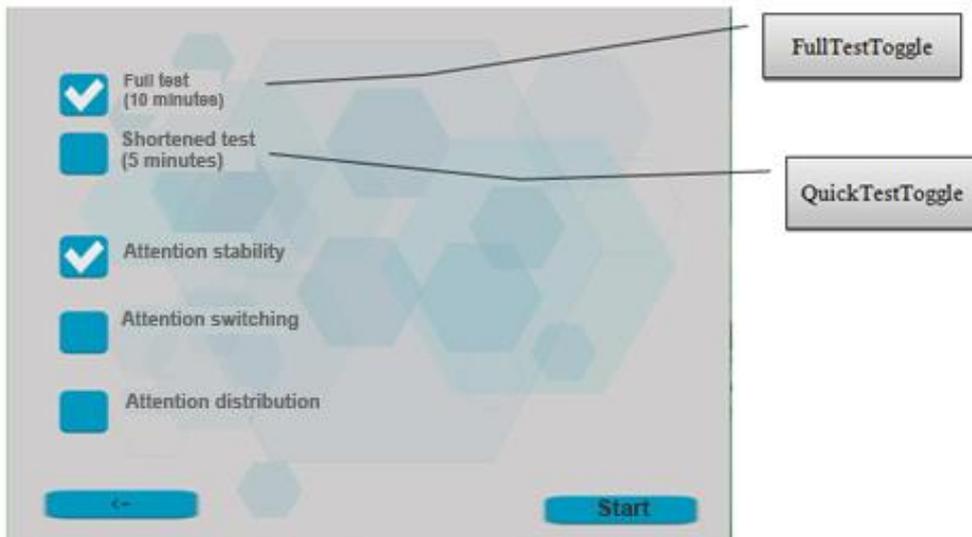
The main test
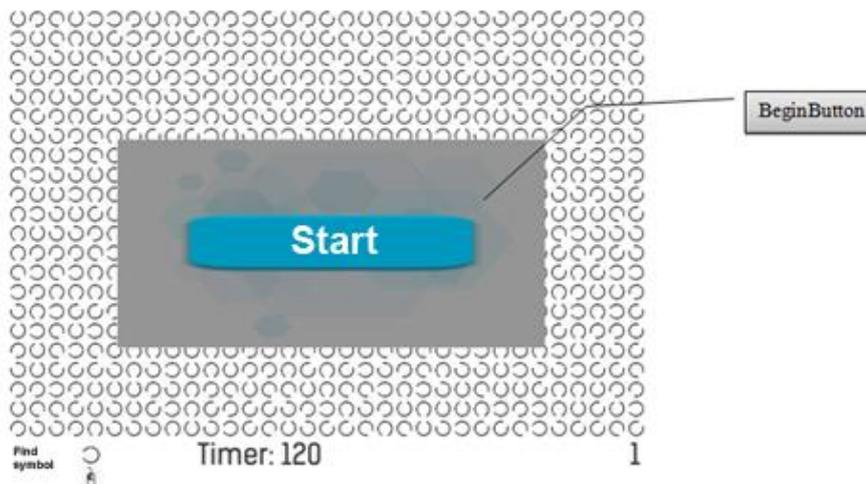
Test results
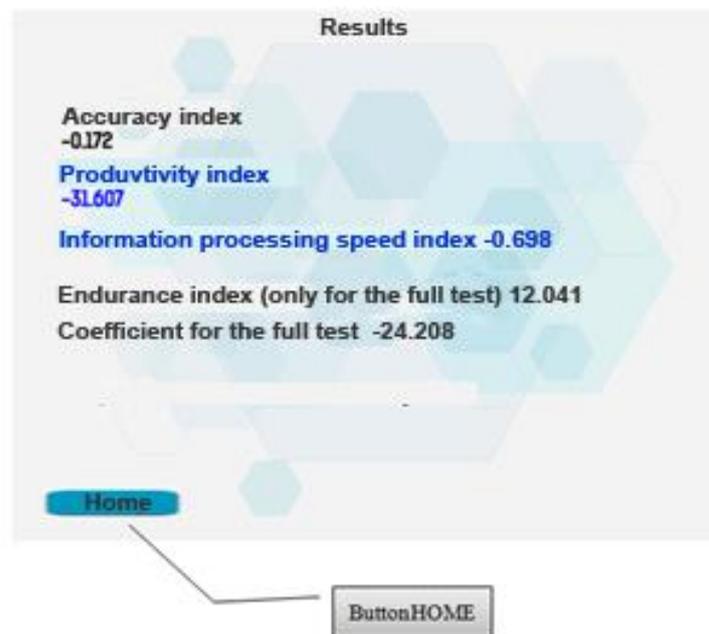
With the help of the program the received results are processed and the indices of attention properties are determined:

- "Accuracy Index" - the closer to a unit, the better;
- "Productivity Index" (blue – low level, green – normative level, orange above average level, red – high level);
- "Information Processing Speed Index" (blue indicates a low level of <0,83, green indicates a normative level of 0,84-1,19, red indicates a high level of 1,20<).

Results of the analysis of the conducted research. On the whole, the 11th grade students showed high and moderate results of attention stability and attention switching.

Our hypothesis that there is a correlation between learning achievement and attention development index was checked by correlation analysis, namely the r-Pearson correlation coefficient. Note that the correlation coefficient can be in the range from -1 to +1: the closer the coefficient meaning is to the limits of the specified range, the higher the connection is, the closer it is to 0, the greater probability, that there is no correlation. The analysis of correlation coefficients showed that learning success is mostly related to the high indices of all kinds of attention - concentration, switching, and distribution (see Table 1). Therefore, the greater the indices of attention properties, the higher the learning achievement indices.

Table 1. Correlations between average score of achievement and attention properties indices in 11ᵗʰ form students (N = 25)

	CONCENTRATION			SWITCHING ATTENTION			DISTRIBUTION OF ATTENTION		
	Productivity	Information processing speed	accuracy (average value)	Productivity	Information processing speed	accuracy (average value)	Productivity	Information processing speed	accuracy (average value)
average value	0,55	0,49	0,50	0,38	0,54	0,33	0,45	0,39	0,34

It should be noted that the correlation indices were characterized by average strength and positive orientation in all indices of attention properties – both in productivity (r = 0,55; r = 0,38; r = 0,45, respectively) and in the speed of information processing (respectively r = 0,49; r = 0,54; r = 0,39) and accuracy (respectively r = 0,50; r = 0,33; r = 0,34). Consequently, learning success is determined by the ability of students to hold attention for a long time on the subject of cognition and retain purposeful activity (stability of attention), to arbitrarily change the direction of their attention from one task to another (switching attention), as well as to the ability to perform a lot of or simultaneous activities or to observe many different phenomena.

Therefore, our assumption has been confirmed: the success in learning is due to the development of properties of attention.

Conclusions. Attention is the basic condition for the development of the human psyche. According to scientists, attention should be considered as the state that "services" or provides the work of cognitive processes, such as sensation, perception, memory, thinking and imagination. Therefore, attention is the direction and concentration of human consciousness on the objects of knowledge. Advanced attention is a prerequisite for successful activity in any field. In order to be successful, one must learn to be attentive, enduring in difficult situations, to be able to exert a willful effort to achieve goals.

We have created and tested a computer program of the "Corrective Test" technique, which allows us to quickly obtain reliable indices of the volume of concentration, switching and distribution of attention of the examinee.

With the help of a computer program, the empirical data of the 11ᵗʰ students were obtained and analysed. The convenient and simple program procedure has reduced the time and effort in identifying the peculiarities of the development of attention of high school students, has made it possible to easily establish and analyse the links of attention indices with the achievements in learning.

Consequently, the ability to concentrate attention allows a person to navigate well and quickly in an information environment and easily achieve goals.

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2.7. THE ALGORITHM OF SCIENTIFIC CONCEPTS FORMATION IN THE JUNIOR PUPILS IN THE LEARNING PROCESS

Problem formulation. The information and communication technologies intensive development, the powerful globalization processes influence, the active introduction of new scientific inventions into the society life, the reform processes taking place in education, determine the scientists' special attention to study the problem of a coherent, creative person development. As never before, the progressiveness of any society is determined by the personality development level. This factor is the main lever of further progress and is provided by education. Relevance of the above is reflected in the Law of Ukraine "On Education", the Concept of the New Ukrainian School, the State Standard of Primary General Education. The normative documents state that the education purpose is the child's comprehensive development, his talents, competencies and cross-cutting skills in accordance with age and individual psycho-physiological characteristics and needs, values formation, autonomy, creativity and curiosity development.

Psychological and pedagogical researches show that personality development is based on theoretical knowledge and scientific concepts.

In the learning theory, there are known areas which concentrate and enrich scientists' progressive formation experience of the scientific concepts in junior pupils. These are: P. Halperin and T. Talizina's theory of mental actions phased formation; M. Shardakova's theory of concepts formation by revealing the ratio of verbal-conceptual, figurative and practically-effective thinking activity; V. Davydov and D. Elkonin's theory of meaningful generalization; L. Zankova's theory of pupils' training on the raised difficulty complex; I. Yakimanska's theory of developing education; V. Palamarchuk and O. Savchenko's concept of general educational skills and abilities formation and development. The concepts that are formed in primary school pupils are an indicator of their knowledge quality and evidence of their intellectual development.

However, scholars[216,217,218,219] also proved that junior pupils often learn the concept definition without understanding its essence. They operate the terms without realizing the existing essential features, experiencing difficulties in their classification and systematization.

That is why the search for new organizational and content components of educational activity, in which the thinking development of junior pupils will be more effective, and optimization of the concepts process formation is essential for a modern school.

The article aim is to present the results of the theoretical substantiation and the practical application of the algorithm of scientific concepts formation in junior pupils in the learning process.

Presenting main material. *Knowledge* (by scientists O. Brushlinsky, G. Kostiuk) is the system of concepts and judgments, which can become the pupils' property only through appropriate mental actions[220,221].

D. Elkonin understands *concepts* as a set of definitions, the set of many significant relations in the subject [222]. To form the concept it is necessary to identify all sides of an object or phenomenon. Since they are not given directly, they must be detected in the process of dealing with objects. Consequently, the process of a concept formation directly depends on the formation of actions with objects that open their essential properties. In the above-mentioned case, actions with objects are methods of human brain work[223]. Under the *scientific concepts* we understand the psychic neoplasm which is the result of the learning process, the process of subjective knowledge independent discovery[224]. Therefore, we believe that the problem of scientific and theoretical concepts formation in the primary school educational process is extremely important.

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Analysis of psychological and pedagogical sources has showed that in science the significant theoretical and methodological base has been created. The leading positions on the problem of scientific concepts formation among pupils have been stated.

Based on these studies, we have attempted to develop our own algorithm for the scientific concepts formation among junior pupils. As a basis we have taken:

1. P. Halperin and N. Talyzina's research results concerning the mental actions and concepts formation.

Researchers believe that the main source of the concepts formation is the human activity on the basis of sensations, further – perceptions, representations, and, on this basis, – the concepts. N. Talyzina offers to begin to form the actions concept with objects that are aimed at identifying the characteristics important for the researcher of these objects[225]. P. Halperin identified the action as the central activity element. He offered the concept of mental activities phased formation. According to the scientist, mental actions are the result of the transformation of external actions into internal, into the plan of sensations, perceptions, ideas, concepts[226]. N. Talyzina and P. Halperin consider the actions transition from the external plan in the internal specifically human form of obtaining new knowledge. A well-known approach to the concepts formation is possible provided that it is based on concrete visual material or sensations and perceptions.

2. M. Maslova's concept on the thinking integrity.

According to the researcher, holistic thinking involves the use of both visual and figurative types of thinking. The right hemisphere of the 7-8 year old child brain matures much earlier than the left one, and then child thinks in images and seeks to practice. The psychological mechanism of visual-figurative thinking during the perception of a certain phenomenon is the chain of auditory, visual and other images. They are combined by temporal-spatial associative relationships, which are called the moving object of the subject. A moving image is the basis of the mental processes of preschoolers and junior pupils. However, the junior pupils are observing add-ons on the basis of associative chains. Children, operating on specific subjects, gradually master logical operations of comparison, analysis, synthesis, classification, abstraction, concretization, and generalization. Therefore, in conceptual thinking, attention is drawn to the internal, essential objects and phenomena properties and the relation between them[227].

The holistic thinking development should begin at the junior school age, since visual-figurative thinking with the obligatory conceptual elements use is its characteristic.

3. Yu. Kulyutkin and G. Sukhobskaya's statement on the transition of the visual-figurative thinking operational components into the conceptual thinking content components. The transition from the operation of concrete things relations to the operation of abstract relationships the scientists call the main condition for the creative thinking development. This process takes place just at the beginning of the child's school education[228].

Of course, at first it is easier for pupils to solve any task, if they see a particular subject they can analyze the concrete facts and make a general conclusion rather than the opposite. If, however, it is necessary to form abstract concepts, it is necessary to move from the offered definition, the standard by a stepwise analysis of the whole in order to discover its genetically original, substantial relation as the basis of this whole internal unity.

4. The research of psychologists (O. Kulchytska, O. Luk, O. Molyako, etc.) on the structure of the creative process.

It is well-known that all human knowledge is the process of setting and solving certain problems. In order to reveal the essence of uncertainty thinking starts involving in the work. It analyzes the problem situation and transforms it into an understandable task in the form of verbal

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formulation. This allows at least a minimum prediction of future results. The solution of the contradiction between the known and the desired occurs through the brain's analytical and synthetic activity[229].

Junior pupils tend to focus on the final result, not on the process of achieving it, because they are not aware of it and cannot verbalize.

5. V. Davydov and D. Elkonin's development theory.

According to the scientists, the content of educational activities is theoretical (scientific) knowledge. The assimilation of such knowledge is associated with the formation of abstractions, generalizations, which, in turn, are the basis of productive thinking. Educational activity differs from others by one peculiarity: its result is the acquisition of new abilities (new ways of acting with scientific concepts – the process of obtaining knowledge). In the process of joint activities of the teacher with pupils or between pupils there is a transition from external activity forms to internal activity forms. The result of this process is the psychic neoplasm – knowledge[230,231].

Thus, one of the highest values of educational activity is search activity. It is aimed at the student's independent discovery of ways and means of solving life problems.

6. Y. Ponomariov's statement on the internal action plan.

According to the scientist, the development means of the internal action plan is the solution of theoretical problem tasks. Thanks to the functioning of the action plan, the success of the received knowledge formalization is ensured, and mechanical learning is excluded[232]. Concepts are expressed in words. The word makes it possible to create the right image mentally in accordance with the task.

Summarizing theoretical aspects of the problem of scientific concepts formation we have supplemented our algorithm of the studied phenomenon with a practical component. We have developed, selected from the scientific and methodological literature (O. Antoshchak, T. Brailko, V. Barava, V. Zots, L. Derevyanko, I. Dychkovska, E. Zaika, I. Kalmykova, G. Ivanitsa, G. Nedozirna, O. Pometun, L. Pyrozhenko, N. Sydorenko, V. Telyachuk, A. Lesina, L. Tolkachova, M. Chepil) and systematized special games, tasks and exercises[233].

In accordance with our developed algorithm for the concepts formation in junior pupils it takes place in three stages: motivational-orientational, developmental-operational, and reflective-creative. Let's present a detailed description of each of them.

I stage – motivational-orientational. Its goal is to focus pupils on the problem, to raise interest in the topic under discussion; stimulate cognitive needs, motives; to learn to determine the guiding action principle.

The main stage tasks:

1) to direct pupils to perform cognitive and problem-solving tasks;

2) to form a motivational basis for action;

3) to encourage pupils to cognitive and problematic questions;

4) to intensify their imagination, fantasy in order to create an image of the final activity result;

5) to learn to independently determine the activity purpose, turning it into a personally significant (first, under the teacher guidance, then – on their own);

6) to determine the guiding principle for action;

7) to develop skills of independent information search.

Teacher's actions: creates problematic situations; formulates the problem, the task; creates guidelines for recognizing links between component parts of an object; defines goals, activity tasks, plans activities; defines the tasks content, forms, and activity methods; provides the necessary information; controls and regulates students' actions.

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Pupils' actions: focus on the problem situation and its in-depth analysis; necessary knowledge actualization, verbal task formulation; the problem awareness, for the decision of which it is necessary to define the purpose and develop an action plan; self-assessment of their capabilities in solving a specific task; self-control, making corrections in their own educational and cognitive activity.

Exercises: "Assumptions", "Confusion", "Quibble", "Yes – no", "Prolong the sentence", "Complaint box", "Angles", "Five words – three words", "Microphone".

***I stage result*:** the children learn to identify the problem, the goals, to plan their activities, to update the experience acquired earlier.

II stage – developmental-operational. The stage purpose is to ensure pupils' awareness and verbalization of obtaining new knowledge process as a result of cognitive and creative activity.

***The main stage tasks*:**

1) to promote active use of previously accumulated experience by pupils, further development of mental operations in the process of performing problem tasks; the development of conceptual thinking visual-figurative elements, creative imagination;

2) to create conditions for the development of the psychological creativity mechanism, to ensure the transition to real action;

3) to teach to formulate theoretical positions, to comprehend the mastered way of action for the purpose of its further application in non-standard conditions.

The second stage involves the following structural components: ideas nomination and fixing; hypotheses statement, their content analysis; hypothesis testing; decision choice, meaningful generalization, new knowledge consolidation; control, self-control. Let's consider each of these components in more detail.

1. Ideas nomination and fixing.

Teacher's actions: encourages pupils to put forward ideas, guesses, and their verbal design; fixes pupils' thoughts on a board in the scheme or a model form.

Pupils' actions: put forward their ideas for solving the problem.

Methods of cognitive-creative activity: heuristic conversation; associative relations establishment; search for analogies.

Exercises: "Brainstorming", "Creative Drawing", "Restoration", "Invent Wish", "Imagine...", "Synectics method", "Associations Catalog".

2. Hypotheses statement, their content analysis

Teacher's actions: thinks about the alternation of individual and collective work, which makes it possible to create an atmosphere of commonwealth, mutual understanding, dialogue in finding the truth; it ensures that the pupils do not ignore each others' thoughts, maintains the commonwealth atmosphere.

Pupils' actions: each pupil expresses his point of view, his own problem vision, offers hypotheses for the contradictions solution.

Methods of cognitive-creative activity: hypothesis construction according to the headline, the topic key words; work in pairs and in small groups, which are formed at the children's will, where the mutual experience enrichment takes place, the points of view comparison with the thoughts of others (dialogue as a different language); receiving visualization (creating a future result image).

Exercises: "The Wizard", "Searches of connecting links", "Make a sentence", "What will happen next", "Fantasize", "Fantastic hypotheses", "Construction of consequences system", "Choose the position".

3. Testing the hypothesis (solving the problem with heuristic methods and techniques)

Teacher's actions: involves the entire team to work (in small groups, in pairs); carries out the optimum choice of educational activity methods; provides support in case of difficulties; positively evaluates every pupil's success; poses additional questions, compares different opinions, suggests to substantiate them; demonstrates a reasoning example to pupils.

Pupils' actions: together with a teacher and other children, analyze the situation on the basis of knowledge and experience; perform substantive and mental actions; conceptualize, compare new

information with their own knowledge; learn a teacher's mental activity pattern; actions are accompanied by a language directed at another child or teacher.

Methods of cognitive-creative activity: modeling and schematization; establishment of cause-effect relationships, diverse subject analysis; change the main subject purpose and use it in an unusual role; finding objects of new properties; solving the problem in several ways; methods "increase – decrease", "division – association", "revival – petrifaction"; methods to compose fairy tales ("fairy tales", "fairy tale outdoors", "what's next").

Exercises: "Fantastic situations", "Objects classification", "List of possible causes", "Combinator", "Yes – no", "Deny my opinion", "Unusual things use", "Combine the fairy tale".

4. Decision choice, meaningful generalization, new knowledge consolidation

Teacher's actions: creates an atmosphere of mutual assistance through interaction; stimulates pupils to express themselves; shows the possible ways of constructing logical sentences that reflect the relationships found; detailed proof plan, its logical scheme.

Pupils' actions: argue their own point of view and substantiate the findings; perform tasks according to the model and gradually transfer to non-executed tasks; apply a new action method; actions are accompanied with the different language.

Methods of cognitive-creative activity: generalization; rules and concepts formulation; a recognized features description using definitions and narration; creating choice situations; an incentive to find alternative solutions; choral reading aloud definitions, rules with a gradual transition to individual reading; practical application of the learned action mode in order to verify its effectiveness; discussions.

Exercises: "PRESS Method", "Decision Tree", "Common Search", "Continuous Thinking Scale", "Definition Formulation", "Alternate Way Search", "Compare", "Compare Doers Actions".

5. Control, self-control

Teacher's actions: controls, diagnoses the state of action mode (or concept) assimilation; attracts students to control the activities course (control, self-control, intercontrol, work in groups), demonstrating the reasoning algorithm.

Pupils' actions: carry out their activity control: comment on the actions algorithm based on theoretical knowledge with each step justification; work in a small group or in a dialogue (one pupil reproduces the material, and the other controls); proceed to reproduce the acting way in the external speech about themselves to internal speech.

Methods of cognitive-creative activity: formulation of recommendations, algorithms; visual representation of the performed action (drawing, scheme, etc.); operations definition that make up the action.

Exercises: "Retell, relying on...", "Voice", "Retelling", "Transmit opinion in other words", "What was, what will be", "Action Algorithm", "Reduce".

II stage result: comprehension of the received action method, the ability to apply it in various situations.

III stage – reflective-creative. The purpose is to stimulate the need for independent creative activity on the basis of knowledge, skills; impressions obtained at previous study stages.

The main stage tasks:

1) to teach pupils to evaluate their own level of understanding and learning new knowledge by resorting to past experience;

2) to cause a positive emotional experience from the work that contributes to increasing self-esteem;

3) to encourage children to verbalize the experiences that accompanied the creativity process;

4) to teach pupils to define goals and design future activities, mentally reproducing the sequence of all subsequent actions and operations;

5) to encourage pupils to apply the acquired knowledge in the new environment;

6) to promote the children's desire to fulfill their creative tasks independently.

Teacher's actions: evaluates only the process of pupils' activity; initiates and intensifies the pupils' reflection about individual and joint activities; creates conditions for the emergence of

independent children's creative activity; directs pupils' independent search to resolve difficult situations.

Pupils' actions: purposefully carry out self-control and self-evaluation, determining: the mastering degree of ideas, knowledge, actions ways, values; the possibility of their use for the new knowledge acquisition; compare results with the tasks, analyze the difficulties causes; analyze their own mental activities and feelings; realize the situation to achieve the goal; evaluate their ability to share knowledge with others; establish connections between the well-known and those that still need to be learned; express new ideas and thoughts.

Methods of cognitive-creative activity: a question on the pupil's awareness of the new knowledge value gained; creative tasks performance; the problem simplification; analogies vision; individual independent tasks; return to key words, true and false allegations; the answer to the question from the stage I.

Exercises: "Good – Bad", "Top of Success", "Time Machine", "Unfinished Suggestions", "ABC Soup", "Impressions Circle".

III stage result: formed ability to evaluate acquired experience, potential opportunities, use the acquired values in the independent creative activity.

Thus, the theoretical substantiation of the algorithm for the scientific concepts formation in junior pupils, a detailed stages description and their effectiveness, gives all grounds to argue that its application will contribute to the formation of pupils' ability to independently solve medium and high severity problems, obtaining a new way in solving them.

In order to test and validate our developed algorithm, an experimental study has been conducted on the basis of Uman secondary school #3. The experiment has involved 102 primary school pupils. There have been 2 experimental classes with a total number of 52 pupils who have studied according to our offered algorithm and 2 control classes with a total number of 50 pupils who have studied according to the traditional system. Four primary school teachers (class guides of experimental and control classes) have been involved in the experiment.

Experimental work has included the following steps:

I. Instantiate section of the existing level of pupils' scientific concepts formation in experimental and control classes.

II. Conducting classes from the courses "I am in the world" and "Natural Science" with the application of the developed algorithm, which contribute to the purposeful process of scientific concepts formation based on experimental classes.

III. Control section – measurement of pupils' scientific concepts formation levels in experimental and control classes and their comparative analysis.

The study results of the instantiate and forming stages are presented in Table 1.

Table 1. Dynamics of changes in levels of scientific concepts formation in pupils of control and experimental classes before and after the forming experiment

Pupils \ Levels	Experimental classes (52 pupils)				Dynamics		Control classes (50 pupils)				Dynamics	
	Knowledge statement		Final knowledge cut				Knowledge statement		Final knowledge cut			
	n	%	N	%	n	%	n	%	n	%	n	%
High	4	7,7	11	21,2	+7	+13,5	5	10	7	14	+2	+4
Medium	18	34,6	28	53,8	+10	+19,2	16	32	20	40	+4	+8
Low	30	57,7	13	25	-17	-32,7	29	58	23	46	-6	-12

Diagnosis of scientific concepts formation levels in junior pupils has been carried out with the help of special questionnaires, pedagogical observation, and educational products evaluation.

These tables indicate an increase in the number of pupils in experimental classes with a high (13.5%) and an average (19.2%) level of scientific concepts formation and a decrease in respondents with a low level (32.7%).

Conclusions and perspectives of further scientific research. Thus, according to the comparative analysis results, we can state that the most significant differences in the levels of scientific concepts formation in junior pupils occur in experimental classes. That confirms the effectiveness of our developed algorithm. Pupils' activity on the stages defined by the algorithm repeats cycles of children's thinking from 6 to 10 years: from the visual-effective, through the visual-figurative to the conceptual. This algorithm can be used during educational activities, individual lessons, during a certain topic study. Using the technique of organizing a lesson or educational event by analogy with it, the teacher will achieve significant results in the scientific concepts formation in primary school pupils.

However, the conclusions and results obtained do not pretend to be the final solution to the problem of scientific concepts formation in junior pupils. Further scientific research may be aimed at studying the problem of updating the educational activities content in primary school.

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2.8. USING OF INFORMATION AND COMMUNICATION TECHNOLOGIES IN THE PRIMARY SCHOOL TEACHER'S PROFESSIONAL ACTIVITY

In November 2014, a UNESCO World Conference was held in Japan (Nagoya), ending the Decades of Education for UN Sustainable Development (2005-2014). The conference announced the beginning of the Global Sustainable Development Action Program beyond 2015, which was approved at the 37th UNESCO General Conference and the 69th Session of the UN General Assembly. Following the end of the Decade of Education for Sustainable Development, the international community has agreed to promote the development of education for sustainable development, including these issues in the curriculum. Among the basic concepts of ESD (education for sustainable development) is defined[234]: curriculum content, teaching methods and educational environment, learning outcomes, transformation of society. Teaching methods include interactive and learner-centered teaching and learning that provides research, applied, and transformation, knowledge-based learning, as well as updating the educational environment (physical, virtual, and online) to encourage students to act on sustainable development principles.

The use of gadgets – is an essential feature of the modern world, because without gadgets connected to the Internet, humanity does not imagine their daily and professional life. Even young children can easily master mobile phones, tablets, computers by finding cartoons, games, and more online. Today, primary school children are already enrolled in the digital generation, who are in two worlds – the physical and the virtual, and have extensive experience in operating digital devices. Therefore, the teacher is tasked with integrating ICT into professional activities to increase its effectiveness.

On August 10, 2018, the Decree No. 1143 of the Ministry of Social Policy of Ukraine approved the professional standard "Primary School Teacher"[235]. This document states that the purpose of the professional activity of primary school teachers is to organize educational and cognitive activities, education and development of primary school children. The professional standard describes work functions and related professional competences, the basis of which is the knowledge, skills and abilities that a primary school teacher should possess. Apparently, the use of ICT in the performance of all work functions increases the effectiveness of the teacher. At the same time, each of the eight work functions of a primary school teacher, defined by a professional standard has its own characteristics and therefore, in implementing each of them, the teacher can use different ICT tools and Internet resources.

The professional standard of a primary school teacher determines the first work function of **planning and implementing the educational process**. This work function includes the following work activities and operations: the study and use of professional literature in the planning of the educational process; compliance with the requirements of the legal documents regulating the organization of the educational process in primary school; planning of types of work by the teacher: calendar-thematic planning of dynamics of development of the content of educational branches, plan of educational work, planning of professional self-development of the teacher; organization of interaction with profile specialists in planning the educational process; realization of pedagogical diagnostics of the pupils; development of lesson plans and other forms of organization of the educational process; implementation of the educational process [236].

Obviously, for its implementation, the teacher has to study the normative-legal documents that regulate the organization of the educational process in primary school, as well as professional literature. To do this, the teacher can use the online resources that contain the regulatory documents, electrinic textbooks and literature that the teacher needs. These resources include the Ministry of Education and Science of Ukraine, the New Ukrainian School site, and publishers' websites that provide textbooks and manuals for elementary schools, and textbooks for teachers: for example https://mon.gov.ua/ua, https://nus.org.ua, http://interactive.ranok.com.ua, https://skvor.info etc.

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[234] UNESCO Roadmap for Implementing the Global Action Programme on Education for Sustainable Development, p. 11.
[235] The professional standard "Primary school teacher of the institution of general secondary education".
[236] The professional standard "Primary school teacher of the institution of general secondary education", p. 3.

It should be noted that the reform "New Ukrainian School" in Ukraine envisages the creation of a national educational platform that will provide free access to e-textbooks for all participants in the educational process, make education more accessible and accessible to pupils and teachers from rural areas. Developed the "Regulations on the National Educational Electronic Platform"[237] by specialists of the Ministry of Education and Science of Ukraine, the Institute for the Modernization of the Content of Education and the Office of Effective Regulation in order to implement and operate the platform. But unfortunately, this platform still does not work even though the State has allocated money for its functioning,

Teacher planning will help Google services, including the app Google Drive, a secure repository for all files. It should be noted that when you use Google Drive, you get 15 GB of free storage for all your documents. With the help of this service, it will be convenient for the teacher to create calendar-themed planning of teaching certain subjects and integrated courses, syllabus notes on a single subject or integrated course, planning of educational work and planning of their professional self-development. Synchronize your computer with Google Drive and giving access to certain documents to other users – colleagues or school administration – the teacher can engage with profile professionals to plan the educational process.

The teacher can also use Google Drive to create questionnaires, tests, questionnaires, and answer pages to arrange pedagogical diagnostics of the student. The advantage of this app is the ability to instantly work with survey results.

To carry out the educational process, the teacher has the opportunity to choose from a large number of Internet resources, the one that he needs and it is easy to use. We have explored the possibilities of online services, which are available on the Internet with free access, and we propose the classification of Internet resources for the creation of educational and game content:

1) Services for creating interactive exercises: LearningApps, H5P, Flippity and other.

2) Services for creation of tests and quizzes: OnlineTestPad, Google Forms, Baamboozle and more.

3) Services for creating mobile quizzes: Kahoot!, Quizalize, Triventy and other.

4) Services for creating flash cards: Quizlet, StudyBlue, TinyCards.

5) Services for creating puzzles and riddles: Word It Out, Jigsawplanet, «Ребуси №1» and other.

6) Services for creating interactive images: Imgonline (a service for complex processing of photos with the addition of various special effects), Canva (service for creating infographics with many design templates), GIPHY (online English service for creating your own gifs and using the service base), Thinglink (English service for creating interactive images or videos with text marking, links to other resources with different multimedia content).

7) Services to create augmented reality: HP Reveal.

The next work function of a primary school teacher is **to provide and support the education, upbringing and development of pupils in the educational environment and family**, which includes the following work activities and operations: goal setting, adjustment of the educational process on the basis of comparison of intermediate results with planned; selection of appropriate methods, tools and forms of teaching, according to the characteristics of the pupils of the class; the use in the educational process of the theoretical foundations of the educational sectors defined by the State standard of primary education; use of teaching methods in the educational process, defined by the State standard of primary education; realization of formative and final assessment of pupils' educational achievements; monitoring the dynamics of the child's personality development in the educational process and supporting its development; providing parents (persons who replace them) with advice and guidance on supporting the student's educational activities outside the school; organization of cooperation with parents in various forms of interaction; coordination of stakeholder interaction for the harmonious development of children[238].

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[237] The Regulation on the National Educational Electronic Platform.
[238] The professional standard "Primary school teacher of the institution of general secondary education", p. 10.

The use of ICT will greatly assist the teacher in choosing appropriate methods, tools and forms of teaching, according to the characteristics of the pupils of the class; in updating the theoretical foundations of the educational sectors defined by the State standard of primary education; in analyzing and exploring opportunities for further use of educational teaching methods. In particular, on the sites http://interactive.ranok.com.ua, https://skvor.info, http://marinakurvits.com are posted the development of lessons for the current textbooks, the educational-methodical manuals for education of educational branches, defined by the State standard of general primary education, webinars, where the leading didacticists reveal methodical peculiarities of teaching pupils of particular topics in certain educational fields, for example: https://www.youtube.com/channel/UCeFZd8UVIhapGoVVcpN6HDQ, https://vseosvita.ua, https://naurok.com.ua etc. These online resources will assist the teacher in determining the best teaching method, in selecting the appropriate methods, tools and forms of teaching, according to the purpose and objectives of the lesson, forms of training, taking into account the specific content of the educational material and individual characteristics of pupils.

The use of ICT is possible in the study of all subjects and integrated courses in primary school, but the teacher must proceed from the goals and objectives of the educational field, the peculiarities of studying a specific topic and lesson objectives. At the same time, it should be noted that there is no universal online service that can be used to provide and support training in any educational field throughout the academic year. First of all, the differences in the educational sectors do not allow the use of a single online service, because they have different subjects of study, they provide different types of tasks for the formation of concepts, skills and abilities. In addition, modern children are accustomed to the uniformity of the design of educational and game content and, as a consequence, lose interest in working with this material. Therefore, a primary school teacher needs to use a whole range of online services to create educational and game content. Against this background, there is a need to define requirements for the selection of online services that can be used to create interactive exercises and monitor progress of students' learning on a particular issue of the program. To this end, we have identified three sets of requirements:

I – requirements for creating interactive exercises;

II – requirements for monitoring their implementation;

III – requirements for the organization of work with the class[239].

The first group includes:

1) the ability to create exercises for all subjects and in accordance with all their sections;

2) the availability of sufficient platforms for a variety of interactive exercises;

3) the ability to vividly design interactive exercises through the use of pictures, graphs, diagrams, audio and video materials, etc;

4) the presence of animations, dynamics and special effects in interactive exercises;

5) the ability to create differentiated exercises by levels of difficulty;

6) the possibility of presenting a series of interactive exercises at the levels of promotion, where the student sees how many exercises he needs to perform in order to go to the level above;

7) a clear and simple algorithm for performing interactive exercises.

The second group of requirements includes:

1) avoiding the possibility of pupils acting randomly when choosing the answer;

2) the presence of the function of instant and step-by-step control over the course of performance by school children of a certain exercise, series of exercises, accumulation of data on student performance and their analysis and generalization, which allows to trace the results.

The second group of requirements is related to the third group of requirements, namely:

1) the ability to create a virtual class: the selection of exercises or series of exercises to the specified lesson and the corresponding class;

2) having a bank of interactive exercises that can be used at any time without creating your own;

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[239] SKVORTSOVA, S., BRITSKAN, T. Vybir Internet servisiv dlia stvorennia i vykorystannia interaktyvnykh vprav na urokakh matematyky v pochatkovii shkoli, p. 182.

3) the ability to use interactive exercises in offline mode;

4) the teacher's ability to further work with the results.

We have explored the possibilities of using the following online services, namely LearningApps, Plickers, H5P, Flippity, Google Forms at mathematics lessons[240] [241] [242] [243], which led to the conclusion about the advantages and disadvantages of each. In particular, according to the first group mentioned services have the following advantages:

1) the opportunity to create exercises in all sections of elementary mathematics. Learning Apps, H5P and Google Forms allow the teacher to work with all sections of the elementary mathematics course – enumerating non-negative integers and regular proper fractions, arithmetic operations of addition, subtraction, multiplication and division with integers, quantities, plot-based mathematic tasks as well as algebraic and geometric propedeutics. Plickers somewhat restricts the teacher, but allows him to work with arithmetics: existing constructor of question allow the teacher to create interactive exercises to form calculate skills of primary school children.

2) the availability of sufficient number of platforms for a variety of interactive exercises. Learning Apps includes 17 platforms and 5 tools; Plickers service offers only 2 task designs; H5P allows the teacher to create interactive content for 42 different designs; Google Forms contains 9 templates.

3) the possibility of vivid design of interactive exercises by using pictures, graphs, diagrams, audio and video materials, etc. Learning Apps, H5P and Google Forms allow the teacher to use texts, a variety of images, audio and video. Plickers can use text material and images.

4) the presence of animations, dynamism and special effects in interactive exercises. Learning Apps, H5P and Google Forms have a high level of dynamism and special effects when creating interactive exercises and Plickers allows the teacher to use GIFs.

5) the ability to create differentiated exercises by difficulty levels. We can say that all the three services allow the teacher to create differentiated exercises by difficulty level, but exercises created with Learning Apps, H5P and Google Forms may be more diverse and not similar, and exercises created on Plickers may be different in complexity, but will look typically, since it has a limited number of platforms.

6) the opportunity to give a series of interactive exercises according to the level of progress, where the pupil sees how many exercises he needs to perform in order to move to the level above. With all the three services, the teacher can create a series of interactive exercises.

7) a clear and simple algorithm for performing interactive exercises. Analyzing the algorithms for creating interactive exercises on the three services, we can say that each service offers its own unique algorithm, which is different from other services. In our opinion, it takes less time to learn the Learning Apps algorithm, despite the fact that it has more platforms. The advantage of Learning Apps and Google Forms for teachers of Ukraine is that these services are translated into Ukrainian. And Plickers and H5P services are in English. The algorithm for creating interactive exercises on the Plickers service is comparatively easier than on the H5P service. This can be explained by the number of platforms. But it should be noted that the Plickers service has a specific algorithm for live broadcasting, which also needs to be mastered by the teacher.

The second group of requirements includes:

1) avoiding the possibility of students acting at random when choosing the answer. To avoid a situation where a student can randomly choose the right answer, the teacher should avoid platforms that involve choosing one answer from several and true/false. Unfortunately, these platforms (choosing one answer from several and true/false) are present on the service Plickers, but this is not

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[240] SKVORTSOVA, S., BRITSKAN, T. Training of Primary School Teachers for the Use of Information Technology Teaching Mathematics, p. 31.

[241] SKVORTSOVA, S., ONOPRIINKO, O., BRITSKAN, T. Teaching mathematics with the peculiarities of digital generation children, pp. 105-107.

[242] SKVORTSOVA, S., BRITSKAN, T. Training for future primary school teachers in using service learning apps teaching mathematics, pp. 59-77.

[243] SKVORTSOVA, S., BRITSKAN, T. Training for primary school teachers in using service Plickers teaching mathematics, pp. 74-87.

a factor not to use this service. The teacher needs to make more efforts in formulating questions and answering them so that the answer is not immediately obvious.

2) the presence of the function of instant and step-by-step control of the students 'performance of a certain exercise, a series of exercises, accumulation of data on the students' success and their analysis and generalization, which allows to track the results of the whole class or each individual student. All four services allow pupils to monitor their tasks. The Google Form lets you instantly view the results of your training assignments, assign each item in the series an appropriate score, and automatically calculate your final grade.

The second group of requirements is connected with the third group of requirements, namely:

1) the ability to create a virtual class: a selection of exercises or series of exercises to the specified lesson and the corresponding class. Learning Apps, Google Forms and Plickers allow the teacher to work with a virtual class.

2) availability of a bank of interactive exercises that can be used at any time without creating your bank. Learning Apps and H_5P contain their own interactive content that can be used in one's concrete activity. But Learning Apps allows any exercise in the collection to be customized. Plickers and Google Forms do not have its own collection of exercises.

3) an opportunity to use interactive exercises offline. This benefit is provided to the teachers who work on Learning Apps; other services do not have this capability;

4) the teacher's ability to further work with the results. Learning Apps, Google Forms and Plickers' users can work with the assessment results.

Thus, the online services Learning Apps, Plickers, H5P, Flippity, and Google Forms will assist the teacher in creating interactive tasks for school children, in organizing the formative and final assessment of students 'academic achievement, since these services allow you to monitor students' performance. These services also allow the teacher to track the dynamics of the child's personal development, such as learning a particular subject, and to support it in every way during the interactive exercises, creating different series of learning tasks according to his level of educational achievement. A prime example of tracking the dynamics of a child's personal development is keeping an electronic journal.

Teacher use of social networks will be a convenient way to communicate with parents and provide them with advice and guidance on supporting student learning outside the educational setting.

The third work function **is to create an educational environment** that includes the following work activities and operations: creation of safe, psychologically comfortable and tolerant conditions of the educational process; creating a health education environment focused on students' personal, creative and spiritual development; meaningful filling of the educational environment in accordance with the requirements of the State standard of primary education; the preservation, observance and development of rules, values and traditions established in the educational establishment; taking into account when creating the educational environment of the individual needs of pupils[244].

For example, the resource "E-School" will be useful for filling the content of the educational environment. This resource is a free platform for creating a school site, and has the advantage of entering e-journals and diaries. Thus, through the use of this resource, it is possible to create a unified information space of the school, class.

The implementation of these three functions is required by the Professional Standard from non-category primary school teachers and first or higher categories. The implementation of the following three functions is foreseen for teachers with first or higher categories.

The next work function of a primary school teacher is **reflection and professional self-development**. The aforementioned work function includes the following work activities and operations: awareness of their role as a primary school teacher, value system, goals and objectives of a teacher's professional activity; analysis of one's own professional activity in realization of set goals and tasks; identifying strengths and weaknesses of their own teaching activities; self-

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[244] The professional standard "Primary school teacher of the institution of general secondary education", p. 19.

assessment of the results of pedagogical influences on quality assurance of education, development and upbringing of primary school children; awareness of the need for self-development in order to acquire additional professional competences; planning activities to achieve their own professional development goals; participation in the work of creative groups, methodical associations of primary school teachers; use / dissemination of innovations in pedagogical science and practice, promising pedagogical experience; tracking your own physical, mental (intellectual and emotional) spiritual (moral) and social health, trying to balance them by optimizing your time and energy costs[245].

Professional self-development of the teacher is carried out during the study of novelties of scientific and methodical literature in the profession, which can also be placed on educational sites, as well as through participation in Internet webinars, where the teacher is able to obtain methodological recommendations from leading experts: http://interactive.ranok.com.ua, https://www.ed-era.com, https://www.youtube.com/channel/UCtCeWuY99SKgi3SQmr1cBwg, https://naurok.com.ua, https://www.youtube.com/channel/UCmj5jBaNuwTLQg9Y6vh4kQg etc. A teacher can use the app Google Calendar for planning activities to meet their professional development goals. This app will help you get event reminders, map events, and share events with other users.

The fifth work function of a primary school teacher is **to carry out pedagogical research**: definition of methodical theme of self-education, substantiation of its relevance, purpose, tasks and other features of research; study of literature on the methodical theme of self-education, with the aim of determining ways to improve its effectiveness; formulation of basic research ideas; development of systems of initial tasks / lesson systems, etc., with the purpose of realization of basic ideas of research; approbation in practice of the developed systems of initial tasks / lesson systems, etc., with the purpose of realization of basic ideas of research; evaluation of the effectiveness of the developed systems of initial tasks/lesson systems, etc., in order to realize the main research ideas - summarizing, conclusions[246].

In order to evaluate the effectiveness of teacher-designed teaching/learning systems, pedagogical influences on pupils, the teacher can use the Google Form application, which allows the user to create a questionnaire and place it on the Internet where respondents can fill out the form instantly. The benefits of this service are that it automatically generates a spreadsheet to collect and process the responses received and displays the survey results. The user has the opportunity to work with the survey results and view it's in the form of charts and graphs with statistics in high quality and percentage format.

The sixth work function of primary school teachers is **to provide methodical assistance to colleagues in the field of education, development, upbringing and socialization of primary school children**, which provides: mentoring and guidance of internship, pedagogical practice of students of pedagogical institutions of higher education; managing the work of creative groups, methodical associations, Young Teacher's School, etc. conducting workshops, trainings, etc.; moderating during seminars, conferences and more.

The possibilities of social networks, namely Facebook, Instagram, allow the teacher to live online – online workshops. A significant disadvantage of this form of work is the time constraint. Another form of workshops and trainings is recording on a digital device and uploading this video to a popular video host YouTube. The advantage of such work is the ability to place links to this video on the Internet.

The following work function **"Generalizing your own pedagogical experience and presenting it to the teaching community"** includes such work activities and operations: generalization of own pedagogical experience and presentation of it in the form of development of educational materials for students, system of lessons, methodical recommendations on the practice of using certain methodical techniques, organization of types of educational activities, etc.; dissemination of own pedagogical experience by participating in methodical activities of different levels (school, district, city, regional, all-Ukrainian); presentation of own pedagogical experience in

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[245] The professional standard "Primary school teacher of the institution of general secondary education", pp. 22-23.
[246] The professional standard "Primary school teacher of the institution of general secondary education", p. 28.

mass media (pedagogical press, educational platforms, etc.); adjustment of existing improvements in the light of suggestions and comments of colleagues; taking into account the achievements of pedagogical science and practice[247].

In order to summarize teacher's pedagogical experience and present it to the pedagogical community, the teacher can maintain a personal profile on the popular social networks Facebook, YouTube, Instagram, etc. Where he can download his own achievements and experiences in various formats and receive some suggestions or comments in the form of comments. Also, for the implementation of this work function, the teacher can create his own site, where more opportunities to present their own experience. The teacher can use the following services to create a site: https://ua.weblium.com, https://tilda.cc/ua, https://uk.wix.com etc.

Primary school teachers with highest category should evaluate **the performance of primary school teachers**. This work function includes the following work activities and operations: analysis of professional activity and results of work of primary school teachers; evaluation of results of work of colleagues – teachers of primary school; examination of educational materials, methodical developments, etc.; participation in the work of expert groups, the certification committee[248].

The primary school teacher can, in particular, fulfil this work function by studying material posted on specialized Internet resources. For example, https://imzo.gov.ua contains all the information on the competitive selection of textbooks (excepting electronic) for applicants for full secondary education and teaching staff in 2019-2020. Thus, the teacher can get acquainted with the regulatory framework for the competition of textbooks, with sets of competitive materials, submitted for competitive selection of textbooks, expert opinions of experts, extracts of minutes of meetings of the Competition and Appeal Committees, and more. Also, in this context, the site of the Ministry of Education and Science of Ukraine (https://mon.gov.ua/ua) is useful, which presents materials for teacher certification, competitions and offers for participation in various expert groups, trainings.

Therefore, we can conclude that the teacher must use ICT to perform work functions. Thus, it is relevant to study the question of the use of ICT in the professional activities of primary school teachers, which correlates with the state of teachers' readiness to use all kinds of Internet resources.

The experimental work was carried out on the basis of the Izmail City Teachers' House (Ukraine, Odesa region, Izmail). 55 primary school teachers of Izmail and Izmail districts took part in the pilot questionnaire.

In order to diagnose the condition of readiness of primary school teachers for the introduction of ICT into their professional activities, we developed a questionnaire with different types of questions, which related to both general data about respondents and certain skills of practical nature.

1. General information (qualification, gender and age of the respondents).

2. Respondents' professional activities (type of educational institution, position, work experience and qualification category).

3. Questions regarding the assessment of professional readiness for the use of ICT in professional activity.

4. Questions about the reasons that hinder the process of implementing ICT in the professional activities of primary school teachers.

We find that the average age of the primary school teachers surveyed is 42 years as a result of the analysis of general information questionnaires. The number of women is 100%. Of the teachers who participated in the survey, 44 work in urban schools (80%) and 11 teachers in rural (20%) (Figure 1).

Analyzing the questionnaires on the professional activities of the respondents, we found that the average length of service of the interviewed teachers was about 19 years. At the same time, the minimum length of service was 1 year and the maximum length of service was 48 years.

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[247] The professional standard "Primary school teacher of the institution of general secondary education", p. 35.
[248] The professional standard "Primary school teacher of the institution of general secondary education", p. 37.
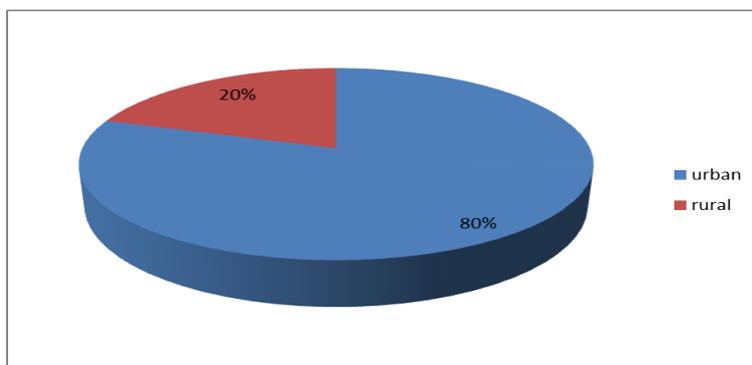
Fig. 1. Types of schools where respondents work
Source: own work

Teachers who participated in the survey were divided into qualification categories as follows: 10 teachers (18 %) have the category "specialist", 7 teachers (13 %) – "specialist of the II category", 20 teachers (36 %) – "specialist of the first category" and 18 teachers (33 %) – «specialist of the highest category» (Figure 2). It should be noted that of the teachers with the highest category, 6 teachers still have the pedagogical title of "Methodist teacher".
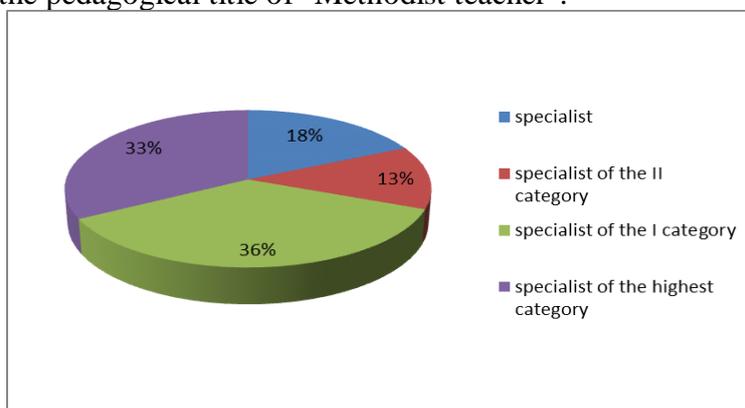
Fig. 2. Distribution of respondents according to qualification categories
Source: own work

An analysis of the respondents' answers to the assessment of professional readiness for the use of ICT in professional activity allowed us to conclude that almost all teachers use ICT in professional activity, but with different frequency, using different opportunities. Thus, to the questionnaire "How often do you use ICT in your professional activity", 78% of the respondents answered that it was continuous, and 22% said that it was periodic (Figure 3).
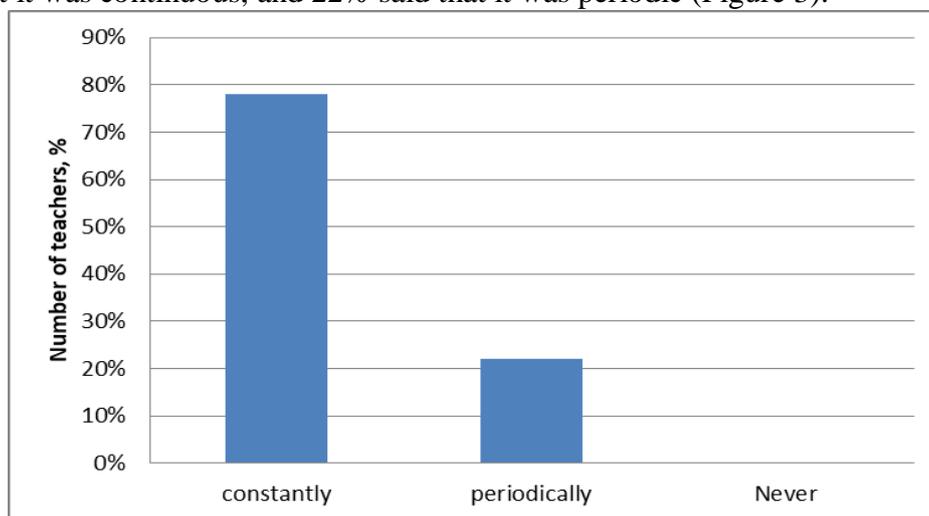

Fig. 3. How often are the interviewed ICT teachers used in their professional activities?
Source: own work

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Respondents were able to choose several options for answering the following question: "Where did you learn this?" 22% of teachers indicated that they had acquired certain skills in using ICT in higher education institutions. It should be noted that this answer was chosen by teachers with less experience in school, that is, we can conclude that they have recently graduated from higher education institutions. 44% of teachers indicated that they acquire certain ICT skills by attending methodical seminars, trainings, and more. And 84% of teachers chose the answer that they are working independently to improve their ICT skills (Figure 4).
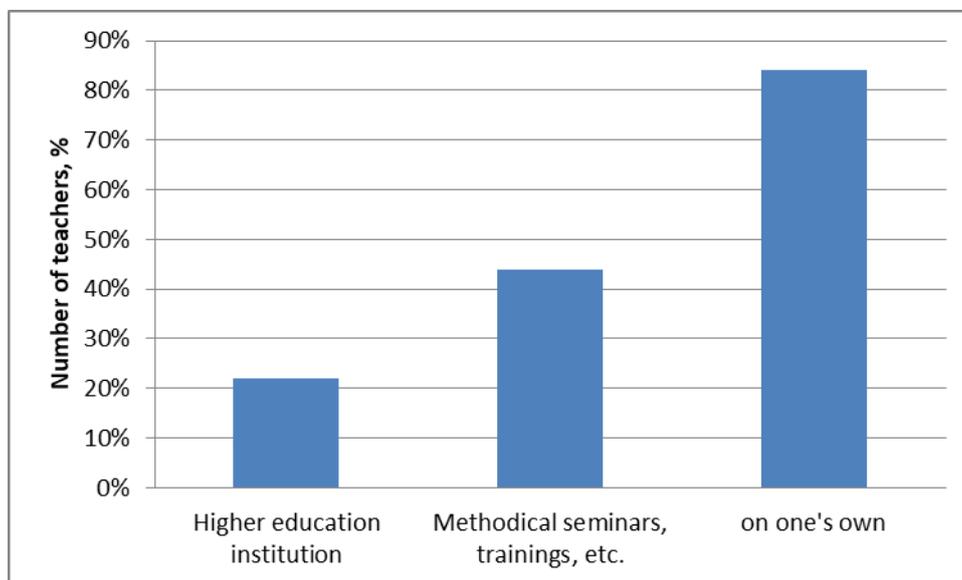
Fig. 4. Where the respondents were able to use ICT in their professional activities
Source: own work

Respondents could also choose several answer options answering the following question "How do you use ICT in your professional activity?" 93% of respondents print training materials for lessons on their computer; 96% of teachers search for information online; 98% spend lessons with computer hardware; 62% use ICT in project activity; and only 24% of respondents create educational and gaming content through online resources (Figure 5). So, we have a small percentage of teachers who see online services as opportunities to create interactive exercises for school children, which testifies to the relevance of preparing teachers to use online services to create educational and game content.
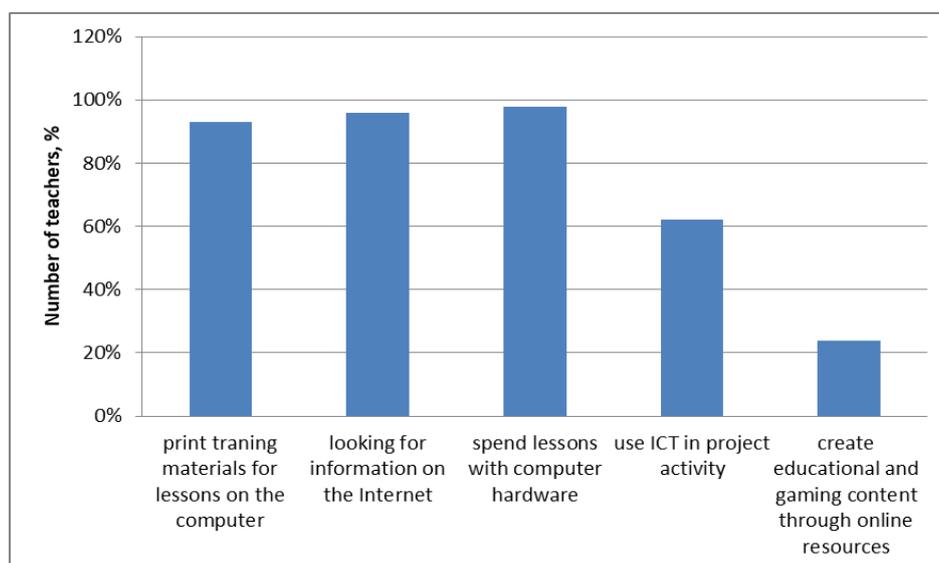

Fig. 5. Ways to use ICT in professional activities
Source: own work

Respondents could also choose several answer options answering the following question "What digital resources do you use in your professional activity?" Thus, 98% of teachers work with the scientific and methodical literature available on the Internet; 20% of teachers are familiar with platforms for e-journals and diaries; 73% of teachers participate in webinars; 24% of teachers are familiar with online services for creating educational and game content; 33% of teachers use social networks in their professional activities or create their own websites and blogs (Figure 6). The results of the teachers' answers to this question can be justified by the fact that in order to use electronic journals, educational and game content created through online services, you need to have specialized knowledge and skills of ICT user, which can be acquired in the process of detailed study of the features of working with digital data resources.
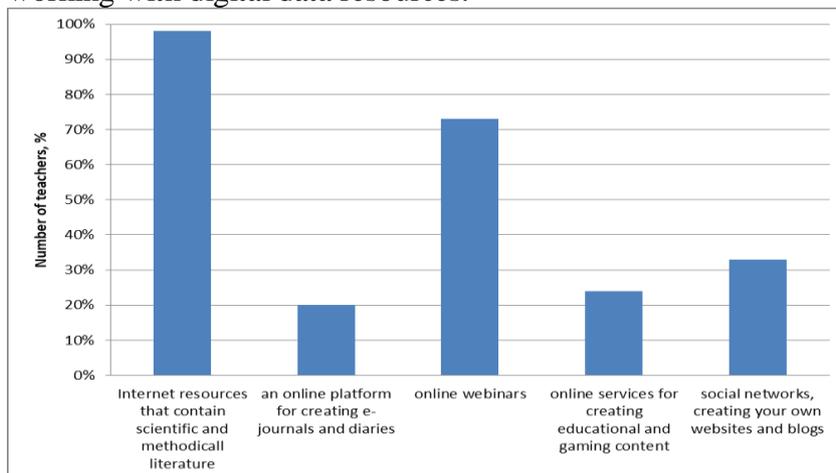

Fig. 6. Use of digital resources by primary school teachers
Source: own work

The next question was an open-ended question for teachers; to indicate what online services they were working for creating educational and game content. The following services were listed: LearningApps and Google Forms. Therefore, we can conclude that teachers have an idea of the most famous online services. It should be noted that the mentioned on-line services are Ukrainian-speaking.

Respondents were also able to choose several options for answering the last question "What do you think are the main reasons for the hindrance of ICT in professional activities?" 66% of teachers indicated that they had problems with insufficient material support; 24% of teachers stated that the cause was excessive material saturation; 18% of teachers are psychologically unprepared for ICT; 64% lack the time to implement ICT; 70% of teachers indicated that they had insufficient knowledge of ICT features (Figure 7).
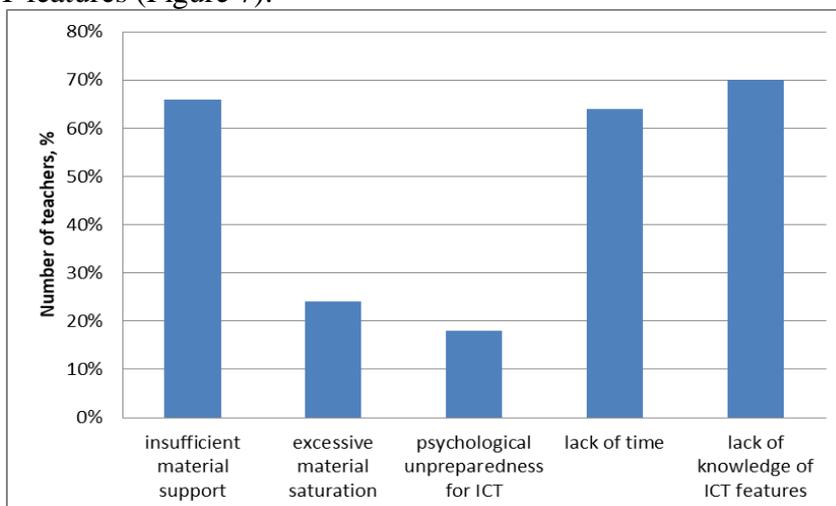

Fig. 7. Reasons for hindering the introduction of ICT in professional activity
Source: own work

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According to the results of the questionnaire, we can conclude that for the implementation of the following work functions: planning and implementation of the educational process; reflection and professional self-development; providing methodical assistance to colleagues in the field of education, development, upbringing and socialization of primary school children; assessing the performance of primary school teachers in general secondary education will be sufficient to have a common use of ICT tools that teachers can grasp on their own. To carry out such work functions as providing and supporting the education, upbringing and development of pupils in the educational environment and the family; creation of educational environment; conducting pedagogical research; summarizing your own teaching experience and presenting it to the teaching community, it is not enough for primary school teachers to have general computer skills, and you need to have information about a set of Internet resources that will be useful for professional and practical use of these resources. Unfortunately, the process of independent acquisition of practical skills to use the Internet resources requires a lot of effort and a lot of time, as the respondents indicated. In this case, the teacher will benefit from training videos, workshops and webinars posted on educational sites.

Conclusions. Effective professional activity of a modern primary school teacher is impossible without the use of ICT. The results of the survey indicate that primary school teachers have basic knowledge, ICT skills, but lack of ability to work with online services to create training and game content. These skills can greatly assist the teacher in the implementation of such work functions as the planning and implementation of the educational environment; providing and supporting the education, upbringing and development of pupils in the educational environment and in the family. Obviously, the readiness of primary school teachers to work with online services needs to be formed at the university, including training courses aimed at introducing ICT into teachers' professional activities. For working teachers, it is advisable to include these issues in the process of professional development and sharing of pedagogical experience of innovative teachers who make extensive use of ICTs while performing professional functions.

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2.9. FORMATION OF COMPETENCES IT-PROFESSIONALS DURING PROJECT STUDY

Formulation of the problem. Today, the problem of the domestic IT market is a shortage of qualified personnel. There is a lack of practitioners who are ready to work in a modern company, the development of which is based on the concept of introducing the latest technologies. The IT-industry brings together diverse professions: Software Design Engineer; Hardware Design Engineer; Test Design Engineer; Program Manager; Project Manager; Business Analyst; IT Manager etc. Employers require IT-professionals not only to have technology-specific skills, but also to have complex knowledge and skills in other related fields, as well as to adapt quickly and quickly to the new situation, to be able to acquire knowledge in the process of work effectively. As a rule, in order to meet the requirements of employers, it is necessary to confirm their qualification with the relevant international certificate documents. In Ukraine, there is a significant development of certification programs in the IT-sphere. Well-known companies are members of the Lviv IT-cluster have opened «SoftServe IT-Academy», «Eleksacademy», «Global Logic Base Camp courses» and other training and certification programs for both practitioners and beginners. An important indicator of professionalism for employers is the presence of international certificates (Cisco, Microsoft, Project Management, Security). Certification of IT-specialists is carried out by international testing centers, in particular, Pearson VUE, Thomson Prometric and others. Having a certificate offers a number of significant benefits:
- for specialist: successful employment; the opportunity to claim a higher level of wages; international recognition of the certificate etc.;
- for the company: quality of services provided; strengthening market position; company development and etc.

Higher education institutions in Ukraine train over 16,000 IT graduates annually. However, there is considerable competition in the job market for skilled IT-professionals. The main problem of today's education is its quality. Training of young technical staff often does not meet the needs of the business, started in real projects they are only three to six months of additional training. In recent years, the technical sciences in Ukraine have not developed as dynamically as the market needs. In particular, graduates have sufficient basic knowledge, developed an analytical approach to solving problems, but they often have to master the methods and methods of using modern technical tools on their own. First of all, young professionals do not have enough practical skills to work on projects, knowledge of modern tools and methods of software development or testing.

Analysis of recent research and publications. The standards of IT-education are based on the findings of international organizations ACM (the Association for Computing Machinery) and IEEE (Institute of Electrical and Electronic Engineers). Application of standards CC2001 in the university education process requires the development and implementation of new educational technologies.

An innovative approach to organizing the educational process of training IT-professionals is project training in the form of startups.

Leading universities and engineering schools implement educational technology through «action learning» (Action Learning), in particular Maastricht University, University of Cologne (Universität zu Köln), Massachusetts Institute of Technology (MIT) and others. The problems of project training are devoted to work K. Frey, M. Braglia, M. Frosolini, S.-K. Lee, J.-H. Yu, M. Caniëls, R. Bakens.

Presenting of main material. The key concepts of the new learning paradigm are competencies and learning outcomes. Learning outcomes are formulated in terms of competencies. The acquisition of competences is gradual, by mastering the disciplines in the process of implementation of the educational program, as well as the peculiarities of the organization of the educational process, motivation of the student for high achievements in the chosen profession.[249]

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[249] Rashkevych Yu. M. The Bologna Process and the New Higher Education Paradigm: A Monograph. – Lviv: Lviv Polytechnic Publishing House, 2014. p. 65.

Competencies are divided into: generic competences and subject specific competences. Subject specific competences determine the profile of the educational program and the qualification of the specialist. In line with the demands of today's job market, general competencies (Soft Skills) are becoming increasingly important in the future role of students in society – as citizens and professionals. These qualities are needed in situations not necessarily related to the professional activity, although their formation should be balanced with the special ones in the course of the educational program.[250]

An innovative training tool that provides training for skilled professionals capable of quickly integrating into manufacturing is startup projects. Creative project work generates skills and abilities to solve real practical problems, the ability to harmoniously combine personal qualities and professional knowledge in the field of IT technologies, responsibility for self-improvement. The method of startup projects contributes to the formation of the whole set of competencies that are needed for future engineers.

This approach gives the opportunity to form important professional competences that reflect the content of engineering education «specialist's ability to integrated engineering activities»: planning, design, creation, application of engineering products, modern processes and systems.

An algorithm for generating general competences in project training in the form of a staple, presented in the Table 1 and in the Figure 1.

Table 1. Formation of general competences in project training

Implementation stages in project training	Competencies, obtained at the relevant stages of the project	Stages results
I. Analysis of problems of a given field of research, needs, formulation of «idea», identification of opportunities and ways of its realization.	1. The ability to analyze and synthesize. 2. Ability to find and analyze information from different sources. 3. The ability to manage information.	Willingness of project members to adapt to different situations.
II. Planning of general principles of startup project implementation, determination of input data for project activity planning.	4. The ability to make informed decisions. 5. The ability to generate new ideas. 6. Project planning and management skills.	Ability to classify information, evaluate its quality and reliability.
III. Team selection. Planning and defining the responsibilities of the startup project members.	7. The ability to work in a team. 8. Responsibility. 9. Leadership qualities of participants.	Willingness to work in real projects.
IY. Predicting the effectiveness of a startup project.	10. The ability to form logical, convincing conclusions.	Research skills and competences.
Y. Social value (identifying financial or information support opportunities).	11. The ability to form logical connections and evidence in communication. 12. Ability to communicate with professionals in other fields.	Identification of managerial qualities of project participants.
YI. MVP (minimum viable product). Development.	13. The ability to apply professional knowledge in practice. 14. Ability to work independently. 15. Ability to plan time. 16. Understanding personal skills and abilities. 17. Responsibility for self-improvement.	Practical skills in the subject area.
YII. Promotion of a startup project.	18. The ability to motivate people and move toward common goals. 19. Ability to resolve conflict situations. 20. The desire to succeed. 21. Ability to resolve conflict situations.	Practical skills in setting up and running an IT-business.
YIII. Project development and support.	22. Understanding the quality of services. 23. Ability to adapt to new situations. 24. Ability to criticize and self-criticize. 25. Interaction between project participants.	Harmonious blend of personal qualities with professional IT-skills.

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[250] Tuning Educational Structures in Europe. – Access mode: http:// www.unideusto.org/tuningeu/
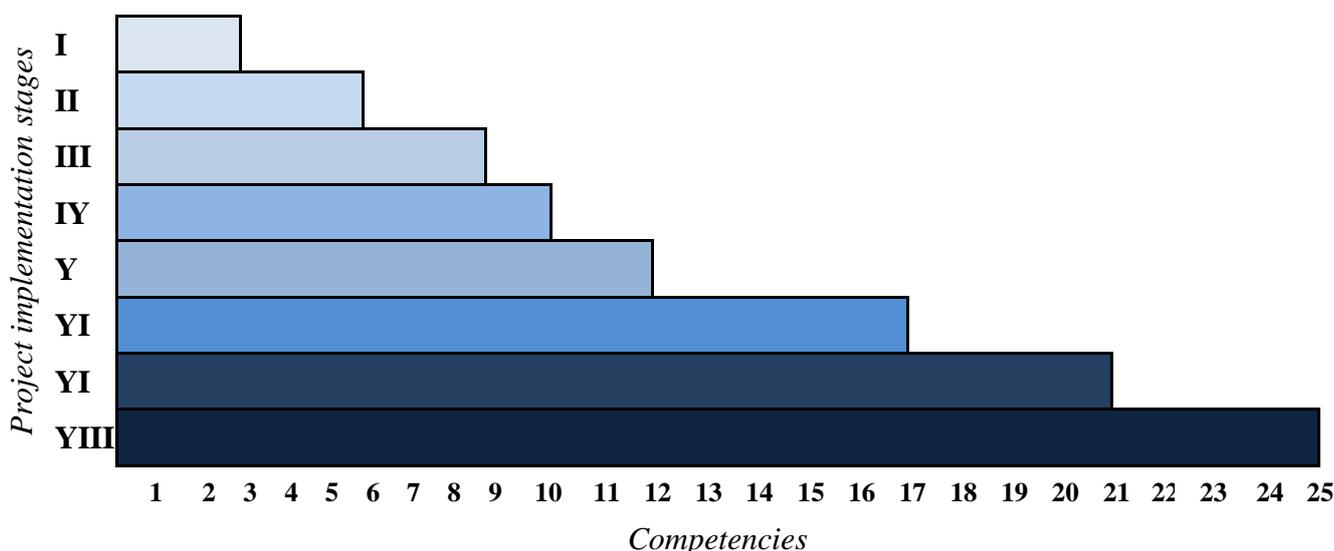
Competencies

Fig.1. Formation of competencies in project training

1 – ability to analyze and synthesize; 2 – ability to find and analyze information from different sources; 3 – the ability to manage information; 4 – ability to make informed decisions; 5 – ability to generate new ideas; 6 – project planning and management skills; 7 – ability to work in a team; 8 – responsibility; 9 – leadership qualities of participants; 10 – ability to form logical, convincing conclusions; 11 – ability to form logical connections and evidence in communication; 12 – ability to communicate with experts in other fields; 13 – ability to apply professional knowledge in practice; 14 – ability to work independently; 15 – ability to plan time; 16 – understanding of personal skills and abilities; 17 – responsibility for self-improvement; 18 – ability to motivate people and move toward common goals; 19 – ability to resolve conflict situations; 20 – the desire to succeed; 21 – ability to resolve conflict situations; 22 – understanding the quality of services; 23 – ability to adapt to new situations; 24 – ability to criticize and self-criticize; 25 – interaction between project participants

In project training in the form of a startup is the integration of mathematical disciplines with computer science, physics, programming, algorithms and data structures, in general, engineering activities. The sequence is fully implemented: «Planning – Designing – Implementing – Product Development – Promotion – Use – Development».

The startup project work uses a team form of work. The students are given sufficient freedom of action when performing the tasks: there is no rigid algorithm of the work, only the stages and timing of the work are set. Responsibility rests with the mentors and student members of the team.

The organization of the process of project work requires the development of appropriate training and methodological support using the tools of the Virtual Learning Environment of Lviv Polytechnic National University (VNS). The mentor teacher creates an educational environment that enables the student to independently acquire the knowledge and skills needed at the moment. The teacher helps to make the most effective use of various educational materials, the Internet, his practical experience, the experience of practitioners. Communication in the course of work on tasks, coordination, interim report on tasks, tracking of problems, it is possible to carry out in real time with use of various modules of VNS. This approach requires the development of appropriate means of assessing the level of competence development. It is advisable to implement the estimation using the Scrum Methodology[251], which is widely used to organize work in leading IT-companies, with the aim of quality control over the process of implementation of tasks.

The Institute of Entrepreneurship and Advanced Technologies of Lviv Polytechnic National University has, in recent years, experienced the implementation of startup project training, in particular, examples of student project training were the contests «Create a Site of the Institute» (the winning work is the official operating site of the Institute), «Create an advertising campaign for the Institute», «Tustan: augmented reality», «Work legally», «Lviv Bicycle Map». Project managers and consultants were both teachers from different departments of the Institute and practitioners.

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[251] Scrum Methodology. – Access mode: http:// scrummethodology.com/.

Conclusions. Improving the quality of engineering education and the competitiveness of IT-professionals requires the active introduction of international educational standards and the latest teaching methods into the educational process. Today, an IT-specialist is required to have the skills and ability to create modern technical products or innovative ideas, to perform complex engineering activities, to conduct business in the IT-sphere.

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Part 3. APPLIED ASPECTS OF SUSTAINABLE DEVELOPMENT

3.1. ENVIRONMENTAL ASPECTS OF SUSTAINABLE DEVELOPMENT

The rapid development of the world economy in the second half of the twentieth century outlined a number of environmental issues globally.

At the UN World Conference on Environment and Development held in Rio de Janeiro in 1992, the term «sustainable development» was formally adopted – a development of a society that meets the needs of today without compromising the ability of future generations to meet their own needs (Кінаш, 2012).

Throughout its existence, humanity has given rise to a number of global environmental crises, including warming, ozone depletion, environmental pollution, desertification, acid rain, and biodiversity degradation.

According to researchers, during its existence, humanity has destroyed two-thirds of the forests. Ecologists say that only in the last 40 years, about half of the wet tropical forests where the planet's genetic biodiversity resources are concentrated have been destroyed on Earth. As noted in UNESCO documents, in the conditions of technogenic pressure of modern civilization, «genetic erosion» occurs – from 150 to 200 species of organisms disappear every year (Садовенко, 2011).

Currently, more than 2,5 billion people suffer from water-related diseases, contaminated or contaminated water. As a result of the development of civilization, the planet becomes a giant garbage dump because nature has no mechanism for the disposal and destruction of waste produced by humans (Садовенко, 2011).

All previous crises have been overcome, to a large extent, by the corresponding revolutionary actions of society, and human influence on nature has remained not as rapid and productive as in the last 50-60 years (UN, 2017).

In the middle of the twentieth century. The crisis in the relationship between society and nature has acquired a qualitatively new character – global, planetary.

The concept of sustainable development includes three main components: economic, social and environmental.

Economic – involves the optimal use of scarce natural resources, the use of environmental, environmental, resource and energy-saving technologies, as well as the corresponding forms of capital (natural and artificial).

Social – is human-centred and aimed at maintaining the stability of social and cultural systems, including the reduction of destructive conflicts between people.

Ecological – preserving the integrity of natural systems (UN 2017).

The immediate causes that led to an increase in anthropogenic impact were the rapid increase in the total population and the increase in the absolute value of consumption of natural resources per inhabitant of the Earth.

Conventionally, all the problems of degradation of the global ecological system are divided into two components:

1. Degradation and changes of the environment as a result of irrational economic development and use of the planet's natural resource potential, scarcity and depletion of natural resources for human development.

2. Environmental degradation as a result of its anthropogenic pollution (Державна стратегія…, 2000).

Limited natural resources are now becoming one of the most acute environmental problems. Solving environmental management tasks requires not only knowledge of the functioning of ecological systems, but also a certain moral education and awareness of the need to restructure social production and consumption. Currently, we live in a society characterized by wasteful use of resources.

For a conscious and qualified management of the economy and environmental management it is necessary:

• identify management objectives;

• develop programmatic achievements;

• create a mechanism for the implementation of tasks (Sustainable development. 2020).

At present, man is already approaching the limit of those possibilities that can be provided with the production properties of the biosphere. Thus, rational nature management is the only way out of the situation.

One of the main tasks of the rational management of natural resources is to develop and apply optimal ways of exploiting natural and artificial ecosystems.

The principle of rational nature management ensures the efficient use of natural resources, taking into account their possible reproduction. At the same time, the exploitation of natural resources is carried out simultaneously with a focus on sustainable development.

Rational nature management has the following features:

• using of natural resources should be accompanied by their restoration (for renewable natural resources);

• integrated use of natural resources;

• reuse of natural resources;

• environmental protection measures;

• introduction of the latest technologies in order to reduce the anthropogenic burden on the environment (FAO, 2002).

The world community is currently living in an era of progressive energy crisis. In the development of the world economy and scientific and technological progress, energy is playing an increasing role. At the same time, the rapidly developing energy economy is complex and multifaceted, and non-renewable sources such as gas and oil products, coal, and shale remain the main types of fuel.

At the same time, as a result of the intensive use of non-renewable energy sources for heating, vehicles, road-building machines, agricultural units and various household devices, a huge amount of carbon, sulfur and nitrogen oxides is formed. All this contributes to an increase in the temperature of the earth and water surface, causes environmental pollution, acid rain, and also stimulates intense melting of ice, raising the level of the oceans, flooding vast territories of land, the emergence of cyclones and hurricanes, spanning entire continents. These phenomena lead to large-scale destruction of agricultural land, the disappearance of forests and wildlife, increased reproduction of harmful insects, an increase in the frequency of droughts, forest fires, torrential rains, floods, etc.

With the development of industry – the main consumer of the energy industry, mankind begins to use all new types of resources, the so-called «non-traditional» energy sources, which include – solar and geothermal energy, tidal hydropower, wind and other non-traditional sources. In recent decades, valuable renewable energy sources include biohumus, which consists of bird droppings, animal manure, human waste and decaying vegetation (Sustainable development. 2020).

The use of these energy sources is caused by the need for significant financial costs for the exploration of new deposits, as often these works are associated with the organization of deep drilling (in particular, in offshore conditions) and other complex and high-tech technologies. As well as environmental issues associated with the extraction of energy resources (Sustainable development. 2020).

Therefore, the development of alternative solutions for energy use based on non-traditional approaches, as well as using renewable sources, is relevant.

The general objective of rational management of natural resources is to determine the appropriate directions for the use of natural resources depending on their properties, finding the best or best ways to exploit natural and artificial (for example, in agriculture) ecosystems.

Principles (rules) of environmental management and nature conservation.

Environmental management and conservation should be based on the following principles:

Forecasting rule: the use and protection of natural resources should be based on foresight and the maximum possible prevention of the negative consequences of environmental management.

The rule of increasing the intensity of natural resource development: the use of natural resources should be based on increasing the intensity of natural resource development, in particular, with the reduction or elimination of mineral losses during their extraction, enrichment and processing, transportation.

The rule of plural significance of objects and natural phenomena: the use and protection of natural resources should be carried out taking into account the interests of different sectors of the economy.

Complexity rule: the use of natural resources should be carried out in a complex, by various sectors of the national economy;

The rule of regionality: the use and protection of natural resources should be subject to local conditions.

The rule of indirect use and protection: the use or protection of one object of nature may lead to the indirect protection of another, and may harm it.

The rule of unity of use and nature conservation (basic principle): nature protection should be carried out in the process of its use (FAO, 2002).

A study of the processes taking place in the biosphere and the influence of human economic activity on them shows that only the creation of environmentally friendly and low-waste industries can prevent the depletion of natural resources and the degradation of the environment. The economic activity of people should be based on the principle of natural ecosystems that economically consume matter and energy and in which the waste of some organisms serves as a habitat for others, i.e. a closed circuit is carried out (Sustainable development. 2020).

An important place in the process of rational nature management is occupied by the issues of organizing environmental monitoring and ecological expertise of the environment, the natural resource potential of the territory in order to preserve biological and landscape diversity.

The most universal is integrated environmental monitoring of the environment.

Integrated environmental monitoring of the environment is the organization of a system for monitoring the state of environmental objects to assess their actual level of pollution and warn about emerging critical situations that are harmful to human health and other living organisms.

When conducting integrated environmental monitoring of the environment:

• a constant assessment of the environmental conditions of the human environment and biological objects (plants, animals, microorganisms, etc.) is carried out, as well as an assessment of the state and functional integrity of ecosystems;

• conditions are created for determining corrective actions in those cases when target indicators of environmental conditions are not achieved (Sustainable development. 2020).

The system of integrated environmental monitoring provides for: allocation of the object of observation; examination of the selected object of observation; drawing up an information model for the object of observation; measurement planning; assessment of the state of the object of observation and identification of its information model; forecasting changes in the state of the object of observation; presentation of information in a convenient form for use and bringing it to the consumer.

Environmental monitoring has arisen at the intersection of ecology, biology, geography, geophysics, geology and other sciences. There are various types of monitoring, depending on the criteria: bioecological (sanitary-hygienic), geoecological (natural-economic), biosphere (global), space, geophysical, climatic, biological, public health, social, etc.

Depending on the severity of anthropogenic impact, monitoring is distinguished between impact and background monitoring. Background (basic) monitoring – tracking of natural phenomena and processes taking place in a natural environment, without anthropogenic impact. It is carried out on the basis of biosphere reserves. Impact monitoring – tracking anthropogenic impacts in especially dangerous zones (FAO, 2002).

Depending on the scale of observation, monitoring is distinguished between global, regional and local.

Environmental monitoring points are located in large settlements, industrial and agricultural areas (cities, highways, territories of industrial and energy centres, nuclear power plants, oil fields, agricultural ecosystems with intensive use of pesticides and fertilizers, etc.).

Local monitoring (sanitary-hygienic, bioecological, impact) - the most important is monitoring the concentration of pollutants hazardous to natural ecosystems and humans in life-supporting environments:

• in atmospheric air: carbon oxides, nitrogen, sulfur dioxide, ozone, dust, aerosols, heavy metals, radionuclides, pesticides, benzo (a) pyrene, nitrogen, phosphorus, hydrocarbons;

• in surface waters: radionuclides, heavy metals, pesticides, benzo (a) pyrene, pH, mineralization, nitrogen, petroleum products, phenols, phosphorus;

• in soil: heavy metals, pesticides, radionuclides, petroleum products, benzo (a) pyrene, nitrogen, phosphorus;

• in biota: heavy metals, radionuclides, pesticides, benzo (a) pyrene, nitrogen, phosphorus (FAO, 2002)..

Regional monitoring (geosystem, natural and economic) – observations are made on the state of ecosystems of large natural and territorial complexes (river basins, forest ecosystems, agroecosystems, etc.), differences in their parameters from background territories are recorded due to anthropogenic impacts.

Global monitoring (biosphere, background) – changes in the biosphere as a whole are tracked. The objects of global monitoring are the atmosphere, hydrosphere, soil cover, flora and fauna, and the biosphere as a whole as the living environment of all mankind.

A special role in the environmental monitoring system is played by biological monitoring, that is, monitoring the biotic component of ecosystems (biota). Biological monitoring is the control of the state of the environment with the help of living organisms. The main method of biological monitoring is bioindication, which consists in recording any changes in biota caused by anthropogenic factors. The bioindication is the detection and determination of biologically and environmentally significant anthropogenic pressures based on the reaction of living organisms and their communities to them. Living organisms, by the presence, condition and behaviour of which can be judged on a change in the environment, are called bioindicators (Sustainable development. 2020).

Environmental monitoring allows you to quantify all of the negative processes in nature that cause human activity. It also allows you to see the positive results of environmental measures.

Ecological expertise – establishing compliance of the planned economic and other activities with environmental quality standards and environmental requirements, as well as determining the feasibility of the implementation of the object of environmental expertise in order to prevent possible adverse environmental impacts of this activity and related social consequences.

In Ukraine, the state environmental review and public environmental review are carried out in order to determine and limit the possible negative consequences of the implementation of the planned management, economic, investment, legislative and other activities on the environment and public health; maintaining a balance of interests of economic development and environmental protection, as well as preventing damage to third parties in the process of environmental management.

State ecological expertise is carried out by the authorized body in the field of environmental protection and local executive bodies within their competence. State environmental review is mandatory and must precede the adoption of legal, organizational and economic decisions regarding environmental management and environmental and public health impacts. Without a positive conclusion from the state environmental review, the implementation of the project is prohibited.

In recent decades, the problem of preserving biological diversity has been formulated, i.e. conservation of the entire set of biological species and their habitats existing on earth.

When using the concept of biological diversity, it must be understood that biological diversity is not equivalent to ecological well-being. First, in some cases, the formed stable ecosystems are monodominant and their destruction (for example, deforestation) leads to a change in the biogenesis and an increase in biological diversity. Environmental pollution can also lead to increased biodiversity, which is also associated with increased opportunities for interspecific competition.

Despite all the measures taken, the absolute amount of renewable natural resources – forests, arable land, suitable for drinking water reservoirs is decreasing from year to year. This suggests that they are not effective enough, and the declared tasks most often pursue political goals.

The environmental situation in Ukraine, despite the implementation of a number of environmental measures, remains extremely difficult. This situation is due to the voluntarist approach to the placement and expansion of industrial capacity without taking into account the environmental capabilities of the regions, which led to a very large man-made load on the environment, led to the violation of ecological balance, a significant change in habitat, increasing the incidence of flooding. Powerful giants of metallurgy, energy, chemistry, mining and coal industry, machine building and others are concentrated in Ukraine. For decades, no attention has been paid to improving the technical level and environmental safety of production. Fixed assets in the metallurgical and chemical industries are worn out by 60-70%, resulting in frequent accidents leading to accidental emissions and discharges of harmful substances into the environment. Financing and logistical support for the construction of nature protection objects and structures has been and continues to be carried out on a residual basis (Аналітичний звіт…, 2019).

Significant contribution to the pollutant emissions into the air is made by mobile sources: road, rail, sea, river and aviation, as well as agricultural and construction machinery, which is currently operated by more than 6 million units, according to the State Statistics Committee of Ukraine.

Monitoring of atmospheric air pollution is carried out at 171 stationary posts, which determine the content of 36 major pollutants (dust, sulfur dioxide, carbon monoxide, nitrogen dioxide and others). The largest contributors to air pollution are emissions from energy companies (over 30%), metallurgy (25%), coal (23%), chemical and petrochemical industries. And given that a number of thermal power plant have a pipe height of more than 300 m, these emissions from transboundary movements are also detrimental to many neighbor countries (Аналітичний звіт…, 2019).

As stated in the Law of Ukraine «On the Fundamental Principles (Strategy) of the State Environmental Policy of Ukraine for the Period up to 2030», air pollution is one of the most pressing environmental problems. Today, the level of air pollution in large cities and industrial regions is high despite the decline in production in Ukraine (Закон України…, 2019).

According to the World Health Organization, air pollution is a major environmental risk factor. The lower the levels of air pollution, the less cardiovascular and respiratory diseases in the long and short term (ВООЗ, 2018).

One of the forms of nature conservation, which is extremely important, are protected areas. The forms of protected areas in the world are very diverse: reserves, nature reserves, natural monuments, national and natural parks, botanical gardens, biosphere reserves. Protected areas currently account for about 1.6-2.0% of the world's land (FAO, 2002).

Reserves are the most perfect form of full protection, since they usually include an integral site, a natural complex and stop any economic use of natural resources. The protection of unique nature objects can be decided by the organization of a system of territories with a sparing regime of economic activity – reserves. One of the categories of protected natural habitats can also be considered natural (national) parks, the main task of which is recreational services for the population.

In Ukraine, there is a significant lag in the development of the system of territories and objects of the nature reserve fund (6.6% of the state area), compared with European countries (21.8%) (Уряд України…, 2020).

Currently, there are 19 nature reserves in Ukraine. 4 of them are in the zone of mixed forests (Polessky, Rovnensky, Drevlyansky, Cheremsky), in the forest-steppe zone – 3 (Rastochye, Medobory, Kanevsky), in the steppe zone – 7 (Dnieper-Orelsky, Kazantipsky, Lugansky, Opuksky, Ukrainian steppe, Elanets steppe, Mikhailovskaya virgin land), in the Carpathians – 1 (Gorgan), in the Crimean mountains – 4 (Karadag, Crimean, Cape Martyan, Yalta). As of 01.01.2020, there are 4 biosphere reserves in Ukraine – «Askania Nova named after FE Falz-Fein», «Chornomorsky», «Carpathian», «Danube» and «Chornobyl Radiation Biosphere Reserve» (Природно-заповідний фонд). Currently, Ukraine has 52 national natural parks (Уряд України…, 2020).

In June 1992, the Convention on Biological Diversity, ratified by more than 100 countries of the world, was signed at the Higher Earth Forum in Rio de Janeiro. The main objective of the Convention is the conservation of biological diversity and the sustainable use of its elements. The International Conference on Biosphere Reserves (Seville, 1995) developed the Seville Development Strategy and the role of biosphere reserves in the 21st century. Proposals for the creation of biosphere reserves are put forward by national governments (Декларація…, 2002).

Biosphere reserves should fulfil three complementary functions: a conservation function for the conservation of genetic resources, species, ecosystems and landscapes; a development function to promote sustainable economic and human development; logistical support function to support and encourage research, education, training and monitoring activities in connection with local, national and global activities undertaken to protect nature and sustainable development.

Each biosphere reserve should include a strictly protected zone, a buffer zone and a flexible transition zone where some types of agricultural activity can be carried out, settlements can be located or which can be used for other purposes and within which local administrative and scientific institutions, non-governmental organizations, cultural Societies, business circles and other partners work together for the sustainable development and rational use of the resources of this territory (Biosphere reserves…, 2000).

Biosphere reserves play an important new conservation role. They are not only a means of allowing the people living in these areas to develop in equilibrium with the natural environment, but also contribute to meeting the needs of society as a whole, showing the way to more sustainable future development.

Based on the environmental principles of sustainable development of Ukraine include a number of provisions, namely:

1. Formation of legislative and institutional framework for balanced development. The transition to balanced development is a new political challenge, not only for Ukraine but for other countries in the world.

2. Structural adjustment and greening of the economy. But, while maintaining the existing structure of the economy, it is impossible to achieve its real development, because every unit of GDP growth requires even greater expenditure of natural resources, even more pollution of the environment. Therefore, it is necessary to develop programs of structural restructuring and greening of the economy according to the innovation model, which envisages a significant increase in the share of technologically high production and the share of high-tech products in the economy, a significant expansion of the number of enterprises introducing innovations.

3. Conservation of biological and landscape diversity. Natural areas are at risk of theft. Conservation of biological and landscape diversity should be a national priority.

4. Addressing regional environmental problems in the context of the transition to balanced development and the realization that a geographical or spatial factor has a significant impact on development effectiveness (Садовенко, 2011).

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3.2. SUSTAINABLE DESIGN. INNOVATIVE GREEN BUILDING MATERIALS

Introduction. At the present stage of society's development, the goal of international humanitarian action and one of its socio-economic objectives is to ensure a "Sustainable Development of the Architectural Environment". It is currently one of the European Union's regulatory requirements. The need to ensure an ecological balance between meeting the modern needs of mankind and protecting the interests of future generations, including their need for a safe and healthy environment, defines current global construction trends, which indicate that the most promising direction is the development of urban environment based on energy-saving technologies, as well as environmentally friendly building materials.

In 2006, the Council of Europe adopted the renewed strategy of the sustainable development. The strategy mentions three aspects of the sustainable development, i.e., the economic growth, the social integration, and the natural environment protection. The construction industry is the biggest sector of the economy as regards management and in terms of raw materials flow. Most capital, both the financial and the natural, is invested in building structures. The construction industry and architecture, the disciplines engaged in a space forming, play a substantive role in the creation of the sustainable development. LEED (Leadership in Energy and Environmental Design) and BREEAM (Building Research Establishment Environmental Assessment Method) assessment methods for the architectural facilities in the aspect of sustainable development count among the most dynamically developing methods that have gained the worldwide recognition. The Green Building certification program achieved the European rank. The facilities designed in accordance with codified standards in the above-mentioned methods are also being designed and constructed in Poland. The programs based on LEED and BREEAM methods and also on the Green Building certification method and procedures worked out by the European Committee, certify the buildings and enjoy ever increasing high prestige among the users, investors, developers, and designers. One should also emphasize importance of defined parameters of the "passive house" (Feist W.: Passive House in Central Europe, 1993) in the attempts undertaken to design and develop structures.[252]

Leadership in Energy and Environmental Design is a set of rating systems for the design, construction, operation, and maintenance of green buildings which was developed by the U.S. Green Building Council. Another certificate system that confirms the sustainability of buildings is the British Building Research Establishment Environmental Assessment Method for buildings and large-scale developments. Currently, World Green Building Council is conducting research on the effects of green buildings on the health and productivity of their users and is working with World Bank to promote Green Buildings in Emerging Markets through EDGE (Excellence in Design for Greater Efficiencies) Market Transformation Program and certification.[253]

Main part. Green building(also known as green construction or sustainable building) refers to both a structure and the application of processes that are environmentally responsible and resource-efficient throughout a building's life-cycle: from planning to design, construction, operation, maintenance, renovation, and demolition.[254]

It is well known that green building is based on two basic principles. First, at all stages of project implementation the negative environmental impact should be minimal. Second, maximum comfort and safety should be created for those who work or reside in the building. These aspects are the focus of the certification systems mentioned above. "Green" building as a trend is becoming increasingly popular. More and more green projects of various functional buildings are being implemented every day.

In addition to environmental problems it is also important to solve the problem of energy conservation (Fig. 1). To solve these issues, it is necessary to analyze carefully building materials and choose those that will contribute to the efficient use of energy, greater comfort and lower costs

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[252] Kamionka L., Sustainable architecture in urban environment in 21 centre, Problems of urban environment development", 1 (11). Kyiv 2014, pp. 28-54.

[253] EDGE Buildings, Build and Brand Green", http: //www.edgebuildings.com.

[254]"Green Building – US EPA", http: //www.epa.gov.

taking into account the life cycle of the materials, which includes its production, use and disposal (recycling).

Fig. 1. First Smart ForestCity in Mexico will be 100% food and energy self-sufficient.
Source: https://www.realestatemarket.
com.mx/images/2019/10-Octubre/2810/boeri-01_2.jpg

Building materials' creation (taking into account all the technical advantages that the scientific base of modern materials science gives) must consider the economic, environmental, social and ergonomic aspects in the life activity of mankind and production, including: ensuring the minimum energy costs at all stages of production and use; possibility of material renovation, maximum re-use of material (recycling), preservation of environment. In this regard, a new term has emerged – "Eco-friendly materials". It is applied to materials and structures that promote a healthy lifestyle and the conservation of natural resources.

In building, *environmentally-friendly materials (also known as green building materials)* are those in which, for their production, placing and maintenance, actions of low environmental impact have been performed. They have to be durable, reusable, include recyclable materials in their composition and have to be from resources of the area where the building activity will take place – they have to be local materials. These materials also have to be natural (soil, adobe, wood, cork, bamboo, straw, sawdust, etc.) and must not be spoilt by cold, heat or humidity. [255]

The idea behind sustainable architecture is to build in a way that reduces harmful impact on the environment. The leading components of a sustainable building architecture are the application of sustainable building materialssuch as organic compounds or recycled materials and the use of environmentally friendly methods of waste management. The key role is played here *innovative materials*, including traditional ("old-new") building materials made on the basis of modern technologies. There are different views and opinions in the modern scientific literature regarding the typology of modern innovative building materials. The most complete classification of innovative materials is presented in the book "Smart Materials in Architecture, Interior Architecture and Design". [256] Its author, Axel Ritter, offers the following vision:

- RECYCLABLE MATERIALS – these materials are manufactured mainly from crushed and cleaned waste. Unless the raw material is sorted in advance to separate out the valuable fractions, the resulting products are usually of lower quality than the originally used materials;

- BIODEGRADABLE MATERIALS – materials, e.g. from vegetable starches, that are decomposed and completely broken down by microorganisms living in the soil;

- BIOMATERIALS – plastics and other materials made from renewable sources. One current research focus, for example, is the use of special CO_2 consuming bacteria in the production of biodegradable plastics;

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[255] https://www.active sustainability.com/construction-and-urban-development/sustainable-building-materials.
[256] Ritter A., Smart Materials in Architecture, Interior Architecture and Design, Birkhauser – Publishers for architecture, Basel-Boston-Berlin, 2007.

- NONVARIABLE MATERIALS – these materials are largely unaffected by physical and chemical influence, e.g. changes in ambient temperatures. One such material is the metal alloy invar;

- FUNCTIONAL SUBSTANCES – a general term for monofunctional and multifunctional substances;

- SMART MATERIALS – belong to the functional substances. These materials, substances and products have changeable properties and are able to reversibly change their shape or colour in response to physical and/or chemical influences, e.g. light, temperature or the application of electrical field. They can be differentiated into non-smart, semi-smart materials and smart materials.

- HYBRID MATERIALS – these materials are manufactured by combining at least two different components, e.g. biological with synthetic components.

- FUNCTIONALLY GRADIENT MATERIALS – composite materials with gradually merging layers. This results in a continues change in material properties.

- NANOMATERIALS – materials made from nanometer-scale substances. They can be used as coating or in product manufacture, for example.

Along with this and well-known environmental materials the purpose of this research is an attempt to identify and analyzesuch innovative materials and products as: reusable materials; traditional natural and local building materials that due to technical progress have gained new prospects for use in modern environmental and energy-efficient structures and buildings ("old-new" natural materials); nanomaterials.

Recycled materials. The reuse of building materials and industrial waste is currently under development. With the improvement of processing technologies for various types of materials suitable for re-production and waste there is an intensive expansion and use of them in world practice. The use of industrial waste is particular relevance in conditions with limited sources of supply of material and financial resources.

In the recent past, construction sites that had to be demolished were destroyed in such a way - they were blown up, and then the landed mass was taken out. As a result, there were huge blockages of concrete, metal, glass, which was not easy to disassemble. Nowadays, municipal landfills are filled by 90%. It becomes expensive to take out construction debris anywhere. From an economic point of view, this is not as rational as it can be recycled, saving huge amounts of money in the state budget and in the coffers of many cities, as well as avoiding environmental pollution. Recycling of construction waste will in the near future be an essential requirement when dismantling any building structure. It is through the recycling of construction debris that the second "life" is found in many materials – this is wood, and the roots of uprooted trees, concrete scrap, plastic, glass, old tires, as well as brick fighting, and many other materials. The amount of construction waste is increased by 2.5 billion tons every year in the modern world. This has a very detrimental effect on the ecology of the entire Earth. This is the conclusion reached by experts from the European Association, which includes demolition companies. Recycling allows to reuse construction waste without harming the environment. Throughout the world, recycling of construction waste is a very profitable industry. The volume of construction waste is increasing every year and, according to the participants of this promising market, the main problem is not transportation, but recycling and, importantly, ecological disposal of construction waste. Due to improvements in technology and legislation, countries such as Denmark, Netherlands, Sweden, where more than 90% of waste is currently being recycled, have been able to reach a very high level of construction waste recycling.[257]

Thus, construction based on recycled materials can be an effective means of saving money and protecting the environment. Against this background, let's show some interesting examples of the use and disposal of various building materials in the modern construction industry (Fig. 2-5).

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[257] https://bio.ukr.bio/ua/articles/2467.
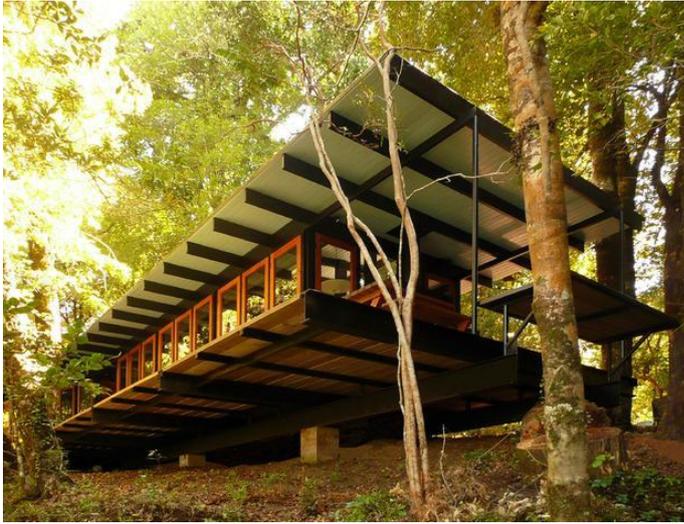
Fig. 2.
This modern lakeside cottage (Recycled Materials Cottage – Panguipulli, Chile) is built from pieces taken from other homes and buildings. Architect Juan Luis Martínez Nahuelsalvaged the glazed doors from the patio of a house from the 1960s and parquet flooring from a 1970s house for the cottage's exterior. Laminated and steel beams for the frame of the house had previously been used in a temporary exhibition.
PHOTO COURTESY OF JUAN LUIS MARTÍNEZ NAHUEL
Source: https://www.cbsnews.com/media/8-homes-made-from-recycled-materials/

Fig. 3.
Hanil Visitors Center & Guest House, Nicholas Locke, Maepo, KR. The entiregoal of this project is as a built example of waysto recycle and reuse concrete, one of the world's most common building materials. The facade ismade with both gabion walls, as well as concretecast with fabric.
Source: http://www.builtconstructions.in/OnlineMagazine/GlobalPageImages/T-GM-Fig3-March2015.jpg

Fig. 4.
Approximately 20,000 lineal metres of 4"x 2" house frame timbers were used for the City of Melbourne CH2 Project. Approximately 270,000 old and rusty nails were removed by hand.
Source: https://renew.org.au/sanctuary-magazine/in-focus/recycled-timber-material-that-tells-a-story/

"Old-new" natural materials. In recent years, an ecological trend is developing in construction, which aims to use natural materials. These materials can be of both plant and animal origin. This eco-building model does not require high-energy expenditure for production and contributes to the development of energy-saving investments that meet current technical requirements.

These types of products are perceived as healthy and cheap, in many cases locally available. In addition, the above material solutions can have a significant impact in modern construction due to the increase in prices of traditional construction products and due to energy savings during construction and when using the investment. Building materials of natural origin can be used as materials for thermal insulation, e.g. straw, sheep's wool or cellulose, and can be used as construction or finishing materials, such as plywood, wood fiber materials with external gypsum or wooden board or clay plaster with straw.

Fig. 5.
EcoARK recycled plastic bottle building in Taipei.
Plastic bottle architecture is fantastic at turning a problem into an eco-friendly opportunity. The amazing EcoARK in Taipei, Taiwan is one such example. Built from 1.5 million recycled plastic bottles, this massive pavilion is surprisingly strong enough to withstand the forces of nature— including fires and earthquakes
Source: https://inhabitat.com/amazing-plastic-bottle-architecture-withstands-earthquakes-in-taipei/ecoark-recycled-plastic-bottle-building-in-taipei-7/

In construction, especially housing, the "ecological" trend has been increasingly visible in recent years, where materials of natural origin – both vegetable and animal - find use in the building. This type of solutions is perceived as economical, energy-saving and healthy. This type of construction requires smaller ones' energy expenditure on production compared to traditional. The advantage of the above solutions is the use of locally available materials, if possible. Great attention is paid that these materials do not contain toxic substances and harmful to humans. What's more, they can be recycled. This is due to the low energy input that must be used to process the material. They also give in faster and natural biodegradation.[258]

Examples of materials of natural origin are: dried and compacted earth, wood, plywood, wood or hemp fiber insulation boards, straw, sheep's wool, cellulose,bamboo, chipboard with an external gypsum board or wooden etc. (Fig. 6-8).

Fig. 6. Eco Houses with walls made of rammed earth
Source: https://inhabitat.com/11-green-building-materials-that-are-way-better-than-concrete/

Fig. 7.
House of clay and straw in the village Przełomka (Podlaskie, Poland)
Source:
http://www.galeriawiejska.pl/wp-content/uploads/2015/01/PICT0013.jpg

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[258] Dachowski, R., Kamionka, L. W. & Gałek, K., Unconventional buildings materials in biplot context, Scientific Review Engineering and Environmental Sciences, 28 (2), 2019, pp. 268-277.

Fig. 8.
The modern architectural solution of building with the use of bamboo as a load-bearing structures
Source:
https://www.lifegate.com/people/lifestyle/bamboo-construction

Nanomaterials. An analysis of current trends in the introduction of new building technologies and materials in economically developed countries of the world suggests that the basis for the dynamic implementation in practice for the next 10-20 years will be materials and technologies obtained on the basis of achievements and developments in the field of nanotechnology.[259]

Progressive building materials and technologies can ensure not only the durability of buildings and structures that are operated in difficult conditions, but also the consumption of a minimum amount of energy with little impact on the environment. Currently, special attention is paid to the possibility of creating durable building materials that will be safe for human health and the environment.

An important role in solving these problems is assigned to nanomaterials and nanotechnologies, the use of which will not only improve the quality and properties of materials, but also create completely new materials with a set of properties (Fig. 9, 10).

Nanomaterials are materials created using nanoparticles and through nanotechnology, which have unique properties due to the manifestation of synergistic effects that occur when these particles are introduced into the material. A nanoparticle is an isolated solid-phase object that has a clearly defined boundary with the environment, the dimensions of which in three dimensions are from 1 to 100 nm. The definition given by the German Federal Ministry of Education and Research (BMBF) summarizes nanotechnology as follows: "Nanotechnology refers to the creation, investigation and application of structures, molecular materials, internal interfaces or surfaces with at least one critical dimension or with manufacturing tolerances of (typically) less than 100 nanometers. The decisive factor is that the very nanoscale of the systemcomponents results in new functionalities and properties for improving products or developing new products and applications."

Today in the world with the help of nanotechnology on an industrial scale, cement, ceramics, metal alloys, plastics, paints and other materials with unique properties are produced. Nanomaterials are usedto improve thermal properties, increase the efficiency of energy transfer, lighting, heating.[260] The use of nanomaterials in construction is important not only to improve the properties of materials, but also from the point of view of solving the problems of energy conservation and ecology.

The work of scientists in the field of nanotechnology in construction was reflected in the production of materials such as high-strength concrete, high-strength steel, structural composites, nanocoatings, innovative films, nanocomposite pipes, fiberglass composite reinforcement. Energy-efficient mineral-based heat-insulating materials with low thermal conductivity, sorption humidity and increased noise absorption, nanoscale organic-mineral modifiers for road concrete are being developed; nanometric metal-mineral biocidal additives for paints and varnishes, mortars and concrete, working in conditions of biological aggression; high-strength concrete with a low average density; nanometric compensators of internal stresses, etc.

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[259] Leydecker S., Nano Materials in Architecture, Interior Architecture and Design, Birkhauser, Basel-Boston-Berlin, 2008.
[260] Ibid.

Fig. 10. Latent heat storing glass, phase change material (PCM), GLASSXcrystal. Zurich,
Switzerland.
Source: https://i.pinimg.com/originals/db/08/42/db08426b9ec18d06b39bbe3fad829920.jpg

The use of nanomaterials in construction: allows the use of new architectural solutions; reduces construction costs and the pace of construction of buildings; improves the quality of structures and its operational characteristics; contributes to the preservation of the environment; ensures compliance with safety standards and requirements; allows designers to adapt buildings to biologically similar forms, creating a model of architecture that fully interacts with the climatic, chemical, kinetic and social aspects of life, reducing the ecological footprint of modern society in an urban environment.

Conclusions. The need to ensure an ecological balance between meeting the modern needs of mankind and protecting the interests of future generations, including their need for a safe and healthy environment, defines current global construction trends, which indicate that the most promising direction is the development of urban environment based on energy-saving technologies, as well as environmentally friendly buildings and materials.

In the context of the prospects for the development of environmental approach and sustainable design, a key role belongs to the use of environmentally friendly and innovative building materials. Along with well-known environmental materials, recently developed such as: recycled (reusable materials); traditional natural and local building materials that due to technical progress have gained new prospects for use in modern environmental and energy-efficient structures and buildings ("old-new" natural materials); nanomaterials, application features, examples and advantages of which are summarized and considered in this article.Such review will help to create a holistic view of the creation environmentally-friendly environment, sustainable design and will allow to systematize existing knowledge and concepts, practices and prospects of the means and methods of its formation and development**.**

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3.3. ENHANCING INTERDISCIPLINARY CONNECTIONS BY APPROACHING THE ARTISTIC POTENTIAL

Education is the foundation of a society; it offers ascension and performance in all social spheres of civilization.

The genesis of mankind is based on education. Questions like *How to teach? What to teach? How to learn? What to learn?* have been popular since the emergence of humanity. The modern world directly faces these questions and their solutions, more acutely than ever. Political, social, economic and cultural "mutations" directly influence the education system, asking for major changes. Thus, the educational system is committed to advancing the educational ideal, to anticipating certain politico-economic or socio-cultural situations, to overcoming the traditional and to imposing new forms of development and achievement of quality goals.

If, in antiquity, the educational ideal was a limited one, aimed first and furthermost at the physical and military development of the trainee, and only later at the development of a harmonious personality on the aesthetic and moral level, in the Middle Ages the ideal raises to 7 subjects and 7 virtues: grammar, rhetoric, arithmetic, dialectics, geometry, astronomy and music. During Renaissance, on the other hand, the ideal to grow a universal man, who was required to learn everything, which was practically impossible to achieve.

The modern era brings with it some ideal variants, but education focuses on the complex and harmonious development of the human personality. It oscillates between forming a limited and unilateral personality, which has the role to perform detailed functions and another multilaterally developed complex personality which has divers equalities, creativity and can easily adapt to changes.

The contemporary era goes on to form a man with good skills, a wise, balanced, active and resourceful man. Jean Jacques Rousseau promoted –as an educational ideal – the idea of learning the craft of living, of training a healthy man, with a solid culture, a job and dignified moral qualities; Simion Bărnuşiu claimed the formation of a fully developed, harmonious man was the educational ideal, while I.H. Radulescu argued that "education should meet the material and spiritual needs of man through science, crafts and others."[261]

The educational ideal is the foundation of pedagogy, it implies a certain concept and clear ideas that designate the purpose of the educational process, having as general features:

- objective character – in accordance with the socio-economic development and the tendencies of humanity development;
- subjective, psychological character – in accordance with human interests, motivations and demands;
- pedagogical character – the agreement with the real possibilities of the educational theory and process towards the achievement of the human personality;
- dynamic character – changes its model and meanings due to the historical development and ontogenetic evolution of man;
- relatively continuing and permanent character – with sequenced development, that is, the information accumulated in evolution is maintained for a certain period, depending on the conditions of the respective historical stage.

Today, due to advanced changes and transformations in society, in the era of constantly developing technologies, in order to maintain the ideal and to reach successful educational goals, education and the educational system in general are heading towards a continuous modernization, development and rediscovery.

If previously education was realized segmentally, on each discipline separately, today, when new concepts, sciences or disciplines appear on a regular basis, there is no room for the traditional ones. Each of these disciplines carries valuable content that is indispensable to the new generation. Traditional education is outdated and is no longer as captivating as it used to because it distributes

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[261] Bontaş Ioan, Pedagogie – tratat, Ediţia a 5-a, Bucureşti: Edutura Bic All, 2001, p. 70.

the information into particular fields and because the younger generations are attracted to everything that is dynamic, spontaneous, transformed, or in the form of a combined experiment. Thus, in order not to omit something that is necessary for the growth and the formation of a successful personality and so as the pyramid of human values does not reverse or bear negative consequences, an alternative has been put forward. Namely, the educational system brings in new, current, captivating and efficient methods adapted to the needs of learners, ready to conceive a complex model of development of the personality, to bring up an integral, multidimensional, harmonious person, which offers the possibility of a wide range of intellectual, moral, professional, aesthetic and physical qualities, adapting to changes, mutations and creativity – required by contemporary social, scientific-technical, cultural and ethical progress.[262]

Current theories denote the fact that there is no man with no virtues, talents or vocation and that anyone can learn anything, if the right method is found. In order to realize a modern educational process – that has an impact and maximum development efficiency – an optimal solution would be to combine and correlate the study disciplines, in order to keep and enhance the contents. One condition would be that the teaching-learning process is an interesting and interdisciplinary one, going smoothly from one content to another. The correlation of knowledge from several subjects contributes substantially to the realization of a quality education and to the formation of a flexible way of thinking and the ability to apply knowledge in practice. Moreover, knowledge is better classified and fixed, and the related disciplines help each other to be more easily learned and perceived and to find practical utility. The connection between these disciplines is an unlimited one.

Due to the reshaping of the methods the teaching-learning process is viewed as a modern way of achieving the efficiency of the lessons. The correlation or interdisciplinarity that represents the educational novelty captivates the students, stimulates their activity and creativity, and the pedagogues, in order to achieve the proposed objectives must appeal to their creative capacity and to process the contents, methods, means, organization of the training, focusing on the development of competences and applicability, but not on the acquisition of knowledge directly.

Interdisciplinarity establishes links between several subjects, and the effectiveness of using interactive methods in the teaching-learning process has long been demonstrated. Of huge importance is the use of such methods as: problem solving, role-play, demonstration, debate, heuristic conversation, and activities involving team and pair work.

Interdisciplinariy contributes to the formation of a continuous training and adaptation process. It offers several advantages for achieving ideals, including:
- it offers the possibility to apply knowledge in several areas;
- it offers the opportunity to correlate the languages of the disciplines;
- previously accumulated information about certain phenomena, processes or objects, can be subsequently extended to other disciplines or to the following school years;
- it is easier to penetrate the content by invoking other disciplines;
- it allows to establish a ratio between the amount of knowledge accumulated and the volume that is required to be studied.

Interdisciplinarity implies using mainly discovery learning guided by the teacher. The teacher is the one who selects the necessary situations. He is the one who encourages the student to discover the appropriate principles and helps him to engage in heuristic dialogue and activity. It is the teacher who provides support for the activities and asks for correlation. Perception tends towards good form, the pedagogue aims at directing the formation of information models. Learning through discovery stimulates motivation and supports progress.

The teacher's pedagogical assessment skills are indispensable for meaningful learning. When the students have difficulty in noticing the contents of some unfamiliar material, with a lot of details, the teacher is the one who has the mission to adapt any information and present it in a form that is as close as possible to the student's level of understanding, having the role of facilitating

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[262] Ibid, p. 70.

learning, making it as easy and attractive as possible. Before students begin a new learning process or topic, it is the teacher who must ensure that students have the necessary prior knowledge to learn a new topic, or discover new ideas. He has the obligation to structure the learning, to direct the activity, or to discover, evaluate and verify the new ideas conceived by the students. It is the teacher who has to make the children discover that they can use their own mind, their own resources and knowledge in their education. Teachers need to be supportive of the students' opinions, ideas, and visions for their development.

It is important that the teachers' share is consistent and takes into account not only the contents, and volume, but also the emotional intensity of the material and the present state of the students, their predisposition to assimilate the information to be presented. Teachers must possess the ability to change the form and order of the contents, making presentation as accessible as possible in order to be assimilated by the students. During learning activities the teacher can encourage and observe the character, the attention, the memory, the development of the communicative skills, of the coherent communication based on the logic, the ability to draw conclusions, to understand messages and to express personal opinions.

Interdisciplinarity is a social instrument that involves the development of the teacher's educational qualities and is based on stimulating the teacher towards increasing their professionalism, teaching skills and social activity. It is important to mention that this does not duplicate the requirements towards the teacher, it only asks for extension of the capacities they possess and interaction through teamwork. The teacher aims at creating information models, grouping what is similar, using means or materials that allow the formation of models, structures that contain relations between stimuli or between stimuli and the experience and knowledge previously accumulated by the teacher. Another responsibility for the teacher is to be functional – to include and teach several disciplines at once, to direct activity projects, taking into account personal development and also to be willing to offer consultancy to the students and to undertake extracurricular activities as often as possible, and to motivate their disciples.

Obviously, these conditions for the realization of modern educational models differentiate and put out the teachers in relation with the skills and professional level of their peers. This greatly enhances the professional development of teachers and motivates them to work in a team, to collaborate with colleagues, to exchange experiences and information, to experiment and to implement the methods and tools specific from one field to another. This is another example worth being followed by the students, as they are those who place high value on practical models rather than theoretical ones.

Only learning that can anticipate development and that attracts development, or learning that finds similarity between the knowledge from school and that from home or another social framework is useful for the student. To ensure this process, the teacher has the obligation to identify what the student knows today and what the student can solve, if helped and guided by the teacher. These tasks are crucial because the student can achieve greater performance under supervision or guidance than if they were acting independently.

To be considered authentic, training must encompass formation of functional skills, implying that what the students learn in school should be applicable and gain value outside the school context. Evaluation in relation to lifelong learning is required to be usual in the educational space, serving as methodological standards for human's successfully taking the maturity and life exam. The more intense and complex the human activity, the more necessary evaluation becomes. Every activity of the human being is on the line of value ascendancy.[263]

Mediation of learning is done by the adult, and to illustrate how adult-mediated learning occurs, Vygotsky proposes the metaphor for gardening. Wanting to promote growth, the gardener does not act directly on the plants. He does not pull the root to make them grow, but acts on the environment in which it is located: by changing the temperature, fertilizing the soil, maintaining proper humidity, changing the position of the neighbouring plants. Acting directly on the child, is in

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[263] Cucoş. C, Teoria şi metodologia evaluarii, Iaşi Polirom, 2010, p. 22.

contradiction with the nature of education, the beneficial influence of the adult coming from the intervention on the social environment in which the child is.

The presence of an adult allows the child to activate, through social and cultural interaction, the systems of signs existing in the social environment, the latter being mediated by the adult. In its development, a child's thinking is guided by the adult who imposes stable, permanent, pre-existing meanings in the cultural environment. The child gradually reaches these meanings through learning and not through continuous memorization. Therefore, ontogenesis is actually "sociogenesis"; the higher mental processes – attention, memory, thinking, will – are of social origin, and formed by transforming interpersonal relationships into intrapersonal processes.[264]

Piaget, as the representative of Geneva School, proposed as a model of learning the model of the child's interaction with the environment, but reduced this environment to the physical dimension. His theory went beyond the strictly cognitive approach, proposing a three-dimensional interaction: Subject-Object-Other, so a socio-cognitive interaction.[265]

The development of thinking comes from the social environment, and the social environment is the one that imposes various tasks on the student and is not limited only to the tasks that the student is forced to do. It also offers the necessary means, materialized in scientific knowledge, instruments and tools, art and language. This knowledge, is already there, in the cultural environment, where the student finds and from where he has to take it, by internalizing it and learn it with the help of correlation or interdisciplinarity.

The idea of attaining the educational ideal by means of interdisciplinarity is not a recent one – it has its roots in antiquity. However, nowadays more and more researchers and educators are concerned about this topic. An eloquent experiment was carried out in the XIXth century by Lev Tolstoi, who created a "free school" focused on "the life of the learner" in his estate, stating that "the only educational method is life itself".

Several learning methods specific to the interdisciplinary approach have been put forward: learning based on multiple intelligences, project-based learning, problem-based learning, learning-adventure, which takes place outside the classroom.

Being a form of cooperation and fusion between disciplines, interdisciplinarity also implies the open action between certain interdependent competences or contents of two or more disciplines. This cooperation between disciplines makes it possible to solve the problem from several perspectives. The exact boundaries between the disciplines are ignored, in an attempt of finding common topics for certain subjects of study, which may result in a new discipline. Emphasis is placed on exploring the subject, so the focus is on the learner. In this way learning becomes a process based on problems and their solution, because problems mirror the social life of people.

The emphasis is on the individual achievement of the student, on the growth of his personality, on responsibility and individual choice. The objective is set not only the product or content of learning, but also the learning process in which the student is involved through various means. It is the method that causes the child to deal with the problems he has encountered in a critical way, so as to help him develop and express his talents and values.[266]

In order to achieve the ideal of education contemporary education encompasses several dimensions of education:
- intellectual education
- technological education
- aesthetic education
- vocational education
- moral education
- legal education
- religious education
- physical education

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[264] Cocoradă, Elena. Introducerea în teoriile învățării, Iași: Polirom, 2010, pp. 89-90.
[265] Ibid, p. 87.
[266] Bruner, Jerome. S, Pentru o teorie a instruirii, București, Editura Științifică, 1970, p. 188.

- economic education

- ecological education and so on.

Each of the different dimensions bears an increased importance for the harmonious development of the trainee. But because of our hectic and alert lifestyles and constant lack of time we might end up repeating the deficient educational practice from the Middle Ages, that is aiming at learning everything and achieving almost nothing for the ideal. However, it should be noted that so-called "strong" and important subject that constitute the main objectives of general educational will never be ignored..

"Almost every significant process is the result of a courageous rejection of the traditional way of thinking. In scientific spheres, these dramatic transformations, revolutions in thought, great leaps in knowledge, and sudden releases from the old limitations are called "paradigm shifts".[267] The paradigm being conceived as a set of beliefs and values, in this sense expresses a new way of thinking and working.

Being applied the paradigm facilitates the development of the man, of the complex student; it helps him to realize himself both at individual level and socially. His practicing will anticipate the trends of evolution through prospective and will offer new directions of education or research and the changes will be made in accordance with the interests and requirements that appear along the way.

The interdisciplinary method simultaneously emphasizes several aspects of integration and development: social, intellectual, emotional, physical and aesthetic. Due to interdisciplinarity, the continuous and progressive formation of a generation with an increased level of communication culture is ensured, which is indispensable to the student both for learning and for relationships with colleagues, with peers or adults, and for the permanent study and successful completion of the next stages of life. "Today's student will be tomorrow's explorer", says Marshall McLuhan. For this he must be trained to give importance to learning through research, through discovery, by making connections between different disciplines.

Another plus of interdisciplinary is that it enhances a positive conception regarding the hierarchy of professions and their choice, changing such mythological stereotypes as that some professions are good and others less. Thus, today's students – adults of tomorrow – are encouraged to believe that all professions are good, valuable and only bring profits and prosperity if done with vocation and pleasure. By changing this conception we allow all students to feel good, important and unique both in school and in the role of adult – a healthy and integrated generation is raised at the personality level.

The development of skills and the formation of these new experiences should not only remain at the level of a theoretical ideal, with objectives formulated only on paper. The teachers are the ones who have the mission to train and develop these skills, to interweave and implement them in the daily activities of teaching-learning-evaluation and to discover the vocation, the values and the ideals of each of the student. The achievement of the ideal and the success of the students will be directly linked to the quality of the educational process and the partnership between teacher and student.

Interdisciplinarity can be achieved in a single study discipline, in all its dimensions, as well as in all other disciplines. The advantages of interdisciplinarity by approaching plastic activities are varied:

- allows the application of all knowledge obtained in various subjects, in practical activities, giving them maximum efficiency

- aims at correlating all knowledge and languages

- enhances creativity, imagination, aesthetic taste, visual memory

- facilitates the exchange of information and the transfer of knowledge from one subject to another

- perception becomes simultaneous

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[267] Cojocaru, Vasile Gh. Calitatea în educaţie, Chişinău, 2007, p. 86.

- theory combines with practice – motor, visual, intellectual, auditory and other skills are put in value.

The effects of applying the interdisciplinary model, as specified, are numerous in an era of dynamics and change, and its realization implies considerable improvement in the acquisition and implementation of all disciplines and subjects simultaneously. For example, in a very successful Art lesson, one manages to combine most of the subjects, but at the same time he importance of Arts in making the most of so-called "strong" subjects is valuable:

- Language and Literature an indispensable means of communication, a motto, a parable and so on are brought to debate. For example, a poem, story or adventure can serve as a source of inspiration or the subject of an art work; calligraphy, or the art of beautiful writing, the correct and aesthetic placement of the text can be developed when making a poster or a booklet.

- Foreign languages use of borrowed expressions, new terms, for example "kich" (English – cheap, worthless copy); images with objects, schemes, colour accentuation allow for more qualitative memorization or association.

- History source of inspiration, use of bibliographic data, genesis of art and so on. It is art that helps to preserve and discover historical sources and documents. Art also serves as a means of expressing the oldest civilizations.

- Sciences, e.g. geography, biology, zoology anthropomorphic, phytomorphic, zoomorphic, aviomorphic motives and so on. It is art that allows graphical representations, schemes, formulas, tables and so on.

- Mathematics, and related sciences. I tend to say "There is more mathematics than creation in Arts" And this is because in art everything is calculated, estimated and weighed starting with the page layout, drawing, identifying light, shadow, half shades, applying shades of gray or colour, the ratio of colour or contrast, the ratio between the size of objects and the work stand, the ratio of the dimension between the elements of a compositional body (for example: the portrait or the human body and its elements). Mathematics without art is also something that is inconceivable, the art is the one that allows the drawing, drawing of figures, geometric shapes, perspectives or drawings in space, comparison, finding areas, sums and so on.

- Computer science or information sciences allow the visual arts to acquire other dimensions, develop them, expand them, offering them nowadays a particularly valuable connotation. Due to information technologies Art is present absolutely in all the fields of human activity and interest. On the other hand, art through all the forms and expressions it contains, enables information technologies to become valuable in the use of society.

- Music and artistic-plastic art are mutually inspired, they are complemented, developed, interwoven and their product is one – *Art*.

Interdisciplinarity presents itself as a social mechanism of the community's strengthening and development community, of mediating educational systems. Because all the educational sciences, both the strong and the alternating ones are absorbed and merged in society, it manifests as a single body. This strategy makes it possible to change the outdated conception about the school, society, environment, giving value to the preferences of each student, giving them the opportunity to be all good, each one in his / her field, to take something new and to compensate their reserved skills through their peers. Interdisciplinarity is a social mechanism of strengthening and enhancing the social development of the community, a means of mediating the educational system. It happens because all the educational subject, both the so-called "strong" and the alternating ones are absorbed and merged in society, and they work as a single body. This strategy makes it possible to change the outdated conception about the school, society, environment, giving value to the preferences of each student, giving them the opportunity to be all good, each one in their field, to take something new and to compensate their skills through their peers.

Below there are a few examples from personal good practices with students at different ages in different activities to demonstrate the importance of the interdisciplinary means of approaching subjects

*Pic. 1. Artistic and educational activity about underwater swings, salt dough modelling –
summer camp, Tabăra Bucuriei, Moldova, Chisinau, July 2019*

*Pic. 2. Artistic and educational activity about underwater swings, salt dough modelling –
summer camp, Tabăra Bucuriei, Moldova, Chisinau, July 2019*

Pic. 3. Rides, games, teamwork – summer camp, Tabăra Bucuriei, Moldova, Chisinau, July 2019

Pic. 4. The final exhibition with the works of the children participating in the camp – summer camp, Tabăra Bucuriei, Moldova, Chisinau, July 2019

Pic. 5. The final exhibition with the works of the children participating in the camp – summer camp, Tabăra Bucuriei, Moldova, Chisinau, July 2019

Pic. 6. Opening of the summer camp - summer camp, Tabăra Bucuriei, Moldova, Bălți – village Pelinia, August 2019


Pic. 7-8. Geometric shapes, self-portrait stylized using geometric shapes – summer camp, Tabăra Bucuriei, Moldova, Bălți – village Pelinia, August 2019

Pic. 9. Isac Sofia, 5th grade, 2020
*History – "Prehistory, people's tools and occupations" (wood, cardboard, paper, gouache)*
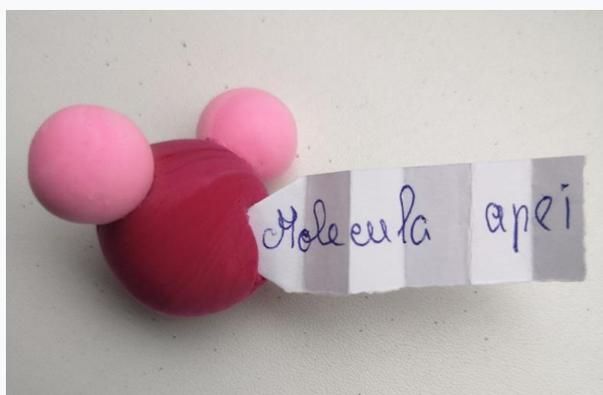
Pic. 10-11. Isac Sofia, 5th grade, 2020
Science –"The general properties of substances – H2O, O2" (plasticine, paper)
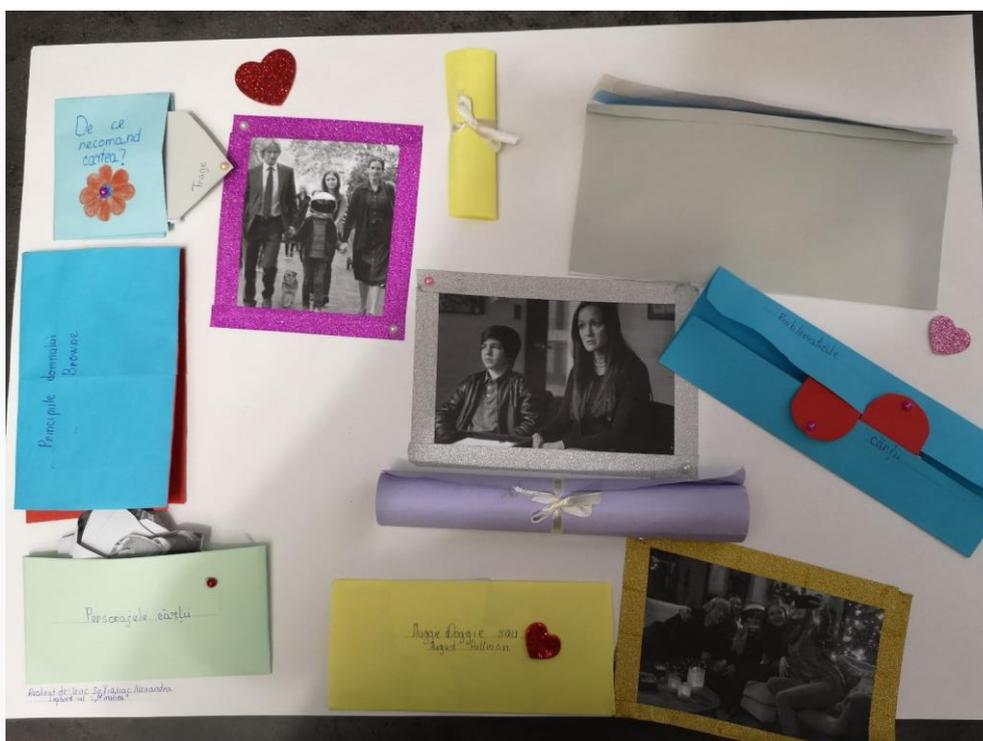
Pic. 12. Isac Alexandra, 5th grade, 2020
Romanian language – reading the book "Wonder", R. J.Palacio (paper, gouache, photos, stickers)
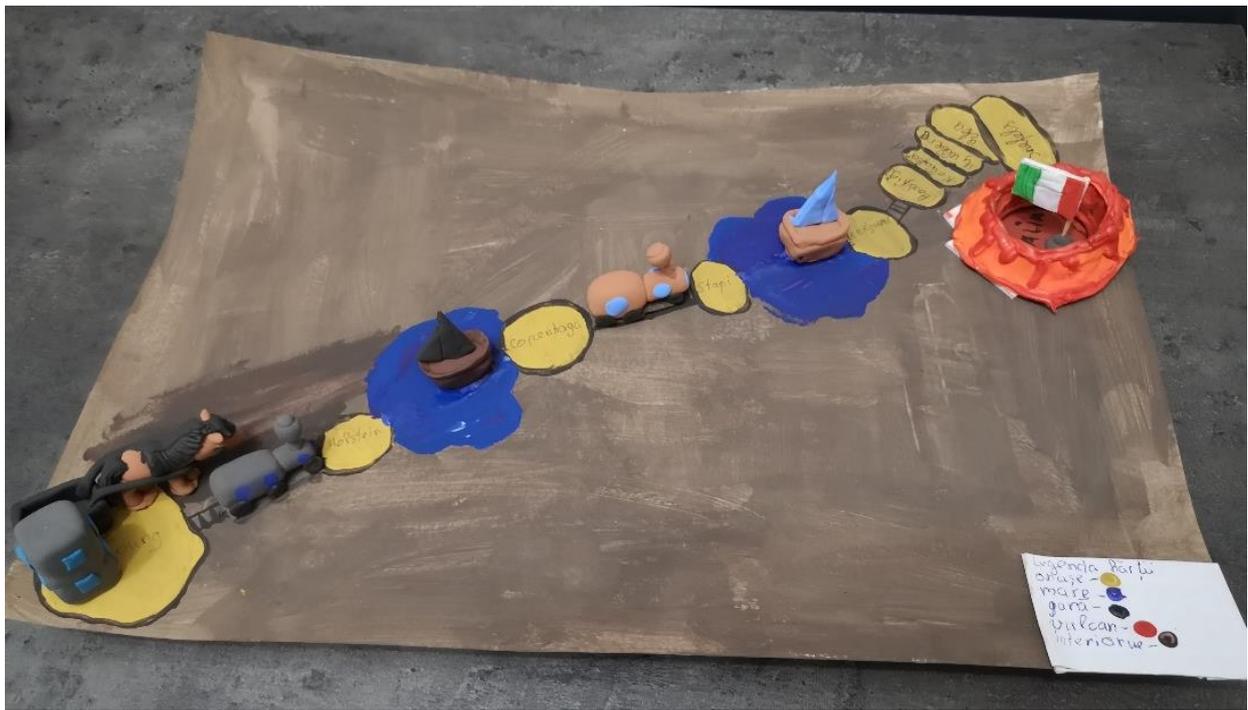
Pic. 13-14. Isac Sofia, 5th grade, 2020
Romanian language – reading the book "A Journey to the Center of the Earth", Jules Verne
(plasticine, paper, gouache)

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2. Bruner, Jerome. S, Pentru o teorie a instruirii, Bucureşti, Editura Ştiinţifică, 1970.
3. Cucoş, C. Teoria şi metodologia evaluarii, Iaşi Polirom, 2010.
4. Cocoradă, Elena. Introducerea în teoriile învăţării, Iaşi: Polirom, 2010.
5. Cojocaru, Vasile Gh. Calitatea în educaţie, Chişinău, 2007.

3.4. DIGITALIZATION OF EDUCATION FOR THE SUSTAINABLE DEVELOPMENT SAKE: LINGUISTIC ASPECT

The concept of sustainable development becomes increasingly important as the world economy joined the path of systemic transformation in line with global challenges. The "Transforming our World: the 2030 Agenda for Sustainable Development" with its 17 Sustainable Development Goals and 169 Targets, adopted on 25 September 2015 by Heads of State and Government at a special UN summit by occasion of UN 70th anniversary is considered as an international program of activities in that respect.[268] The global development goals set out in this agenda are perceived by the international community as a strategic push to introduce information, management, technological and other innovations, and to develop new products and services that are in actual demand.

One of the 17 sustainable development goals is the education quality, in other words: the quality of education as the provided intellectual service product (and result) assumes the education level adequate to the rapid development of information and digital technologies. This goal-setting is based on the combination of scientific-technical knowledge and the humanitarian one, that amalgamation reflecting the modern science world. This is confirmed by the fact that *digitalization* reveals the global digital revolution manifestation or *digital transformation* of social processes.

Often, the concept of "digital transformation" is identified with either automation or data digitization while both them are only components of whole digitalization process. The automation implies the appearance of a hard- or software product (robotics) capable to replace a human in performing certain functions. And the understanding of the fact that the increase in technological capacities (automation systems) and data volume (collected data) shall never produce by itself the desired positive result, implies the *necessity to build effective processes for the use of technological capacities* in order to develop the society in all its basic areas.

The digital transformation involves 5 key areas:

1) reinterpretation of external communication: focus on a specific person, its needs and some given situation;

2) reinterpretation of internal communications: in the context of digital transformation, it is necessary to rearrange work with people in a principally new way (e.g., switching to telemediated or remote work, jobs outsourcing, etc.);

3) rethinking principles of work with data, because data is not just something that allows you to extrapolate: using past periods as the basis to predict future development; other aspect of work with data is deep machine learning, in other words the use of artificial intelligence, which allows decisions-making even in a situation when incomplete data available, based on asymmetric data set;

4) the priority of a customized business model, i.e., commuting with consideration to the client, to circumstances and situations, which implies omnichannelling, never imposing its own channel to the market;

5) project processes based on flexible change technology.

The first three of these areas are fully projected into the field of education: these are the personal-oriented distance learning, Internet communication format, deep machine learning, etc. The popularity of distance learning, that completely removes geographical and age restrictions, is increasing: today, much more accessible become completing the program at any University worldwide. Recall that since 1982 the UNESCO international Council for correspondence education (ICCE) has been renamed into the International Council for Open and Distance Education (ICDE).[269]

Today, digital transformation of business, society and the state is declared in Ukraine, and the term "digitalization" is used by the new Cabinet of Ministers' representatives as referring to the process of abandoning the "state apparatus bureaucratization" practice. Analyzing how specifically

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[268] https://undocs.org/ru/A/RES/70/1
[269] Romanova, O. (2019): Educational trends in the training of Odessa polytechnics / O. Romanova // Innovations in humanities: restarting / ed. A. Ostenda, N. Rybka, V. Zharkykh. – Katowice, 2019. – Pp. 151-159.

the digital transformation is carried out in Ukraine, Doctor of Economic Sciences A. Dlygach (Taras Shevchenko National University of Kyiv) states that machine learning is among those technologies that change the world (Internet, renewable energy, etc.).

Digital processes are challenging the traditional formats of learning. Young people already perceive information differently: in the digital world, you don't need to memorize facts and dates you need just the ability to correctly handle information: find it, process it, and analyze it. Therefore, already at the school level the information is available on request at any time thanks to Wikipedia, Google, voice assistant, etc., however, any of these tools never cancelling the need for memory training.

Thanks to the new tools, teachers can communicate with students through mobile apps, social networks, and cloud technologies.The automation as a component of the *digital* process in education is implemented through special portals, webinars, web conferencing, creating video presentations, in the control phase of knowledge getting and acquired skills assimilation. In addition, the new model of education implies introducing professional standards, allowing us to obtain knowledge in the most convenient form, ibid. in practice, joining the University courses in the format of coaching that results in acquiring competencies sets, and the graduation exam results in such a way proves the graduate's ability to carry out professional activities that require (or do not require) licensing[270]. Therefore, *digital* technologies make it possible to get education outside of the University, since many universities open their programs following the main education developmentvectors. Those vectors list is following:

1-enthusiasm and motivation as fundamental principles;

2-transforming the teacher's role: he/she becomes a coordinator, directing students in online / offline modes;

3-availability of training materials in real time, which simplifies the process of new knowledge getting;

4-interdisciplinary content that involves a synergistic approach to learning, mastering tools of related (and not only) scientific knowledge branches, blurring the rigid boundaries between the spheres of production, business, etc.

Such education constantsare: the interdisciplinarity, a synergistic approach to learning and the development of cognitive abilities, and the main feature here is that it turns into *education throughout life* or life-long one.

The profession issuing from University studies ceases to be a "sentence" for all life long. According to experts' 'forecasts, changing 8-10 professions during the lifetime will be considered a a regular norm. Therefore, critical thinking skills, learning skills, creativity, and a *stable "learning ability"*, i.e., readiness to undergo additional education based on the data processing ability, such as to extract, combine, and differentiate the information's individual components for creative and rapid problems solution at various levels must be formed starting as early as at secondary school, and the teacher's function is to create a space in which students are taught how to learn. An alternative to the University in its classic format is free access to the online / offline University as a repository of certain knowledge, where students can, figuratively speaking, "shape themselves" with the courses necessary in order to pass their personal exams in the future.

According to experts, in 5-10 years period the most popular professions list will appear as follows: IT specialists, virtual reality architects, BigData model developers, intellectual property appraisers, designers of smart houses, smart cities, etc.

Thus, a specialist of information technologies rapid development epoque must meet the following requirements:

- being cross-functional: working at the professional areas intersection,
- being ready to retrain throughout his/her life,
- being able to work remotely,

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[270] Dlygach, A. (2018): How will society be transformed against the technological progress background: education, professional activities, economy, social structure: interview. URL: https://tqm.com.ua/likbez/news/andrey-dligach-didgitalizaciya-obshestva

- knowing IT technologies fundamentals,
- being a BigData professional– in other words able to collect and process large amounts of information;
- knowing several languages,
- thinking creatively,
- being able to self-learning, being talented for fundamental science subjects,
- being ready to change up to 10 professions during his/her life,
- a necessary precondition here is the ability to achieve goals using tolerant approaches,
- being prepared for cross-cultural movements, i.e. to work due to globalization, in different countries.

Our attention focuses here on therefrom issuing requirement and need for mastering several languages. Based on the fact that one of the trends in modern society's linguistic development is the global multilingual processes progressing, the multilingualism as a social phenomenon can be considered a basic component contributing to creating an united open information-and-communication, cultural and educational space. In addition, several languages speaking, or the multi-lingual personality component[271] symbolizes the cultural tolerance sphere and ensures the implementation of related requirements to a specialist in the era of information technologies rapid development, namely: willingness to cross-cultural movements, working in different countries due to globalization, ability to achieve goals using tolerant approaches, and readiness for changing up to 10 professions in a lifetime.

In the context of the above, we note transformational manifestations, new scientific directions and opportunities in linguistics.

1. Communicative aspect of education process digitalization. Internet communication as a format of communication significantly changes the pace of spiritual and cultural life both for society as a whole and the cultural world of an individual. For example, computer translation programs help to overcome the language barrier, computer graphics programs provide huge opportunities for creativity, computer encyclopedias and dictionaries expand the horizons, etc. Network or Internet communication is recognized as the main, basic process of culture, corresponding socio-cultural institutions and human thinking virtualization. The product of interaction between the human and the existing information technology environment, when a system of images is formed in cyberspace, is defined as the virtual reality. And this phenomenon is one of the most debatable subject values of crossdisciplinary scientific discourse; today, a new interdisciplinary field: virtualistics is being actively formed.

In addition, certain areas of linguistic research are being formed, including the Internet communication genre differentiation, rules of speech behavior in Internet communication, in particular, normative and ethical aspects, research of speech units in an Internet message, speech portrait of an Internet communication participant, and new requirements for cursive writing.[272]

According to E. F. Kirov[273], for example, when writing on a computer, you can use a point instead of a comma punctuator at a sentence. Such a point-2 together with a minuscule letter on its right can function as a comma, which, according to the mentioned author, is the most ergonomic. In the work of A. V. Romantovsky[274] "On the effect of communicative complementarity in the Internet comments discourse" presented is such a linguistic problem as the verbal communication adaptation to a new ontology of communication. The formation of Internet stylistics as an independent

[271] Kolyada-Berezovskaya, T. (2019): The multilingual component of European integration cultural-educational process // Innovations in humanities: restarting / ed. A. Ostenda, N. Rybka, V. Zharkykh. – Katowice, 2019. – Pp. 19-26.

[272] Romanova, O. K. (2017): Russian language and Internet space / O. K. Romanova, N. Madariaga // Information education and professionally-communicative technologies of the XXI century: materials of X international. sci.- pract. conf., Odesa, 14-15 Sept. 2017 – Poltava, 2017. – Pp. 267-271.

[273] Kirov E. F. (2015): Comma in the system qwerty // Russian language and literature in the space of world culture: collected volume: XIII MAPRYAL Congress materials (Granada, Spain, 13-20 September 2015). – Vol. 13. – SPb.: MAPRYAL, 2015. – Pp. 25-30.

[274] Romantovsky A. V. (2015): On the effect of communicative complementarity in the Internet comments discourse. – Ibid. – Pp. 67-72.

stylistics field is a problem that caused a serious discussion, since to solve it, necessary is, – as N. I. Klushina[275], notes, – to solve a whole range of scientific problems: determining the functional Internet style status, building a typology of Internet genres, and analyzing individual stylistic phenomena generated by the Internet.

2. Digitalization of education: terminological aspect. The synergistic nature of modern science and international information exchange expansion and intensifying lead to the introduction of special words-terms that originated in one language system, in the scientific language of another one. Therefore, in recent decades, the key issues related to cross-industry and international consistency of terminology remain particularly important.[276]

The concept of *cybertext* has already become firmly established in modern linguodidactics, as well as *cyberspace*, *cybermedium*, *cybersphere*, etc., all those requiring terminological study for further standardization.

The term "cybertext" refers to a new type of multimedia text, an unique, integral, complete one, generated in cyberspace and expressed in different characters, covering a large semiotic field, but bearing a single content and characterized with a single semantic image (cyberimage). This is a fundamentally new textual structure, a new figurative architecture, embodying a synthesis of verbal and figurative-emotional perception of the world.

A. A. Akishina and A. V. Tryapelnikov[277], analyzing the reasons for the cybertexts relevance in language teaching, noted the following parameters:

a) cybertext is a fusion of diverse texts;

b) observed is the simultaneous use of verbal and audiovisual channels of perception;

c) the emotional and imaginative perception of the text is connected to the logical one;

d) expanded is the scope of student's independent work, thanks to the possibilities provided by the Internet;

e) it functions in an electronic environment and can be easily transformed if necessary;

f) it is possible to include country studies material at early stage, when the student does not yet have the skill to speak the foreign language;

g) expanded are the interactive learning opportunities.

The emotional perception of cybertext is much stronger than this one of the verbal text: the user has the opportunity to hear and see frames voiced by different people in different historical periods, and the hypertext factor makes its information-image volume limitless.

It should be noted that along with the "cybertext" concept in the educational context, the concept of "dynamic text" is used. The latter is connected with the development of technology for interactive and graphic interaction of *human*, his imaginative and creative thinking, with the *problem* under study on the basis of computer-mediated educational mechanisms, which, as a result, renders possible to combine the logical and semantic basis (verbal component) with audio-visual and dynamic components, i.e. to create dynamic training texts.

Thus, the concepts of "cybertext" / "dynamic text" are synonymous. They serve to denote a communication model (text as a system of communication elements hierarchically united in one semantico-conceptual structure), characterized by an optimal combination of the "content plan" and "expression plan" with a communicative *IT* format, thanks to *digital* technologies. The choice of a term is a question to resolve only depending on some particular author's idiostyle.

3. Digitalization in solving lingvodidactic problems. Digital transformation as a transition to the use of new lingvodidactic tools represents, first of all, online tests inclusion in the process of teaching foreign languages at all stages: of initial representation, comprehension, consolidation of

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[275] Klushina N. I. (2015): Internet stylistics in Russia. Problem statement. – Ibid. – Pp. 31-34.

[276] Terminological aspect of textual activity and culture of scientific communication in the educational process / T. Kolyada-Berezovskaya, O. Romanova // Pyvdenniy Arkhiv. Philolog. sciences: col. volume. – 2018. – issue LXXIV. – Pp. 165-167. URL: http://dspace.opu.ua/jspui/handle/123456789/8179.

[277] Akishina A. A., Treyapelnikov A. V. (2015): Cybertext as a new type of tutorial text: Russian language and literature in the space of world culture: collected volume: XIII MAPRYAL Congress materials (Granada, Spain, 13-20 September 2015). Vol. 13. SPb.: MAPRYAL, 2015. Pp. 5-8.

new material and result control, in the development of multi-level educational tasks' sets: controlling, correcting and intended for independent study of language material. In such a way ensure is the individualization of the training pace and content in accordance with the required profile, the formation of foreign students' analytical and predictive skills. For students at the initial stage of foreign language learning the online testing system provides an opportunity for remotely passing tests to assess background knowledge on the subject content, and at the advanced stage this one to prepare for further tests and exams.

Thus, the online testing system developed at the Odesa National Polytechnic University (ONPU) Department of Ukrainian and Russian languages allows managing the teaching-and-learning activities according to the ideology of independent work tasks computer modification. Tests, powered by Online Test Pad platform and available on ONPU web-site distributed by foreign students' training profiles (economic, general technical and chemical engineering), involve the stylistic analysis of the read texts, the semantic interpretation of the scientific speech style units, terminological vocabulary and lexic-grammatical structures relevant to style's particular lower level: chosen specialty style.[278]

The cognitive aspect of online testing is implemented in tasks typology that involve: single selection, multiple selection, text entry, sequencing, matching, filling in the omitted spaces, and correcting substitutions according to the task stated. Another positive aspect of digitalization in lingvodidactics is motivational one. In the non-native language teaching process educational and methodological support, the subject's individual topics and sections can be presented in digital format online (individual mini-lessons and interactive tasks for independent work, presentations, interactive tables, virtual tours, exhibitions, travel), while in offline mode, the teacher evaluates the test tasks completing results, and the students can do their independent work on errors.[279]

All this contributes to the sustainable development of the independent and extracurricular work sphere since these types of educational activities are characterized by developing, stimulating, educating and research functions. The above applies primarily to teaching foreign students on referring scientific texts, such skill supposing use of primary information digital sources through the online service of library information centers, as well as the ability to remotely get acquainted with samples of abstracts and annotations available through the library automated engine service and bibliographic services. In general, structuring the educational process on the basis of distance learning allows speaking about a fundamentally new principle of work organization as to the abstracting, based on a conscious, motivated attitude to self-learning and self-improvement as the individual's sustainable development process.[280]

4. Multilingual education in the context of sustainable development. The sustainable development is one of the challenges mankind faces in the XXI century, a life position in which development the international multicultural educational environment plays an important role. As an illustration of high level in demand for multilingual education for the sustainable development sake, we can consider the activities of language schools in many countries of the world.

For example, the work of ONPU summer language school created as a result of deep interest revealed by bachelor philologists from the Basque Country University, future Russian language professionals from Spain, to be trained in a region whose specifics refer to an active functioning of two (Russian and Ukrainian) related Slavic languages.

[278] Online testing as a tool increasing the 1-2 year students' independent work efficiency / G. I. Kurova, T. V. Lishnevska // Information education and professionally-communicative technologies of the XXI century: materials of XII international. sci.- pract. conf., Odesa, 11-13 Sept., 2019. P. 164-169.

[279] Kolikova, T. G. (2017) Possibilities to use modern information technologies in teaching a foreign language to technical universities' students // Information education and professional communication technologies of the XXI century: materials of X international. science.-pract. conf., Odesa, 14-15 Sept. 2017 – Poltava, 2017. – Pp. 261-264. URL: http:// dspace. opu. ua/jspui/handle/123456789/6470.

[280] Romanova O. K., Pechkurova L. V. (2017): Scientific and professional text as the basis for the teaching of referencing foreign students // Scientific Bulletin of the International Humanitarian University: Serie Philology: col.vol. – issue. 27. – 2017. – Pp. 42-44.

As a first step, the short-term language courses preparation by the Department of Ukrainian and Russian languages teaching staff consisted in *online-testing* and *analysis of professional profiles*, models of this field specialists' professional activities, as well as requirements for knowledge, skills and abilities that provide an efficient professional activity. As a result of this work, the group of Spanish colleagues has been characterized as heterogeneous by goals, professional orientation and level of Russian language proficiency:

- future philologists for whom language is an object of research and studies;
- future teachers of the Russian language, for whom the language is a subject of teaching;
- future translators for whom the language is the subject of their professional activity.

The program goal was to develop skills that allow Spanish colleagues to communicate in Russian while performing their official duties. These are: an appropriate amount of vocabulary, knowledge of speech patterns and structures, stylistic register related to their professional activities.The development of professional charts for specialists of various profiles included the following stages:

Stage 1: forecasting future foreign-language professional activity, highlighting the communicative areas of communication in which this activity will take place;

Stage 2: identification, classification and socio-psychological analysis of the most typical communicative macro-and micro-situations within the selected areas of communication;

Stage 3: formulation of the final learning goals for each category in the form of language, communicative-speech, text, theoretical-linguistic, methodological and foreign-language educational minimums.

This allowed us to develop common criteria for training future Russian language specialist from Spain and optimize the learning process for short-term courses.[281]

The main task refers to the simultaneous, parallel formation and development of linguistic (formal), communicative (usual) and cultural (cognitive-pragmatic) competencies. In the conditions of limited time when short-term school, it is logical to use intensive methods in teaching Russian speech. A rational approach to the practice of communicative-information-oriented training, when advisable is using the so-called activity approach, gives actually reliable positive results. Accepting a role position that has no analogies in everyday life infantilizes the student and deliberates him/her from the restrictions in both actions enterprising and sense of responsibility that presses on every adult member of society. As a result the audience reaches the level of extremely effective communication situations producing. The specificity of the situation created in such a way is that it is based on needs that remain unsatisfied in the life experience of the trainees.

This way of creating situations is typical for active forms of learning: dialogical and psychological learning technologies, including business games, which are the most interesting and useful form of educational social contact. The problematic situation laid as such game background, teaches the trainee to quickly make new decisions and contributes to mastering new verbal forms and speech patterns, the ability to listen and speak in the correct form, evaluating the own dialogic skills and abilities, contributing to their improvement, thus creates prerequisites for learning monological utterance, teaches non-verbal communication, develops cooperative skills and abilities.

Well known is that the successful communication requires not only formal knowledge of the language, but also deep immersion in the socio-cultural context of the studied language country. Through traditions, customs, and culture, language concepts that reflect reality occupy a large place in this context. One of the main motivations for coming to the ONPU summer language school program is the desire to get acquainted with the unique history and culture of Odesa, this city in the Southern Ukraine, taking into account that factor the Department teachers created the textbook "Invitation to Odesa" (authors: T. Kolikova, N. Madariaga, O. Romanova). This manual electronic version for distant-learning online classes promote an active assimilation of material which quantitative and qualitative characteristics are determined by the communicative and cross-cultural

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[281] Romanova, O. K. (2018): About the summer school of Russian language "Letras-2017" / O. K. Romanova, N. Madariaga // Inform. education and prof. comunic. technologies in XXI century.: XI Inter.sci. – Pract. conf., Odesa, 12-14 September, 2018. – 2018. – Pp. 172-177.

orientation and involve hyperlinks to the full program materials, as well as improved scheduling and curriculum, all that allowing one to combine work with study, given the different age of participants (20+): students, working professionals who need knowledge and conversational practice for sustainable development.

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3.5. INTERDISCIPLINARY CONNECTS FOR EDUCATIONAL PROGRAMS IN THE SPECIALTY "CYBERSECURITY"

Introduction. Even on the end of the twentieth century more people could not dream about different life possibilities which give such industries as artificial intelligence, robotics, the Internet of Things, and the Comprehensive Internet.

Now a bigger part of society uses modern personal computers, laptops, tablets, cellphones and other digital devices with using the global world network Internet for quick and reliable communication.

Today the questions of information security and cybersecurity are very important for society because all advantages of modern information technologies can be used with positive or really negative consequences.

Also, we understand that with growing need of comprehensive specialists in information security the universities have to create new professional standards and educational programs in the specialty "Cybersecurity", which will use new modules to create complex approach for forming a modern specialist. The world realities require from the specialist to be competent in different fields during the studying in higher education schools. Modern graduate must be a specialist who can take decisions and be responsible for it, be able to think critically, has management skills and excellent theoretical and practical training, is stress-resistant and able to respond to the demands of time. Therefore it is important to use clear interdisciplinary connects in the process of preparing such a specialist.

After graduating graduates can work as specialists of information protection of departments of state-owned enterprises, banks, private companies and organizations. They can also work as programmers and system administrators in IT companies.

In this article we will consider the features of the educational program for specialists of educational level bachelor in the specialty "Cybersecurity" and the connection of the disciplines of this program.

The issues of information security always investigate two opposite sides: the first is attackers and the second - defenders. Therefore, conceptually all disciplines should be divided into two large parts. However, it is not so easy because attackers need to know the various ways to protect defenders in order to avoid unnecessary efforts, which not be able to reach the necessary result. In turn, defenders need to know the different methods of attack in order to be able to defend themselves against attacks by attackers.

1. Review of the Ukrainian educational standard for preparation bachelors in the specialty "Cybersecurity". Due to the particular relevance of information security issues, the Ukrainian Ministry of Education has recently been developed and adopted the Standard of higher education in the specialty "Cybersecurity"[282].

Let's consider the main features of this standard. First of all, it is necessary to analyze the skills and knowledge of the future specialist described in the adopted standard. This will allow you to determine the disciplines for education and to create a structural and logical scheme for creation necessary interdisciplinary connects.

Future students will have studied different parts of information technologies, including computer, communications, automation, information analytics and information-communication systems, information resources, as well as various information security technologies and information security management processes.

Also the purpose of new Standard is preparing analysts-professionals, who can use mathematical foundations, algorithmic principles in modeling, design, development, implementation and maintenance of information, intellectual systems in order to ensure confidentiality, integrity and possibility of using data in such systems: organizational, technical, natural and social and economics. In addition, it is important to develop students' professional and

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[282] Standard of higher education of Ukraine, the first (bachelor) level, branch of knowledge 12 "Information technologies", specialty 125 "Cybersecurity" (2018).

creative abilities while solving practical problems, which are characterized by complexity and uncertainty, based on cybersecurity techniques and tools.

Another objective of standard is preparation professionals who can use and deploy information security technologies. They are capable to analyze and improve different telecommunications and information technology solutions, assess and control information security risks, which arising from the use of computers and computer networks.

Now it is important to consider different skills of future specialist. The first of these skills is general theoretical one. Engineer in cybersecurity has to know what is the legislative and regulatory framework of Ukraine, as well as the requirements of relevant international standards and practices in the field of information security.

Others theoretical skills we can divide on two groups: related to technical and management tools. The first group consists knowledge of systems and complexes of information security, information and communication technologies, software and hardware of information systems, methods of technical and cryptographic information protection. The second group includes theories, models and principles of managing access to information resources, information security management systems, methods of identification and risk management.

One of the important aspects of education is the acquirement of general abilities and skills that a future specialist should possess. It includes the ability to apply knowledge in practical situations, the ability to understand the profession and subject area, the ability to be able to communicate professionally and to write in national and foreign languages. A modern engineer should identify, pose and solve problems in a professional direction and be able to search process and analyze information.

Also, every citizen of the country, especially who has higher education, should be able to exercise their rights and obligations of a member of society, be aware of the values of civil society and the need for its sustainable development, the rule of law and the enjoyment of human freedoms. It is even more important to segregate the ability to preserve and enhance the moral, cultural, scientific values and achievements of society on the basis of understanding the history and patterns of development of the chosen profession, its place in the general system of knowledge about nature and society and in the development of society, technology and technology.

Also, it is considered the professional capabilities of future cybersecurity professionals. In particular, they should be able to restore the functioning of information and information and telecommunication systems after the implementation of threats, attacks, failures and failures of different classes and origin. Also, the implementation and maintenance of comprehensive information security systems, the use of generic regulatory, organizational and technical tools, methods and procedures are important.

The future specialist has to be able to use procedures for managing incidents, investigating, evaluating and monitoring systems operations in accordance with established information and cybersecurity policies for creating full defended system. During providing information security management it is important to identify and evaluate potential threats, vulnerabilities and destabilizing factors of the information space and information resources. You must be able to develop models of threats and offenders, to solve the problems of ensuring the continuity of business processes of the organization using the techniques and tools of risk theory. Also the specialist will have involved in the development and implementation of an information security strategy in accordance with the goals and objectives of the organization.

Another part of the Ukrainian cybersecurity standard is the formation of practical skills of future specialists.

Organizing your own professional activity, you need to choose the best techniques and methods for solving complex specialized tasks and practical problems in professional activity and to evaluate their effectiveness. In order to effectively solving the specialized tasks of professional activity, the results of independent search, analysis and synthesis of information from different sources should be used.

For formation scientific-based investigations a specialist must analyze, argue and make decisions solving complex specialized tasks and practical problems which characterized by complexity and incomplete conditions, and adapt in the conditions of frequent change of technologies, predicting the end result.

As skills of a specialist must be related to the protection of computer networks, it is necessary to teach him how to analyze information and telecommunication systems projects, based on standardized technologies and data transmission protocols and to analyze the connections between information processes on remote computing systems.

The next stage of preparation is skills of performing analysis and decomposition of information and telecommunication systems. It is necessary in order to use processes of protection and functioning of information and telecommunication systems based on practices, skills and knowledge of structural diagrams, network topology, modern architectures and models of information resources protection with reflection of interconnections and information processes for internal and remote components.

Using computer networks specialist must solve the problems of protecting software and information processed by software and hardware. Also he must be evaluated of the decisions quality results and must be used modern cryptographic methods of information protection. It is important for the specialist to ensure the functioning of special software to protect information from destructive software influences, destructive codes in information systems and to solve the problem of data flows protection in information systems.

To ensure authorized access on the enterprise, the tasks of managing the procedures of identification, authentication and authorization of processes and users in information systems should be solved according to the established information security and cybersecurity policy. Specialist needs to know measures to prevent unauthorized access to information resources and processes and for solving tasks of management access to information resources he needs to use mandate, discretionary, and role-based models[283].

For logging and accessing control of information resources and processes specialist uses registry logs and event logs which consist using established security procedures. It is also imperative that measures are taken and processes in place to prevent unauthorized access based on a reference model of open systems interaction.

Also the important part of standard is the skills of cybersecurity specialist in technical protection of information. Students must have to learn how to detect dangerous signals of technical means and to measure the parameters of dangerous and interfering signals during instrumental control of information protection processes, as well as to determine the effectiveness of information protection against leaks by technical channels in accordance with the requirements of regulatory documents.

Also, specialist must be able to interpret the results of special measurements using technical means and control the characteristics of information systems in accordance with the requirements of regulatory documents of systems of technical protection of information and to conduct certification of regime territories in the conditions of compliance with the secrecy regime and to record the results in the relevant documents.

Specialist must use cryptographic security components to provide the necessary level of information security to implement and maintain intrusion detection systems. Also it is important for future specialist to ensure the proper functioning of the system for monitoring information resources and processes, software and hardware systems for detecting intrusions of different statistical, signature, statistical and signature levels and classes in information systems.

2. Interdisciplinary connects for educational program of bachelor preparation in the specialty "Cybersecurity". Let's consider the structural and logical scheme of interdisciplinary connects in designed educational program of bachelor preparation in the specialty "Cybersecurity" and let's place all educational modules in five units (Fig. 1).

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[283] Lagun, A. (2017): Analysis of methods for ensuring the accuracy, integrity and confidentiality of information.
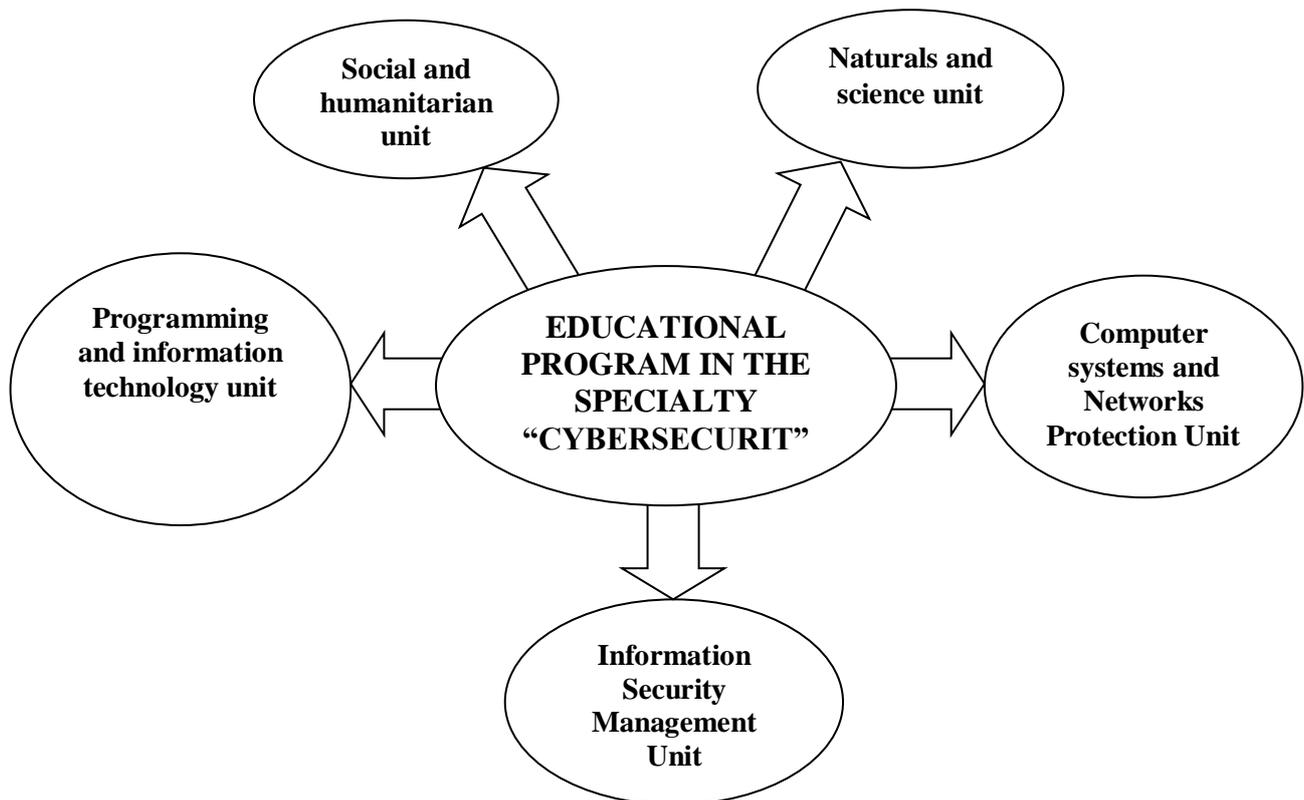
Fig. 1. Structural scheme for educational program in the specialty "Cybersecurity"

If we speak about the general social and humanitarian skills of future specialist with higher education, than in different semesters students will be learn such modules as history of the state and the world, philosophy, sociology and political science[284]. Also in higher school occupational health and life safety to build skills in responding to the different of emergencies are studied. To ensure the legal foundations of the future cybersecurity specialist, the program includes modules associated with jurisdiction in the branch of information security. An important point is to learn a foreign language (including English) to be able to communicate with foreign partners, study and describe research results.

The next unit is naturals and science. This unit provides students the basic theoretical knowledge of mathematics, physics and ecology that will be used in the study of other modules.

For example, in mathematics students learn such chapters as linear algebra and analytical geometry, mathematical analysis, probability theory, number theory, fields and remains theory. In order to form a general knowledge of the principles of computer programming and operation, they study the structure of computers, computer systems, office and other software (Word, Excel, PowerPoint), the Internet (browsers, e-mail, information search), theory of algorithms.

Also, in the natural and science unit will study economics and modules related to economic security and management. In particular, there is a very important module called risks theory in cybersecurity, continuance of which is module "Information Security Management". In the "Risks theory" are considered the concepts of information security risks and threats, their classification, methods of assessment, quantitative and qualitative risk analysis.

The next unit consists of modules which related with programming and information technologies, used in cybersecurity. In particular students learn programming languages Python, C++, C# and Java to develop and protect software. Also the big part of this unit is modules WEB programming (HTML, CSS and JavaScript) and the protection of WEB applications, databases (MySQL) and tools to protect them.

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[284] Lagun, A. (2019): Peculiarities of studying students in the specialty "Cybersecurity" with a specialization "Information Security Management" at Lviv State University of Life Safety.

In addition, the block under consideration has modules related to the application programming of different cybersecurity algorithms. For example, in the module "Information theory" discusses the basics of the concept of probabilistic approach to measuring the amount of information, algorithms of compression and algorithms of error correction, preparation of signals for transmission by communication channels and processing using Fourier transform.

In the modules related to cryptographic and steganography methods of information security students are getting acquainted with mathematical basics of cryptography, cryptographic protocols, open-key cryptographic algorithms (RSA, Rabin, El Gamal, Diffie Hellman, backpack, McEliece), cryptography of elliptic curves, symmetric cryptosystems (Feistel network ciphers, AES, streaming ciphers), steganography algorithms for hiding information in spatial and frequency domains

Also, this unit may include disciplines related to the technical of information protection, using of the Internet of Things, and the protection of devices connected to the Internet of Things. The module "Microprocessor Programming" is about the structures of microprocessors and microcontrollers, the principles of assembler programming of information security devices. In the bases of technical protection students consider directional antennas, types of microphones and electromagnetic devices for information acquisition, electromagnetic radiation of communication channels and monitors, shielding methods and protection against sound propagation, noise generators.

The next unit is "Management of information security". As stated earlier in this article, cybersecurity has two sides: attackers and defenders. In order to ensure reliable protection a clear information security management system should be built for defenders against the attackers.

First of all, it is necessary to study information providing of management that is related to information systems as objects of management information activity, decision-making systems, expert systems. The next stage students study is the organization of information security: stationary and dynamic protection of the perimeter of the object, burglar alarms and CCTV cameras, holding meetings, conferences, signing agreements.

The final and main module of this unit is "Information Security Management". In this module teachers are taught to use a systematic approach to the problem of information security management, to introduce students to possible solutions, to identify the main components of the process of information security management and to learn the basic conceptual approaches to the correct organization of information security management based on the creation of information security management system, taking into account the identified risks security. In addition, students should be able to skillfully develop documentation for the information security management system, evaluate its performance, select, apply and independently develop defense measures and information security measures to ensure an appropriate level of information security.

As a result of studying the module, the student should know the principles of building information security management system of the object and modern approaches to information security management of the object, directions of their development, the basic international and Ukrainian standards governing information security management, principles of process development and creation of basic of information security management documents, as well as approaches to the integration of information security management system into the overall organization management system.

Management international standards are considered in module "Information Security Management". There are such standards: ISO 27xxx: ISO 27000 – Information Security Management Systems – Overview and Vocabulary, ISO 27001 – Information Technology – Security – Information Security Management Systems – Requirements; ISO 27002 – Information security management practice that can be managed using information security management systems.

The final unit is "Computer systems and Networks Protection". It starts from studying of computer networks namely the design principles and types of computer networks (Ethernet and Bluetooth, WIFI, WIMax, mobile), routers and switches. Operating system modules examine

Windows and Linux operating systems, mobile platforms, and the standards and protocols, which they use to share information (IP, TCP, ARP, ICMP, HTTPS, SSH, SSL, WPA).

The relevance of the module "Information security of computer networks" stems from the sharp increase in the role of information technology in the life of modern society and the deep penetration of information and communication tools in all spheres of human activity and, as a consequence, the need to protect information in automated systems. The main objectives of the discipline are studying of students practical skills in working with software information security and familiarity with methods of attacks on computer networks and protection against them, learning complexes of software for testing and conducting attacks on information security systems.

As a result of the studying this academic discipline students will know the basic Internet protocols, their purpose, formats and options and basic security services, including screening, logging and auditing, as well as the work principles of basic Internet services - www, email, audio and video over the Internet, IP- telephony. To protect their networks they should to be able to use different types of firewalls. The study of principles of operation of intrusion detection systems (IDS), the basic methods and means of unauthorized intrusion and programs for their detection, as well as programs for analysis of vulnerabilities of configuration, architecture and code used in the information system allow specialists to improve knowledge on protection of computer networks and providing of cybersecurity.

In the final part of module "Computer systems and Networks Protection" students will learn about port scanners and vulnerabilities, code analyzers, the design of secure WEB servers, batch analyzers (sniffers), Kali Linux tools, and digital forensics.

Conclusions. Using developed educational program in the specialty "Cybersecurity" will allow you to prepare a specialist who will be able to handle any task of protecting information systems and computer networks for different enterprises. This is emerge from the specificities of technical preparation and clear interdisciplinary connects of the selected modules units: social and humanitarian, naturals and science, programming and information technology, information security management and computer systems and networks protection.

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3.6. EDUCATION DEVELOPMENT OF THE POLISH POPULATION IN SOUTHERN UKRAINE (FROM IMPERIAL TIMES TO THE PRESENT)

The issues of ethnic communities' education development in Ukraine were constantly in the center of general public attention. The South of Ukraine has been and remains a region with a multiethnic population, a significant contribution to the history and development of which has been made by representatives of Polish nationality. Despite their small number (0.3% of the total population in Ukraine), Poles seek to preserve their own language, cultural heritage and traditions that form the basis of their national identity, provide opportunities to support their livelihoods and cultural development.

The history of the Polish nationality of Ukraine, including its educational development, is explored by such well-known scientists as I. Baluba,[285] O. Kalakura,[286] A. Kondratskyi,[287] I. Lisevych.[288] At the same time, this problem remains under-researched in the regional aspect. In this regard, the author of aims to reveal the peculiarities of the educational progress of Polish nationality in Southern Ukraine in different historical periods and to evaluate the effectiveness and consistency of governmental measures in this development.

After 1861, great part of Polish working population settled in Southern Ukraine. Many of Poles remained there, having served a valid period in the tsarist army. Enterprises that opened in the Ukrainian Black Sea region, gave the opportunity of good earnings. Thus, the Polish colonies appeared in Odesa, Nikolaev, Kherson, Crimea.[289] Despite that, the Polish population of Southern Ukraine was significantly dispersed among the surrounding Ukrainian and their own, in fact – Polish, settlements. Only in Odessa, it was a small Polish community. The rest of Poles lived in the villages and was engaged in agriculture, gradually losing the national peculiarities in farming, life and culture.[290]

According to the All Russian Census of Population 1897, 0,6% of Poles lived in the Ekaterinoslav Governorate (i.e. Province), 0,7% – in the Tavria Governorate, and 1,1% – in the Kherson Governorate; totally – 0,8% of the whole population of Southern Ukraine. Generally, they formed 0.8% of the total population of Southern Ukraine. Due to the tsarist discriminatory educational policy, a significant part of the Polish population was illiterate. For example, according to the Census, there were the following literacy rates among 1,13% Poles in the Kherson Governorate: in villages – 58,4% of literate men and 50,5% of literate women; in cities – 60,6% of men and 64,3% of women.[291]

In the XIX century, the tsarist government began to implement a state large-scale policy on new subjects. The system of governing territories in the Russian Empire was based on the following three interrelated principles: unification, bureaucratization and Russification. Its ultimate purpose was to eliminate any features that would threaten the imperial existence. The national problem was an integral part of the political, spiritual and economic crisis of the country because it violated the foundations of its functioning as an empire.

Despite the entry of the of Southern Ukraine lands into the unified administrative system of the Russian Empire, the process of educational development had certain peculiarities. It was due to

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[285] БАЛУБА, І. А. (1997). *Польська національна меншина України в 20-30-ті рр. ХХ ст.:* дис. ... канд. іст. наук. Київ.

[286] КАЛАКУРА, О. Я. (2007). *Поляки в етнополітичних процесах на землях України у ХХ столітті.* Київ: Знання України.

[287] КОНДРАЦЬКИЙ, А. А. (1991). Поляки на Україні в X-XIX ст. *Український історичний журнал, 12,* с. 95.

[288] ЛІСЕВИЧ, І. (1993). *У затінку двохголового орла: польська національна меншина на Наддніпрянській Україні в другій половині ХІХ ст. – на початку ХХ ст.* Київ: І-т історії України НАН України, с. 55.

[289] ЛІСЕВИЧ, І. (1997). Польська національна меншина в Наддніпрянській Україні (1864-1917 рр.). *Український історичний журнал, 2,* с. 43-54.

[290] ДАНИЛЬЧЕНКО, О. (1993). *Етнічні групи України: економічне та соціально-політичне становище на початку 20-х рр. ХХ ст.* Київ: Ін-т історії України НАН України, с. 20.

[291] ДОБРОВОЛЬСЬКА, В. (2008). Історичні передумови становлення багатонаціональної системи жіночої початкової освіти Півдня України у ХІХ столітті. In Т. Цисельський, Е. Чапевський, & В. Кушнір (Ed.) In *Причорноморський регіон у контексті європейської політики.* Одеса – Ополє – Вроцлав, сс. 298, 301.

the fact that the region had a brief history, became a home to those, who were oppressed and persecuted, and those, who wanted to get rich quickly. The population was multinational and multidenominational. According to the division of the Ministry of Public Education, almost all of the Southern Ukraine territory belonged to the Odesa Educational District.[292]

According to I. Lisevych, the policy of tsarism on Polish nationality in the Russian Empire in the education and culture field was a policy of total prohibitions and restrictions, condemning that nationality to spiritual hunger. The Russian Empire directed its spears to national-cultural eradication and Russification. In relation to Poles, that policy manifested itself especially cruelly, since "libertarian and proud Lakhs did not obey the tsarist autocracy", and that was manifested in the three national liberation uprisings that took place in the late XVIII-XIX centuries. Despite the fact that they ended in failure, that uprisings caused a lot of trouble to the Russian Empire.[293]

Due to the policy of continuous Russification, the tsarist government made every effort to control the schools of national minorities. The purpose of the government was to promote the education of foreigners, to spread the Russian language in their environment for rapprochement with the Russian people.[294] Schools became an instrument of Russification of the Polish youth. However, despite the brutal censorship and restrictions on education in the XIX – early XX centuries, the Polish diaspora in Ukraine presented many talented scholars and artists.[295]

In spite of nation-wide harassment against the Polish population, Southern Ukraine in the imperial period differed from other regions of Ukraine in a more loyal attitude to Poles, as it was on the Southern lands that the rapid development of heavy industry began, which caused a great demand for engineering and technical workers. A lot of them were hired among Poles, who moved to the region, searching for work and better earnings.[296]

In those days, Polish colonists in Ukraine tried at least to do something to organize their children's educating and to soften the Russification pressure on them. To that purpose, the Roman Catholic parishes opened primary classes, where lessons were taught in Russian. Therefore, parishioners tried to find at least one Pole teacher, but it was not always possible. It is clear that the teaching of Polish in schools opened at Catholic churches in Ukraine was prohibited. When an attempt to introduce Polish into one of the Catholic Church schools in Odesa was made in 1869, a trustee of the Odesa Educational District immediately banned it.[297]

There was also a Polish church-parish school in the city of Nikolaev, which was one of the oldest in the region. It appeared in 1794 with the Church of St. Joseph. Until the 1880's, it did not have own building and classes were held at the abbot's or organist's home. In 1887, a separate house was finally built on church land. The school implemented a program of educational classes to teach children drawing, sewing, crafts and gymnastics. It was attended by about 50-60 children. Thanks to the charity of an Italian K. Aliaudi in 1900, they opened a second school. On the eve of World War I, about 200 children studied at those two schools.[298]

In 1896, in the city of Nikolaev, the Parish Philanthropic Society under the Roman Catholic Church was opened. Its core purpose was helping the poor and providing patronage over schools. Making its best efforts, the Society helped capable pupils to study in handicraft special schools.

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[292] Ibid, с. 299.

[293] ЛІСЕВИЧ, І. Т. (1997). *Духовно спраглі (Духовне життя польської національної меншини на Наддніпрянській Україні в 1864-1917 рр.)*. Київ: Ін-т історії України НАН України, с. 3.

[294] ДОБРОВОЛЬСЬКА, В. (2008). Історичні передумови становлення багатонаціональної системи жіночої початкової освіти Півдня України у XIX столітті, с. 302-303.

[295] КОНДРАЦЬКИЙ, А. А. (1991). Поляки на Україні в X–XIX ст., с. 95.

[296] ГАНЗУЛЕНКО, В. (2008). Польська католицька громада Півдня України в другій половині XIX – на початку XX століть. In *Поляки на півдні України: історія та сьогодення,* том 1. Жешов; Київ; Миколаїв: Вид-во МДГУ ім. П. Могили, С. 165.

[297] ЛІСЕВИЧ, І. Т. (1997). *Духовно спраглі (Духовне життя польської національної меншини на Наддніпрянській Україні в 1864-1917 рр.)*, с. 7-8.

[298] КУХАРЕНКО, Б. (2012). Поляки в Николаеве. In Л. С.-М. Каймаразова (Ed.) In *Миколаївщина багатонаціональна: з історії етнічних спільнот регіону*. Миколаїв: Видавець Прокопчук Т. Ю., с. 410-411.

Despite the prohibition of the tsarist government to teach children Polish, Poles fought hard for their national school. Under the pressure of the 1905 revolution, legally, the national schools of the empire, including the Polish ones, achieved some changes for the better, at least on paper. On the eve of the revolution, on December 12, 1904, it was allowed in the Ukrainian cities to teach the optional Polish language (that prohibition remained in villages) during the overtime classes, if a language teacher in a particular school was approved by a school trustee, who, of course, did it reluctantly, delaying the resolution of the case in every possible way. However, a year later, in 1905, students were allowed to teach Polish in private schools, with the exception of lessons in Russian, history and geography. In April of that year, Tsar Nicholas II's decree On Religious Toleration declared, in particular, the right to teach religion in schools in the mother tongue – in this case Polish.[299]

The outbreak of World War I prompted the governments of the three empires, which at one time divided the Rzeczpospolita, to treat the Poles favorably, because each of them needed a Polish soldier. All of them promised them a better future, began to hire Poles in various state institutions, allowed the opening of Polish schools. In 1915, a number of gymnasiums was evacuated from the cities of the Kingdom of the Poland to Ukraine. They expanded their educational activities in Kiev, Odesa, Kharkiv, Chernigiv, Mykolaiv and other cities of Ukraine, and even an agricultural institute, evacuated from Pulawy near Warsaw, worked in Kharkiv. In addition, new Polish schools were being opened locally. During the war, their network in Ukraine expanded significantly, and by 1917, it included 103 of such schools, where 8800 students were studying.[300]

The situation with higher education in Ukraine was somewhat different in imperial times. That issue was of utmost importance to Polish nationality, for the intellectuals had considerably to quench the spiritual thirst for Poles. At the end of XIX, in Ukraine, there were 5,2% of Poles among the all intellectuals. Given the contemporary conditions, it was not the worst situation, because the percentage of Poles in the total population of Ukraine was 1,7%.[301]

The core center of higher education in Southern Ukraine was Novorossia University (the University), founded in 1865 on the basis of the Richelieu Lyceum. At that university, Poles made up about 20 % of the total number of students in the 1860's and 10% – in the 1870-90's.[302] At the time, 19 Polish professors and associate professors, including L. Tsenkovsky, F. Kamensky, B. Verigo, V. Rotert, F. Porodko, B. Grinevetsky, L. Berkevych and others, were employed at the University.

Thus, despite all the oppression of tsarism in the early XX century, Poles were able to gain the right to national education. With the coming to power of the Bolsheviks, the attitude towards the entire education system, including national minorities, was changed dramatically. Separately, in Soviet times, it can be distinguished the 1923-1938 period of introduction of the so-called korenization (indigenization or nativization) policy, initiated by the XII Congress of the Russian Communist Party (Bolsheviks) or RCP(B) in April 1923, which core has become the formation of national districts, national settlement and village councils. Authorities and management in these administrative formations have not differed in their competence from similar local bodies in the whole republic. The specifics of their activities mainly consisted of meeting the needs of national minorities in the linguistic and cultural spheres.

According to the All Russian Census of Population of 1926, there were 23 368 Polish nationals in Southern Ukraine.[303] In the mid-1920's, they resided in six settlements and the most of them lived in the Kherson and Mykolaiv districts.[304] Forming the compact groups in the territory of modern Mykolaiv Oblast, Poles lived in the following four settlements: the village of Kyselivka in

[299] ЛІСЕВИЧ, І. Т. (1997). Духовно спраглі (Духовне життя польської національної меншини на Наддніпрянській Україні в 1864-1917 рр.), с. 9-10.

[300] Ibid, с. 40.

[301] Ibid, с. 44-45.

[302] КОНДРАЦЬКИЙ, А. А. (1991). Поляки на Україні в X-XIX ст., с. 92.

[303] Всесоюзний перепис населення 1926 р. (1929). Т. XIII. Москва: ЦСУ СССР, с. 12-36.

[304] НАУЛКО, В. (1998). *Хто і відколи живе в Україні*. Київ: Головна спеціалізована редакція літератури мовами національних меншин України, с. 51.

the Snihurivka Raion, the Zhovten khutor of the Balanivsk village council of the Ochakiv Raion, the Ivanitsk khutor of the Pryvilnianskyi Raion, and the village of Shcherbani in the Voznesensk Raion.[305] There was only one village council of the 92 Polish national village councils allocated in the 1920's, in the South of Ukraine, – the Kiselevka village council that counted 1413 Poles.[306] Among the primary tasks of the national village councils, which concerned the cultural and educational construction in the villages, there were the organization and establishment of national schools, creation of the illiteracy eradication centers, village buildings, reading rooms, mugs and libraries.[307]

In the early years of Soviet power, the Bolshevik leaders realized that one of the most important conditions for the support of Soviet authorities by non-Russian peoples could be a policy of temporary concessions and compromises to solve national problems, as well as open 'flirtations' with the local national-communist community. Those conditions formed the basis of an korenization policy aimed at giving the peoples, united in the Ukrainian Soviet Socialist Republic (USSR), a certain 'cultural and national autonomy' – a real opportunity to develop their national cultures and languages.

According to the 1926 All Russian Census, there were 78% of literate urban Poles in Southern Ukraine; only 36,9% of them spoke the language of their nationality; among rural residents, the figures were 66,3% and 34,9% respectively. The language was mostly Russian in cities and Ukrainian – in rural areas.[308]

It was more expedient to increase the literacy rate of the population in their mother tongue and to instill a new 'socialist culture' through educational and cultural institutions. Therefore, in five years it was planned to create a network of general educational establishments, where teaching would be conducted in the national language, to establish literature production in the languages of national minorities, to create a nationwide network of research and higher educational institutions that would serve the needs of the national minorities of the republic.

The real practical steps for the implementation of the korenization policy were the Regulations of the All Ukrainian Central Executive Committee and the Council of People's Commissars of Ukrainian SSR *On Measures to Ensure Equality of Languages and to Facilitate the Ukrainian Language* (August 1923) and *On Ensuring Equality of Languages and Promoting the Development of Ukrainian Culture* (July 1927). The last document in the section *About Language in Educational Institutions and Scientific Institutions* stated the following: "The network of educational institutions should be built so that the population of each nationality has an opportunity to receive primary education in the native language".

Considering the comprehensive concept of Sovietization, the education sector was seen as an ideological superstructure of the regime created, which determined the sole purpose of involving national minorities in Soviet constructing. The field of education included a wide range of activities, namely the development of elementary, secondary, higher schools, the elimination of illiteracy and more.[309]

Until the mid-1920's, there were no Polish educational institutions in Southern Ukraine, excepting a small number of Polish schools. Their work took place in unsuitable premises, without the necessary tools and manuals. The network of Polish schools in Ukraine began to grow from 1924/25 educational year. In those years, there were only 5 Polish schools in Southern Ukraine (per one in the Odesa and Mykolaiv districts) and three – in the Kherson district that made up 0,25% of

[305] ТРИГУБ, П. М. (2001). Польське населення Миколаївської округи у 20-х рр. XX ст. *Південний архів. Історичні науки,* (5), с. 143.

[306] Центральний державний архів вищих органів влади та управління України (ЦДАВО України), ф. 413, оп. 1, спр. 541, арк. 117, 124.

[307] Державний архів Миколаївської області (далі – ДАМО), ф. Р–161, оп. 1, спр. 1161, арк. 104.

[308] Всесоюзний перепис населення 1926 р. (1929). Т. XIII, с. 12-36.

[309] МІРОНОВА, І. С. (2002). Впровадження рідної мови в національні заклади освіти Півдня України в 20-30-ті рр. XX ст. *Історичні і політологічні дослідження: науковий журнал,* (2/10), с. 107-108.

all schools in the region.[310] In the following 1926/27 educational year, there were already three Polish schools in Mykolaiv, and one – in the district;[311] Polish evening schools also functioned.[312]

Often Polish schools were set up for short periods. For example, in 1925, the village of Shcherbani in the Voznesensk Raion, Mykolaiv district, where 75% of Poles lived, the Polish school was existing only three months in the winter, while being kept at the expenses of the community.[313]

In contrast to other nationalities, including Jews, the Polish population was quite positive about opening Polish schools. However, in the quality of their work, those schools were very lagging behind the Ukrainian and Russian ones due to the insufficient number of pedagogical staff, educational literature, school equipment, and special premises etc. The poorly developed network of Polish schools of the 2nd Concentra violated the continuity in the education system of the Polish population. That problem was not only regional but also nationwide. Most Polish children graduating from primary school in the national language were forced to continue their education in Ukrainian or Russian 7-year schools that negatively affected their achievements.

On the other hand, there were difficulties in continuing education after graduating from 7-year schools in the national language. For example, in Odesa, Polish children did not have an opportunity to continue their education due to the lack of higher education institutions and vocational schools in the national language. It was not possible to join Ukrainian or Russian vocational schools, because they could not pass the exams without knowing the special terminology in those languages.[314]

The main purpose of the Soviet authorities regarding Polish schools was to supplant national and religious essence from the educational process, from the life of the school in general, and to introduce ephemeral Soviet standards-substitutes. Here is how the director of the Mykolaiv city Polish school Vendzykovska put it about the national policy of Soviet power: "This policy is nonsense, because we have the Moscow, but not national content in the literature in the national minorities languages".[315] In order to prevent such statements, the Soviet authorities paid serious attention to Polish teachers with the old ideology, holding various discussions and meetings among them, and replacing them with Soviet-minded teachers.[316]

It should be noted that the nationalization of the Polish population did not take into account its national features at all. First of all, it concerned the deep religiosity of Poles, the significant influence of the Catholic Church on the life of a Polish family. The authorities' neglect of the religious feelings of Poles and their persecution for religious beliefs also took place in the South of Ukraine. Thus, the already mentioned teacher Vendzykovska was accused of demonstrative participating in a religious procession led by a ksondz all over the city under the religious khorugvs together with a part of the students during the funeral of another teacher. A conclusion was the following: she gave a negative example to her students. To prevent the Catholic Church from influencing students, party functionaries even delimited the school from the church by a fence. Nevertheless, the students continued to flee from school to worship, using a hole made in the fence.[317] Thus, the above facts clearly showed that the Polish bureau of the Mykolaiv City Party Committee and the district inspectorate had almost lost ideological control over the Polish school.

Korenization policies have created some difficulties in the field of education, in particular, caused lacking teachers, who were fluent in national languages. Training courses for Polish teachers

[310] Державний архів Одеської області (ДАОО), ф. П–3, оп. 1, спр. 1218, арк. 45.

[311] ДАМО, ф. Р–161, оп.1, спр. 1166, арк. 40.

[312] МІРОНОВА, І. С. (2002). Впровадження рідної мови в національні заклади освіти Півдня України в 20-30-ті рр. XX ст., с. 109.

[313] ДАМО, ф. Р–99, оп. 1, спр. 889, арк. 92.

[314] ТРЕТЯКОВА, О. (2015). Особливості освітнього розвитку польського населення Півдня України в 1920-х рр. *Педагогічний дискурс,* (18), с. 236.

[315] СОБОЛЬ, П. І. (2001). Совєтизація етнічних поляків Миколаївщини: 20-і роки. *Щотижня,* (16 серпня), с. 4.

[316] ДАМО, ф. П–1, оп. 1, спр. 118, арк. 5, 20.

[317] СОБОЛЬ, П. І. (2001). Національно-культурне життя поляків Миколаївщини в 20-ті роки XX століття. *Південний архів. Історичні науки,* (5), с. 157.

were organized only at the Polish Pedagogical Technical School in Kyiv.[318] They gave good results, although they could not meet the requirements that were put forward.

The need for qualified staff to work among national minorities has also contributed to the growing network of the secondary specialized and higher education institutions, which provided with courses taught in their native language. In different years, specialists in the Polish language were trained by the Polish Institute in Kyiv, 7 departments at the higher educational establishments, 9 pedagogical technical schools, and the Polish Technical School of Agricultural Mechanization in Odesa.[319]

In the early 1930's, the Soviet government overcame considerable difficulties in shaping national policy. The main problem was that in the places of national minorities compact residence, especially of Polish and German nationalities, the process of Bolshevization of education was difficult. The authorities failed to undermine the national foundations of cultural life and to deprive those peoples' representatives the resistance ability.[320] For that case, the gradual decline of education among national minorities begun. At first glance, during those years, a harmonious, branched, efficient system of establishments and institutions was formed in order to satisfy the cultural and educational needs of national minorities of Ukraine, to provide them with methodological assistance and to guide scientifically. Unfortunately, there was laid the beginning of the 'national renaissance' end in the discussed period.

In 1930's, with the establishment of totalitarian, dictatorial regime in the country, a gradual forced collapse of national, including Polish, institutions, began. It led to the decline of Polish public life and national culture. One of the core reasons for that phenomenon was the deterioration of the USSR's relations with Germany and Poland and the corresponding intensification of the anti-German propaganda campaign, which led, among other things, to the particular bias of the Soviet authorities regarding the German and Polish populations.

However, the educational processes in the national minorities environment were still inertia. The enrollment percentage of different nationalities children in primary education reached 95,2%. Nevertheless, the data on the ability to receive a native language education during that period were not as impressive. In 1931, the Soviet government set out the task of completely eliminating illiteracy in Ukrainian and Russian among national minorities. The need to learn Russian in Ukrainian in schools was conditioned by the strengthening of fraternal ties and the unity between the Ukrainian and Russian peoples and the peoples of the former USSR for their further economic and cultural growth.

Firstly, a fundamental reorganization affected Polish schools. On December 20, 1935, the Politburo of the Central Committee of the Central Committee of the Communist Party (Bolsheviks) of Ukraine or CCCP (B) U [TsK KP(b)U] approved a regulation stating the existence in the republic of "nationalist schools, which are artificially created by Polish nationalists". There were issued the CCCP (B) U Resolution *On the German and Polish Schools in Ukraine* (December 13, 1933)[321] and the Resolution *On the Reorganization of National Schools in Ukraine* (April 1938)[322] that put an end to the existence of the Polish educational institutions, transferring (translating) the training into Ukrainian and subsequently into Russian. M. Popov and V. Balitsky received a separate order and were obliged "to replace all teachers-nationalists in Polish schools and Polish sets of Ukrainian schools by Soviet teachers".[323]

On March 4, 1935, it was adopted the CCCP(B)U Resolution *On the Teaching of the Ukrainian Language at the Schools of National Raions*, and on April 20, 1938, – the Resolution *On Compulsory Study of the Russian Language in Non-Russian Schools of Ukraine*, which greatly

[318] Бюлетень Народного комісаріату освіти. (1928), 10 (97), с. 9-11.
[319] ДАМО, ф. П–1, оп. 1, спр. 228, арк. 34.
[320] ДАНИЛЕНКО, В. М. (1994). Згортання українізації й посилення русифікаторських тенденцій у суспільно-політичному житті Радянської України. *Україна XX ст.: культура, ідеологія, політика,* (2), с. 103.
[321] Центральний державний архів громадських об'єднань України (далі – ЦДАГО України), ф. 1, оп. 6, спр. 286, арк. 108.
[322] ЦДАГО України, ф. 1, оп. 6, спр. 463, арк. 2-4.
[323] ЦДАГО України, ф. 1, оп. 6, спр. 12, арк. 278.

increased number of hours for studying Russian in national schools. However, such measures, of course, did not remove the core problem of national minorities education. Its radical decision was made on June 29, 1938, in the Resolution of the Council of People's Commissars of the USSR *On the Reorganization of Special National Schools, Technical Schools, the German Pedagogical Institute in Odessa and Special National Departments and Classes in Schools, Technical Schools and Universities of the Ukrainian SSR*. According to it, 766 national primary, incomplete secondary and secondary schools were to be reorganized by August 1, 1938, into the same schools with Russian (mainly) and Ukrainian teaching languages, as well as the association of another 122 schools with Russian and Ukrainian schools.[324]

During that period, the number of Polish educational institutions decreased greatly. While, there were 381 USSR Polish schools in 1930,[325] and 238 Polish schools functioned in 1934,[326] it was left only 63 of them[327] (1 – in the South of Ukraine)[328] at the time of reorganization and, in fact, the liquidation of the network of school education institutions of national minorities.

Universities and technical schools, faculties and national offices were also reorganized. The institutes of Polish culture were closed, but in fact destroyed. In addition, during 1932-1938, the search for the Polish 'fascists' led to the elimination of the Polish Technical School of Agricultural Mechanization in Odesa and the evening working school and the collapse of the Polish club.[329]

The policy of eliminating the national zoning system of 1935-1939, when the national minorities were scattered among the Ukrainian and Russian populations, contributed to the curtailment of education of national minorities. The districts were reorganized in such a way that the Germans, Poles, Bulgarians and other nationalities formed a minority in their population.[330] Repressions in the environment of the creative intelligentsia and responsible workers, which started with great force in 1937-1938, completed the case. After 1938, we could find no mention of the national, including Polish, educational institutions in the South of Ukraine existence.

The 'ethnic renaissance' in the USSR and Ukraine, which, according to A. Antonyuk, was marked by the rehabilitation of undeservedly accused and repressed peoples, their national heroes, cultural figures, activities of the national-patriotic associations and organizations, the influence of foreign diasporas, the resistance of all ethno-national communities to forced assimilation and Russification, the emergence of new (critical) ethno-political thinking, in particular, began only in 1989-1991. National-patriotic organizations that advocated the preservation of the national language and culture were active in Ukraine.[331]

Enhancement of the national-cultural movement was facilitated by the Law *On the Languages in the Ukrainian SSR* adopted on October 26, 1989, by the Verkhovna Rada. The Article 2 of the Law declared Ukrainian as the state language. The languages of international communication were called Ukrainian, Russian and others. The use and development of the languages of all peoples living in Ukraine, the right of citizens to use their national or any other language were guaranteed. As a result of this law, training of more than 12,000 citizens at 711 elective courses was transferred

[324] МІРОНОВА, І. С. (2002). Впровадження рідної мови в національні заклади освіти Півдня України в 20-30-ті рр. ХХ ст., с. 110.

[325] ГРИЦЕНКО, М. С. (1966). *Нариси з історії школи в Українській РСР (1917-1965)*. Київ: Радянська школа, с. 57.

[326] МАЦ, Д. (1935). На высоком подъеме: О работе среди национальных меньшинств Украины. *Революция и национальности, 6,* с. 60.

[327] Інструкція про порядок реорганізації шкіл в західних областях України. (1939) Київ: НКО УРСР. Управління шкіл, с. 152-153.

[328] МИХАЙЛУЦА, М., & БУРУНДУКОВА, М. (1994). Сталінщина: розвал національних шкіл Одещини (1937-1938 рр.). *Розбудова держави, 3,* с. 45-47.

[329] ДАНИЛЮК, Ю. В. (1994). Масові репресії проти німецького населення на Одещині в 30-ті роки. Тези доповідей '94: *Одесі – 200: Матеріали міжнародної науково-теоретичної конференції, присвяченої 200-річчю міста.* Одеса, с. 144.

[330] Німці в Україні в 20-30-і рр. ХХ ст.: Збірник документів державних архівів України. (1994). Київ: Ін-т історії України, с. 204-206.

[331] АНТОНЮК, О. В. (1999). Етнополітика в Україні: історія та сучасний стан. *Український історичний журнал, 4,* с. 19-20.

to the Crimean Tatar, Bulgarian, Hungarian, Polish, Czech, Novogreek, Gadauzk, Hebrew languages.[332]

The real ethnic revival of the Poles in Ukraine appeared in the formation of a number of national-cultural societies and the intensification of their activities. In particular, in July 1988, the Polish Cultural Section of the Ukrainian Branch of the Ukrainian Branch of the Society for Friendship and Cultural Relations with the Foreign Countries (later – the Cultural and Educational Society of Poles in Ukraine) was established; afterwards, the Polish Culture of the Lviv Land [Towarzystwo Kultury Polskiej Ziemi Lwowskiej], the Union of Poles in Ukraine [Związku Polaków na Ukrainie], the Polonia Society [Towarzystwo Polskie 'Polonia'] (in the Odesa Oblast) were founded.

There were created Polish public associations in Chernivtsi, Ternopil, Ivano-Frankivsk, Lutsk, Rivne, Zhytomyr, Khmelnitsky, Odesa and other cities, as well as the Federation of Polish Organizations in Ukraine.[333] Activity of national professional and amateur theatrical and concert organizations and collectives, newspapers resumed in various regions and cities of Ukraine. Revival of traditional ethnic groups beliefs and religious communities took place.[334] Generally, the restructuring led to an active manifestation of the national consciousness of the Polish community, which was expressed in its desire to preserve the Polish identity, language, culture and to resist increased Russification.

In the period of independence of Ukraine, national minorities felt the support of the state and achieved some development in language policy of cultural and educational institutions and public institutions.

Since the passing of the Law *On National Minorities* in 1992, Ukraine has become a party to a number of international treaties concerning the rights and protection of national minorities, and has proceeded to solve one more significant task – the educational revival of ethnic groups. A wide range of national minority education organizations reflected the educational legislation – the Laws *On Education*, *On General Secondary Education*, *On Extracurricular Education*, *On Higher Education* and more.[335] In 1999, the Association of National and Cultural Unions of Ukraine [Asotsiatsiia Natsionalno-Kulturnykh Obiednan Ukrainy] was established in 1999 to unite efforts and to coordinate the actions of individual national-cultural public organizations.[336]

Treaty Between Ukraine and the Republic of Poland on Good Neighbourhood, Friendly Relations and Cooperation, ratified in 1992, has become of great importance for the Ukrainian-Polish relations. It is stated in the Article 2 that the parties act in accordance with international standards for the protection of national minorities, recognition of their right to preserve their ethnic, cultural, linguistic and religious identity.

Although the number of Poles in Ukraine as a result of natural and artificial demographic processes and the massive departure to the historical homeland, which peaked in the crisis of 1995-1997, has decreased from 219 thousand in 1989 to 144 thousand in 2001, they continue to demonstrate their ethnic advancement and occupy one of the dominant positions among the ethnical groups of foreigners in our country. The Polish community is one of the most integrated ethnic minorities in Ukrainian society, which, despite its assimilation and urbanization phenomena, has retained the basic parameters of its identity, demonstrating active involvement in national and cultural revival and becoming a reliable bridge for Ukrainian-Polish cooperation and partnership.[337]

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[332] КОТИГОРЕНКО, В. (2012). Україна багатонаціональна після Другої світової війни (1945-1991). In *Національне питання в Україні ХХ – початку ХХІ ст.: історичні нариси.* Київ: Ніка-Центр, с. 503-504.

[333] ПАПАКІН, А. Г. (2018). Поляки в Україні. In *Енциклопедія історії України. Том (Україна – Українці):* Кн. 1. Retrieved from http://www.history.org.ua/?termin=poljaky_v_ukrajni.

[334] КОТИГОРЕНКО, В. (2012). Україна багатонаціональна після Другої світової війни (1945-1991), с. 506-508.

[335] ЗЕРКАЛЬ, М. М. (2013). Освіта національних меншин України (1999-2000-ні рр.). *Український історичний журнал, 2,* с. 123-127.

[336] МІРОНОВА, І. С. (2006). *Національні меншини України: Навчально-методичний посібник.* Одеса – Миколаїв: Вид-во МДГУ ім. Петра Могили, с. 137.

[337] КАЛАКУРА, О. Я. (2007). Мовно-культурний розвиток сучасної польської меншини в Україні. *Наукові записки Інституту політичних і етнонаціональних досліджень ім. І. Ф. Кураса НАН України,* (34), с. 238-239.

Poles live in all regions of Ukraine, but most of them are related to the following traditional settlements: Halychyna [Galicia], Volyn, Podillia, Polissia, Kyiv ta Kyivshchyna (the Kyiv Oblast). It is worth noting that the relatively large share of Poles remains in the South of Ukraine – in Odesa, Kherson, Mykolaiv Oblasts and in the Crimea, as well as in industrial regions – in the Donbas, Dnipropetrovsk and Zaporizhzhia.[338]

The beginning of the 2000's has been marked by the stabilization of the Polish national-cultural societies activities in the South of Ukraine. The Polish Cultural Center in Odesa, the Society of Polish Culture named after A. Mickiewicz in Zaporizhzhia, the Polish Houses in Crimea, in the village of Yakymivka of the Zaporizhzhia Oblast, as well as the centers of Polish culture in Mykolaiv and Dnipro are distinguished by their meaningful work

The Ukrainian authorities have understood the initiative of the Polish public associations, which put the issue of national education and schooling in prominent place in their activities that is stipulated by the inherited from totalitarian regime educational and language situation not only among children, but, also, among adult Poles. According to the 2001 All Ukrainian Population Census, the level of education of the Polish minority and Poles' fluency in their native language was far from ideal. Thus, among 138 thousand Ukrainian Poles of 10 years of age and older, 11,29% had a complete higher education; 0,43% of them possessed a basic higher education; 16,84% – an incomplete higher education; 34,31% – a complete general secondary; 16,68% – a basic general secondary education; and 15,19% of Poles had an elementary general education. The situation with the possession of Poles in the native language was even worse. According to the 2001 Census, only about 13% of them called Polish as their mother language, which was a direct consequence of the assimilation and Russification processes in times of totalitarianism.

Given the difficult linguistic and educational situation in the Ukrainian polonium, Polish societies put forward the revival of national education in its various forms at the forefront of their activity. During the first ten years of independence, the foundations of the Polish education system in Ukraine were laid and included schools and classes with the Polish language of teaching; schools and classes with Polish language as optional; Sunday school classes for children and adults. According to the Ministry of Education and Science of Ukraine, in 1995, 3047 students studied Polish in 88 schools, 239 classes and groups. Today, thousands of pupils and students are learning Polish optionally. Hundreds of graduates from high schools, gymnasiums, lyceums and colleges attend full-time or part-time study at Polish higher schools, as well as Polish courses in summer time.[339]

Since 1997, the revival of the Polish language and education has begun in Mykolaiv at the Mykolaiv Regional Society of Poles. The first organizer of such undertakings was I. Andrieieva. The Society organized evenings dedicated to the Polish language, traditions and holidays. Since 2001, the Days of Polish Culture have been held in the city. From the same year, the Society is headed by Yelyzaveta Selianska.[340]

Today, there are only six Polish-language schools left in Ukraine – two of them in Lviv (the Konopnitska school and the School № 10 named after St. Mary Magdalene), in the Horodok City in the Khmelnytsk Oblast, the villages of Lanovychi, Striletsk ta Mostysk in the Lviv Oblast. Five more schools, – in Shepetivka, Ivano-Frankivsk Kamianets-Podilskyi, Zhytomyr and Dovbysh, – have Polish language classes. Also in Ukraine, and, in particular, in its Southern region, there are more than 60 schools in which Polish is taught as a foreign language. There are also several dozen educational institutions, where Polish is taught during elective classes; there are Saturday and Sunday schools of Polish, training places in Polish organizations and parishes. Courses in Polish are also taught at universities.

Nevertheless, today, teachers of Polish schools are concerned about secondary education law, which reduces training in languages of national minorities in favour of increasing education in the official language – Ukrainian. At present, in connection with the protest of Hungary, the

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[338] Ibid, с. 239-240.
[339] Ibid, с. 240-244.
[340] КУХАРЕНКО, Б. (2012). Поляки в Николаеве, с. 414.

introduction of this document has been suspended. Moreover, the core problems of modern Polish schools remain insufficient state funding, because, mainly, these schools work through support from Poland, as well as a lack of teaching staff.[341]

Thus, comparing the development of the Polish population education in Ukraine during the imperial and Soviet times, it could be noted a similar obsessive idea and ideology of governments of these epochs about the continuous Russification of the entire population of the country, including the Polish, expressed in the prohibition of opening national educational institutions. However, despite the state-wide oppressions in education of the Polish population, Southern Ukraine in the imperial period differed from other regions of Ukraine in a more loyal attitude to the Polish population, since the industrial development of the region required a large number of educated people, many of whom were Poles.

The policy of the Soviet leadership on the educational development of the Polish community is unambiguous. It had both positive and negative effects. The efforts of the Soviet authorities to improve the educational state of Poles was a substantial matter. They were able to raise the level of literacy in their native language; the network of Polish educational institutions functioned properly; gradually disappeared reluctance of the population to study at school with their native language of teaching and so on. In general, the educational interests of the Poles of Southern Ukraine were sufficiently secured in the first phase of the korenization policy. However, the departure from such kind of policy, the destruction of its effects since the early 1930s, accompanied by the intensification of big-state and Russification tendencies, finally resulted in the destruction of national education.

At the time of Ukraine's independence, Poles were distinguished by their different educational potential and ability to integrate into Ukrainian society. On the whole, the state formed an effective legal framework that defined the place and role of the Polish community in the society structure, guaranteed the system of rights and freedoms, regulated the effective activity of educational institutions, provided methods of international cooperation in that field, etc. Today, the Polish community of Southern Ukraine, despite the disappointing modern reality, still tries to revive its ethno-national features, in particular the native language, to develop traditional folk culture and mentality. Reviving the national cultural and linguistic traditions of the ancestors, Poles in Ukraine are a reliable bridge of Ukrainian-Polish understanding, cooperation and partnership.

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[341] Польські школи в Україні також почали новий навчальний рік. Retrieved from http://archiwum.polradio.pl/5/38/Artykul/380788.

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3.7. AGGRESSIVE BEHAVIOR OF TEENAGERS: CAUSES AND CONSEQUENCES

The problem of aggression and aggressive behaviour in science becomes relevant when society is going through critical periods of development. Transformation of the former socio-political, economic system, high level of protest sentiment, war in the east of Ukraine, cultural changes, which leads to exacerbation of social contradictions, rethinking of values, norms and laws of morality have led to bursts of aggression, increase of violence and crime, cruelty behaviour.

The growth of aggressive tendencies in the teenage environment reflects one of the most pressing social problems in our society, aggressive behaviour, today, more like a routine than an exception. The high level of aggression in the teenage environment is a dangerous factor as it adversely affects not only educational activities, relationships with parents, friends, peers, individual development, but also the success of their future personal and professional activities.

In this regard, it is urgent to find the answer to the question of why people act aggressively and what measures should be taken to control or prevent aggressive behaviour. Teenager is characterized as a turning point, transitional, critical, there is a formation of qualitative neoplasms, transformation of relationships with adults and peers, the development of new ways of social interaction, as well as laying the foundations of conscious behaviour.

The causes of adolescents' aggressive behaviour and factors that absorb its formation have been studied by such scientists as: O. Bilous, N. Grebinichenko, T. Kostyuchenko, I. Malysheva; questions of methods of prevention of aggressive behavior of adolescents in their scientific works are considered by Yu. Andreev, I. Gaidamashko, T. Zhuravel, N. Malikova, K. Sergeyev; the problem of correction of aggressive manifestations in different categories of children and adolescents was investigated by L. Galushko, T. Lomova, V. Pavelkov; peculiarities of manifestations of aggressive behaviour of children and adolescents were studied by I. Masokh, O. Mizern, O. Tarasov, I. Feduk; N. Sukhareva was engaged in research of gender peculiarities of manifestation of aggression in children.

Scientific works of foreign and native scientists: K. Dodge, M. Kaplan, K. Lebedynskaya, Y. Mozhinsky, A. Paterson, M. Paradise, A. Statsenko, G. Sukhareva, R. Husman are devoted to the development of the practical side of aggression in the adolescent period.

In scientific works, the term «aggression» is used in a broad context: self-confident and selfish behavior (R. Broun, S. Kravchuk, R. Smith, J. Tedeshi); physical or verbal behaviour whose sole purpose is to hurt, harm, destroy (A. Adler, R. Beron, A. Rean, T. Rumyantseva, K. Horney); activity display, pursuit of achievement, tool for self-realization (D. Atkinson, J. Dollard, M. Levitov). According to A. Bass, E. Donchenko, M. Klein, T. Titarenko, at the basis of any manifestation of aggression is the property of personality, as aggressiveness.[342]

The theory of social learning proposed by A. Bandura is unique: aggression is seen here is a specific social behaviour that is assimilated and supported in much the same way as many other forms of social behaviour. According to A. Bandura, the analysis of aggressive behaviour requires taking into account the ways of mastering such actions; factors that provoke their appearance; the conditions under which they are fixed[343].

In the scientific literature, they distinguish «aggression» and «aggressiveness». «Aggression» is a form of behaviour that is partly social learning (media, peers, family) and partly a consequence of aggression (personality traits) and «aggressiveness» is a conscious or unconscious tendency to aggression.

According to F. Bassin, the distinction between the terms «aggression» and «aggressiveness» leads to important consequences: first, not for any aggressive actions of the subject should see the aggressiveness of the person, secondly, the aggressiveness of the person does not always manifest in manifestly aggressive actions. By itself aggressiveness does not make the subject socially

[342] Lomova T. Psychological peculiarities of the aggressive behavior of high school students and its correction in the process of educational activity: the dissertation author's abstract for obtaining the scientific degree of candidate of psychological sciences in the specialty 19.00.07 – pedagogical and age psychology, 2009. – 23 p.

[343] Bandura A. Teenage aggression. The study of the influence of education and family relationships, 1999. – 512 p.

dangerous, since, on the one hand, the existing link between aggression and aggression is not straightforward, and on the other hand, the act of aggression may not take on socially dangerous and non-publicly accepted forms. Often, aggression is understood as «malicious activity». However, destructive behaviour in itself is not «malicious», such is the motive of activity, that is, and those values for the sake of achievement and mastery by which activity are unfolded. External practical actions may be similar, but their «motivational components are the exact opposite»[344].

Considering the fact that people often lose control of themselves, aggression is behaviour that is aimed at causing harm or damage to another living creature that has every reason to avoid such behaviour. A. Rean emphasizes that the proposed definition includes the following separate provisions: aggression is intentional, deliberate harm to the victim; aggression can only be considered behaviour that involves injury or damage to living beings; victims should be motivated to avoid such behaviour[345].

It should be borne in mind that aggressive behaviour can be both direct, when a person does not hide his aggression from others, and indirect, when the aggression is concealed by hostility, aversion or irony. Direct aggression is manifested in various ways, ranging from expressing threats to the other party and ending with direct aggressive actions. Indirect aggression puts pressure on the victim.

To do aggressive action, you need to know how to use a weapon, which movements on physical contact will be painful for the victim, and you need to understand what words or actions are causing the objects of aggression. Because this knowledge is not given at birth, people must learn to behave aggressively, although the role of biological factors is undeniable. One important means of assimilating a wide range of aggressive reactions by a person is to directly encourage such behaviour. After receiving support for aggressive actions, the probability that such actions will continue to occur is increased.

If direct experience plays an important role in assimilating aggressive reactions, then learning through observation has an even greater impact. A. Bandura points out that it is dangerous to rely on trial and error[346]. This method of assimilation of aggressive behaviour is not an adaptive process because it threatens dangerous or even fatal consequences. It is safer to watch the aggressive behaviour of others; this creates an idea of how the behaviour is constructed, and in the future the symbolic expression of this representation can serve as a guide to action. There is no need to demonstrate live social patterns of such behaviour: their symbolic portrayal in motion pictures, television shows, and even in the literature is enough to shape the effect of learning in humans.

Aggressive behaviour is a form of disruption communicative activity in response to various unpleasant in a physical and mental sense, life situations that cause stress, frustration, etc. Aggression can be a way of achieving a certain goal or a way of psychological unloading, even a way of satisfying the need for self-fulfilment and self-affirmation.

The most recognized is the common concept of the scheme proposed by A. Bass and A. Darko: physical aggression (attack); indirect aggression (gossip, furiousness by screaming, stomping feet); tendency to irritation (readiness for the appearance of negative feelings with the slightest disturbance); negativism (oppositional behaviour from passive resistance to active struggle); hurts (envy and hatred of others for true and fictional information); suspicion ranging from distrust and caution to the belief that all other people are harming or planning to harm; verbal aggression (expression of negative feelings both through form – quarrel, shout, scream, and through the content of verbal responses such as threat, curse, swearing)[347].

In the theories of the occurrence of aggression of teenagers A. Reansays about two main trends. It is either a predominantly biological mechanism that emphasizes the role of neurophysiological mediators and the functional state of deep brain structures, or the dynamic

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[344] F. Bassin, Heavy Burden of Light Analogies, 1979. – P. 49-57.
[345] A. A Rean, Gender differences in the structure of aggressiveness in adolescents, 1999. – № 3. – P. 6-7.
[346] Bandura A. Teenage aggression. The study of the influence of education and family relationships, 1999. – 512 p.
[347] Mozhginsky, Yu. B. Aggression of adolescents: an emotional and crisis mechanism, 1999. – 220 p.

theory of aggressive behaviour that suggests that the main mechanism of aggression is pathological and personal development, especially during a period of life[348].

In order to determine whether it plays the role of adaptation (or maladaptation) in adolescents' behaviour, it is necessary to divide productive («constructive») and unproductive («destructive») aggression into typical forms of their manifestation. The first can manifest itself when there is no malicious intent to harm anyone. In this case, the aggressive behaviour is reduced to defensive or unintentional acts or to aggression as self-affirmation. In non-constructive acts of aggression, the intent to harm anyone is the basis for choosing aggressive behaviour as a way of interaction.

The modern teenager lives in a world complex in its content and tendencies of socialization. This is due, first of all, to the pace and rhythm of technological transformations that make new demands on teenagers. Secondly, that creates a lot of «noise» affecting a teenager who has not yet developed a clear life position. Third, with the environmental and economic crises which have plagued our societies, which cause feelings of hopelessness and irritation of teens. In doing so, they develop a sense of protest, often unconscious, and, at the same time, their individualization grows, which, in the loss of social interest, leads to selfishness. Adolescents of more age groups suffer from instability of social, economic and moral, having lost the necessary orientation in values and ideals today: the old were destroyed and the new were not created.

An aggressive behaviour of teens is a complex process that involves many factors. Aggressive behaviour is determined by the influence of family, peers, and the media.

Particularly important is the role of small groups in which the teenager interacts with other people. First of all, it concerns the family. So when talking about the peculiarities of aggression in adolescence, it is necessary to take into account the fact that the teenager grows up in the family, and the family is almost always a major factor in socialization, it is the main source of living examples of aggressive behaviour for most children.

As the child undergoes the stage of primary socialization, it is desirable to dwell in more detail on the factors that shape the model of aggressive behaviour in the family. Of great importance in terms of the development of aggressive behaviour of the child in and outside the family, as well as the nature of relationships with others in adulthood are: the parents' reaction to the behaviour of the child who does not arrange them; the nature of the relationship between children and parents in general; the level of family harmony or disharmony; the nature of relationships with siblings[349].

There are certain characteristics of families where children with abusive behaviour can be distinguished:

- in families of aggressive children, emotional attachment between parents and children is broken, especially between father and son;

- parents often demonstrate patterns of aggressive behaviour themselves and encourage aggressive tendencies in their children's behaviour;

- mothers of aggressive adolescents often show indifference to their children's social roles;

- often the parenting patterns do not match their actual behaviour, the parents do not follow a common line of behaviour in the upbringing of the child and their requirements are mutually exclusive;

- the main educational means used by parents of aggressive adolescents: physical punishment, threats, deprivation of privileges, imposition of restrictions and lack of incentives, deliberate deprivation of love and care in case of misconduct;

- parents of aggressive teenagers do not try to understand the causes of their children's destructive behaviour while remaining indifferent to their emotional world[350].

Parent-child closeness, the nature of sibling relationships, and the style of family leadership influence the formation of aggressive behaviour. Children who have a strong family disorder and whose parents are estranged and cold are relatively more likely to be aggressive.

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[348] A. A. Rean, Gender differences in the structure of aggressiveness in adolescents, 1999. – № 3. – P. 6-7.
[349] Volianskaya E. V. Socioculture determination of adolescent aggression, 2004. – 174 p.
[350] Volianskaya E. V. Socioculture determination of adolescent aggression, 2004. – 174 p.

Teens are strongly influenced by the adolescent group, which often forms an asocial scale of life values. The lifestyle, environment, style and circle of communication contribute to the development and consolidation of deviant behaviour. Thus, there is a negative microclimate in many families, which leads to the emergence of alienation, rudeness, hostility of some adolescents, the desire to do everything wrong, contrary to the will of others, which creates objective prerequisites for the appearance of demonstrative disobedience, aggressiveness and destructive[351].

Adolescents also receive information about aggression through peer communication. They learn to behave aggressively, observing the behaviour of others and find friends among other aggressive peers.

So, one of the main ways of forming aggression is to observe the aggression of others. All of the above factors should be taken into account by parents, educators, psychologists, and society as a whole when interacting with adolescents, since aggression is easier to prevent than subsequently correcting aggressive behaviour.

The reasons for the formation of teenagers' aggressive behaviour can be objective and subjective. Objective factors contributing to the formation of motivation for aggression, violence and cruelty in adolescents are economic and social conditions of society: economic instability, crisis, unemployment, sharp division into rich and poor, accompanied by demonstration in the masses of mass media life. At the same time, a decrease in the moral demands of the individual towards himself and society, to a particular individual, loss of cultural and spiritual values, and a decrease in personal responsibility, greatly contribute to the formation of aggressive and abusive behaviour of a minor. Mental anomalies may be subjective factors contributing to adolescents' choice of abusive behaviour. Chronic mental illness can also cause manifestations of cruelty and aggression, for example, patients with epilepsy have a sharp change in mood, hostile and aggressive attitude to others[352].

Among the various, interrelated factors that determine the detection of aggression are: an individual factor acting on the level of psychobiological prerequisites of a social behaviour that inhibits the social adaptation of the individual; psychological and pedagogical factor manifested in defects in school and family education; a social and psychological factor that reveals the unfavourable characteristics of the interaction of the minor with his or her immediate surroundings in the family, on the street, in the educational staff; personal factor, which is, above all, manifested in the active-selective attitude of the individual seeking his / her environment for communication; social factor, determined by the social and socio-economic conditions of society. The origins of aggressive behaviour are pedagogical and social neglect, various deviations in the state of physical and mental health[353].

Further, one of the most influential institutions of socialization in contemporary society is the media. Studies show that constant revision of scenes of violence blunts sensitivity to aggression, reduces the importance of internal factors that constrain it, increases actual manifestations of aggression in behaviour, and forms the wrong image of social reality, which can be the basis of such actions. As a result of violence, adolescents are no longer considered an unacceptable form of behaviour.

It is also possible to distinguish such factors that influence the formation of aggressive behaviour in adolescents such as: specificity of adolescence (character accentuations, desire of extreme, grouping with peers, maximalism); characteristics of the teenager's personality (increased levels of excitability, aggressiveness, educational maladaptation, social and / or pedagogical neglect); socio-economic and cultural features of society (values, norms, customs)[354].

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[351] Malysheva I. B. Factors of formation of aggressive tendencies of the teenager [Electronic resource] – Access mode http://s-journal.cdu.edu.ua/base/2008/v3/v3pp166-168.pdf.

[352] Zhuravel T. V., Prevention of adolescent aggressive behaviour as a result of domestic violence, 2014. – P. 26-28.

[353] "Stop! – Smile!»: a methodological guide for the prevention of adolescent aggressive behavior in centers for social and psychological rehabilitation / T. V. Zhuravel, K. V. Sergeeva, O. G. Sharovar, 2013. – 124 p.

[354] A teenager in a big city: factors and mechanisms of socialization: qty. monogram / L. G. Sokuryanska, V. L. Arbenina, O. B. Zinchina, A. M. Nikolaevskaya, 2000. – 207 p.

The consequences of teenagers' aggressive behaviour can be diverse: conflicts with peers, parents, and teachers; reducing the level of efficiency of the educational process; adolescents' maladaptation; asocial behaviours of adolescents in adulthood; formation of different types and forms of deviant behaviour, etc.

Today the problem of teenage aggression is quite relevant in the society. The theoretical analysis of scientific approaches to the study of aggressive behaviour gives grounds to make the following conclusions: aggression is the result of assimilation of the relevant worldview, outlook and worldview, and is also one of the instruments of harmonization of the internal state of the individual. Aggressive personality behaviour is the result of a complex interaction of social and biological factors, the action of which is corrected by specific relationships, the specific situation in which it falls.

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3. Volianskaya E. V. Socioculture determination of adolescent aggression / Volianskaya E. V., Pilipenko V. E., Sapelkin E. V., scientific ed. V. E. Pilipenko. – K.: PC «Foliant», 2004. – 174 p.

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5. "Stop! – Smile!»: a methodological guide for the prevention of adolescent aggressive behavior in centers for social and psychological rehabilitation / T. V. Zhuravel, K. V. Sergeeva, O. G. Sharovar. – K.: FOP Storm, 2013. – 124 p.

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7. Malysheva I. B. Factors of formation of aggressive tendencies of the teenager [Electronic resource] / I. B. Malysheva // Cherkasy National University. Bohdan Khmelnytsky. – Cherkasy. – Access mode http://s-journal.cdu.edu.ua/base/2008/v3/v3pp166-168.pdf.

8. Mozhginsky, Yu. B. Aggression of adolescents: an emotional and crisis mechanism / Yu. B. Mozhinsky. – St. Petersburg.: Peter, 1999. – 220 p.

9. A teenager in a big city: factors and mechanisms of socialization: qty. monogram / L. G. Sokuryanska, V. L. Arbenina, O. B. Zinchina, A. M. Nikolaevskaya. – H.: View. the center of Kharkiv. nat. to them. V. N. Karazin, 2000. – 207 p.

10. A. A. Rean, Gender differences in the structure of aggressiveness in adolescents / A. A. Rean, N. B. Trofimova // Actual. problems of practice. psychologists. – 1999. – № 3. – P. 6-7.

3.8. INTERNATIONAL EDUCATION STRATEGY IN THE ASEAN COUNTRIES' POLICIES

The idea of harmonizing higher education systems in Southeast Asia was inspired by the development of regionalism in higher education in Europe, specifically the establishment of the European Higher Education Area (EHEA). Southeast Asia has been integrating rapidly mainly through trade and investment. The region is also witnessing increasing mobility of people in the region and between regions. This new context places higher education in a pivotal role in developing human resources capable of creating and sustaining globalized and knowledge-based societies. Harmonizing the highly diverse systems of higher education in the region is seen as an important step towards the regional integration objective. The most common measure is the step towards a greater degree of integration in higher education policies and practices through concerted regional efforts.

Regionalization of higher education has political, economic, social and cultural dimensions, similar to globalization.[355] As a political lever, regional cooperation provides opportunities for regions and individual nations to contribute to international quality assurance policy discussions. As an economic lever, regional integration provides smaller higher education systems entrance to possibilities of competition and cooperation on an international or regional scale. As a social or cultural lever, regional activities build solidarity among nations with similar cultural and historical roots.[356] Therefore, higher education regionalization looks differently, depending on the dimensions, actors, and values involved in the process.

Various studies have focused on the development of harmonization and regionalization in the ASEAN region, although most of them have concentrated on economic integration, trade facilitation and immigration policies, labor standards, and supply chain connectivity.[357] However, regional integration through the internationalization of higher education is also an important element in achieving regional unification and harmonization.[358] Thus, the current study aims to explore recent trends in the internationalization of ASEAN higher education aimed at harmonization among all member nations. The researchers found that internationalization practices – student / staff mobility, exchange programs, research collaboration, and regional scholarships – could lead to a more harmonized ASEAN community. The more developed countries – Singapore, Malaysia, Brunei, Thailand, Indonesia, and the Philippines – are actively developing their education systems to compete in the global knowledge society. In contrast, lesser developed countries – Cambodia, Laos, Myanmar, and Vietnam – are not competitive globally at this point due to a lack of sufficient resources for internationalization practices, language barriers, low funding and limited regional scholarships, and ineffective national and institutional policies to implement internationalization. Therefore, these countries need to increase their collaboration and research activities within the region and mobilize the inbound/outbound flow of students by providing financial assistance. It is necessary for ASEAN leadership to engage all nations equally to build a harmonious and unified ASEAN community.

In addition, the study attempts a comparative analysis of the internationalization practices followed by ASEAN nations and suggests practical approaches for globalization to bring about harmony and unity in the region.

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[355] Terada, T. Constructing an 'East Asian' concept and growing regional identity: from EAEC to ASEAN þ3, p. 251; Hawkins, J. Regionalization and harmonization of higher education in Asia: Easier said than done, pp. 96-108.

[356] Yepes, C. P. World regionalization of higher education: policy proposals for international organizations, p. 111.

[357] Lloyd, P. J. What Is a Single Market? An Application to the Case of ASEAN, pp. 251-265; Ayudhaya, P. D. N. ASEAN Harmonization of International Competition Law: What Is the Most Efficient Option? p. 1-5; Chia, S. Y. The ASEAN Economic Community: Progress, Challenges, and Prospects, pp. 269-315; Menon, J. & Melendez, A. C. Realizing an Asian Economic Community: Progress and Remaining Challenge, pp. 681-702.

[358] Altbach, P. G. & Knight, J. The Internationalization of Higher Education: Motivations and Realities, p. 290-305; Knight, J. Towards African Higher Education Regionalization and Harmonization: Functional, Organizational and Political Approaches, pp. 347-373; Khalid, J. Diversity's Promise for Higher Education: Making It Work. Asian Education and Development Studies, pp. 118-120.

Flowing from the 'ASEAN Vision 2020' adopted by ASEAN heads of state or government at the Second ASEAN Informal Summit in Kuala Lumpur in 1997, there has been increasing reference to the importance of education integration.[359] Acknowledgement of the value of education for human capital development in the region was made in the Hanoi Plan of Action in December 1997 and subsequently in the Vientiane Action Programme of 2004. The Cha-am Hua Hin Declaration on the Roadmap for the ASEAN Community (2009-2015) was definitive in asserting the importance of the education sector "to achieving enduring solidarity and unity among the nations and peoples of ASEAN".[360]

In addition, reference was made to a statement from the ASEAN Ministers of Education First Meeting (Singapore 2006) that education "permeates through all the three pillars of the ASEAN Community in enhancing competitiveness of individual member states as well as ASEAN as a region".[361] The Hua Hin Declaration advocated practical joint initiatives, such as promoting regional cooperation on higher education.

Blueprint 2025 was launched in March 2016. The blueprint further advocated the promotion of "an innovative ASEAN approach to higher education" which will "promote greater people-to-people interaction and mobility within and outside ASEAN" leading to "the free flow of ideas, knowledge, expertise and skills to inject dynamism within the region".[362] It is envisaged that this will ultimately "strengthen regional and global cooperation in enhancing the quality and competitiveness of higher education institutions" across ASEAN.[363] All these initiatives suggest that momentum is building.

Education policies are a vital function in transforming the education landscape and configuring the learning outcomes of any nation. A prominent feature of a successful educational transformation is that it's guided by a clear goal or vision. This would ideally be implemented through coherent planning, micro-management and a constant monitoring process. However, the education policy in ASEAN countries do not share a clear and common education policy, with each country choosing to priorities various aspects of their educational landscape to focus on and further develop.[364]

In addition to the ASEAN Secretariat's Education, Youth and Sport Division, the primary entities driving ASEAN's cooperation and internationalization agenda forward with dialogue partners are the Southeast Asian Ministers of Education Organization's Regional Centre for Higher Education and Development and the ASEAN University Network. Among ASEAN's closest dialogue partners is the European Union. In 2017, the EU and ASEAN are celebrating the 40th anniversary of the establishment of formal cooperation at the 10th Ministerial Meeting in 1977. Since that time, there have been extensive inter-regional policy dialogues on higher education cooperation and internationalization. The most current iteration of this engagement is the EU-funded Support to Higher Education in the ASEAN Region or SHARE programme, launched in 2015. The aims of the programme are to strengthen regional cooperation and enhance the quality, competitiveness and internationalization of ASEAN higher education institutions and students.

The SHARE result areas that EU and ASEAN partners are collaborating on are ASEAN Qualifications Reference Framework and ASEAN Quality Assurance; development of an ASEAN Credit Transfer System and ASEAN-EU Credit Transfer Systems; and Intra-ASEAN and ASEAN-EU mobility scholarships. This architecture will facilitate, support and expand both intra-ASEAN and ASEAN-EU mobility.

The EU's Bologna Process is often cited as the driving force behind the European Higher Education Area's integration and has become a model for other regions' cooperation efforts in higher education. It is salient to note, however, that the architecture of Bologna was instituted

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[359] Darren J. McDermott . Towards a Southeast Asian Higher Education Area.
[360] Ibid.
[361] Darren J. McDermott . Towards a Southeast Asian Higher Education Area.
[362] Ibid.
[363] Ibid.
[364] Updating ASEAN's education system.

largely to contend with the critical mass of mobility created by the Erasmus programme. Erasmus is considered the gold standard of mobility programmes inasmuch as mobility is the lifeblood of regional cooperation and connectivity. A key finding of the 2014 Erasmus Impact Study showed Erasmus students as well as alumni felt significantly more connected to Europe and people from other European countries.

ASEAN too has recognized the importance of increased mobility to the task of building a regional identity. To this end, in 2010 the Southeast Asian Ministers of Education Organization's Regional Centre for Higher Education and Development launched the Malaysia-Indonesia-Thailand pilot project and that has evolved into the ASEAN International Mobility for Students or AIMS programme.[365] The AIMS programme offers students a single semester exchange across a choice of 68 institutions in six ASEAN member states (Brunei Darussalam, Indonesia, Malaysia, the Philippines, Thailand, and Vietnam) and two of the ASEAN Plus Three dialogue partners: Japan and South Korea.[366] The programme seeks to engender a sense of ASEAN citizenship and identity among student participants and is widely considered to be the flagship higher education mobility programme under ASEAN's people-to-people connectivity enhancement initiatives.

A central tenet of the AIMS programme is the concept of 'balanced mobility'. Through a multilateral platform, participating governments select appropriate higher education institutions under defined fields of study. Then the number of inbound and outbound exchange students is mutually agreed to determine a balance. While this ensures reciprocity and control between national systems and universities, it could be criticized as an overly managed framework that stifles mobility. With 1,700 students having participated to date, the AIMS programme remains relatively small and will likely have to modify its structure to augment its scale and impact. AIMS is certainly a valuable programme that should be expanded to include all ASEAN member states including Singapore, which as the most advanced system of higher education, is notable by its absence.[367]

Regionalization of higher learning has a pivotal role to play in the community building process according to panelists at a forum organized by SEA Junction and the Heinrich Boell Foundation Southeast Asia in November, last year. "ASEAN plans to enhance the quality of human resources in the region and forming a regional identity, while contributing to economic growth. Among the various action plans set out at the 14th ASEAN Summit in Cha-Am Hua-in in 2009, regionalization of higher education profiles was high on the agenda," Jaruwat Kiatiwongse, Director of International Network Development Office, Bangkok University and Rosalia Sciortino.[368]

Through regionalizing higher learning systems in ASEAN countries, the regional bloc would be able to offer the same quality of education regardless of higher education institutions. Student mobility, credit transfers, quality assurance and research clusters were identified as the four main priorities to harmonize the ASEAN higher education system, encompassing 6,500 higher education institutions and 12 million students in 10 nations.[369] The ultimate goal of the scheme is to set up a Common Space of Higher Education in Southeast Asia.

The idea is to enable graduates from one ASEAN country to be recruited by the employment sector in another ASEAN country. This will avoid a brain drain of skilled professionals in the region, which will eventually aid in bolstering ASEAN's economy. These initiatives also pave the way for further collaboration and integration between universities in the region; enhancing the overall reputation of Asian universities compared to their competitors in the West or elsewhere in the world.

Based on a listing by QS World University Ranking, currently, only Singaporean and Malaysian universities are representing ASEAN at the forefront of Asian higher education institutions.[370]

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[365] Darren J. McDermott . Towards a Southeast Asian Higher Education Area.
[366] Ibid.
[367] Ibid.
[368] Pamela, V. Integrated higher learning for community building in ASEAN.
[369] Ibid.
[370] Ibid.

ASEAN as a regional bloc is presently fostering the regionalization of higher education systems through system research, empowerment, and development of mechanisms to facilitate sharing and collaborations. This is being done under the Southeast Asian Ministers of Education Organization – Regional Centre for Higher Education and Development (SEAMEO – RIHED) which has 5 objectives up its sleeves – empowerment of higher education institutions, cultivation of globalized human resources, development of harmonization mechanisms, promotion of university social responsibility and sustainability as well as the advancement of knowledge frontiers in higher education management systems. On the other hand, the individual governments of ASEAN countries are also increasing public investment to encourage the region's growing knowledge sector.

For ASEAN to realize its full potential of regionalizing its higher learning, it needs to ensure that students are obtaining a 'globalized' education.[371] Globalization means an international level education standard but in a localized area or channel for receiving education. More and more countries should take on this concept in order to push for better quality students in the region. Universities in the region should aim to capture an attractive and expanding market while establishing a "glocal" presence in Southeast Asia. Some universities in the region that already have partnerships with foreign education institutions include the Yale-NUS College in Singapore and Heriott-Watt campus in Malaysia.

According to Jaruwat and Rosalia, the "glocalisation" of education also extends to virtual education. The availability and accessibility of digital platforms have redefined education in the region. It provides youth with unprecedented access to world education and universities without having to leave their home country or region."[372] To enhance ASEAN's aspirations and interests, it will be important to strengthen the linkages across the educational system so that the diverse member states will be able complement each other in shaping better-equipped human resources for the region. With the transition into the Fourth Industrial Revolution and the elimination of traditional lab our skill sets, the region needs to work fast to achieve its goal of regionalization so that no member state is left behind.

The ultimate goal of the plan is to set up a Common Space of Higher Education in Southeast Asia. The strategic plan calls for the creation of the ASEAN area of higher education with a broader strategic objective of ensuring the integration of education priorities into ASEAN's development.

The education objectives aim to: advance and prioritize education and focus on: creating a knowledge-based society; achieving universal access to primary education; promoting early child care and development; and enhancing awareness of ASEAN to youths through education and activities to build an ASEAN identity based on friendship and cooperation as a key way to promote citizens' mobility and employability and the continent's overall development.[373]

The declaration advocates specific reforms focusing on a harmonization in the higher education system with the objective of increasing the international competitiveness of ASEAN higher education.

Since then, individual ASEAN governments have increased public investment in universities to support the ASEAN Higher Education Area, and the region's burgeoning knowledge economy. Measures have been set up to strengthen the performance of Southeast Asian universities across a wide range of indicators such as teaching, learning, research, enterprise and innovation. These initiatives also pave the way for further collaboration and integration between universities in the region, enhancing the overall reputation of ASIAN universities compared to their competitors in the West and elsewhere in the world. It is not surprising to see the improved performance of many ASEAN universities in this year's QS University Rankings: Asia.[374]

As one of the five founding members of ASEAN, Malaysia has played a very active role in the organization with ideas and initiatives that has contributed to shaping ASEAN into what it is

[371] Pamela, V. Integrated higher learning for community building in ASEAN.
[372] Ibid.
[373] Olds, K. & Robertson, S. Towards harmonization of higher education in Southeast Asia.
[374] Ibid.

today and what it is going to be in the future. Malaysia also initiated in the of ASEAN Plus Three summit, namely ASEAN and China, Japan and South Korea, which was the other name in replacement of the East Asia Economic Caucus (EAEC) for the East Asia Summit (EAS). Malaysia has also taken a leadership role in the harmonization of the higher education systems through many initiatives. For example, the Malaysian Qualifications Agency (MQA) played a crucial role of promoting harmonization by encouraging active movement towards the development of quality assurance collaboration and sharing.[375] The MQA spearheaded the establishment of the network of quality assurance agencies among Southeast Asian Countries, known as ASEAN Quality Assurance Network (AQAN). It was introduced to develop and recognize strength and commonalities in academic practices without losing individual country identity apart from ensuring compatibility of qualifications and learning outcomes within the ASEAN countries.

In Southeast Asia, the status of integration of higher education in ASEAN are being studied and promoted by three main bodies namely SEAMEO RIHED, ASEAN Plus Three and the ASEAN Universities Network (AUN).[376] Their aim is to promote education networking in various levels of educational institutions and continue university networking and enhance and support student and staff exchanges and professional interactions including creating research clusters among ASEAN institutions of higher learning; not standardization or uniformity of programs, degrees and the nature of higher education institution. Further actions are envisaged to strengthen collaboration with other regional and international educational organizations to enhance the quality of education in the region. Higher education systems in Southeast Asia are very diverse, and even within each nation incompatibility is to be expected. But, it is important to appreciate that in the context of Southeast Asia, with its diverse systems, harmonization is about comparability ns.

Beginning in 1997, the ASEAN community began creating organizations within its framework with the intention of achieving their goals. ASEAN Plus Three was the first of these organizations and the network was designed to improve existing ties with the People's Republic of China, Japan, and South Korea. ASEAN Plus Three developed a Plan of Action on Education: 2010-2017 which emphasizes the need to develop and implement strategies related to quality assurance and the promotion of mobility.[377] Subsequently, the ASEAN Plus Three Working Group on Mobility of Higher Education and Ensuring Quality Assurance of Higher Education among ASEAN Plus Three Countries was created. The working group main objectives are to analyze credit transfer systems within the ASEAN Plus Three region, and explore ways to improve student mobility programs in the ASEAN Plus Three region.

The Southeast Asian Ministers of Education Organization (SEAMEO) is an international organization established in 1965 among governments of Southeast Asian countries to promote regional cooperation in education, science and culture in Southeast Asia. Members of SEAMEO included Malaysia, Brunei Darussalam, Cambodia, Indonesia, Lao PDR, and Republic of the Union of Myanmar, Philippines, Singapore, Thailand, Timor-Leste and Socialist Republic of Vietnam. SEAMEO-RIHED (Southeast Asian Ministers of Education Organization - Regional Centre for Higher Education and Development) was later developed under the umbrella of SEAMEO working for 10 Member Countries in Southeast Asia. Specifically, its mission is to foster efficiency, effectiveness and harmonization of higher education in Southeast Asia through system research, empowerment, development of mechanisms to facilitate sharing and collaborations in higher education.[378] Programs under SEAMEO-RIHED mainly serving 5 objectives. 1. Empowering higher education institutions: includes Study Visit Programmes to the US, the UK, Australia and China, training courses for International Relation Offices (IRP) in Southeast Asian HEIs and workshops on governance and management for HEIs. 2. Developing harmonization mechanism: includes internationalization Award (iAward), workshops on Academic Credit Transfer framework from Asia and Southeast Asian Quality Assurance Framework. 3. Cultivating Globalized human

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[375] Olds, K. & Robertson, S. Towards harmonization of higher education in Southeast Asia.
[376] Ibid.
[377] Ibid.
[378] Ibid.

resources: includes the ASEAN International Mobility for Students (AIMS) Programme. 4. Advancing knowledge frontiers in higher education system management: includes Policy Action Research: Building Academic Credit Transfer Framework for Asia. 5. Promoting university social responsibility and sustainable development: include seminar on University Social Interprise.[379]

Out of the five objectives, the main focus being cultivating globalized human resources through AIMS students' mobility program in which the Malaysian Education Ministry under the Department of Higher Education is directly and actively involved. It also includes the I Award program where Malaysia has participated under AIMS previously known as Malaysia-Indonesia-Thailand (M-I-T) Student Mobility Project.[380]

Student mobility has always been one of the key strategic elements of cooperation leading to the development of a harmonized higher education environment among countries in Southeast Asia. The ASEAN International Mobility for Students (AIMS) program commonly known as AIMS was started in 2009 to aid the drive towards European higher education harmonization. This program was designed to encourage student mobility through the multilateral collaborations among four countries: Malaysia, Thailand, Vietnam, and Indonesia. Three objectives formed the reasons behind the promotion of student mobility and greater university cooperation: enables students to hone their academic skills and intercultural understanding, provides the critical knowledge needed to succeed in today's globalized economy, promotes regional cooperation between higher education institutions and helps to produce the international graduates that are attractive and necessary for an integrated ASEAN Community to contribute to the development of qualified, open-minded and globalized human resources.

Higher education internationalization as a regional policy was initially mainly European, courtesy of programmers such as Erasmus and the framework programmers for research. Building on the experiences of the European programmers, other world regions started looking into the opportunities presented by regionalization. Twenty-five years later, ASEAN – the Association of Southeast Asian Nations – is the clearest example of a regional approach.

A British Council-funded study in 2018 focused on the higher education internationalization policies of countries such as Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, the Philippines, Singapore, Thailand and Vietnam.[381]

The study recognized higher education's powerful role in international relations, diplomacy and in supporting an integrated and aligned ASEAN community. In this vibrant, rapidly growing region with a population of more than 620 million, the study provided information and findings that support increased higher education activity with nations inside and outside the region.

One key finding is the ASEAN emphasis on openness and mobility in higher education, at varying levels according to individual countries' developmental stage.

Openness' – by which we mean a government-level commitment to internationalization via international mobility for students, researchers, academic programmers and university research – assists the development of a we-feeling' among different peoples.[382] Almost all the countries in the region have high levels of openness and mobility.

Openness and mobility introduce new ideas and understanding, which underpin interaction between countries. For instance, in Malaysia, the networking that accompanies international co-operation strengthens internationalization.[383]

These factors are also integral to higher education positively contributing to society; and to students developing as global citizens who can work and live internationally, something that contrasts with the type of internationalization that emphasizes economics and student recruitment.

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[379] Ibid.
[380] Olds, K. & Robertson, S. Towards harmonization of higher education in Southeast Asia.
[381] Atherton, G. & Crosling, G. & Shuib, M. & Azizan, S. N . ASEAN countries move forward on internationalization.
[382] Ibid.
[383] Ibid.

One of the factors studied by the report was the presence of an international education strategy in the ASEAN countries' policies and this was evident in higher education strategic planning in most ASEAN countries.

Relevant ministries or bodies had responsibility for progressing internationalization in all ASEAN countries. Overall, the study indicated strong ASEAN government support and commitment to internationalizing their higher education sectors.

Interestingly, internationalization is not a separate strategy in any country, but integrated in the broader higher education planning framework.

All ASEAN countries have relevant bodies with responsibility for higher education internationalization, but one major difference across countries is how this is governed. This ranges from being under a single entity and ministry, or under separate entities, or multi-ministries.

For instance, in Cambodia, the strategy is embedded in the Ministry of Education, Youth and Sport's "Higher Education Roadmap 2030 and Beyond".[384]

In the Philippines, the International Affairs Staff within the Commission on Higher Education (CHED) coordinates the international dimensions of CHED's work, including establishing cooperation through international and regional bodies or networks and linkages between local and overseas institutions.[385]

Two ASEAN countries that are currently dealing with this issue are both Malaysia and Indonesia1. These two countries have implemented their own education system to further develop human capital unique to each nation. Despite their inherent structural differences both the countries seem to be encountering the same challenges within their education system.

The lack of strong education policy and the quality of the public education system has gradually led to the increasing outbound mobility that is currently experienced by both Malaysia and Indonesia. This problem starts with students in primary and secondary education opting for international or private schools while tertiary level students are travelling overseas to further their studies and eventually settling down in those countries.

At the same time, the number of private institutions in Malaysia increased from six in 2001 to 400 by 2013.[386] According to a research conducted by the ICEF Monitor, both Malaysia and Indonesia have also witnessed strong growth in outbound mobility among students. Over the last decade, the number of Malaysian students studying abroad has increased from nearly 47,400 students in 2009 to just under 65,000 in 2019. On the other hand, neighboring country Indonesia has experienced a 35 percent increase over the last decade, with 42,000 Indonesian students enrolled in higher education abroad in the same year.[387]

Indonesia and Malaysia are both at a different stage with handling the issue of outbound student mobility. Due to Indonesia the sudden increase of students studying abroad over the last decade, the country was not prepared to handle the eventual drain it would leave on its workforce. The archipelagic nation – whose aim it is to be in the top 10 economy globally by 2030 – finds its plans hindered by the brain drain in the country. World Bank that stated the number of Indonesians with tertiary degrees would need to triple if the country is to fully develop to its economic potential.1 found the evidence of the backlash in a study.

Malaysia, on the other hand, has been sending students away to study abroad since the 1990s. However, it has come up with a more elaborate plan to reduce the study abroad process. The Malaysia Education Blueprint – created in 2013 – is a 12-year plan to re-establish the trust in public education as well as to open up Malaysia as a viable tertiary education option for foreign students.[388]

Hayati Ismail, a Senior Lecturer from USIM (Islamic Science University of Malaysia) who worked on the Malaysia Education Blueprint during her time with PADU (the Education

[384] Atherton, G. & Crosling, G. & Shuib, M. & Azizan, S. N . ASEAN countries move forward on internationalization.
[385] Ibid.
[386] Updating ASEAN's education system.
[387] Ibid.
[388] Ibid.

Performance and Delivery Unit) under the Ministry of Education, responded to The ASEAN Post via an email which explained Malaysia's plans in improving the nation's education system. "The MEB (Malaysia Education Blueprint) 2013-2025 aims to put Malaysia among the top one third of the best education systems in the world beyond 2025. For an education system to be effective in ensuring student outcomes in meeting current and future needs, the Ministry has outlined 10 shifts to establish an efficient delivery system in order to bridge the gap between policy and implementation. The Ministry has made significant improvements in the education system under the Blueprint since 2013. Anchored on the Five System Aspirations – access, quality, equity, unity and efficiency, the implementation of the Blueprint has been sequenced in phases or Waves," Hayati elaborated.[389]

When asked about the decline of enrolment in public schools, with families preferring private and international schools, Hayati said the ministry remains open to the preference of the parents to send their children to private and international schools, but also other registered private education institutions such as Tahfiz. "There are no shortcuts in the process of ensuring quality education is provided to all Malaysian children. The system needs to undergo continuous development and evolution process and transform to meet the demands in the Fourth Industrial Revolution and its impact on human culture and values. The Malaysia Education Blueprint (MEB) 2013-2025 is all about putting the trust back into the education system as various initiatives implemented in Wave 1 (2013-2015) have shown significant achievements".[390]

Ninety per cent of ASEAN countries scored high or very high on student mobility, with focused efforts across the region to streamline relevant visa procedures. Mobility, both regional and international, is emerging as a significant regional policy and as a key component in most countries' strategies.

For instance, in Singapore the 2002 'Global Schoolhouse' initiative included establishing the country regionally and globally as an education hub and attracting 150,000 foreign students by 2015.[391] With recent Singaporean private education developments, the "Global Schoolhouse" is now being revised to focus on quality.

Across ASEAN, the rapidly growing market for international student recruitment and student mobility offers national governments many opportunities. However, those implementing policies must consider the socio-cultural diversity of the ASEAN region, where student mobility policies are intertwined with differing socio-political contexts and values.

The Boston Consulting Group and McKinsey & Company have predicted that by 2020 there will be 100 million people with middle class spending patterns across the Association of South East Asian Nations (ASEAN) – such as Indonesia, Malaysia, the Philippines, Singapore, and Thailand.[392]

The motto of the United Nations is, "Think globally, and act locally".[393] In a globalized economy, every student should be educated as an international student, a global citizen with the aspiration to compete globally. However, not everyone is lucky enough to be blessed with the talent and wealth to be admitted to the world's most competitive and expensive universities.

Transnational education, defined as education for students based in a different country to the degree-awarding institution, is becoming increasingly popular. It often offers students an international experience with the advantages of better affordability, lower English language requirements, less competitive admission standards, and regional economic initiatives.

Student mobility, credit transfers, quality assurance and research clusters were identified as the four main priorities to harmonize the ASEAN higher education system, encompassing

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[389] Updating ASEAN's education system.
[390] Ibid.
[391] Atherton, G. & Crosling, G. & Shuib, M. & Azizan, S. N. ASEAN countries move forward on internationalization.
[392] The Rise of Glocal Education: ASEAN Countries.
[393] Ibid.

6,500 higher education institutions and 12 million students in 10 nations.[394] The ultimate goal of the scheme is to set up a Common Space of Higher Education in Southeast Asia.

Individual ASEAN governments have increased public investment in universities to support the ASEAN Higher Education Area and the region's burgeoning knowledge economy. Measures have been set up to strengthen the performance of Southeast Asian universities across a wide range of indicators such as teaching, learning, research, enterprise, and innovation.

These initiatives also pave the way for further collaboration and integration between universities in the region, enhancing the overall reputation of Asian universities compared to their competitors in the West and elsewhere in the world QS University Rankings: Asia.

"Asian higher education is undergoing a rapid transformation, and Singapore, Hong Kong, China and Korea are at the forefront of the assault on the global academic elite," says Ben Sorter, head of QS Intelligence Unit, which compiles the QS University Rankings3: Asia and the QS World University Rankings. "There are already 17% more Asian universities in the global top 200 since the recession, and the next two decades could see leading US and European universities objectively overtaken".[395]

Now Singapore is the only ASEAN country whose universities are operating at the forefront of Asian higher education. However, if Asia continues on its current path and emerges as a genuine competitor to the West in the coming years, the increased financial power of a unified ASEAN could start to have a major impact on global higher education. In addition, global students in the region would be among the foremost beneficiaries.

Most countries scored highly with high-level policy commitment and proactive approaches to establishing or developing international research collaborations and partnerships.

In most countries, several approaches have fostered regional and international research collaborations. For instance, the National Foundation for Science and Technology Development of Vietnam fosters international research collaborations through funding of scientific and technological projects and supporting Vietnamese institutions and researchers' international engagement.[396]

While assessment of internationalization strategies was not widely observed in the ASEAN region, Indonesia showed clear evidence of it for international research and collaboration. The government's strong support for building research capacity is evident in the recent initiatives listed on the ministry of research and technology website. Greater weight is allocated to academics publishing in international rather than domestic journals.

However, several of the ASEAN countries' national research reviews indicated limited or no features of internationalization, with little support for inbound academic mobility through preferential visa policies or working opportunities.

Despite these positive indications of efforts to train and retain talent, 'brain drain' appeared to be a challenge for most countries.[397] This is compounded by the lack of a comprehensive and integrated system to facilitate mutually beneficial academic exchange throughout the region.

"The Shape of Global Higher Education" – the British Council's unique policy framework which assesses higher education (HE) policies in various countries – was launched at the Going Global conference in Kuala Lumpur, Malaysia.[398]

It is notable that Malaysia in particular, but also Vietnam, the Philippines, Indonesia, Brunei, Singapore and Thailand compare favorably with countries from across the world, in terms of the policies and infrastructure provided to support international HE.

We reveal that national strategies for expanding and supporting international higher education engagement are often firmly embedded within other national plans, and linked to the countries' economic priorities. In Cambodia for example, the international higher education strategy is linked

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[394] The Rise of Glocal Education: ASEAN Countries.
[395] Ibid.
[396] Atherton, G. & Crosling, G. & Shuib, M. & Azizan, S. N. ASEAN countries move forward on internationalization.
[397] Ibid.
[398] ASEAN higher education systems are becoming more open for international engagement.

with other policy areas and strategies focusing on growth, employment, equity and socio-economic and industrial development.[399]

Promotion and support of international student mobility is a priority for many ASEAN nations, and underpins many regional objectives; in fact a number of measures in place to support student mobility focus on intra-regional opportunities, including Singapore's ASEAN mobility scholarships.

All of the ASEAN countries already have, or are trying to develop, significant levels of inbound transnational education and are aiming to grow their HE systems often through building on international transnational education partnerships.

Michael Peak, Head of Higher Education Systems Research, British Council, says, "International higher education is of clear national and regional importance within ASEAN. The region, although diverse in many ways, including in terms of the size of the economy, and the relative 'maturity' of the HE systems, is united by a desire to engage further in international higher education".[400]

ASEAN now face the tasks to realize the ambitious vision of an integrated socio-cultural, economic and political community. Education is one of the sectors identified as having a pivotal role in this community building process.

ASEAN plans to enhance the quality of human resources in the region and forming a regional identity, while contributing to economic growth. Among the various action plans set out at the 14th ASEAN Summit in Cha-Am Hua-in in 2009, regionalization of higher education profiles was high on the agenda.

ASEAN has carried out initiatives to foster cooperation among education institutes in the region. ASEAN also plans to encourage joint research projects and foster student (and staff) exchange through common credit transfer systems and other enabling mechanisms.

ASEAN is also working to create a "Common Space for Higher Education".[401] Having a common space for higher education in the region involves harmonizing an estimated 6,500 education institutes among ASEAN countries and catering to about 12 million students.

For a start, students in the region when considering studying abroad generally follow the established pattern of opting for institutes outside of Southeast Asia.

In the past, ASEAN students usually opt for universities in the US, Europe and Australia and a lesser extent Japan. Now they also consider universities in India and China are being. Non-Southeast Asian universities are eager to see such preference maintained. Their student recruitment marketing is widespread and expanding.

Data International Education Expo 2017 held in November 2017 in Bangkok show that the UK, US and Australia are the favorite destinations for studying abroad for visitors' (mostly Thai) Among the top 20 destinations, there were only two ASEAN member countries, Singapore in 9th place and Malaysia in the 20th.[402]

In terms of representation of recruiting institutes, the UK and the US had by far the greatest number, followed by China as an aspiring educational center.

Competition among educational institutes in Southeast Asia is further exacerbated by the increasing number of incoming international universities from outside the region, such as from the US and Australia.[403]

These universities, aiming to capture an attractive and expanding market, establish a "global" (global and at the same time local) presence in Southeast Asia. They open "off-shore" campus such as the Yale-NUS College in Singapore just to name one.[404]

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[399] Ibid.
[400] Trans-ASEAN education can play a role in building a regional community.
[401] Ibid.
[402] Ibid.
[403] Ibid.
[404] Ibid.

They also open academic programs such as double degree programs and pathway programs. They allow the students to study in their home countries for one to two years, and then complete their academic degree in Australia, UK, and so forth.

At present, these educational options are mainly based in Malaysia and Singapore, further strengthening the position of these two countries as educational hubs in the ASEAN landscape. But more and more they are being developed in other parts of the region.

The "globalization" of education also extends to virtual education. The availability and accessibility of digital platforms have redefined education in the region. It provides youth with unprecedented access to world education and universities without having to leave their home country or region.

Current generations of students are aware that their learning is beyond the typical classroom and they appreciate it. It is amply demonstrated by their use of online learning platform such as the Massive Open Online Course (MOOC), Khan Academy, Courser.[405]

Moreover, their entrepreneurial and creative mindset expects an educational (and work) ecosystem that gives them autonomy while supporting them in their exploration of future opportunities of business or career.

Traditional courses and approaches may no longer be adequate. Educational institutes in the region are finding out that they have to quickly adapt to respond to changing students' demands if they are to recruit and keep them.

The shift in students' interest towards new subjects has been observed for instance from "Marketing" to "Digital Marketing", from "Social Development" to "Social Entrepreneurship" and from "Computer Science" to "Application Development".[406]

One example, the Thai government has promoted the country as a regional resource especially for neighboring countries with lesser educational opportunities. In the last decade, there have been a growing number of international bachelor, master, and doctoral degrees in English that cater to both international students and Thai students who wish to access an international education locally.

Thailand has been successful in attracting students from neighboring countries in growing number. And this, somewhat ironically, in spite of reports of the country's deteriorating educational quality and limited teaching capacity in English.

Today, the top five countries from which students come to study in Thailand are China (7,405), Myanmar (2,252), Cambodia (1,317), Vietnam (910) and Laos (909).[407] Increasingly these students are self-financed rather than on fellowships as previously used to be the case.

International students prefer Thailand because it is close to their home countries. Students can travel more easily back home during the course of the study. Students also find the tuition fee for international programs in Thailand is relatively cheaper when compared to Malaysia and Singapore and to options outside of the region. Next, they wanted to learn another ASEAN language, in addition to English and/or Chinese. The students also appreciate the opportunity for self-expression in the less restrictive environment of Thailand. Lastly, but also most importantly, is building networks with Southeast Asian friends that can be a future asset for their business and employment opportunities as ASEAN economic integration proceeds.

Reducing the regional educational gap is also important to avoid regionalization of higher education to become a venue for brain drain. Such is the risk with, for instance, Singapore attracting the brightest students from Vietnam, Myanmar and other neighboring countries with fellowships and then hiring them.

Regulations are in place in most countries for cross-border programmers by foreign providers, but institutional and programmer mobility indicates wide differences across countries, with several countries scoring very highly and being global leaders in domestic international provision.

However, several countries are at the very early stages of development in this regard with little evidence of domestic institutions setting up abroad. As domestic partnerships and local

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[405] Trans-ASEAN education can play a role in building a regional community.
[406] Ibid.
[407] Ibid.

knowledge are essential for countries in establishing international linkages, this is an area for development regionally.

One example of national commitment in this area is Malaysia, where the mushrooming of internationally linked tertiary programmers and cross-border programmers is occurring, especially in the private sector. The setting-up of new foreign entities is clearly regulated under private higher education law and implementing this strategy has led to an increase in private institutions in Malaysia.[408]

Although there is little outbound institutional and programmer mobility regionally, Malaysia-based higher education providers, especially private ones, are expanding internationally, with the Malaysian Ministry of Education exploring public universities setting up branch campuses regionally, as occurs in Indonesia.

In examining the strengths and challenges of ASEAN higher education internationalization policies, a strong commitment to internationalization in terms of openness and mobility is promising.

Of the different forms of mobility, student mobility had the most policy support, and most likely, openness and student mobility will continue as significant drivers for systematic regional development over future decades.

One key area highlighted by the study is the need for regional harmonization of higher education systems, but with consideration of the diversity and the commonalities that characterize national internationalization strategies. This underscores the importance of developing an ASEAN-centric framework that could lead to a more representative and distinctive evaluation of the development of higher education regionally.

Twenty-five years after the European programmers, another region, ASEAN, has developed regional and national policies for internationalization of higher education. This marks an important step forward.

Successful implementation of education policies and reforms rely greatly on partnerships with a number of different stakeholders: governments, the private sector, civil society and bilateral and multilateral organizations. Moreover, cooperation at national and regional levels in a collaborative, constructive and mutually supportive manner leads to more responsive, enabling and participatory planning, implementation and execution of policies. Government leadership is key to successful partnership and ownership of education reform and development, which calls for priority attention to strengthening the capacity of national organizations and institutions.

As socio-economic developments are a focus within the ASEAN region, setting up a standardized education system across all 10 nations could pave the way to a unified future. This could transfigure outbound student mobility from circulating outside the ASEAN region into working on developing the regional bloc from within. If such a proposal should come to fruition, the policies and systems in place would need to address all of the components, in a coordinated and coherent way. This is so that the changes, in turn, become mutually reinforcing and promote continuous improvement and development, of which the ASEAN region aims to achieve.

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3.9. THE CONTRIBUTION OF POLISH SCIENTISTS TO THE DEVELOPMENT OF EDUCATION AND SCIENCE IN THE SOUTH OF UKRAINE (SECOND HALF OF XIX – BEGINNING OF XX CENTURIES)

The national composition of the inhabitants of Ukraine has always been heterogeneous. In the XIX century, a considerable number of Bulgarians, Germans, Serbs, Poles, Greeks, Czechs, Italians and representatives of other nationalities lived on its territory. Each of the mentioned groups occupied a certain place in the cultural and economic life of the country. The land within the borders of the former Kherson, Ekaterinoslav and Tavria Governorates (i.e. Provinces), named Southern Ukraine, was territorially formed quite late and covered the modern Odesa [Odessa], Mykolaiv [Nikolaev], Kherson, Zaporizhzhia, Dnipropetrovsk, a part of Donetsk and Kirovohrad Oblasts (i.e. Regions), and the Autonomous Republic of Crimea.

Polish population of Southern Ukraine in the XIX – beginning of the XX centuries made up a small percentage, living predominantly in rural areas, isolated from other nationalities. Particularly, in the Kherson Governorate, a considerable part of Poles lived in the Ananiev and Tiraspol counties [povits, powiats][409] in the villages of Kiselevka, Landau, Shults, Kasperovka, Novo-Petrovka, Roshtadt, Karlovka, Novyi Buh. Kalinovka village is known as the admiralty settlement, where peasants and refugees without passport were expelled in 1789 from Poland, who worked as admiralty craftsmen.[410]

According to the All Russian Census of Population 1897, 0.6% of Poles lived in the Ekaterinoslav Governorate, 0.7% – in the Tavria Governorate, and 1.1% – in the Kherson Governorate; totally – 0.8% of the whole population of Southern Ukraine.[411] However, such a small number of people tried to preserve their language, culture and religion. Subsequently, the Polish colonists gradually began moving to cities, where, receiving education, became known teachers, doctors, scientists, etc. [412]

History of the settlement, life, economic, cultural and educational development of the Polish communityin the South of Ukraine in the second half of the XIX – early XX centuries remains an under-researched topic in Ukrainian historiography. Such historians as T. Yeremenko, B. Chyrko, O. Kalakura,[413] I. Mironova,[414] V. Savchuk,[415] I. Baluba[416] and others have been working in this direction since the 1990's. The above mentioned authors concluded thatthe natives of Poland made a significant contribution to the educational, cultural (scientific-educational) and socio-economic life of Southern Ukraine, despite their small numbers. Almost all elements of the scientific and organizational structure, formed in the region, were actively represented by Polish nationality. At that time, the mentioned elements included universities and other educational institutions, natural-scientific and scientific-technical societies, various commissions, botanical gardens, statistical

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bureaus, research stations and sections, natural-historical museums, biological and entomological stations, and so on. The building history of a large number of theinstitutions preserves the names of Poles, who have often acted as initiators of such structures, heading them.[417]

It is impossible to reproduce in one article all that has been done by Poles – specialists in different fields of science, technology and industry, etc. Therefore, the primary task of this article is an attempt to identify some of the core areas of education, science, public life, in which the natives of Poland have demonstrated their skills in the lands of Southern Ukraine, and to group them according to certain areas of activity.

In the second half of the XIX century, universities were to become the concentration of intellectual forces of different scientific directions in Ukraine. Positive changes in the sphere of public education in the South of Ukraine on the liberal reforms eve were traditionally associated only with the activities in 1856-1858 of a prominent surgeon and public-political figure M. Pyrohov (1810-1881), who occupied thetrustee position of the Odesa Educational District (the District). In fact, the opening of Novorossia University (the University), – the first one in the Southern region, – was exclusively associated with his name. However, the publications much less cover the activities of other District trustees, including *Adam Antonovych Artsymovych [Adam Arcimowicz] (1828-1893)* – a native of the Western region, a Pole for a national affiliation and a Catholic by religion, a man of liberal views, a supporter of the Russian Empire evolutionary development, accordingly to the standards of advanced European countries. Realization of ideas for reforming the higher, secondary and elementary schools in the District, envisaged by the legislative acts of 1863-1864, fell to the fate of A. Artsymovych. His contribution to the Novorossia University opening became widely recognized by contemporaries.

Being the son of the astronomy professor, A. Artsymovych received a good home education; after graduating from the law school in 1849, he received the rank of titular advisor and enteredthe service to the First Department of the Government Senate. In 1860, on the eve of the serfdom abolition in the Russian Empire, 32-year-old A. Artsymovych, who had already obtained a law degree, received the rank of statutory advisor and, subsequently, the legal statutory advisor, and was appointed Governor of Samara. Governor A. Artsymovychhad the authority and popularity among the liberally minded nobles, officials, representatives of the trade and industrial circles of the governorate. A close acquaintance in Saint-Petersburg with O. Holovin and other liberals had a decisive influence on his further career.[418] In April 1862, the two following events took place in the life of A. A. Artymovych: he was awarded by the Order of Saint Vladimir (third class) and appointed trusteeof the Odesa Educational District by the personal decree. In May of the same year, he and his wife went to the new place of service.[419]

During the term of office, his extraordinary abilities in the field of public education in the region were most visibly evident. Many of his initiatives and endeavors were interspersed in spirit and orientation with the theoretical and poetic heritage of such outstanding educators of the 1960s as M. Pyrohov, K. Ushynsky, V. Stoiunin, V. Vodovozov, M. Korf.

A. Artsymovych was not a cabinet theorist of pedagogy and an administrator; he, with his inherent energy, perseverance and initiative, sought improvement of the Districteducational institutions. Only in 1862, in order to control and provide practical assistance to pedagogical teams, he personally inspected most of the gymnasiums, county schools, boarding houses, visited state and private educational institutions of Odesa, Kishinev, Kherson, Simferopoil, Taganrog, Ekaterinoslav, Mykolaiev, Sevastopil, Kerch, Evpatoria, etc. During the trip, Trustee Artsymovych made sure that there were no schools in many counties; women's education was poorly developed, and national

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[417] МІРОНОВА, І. (2008). Культура та розвиток вільної преси серед польського населення Півдня України в XIX – на початку XX ст., с. 203.

[418] САМОЙЛОВ, О., & САМОЙЛОВ, Ф. (2008). А. А. Арцимович – попечитель Одеського учбового округу. In Поляки на півдні України: історія та сьогодення, том 1. Жешов; Київ; Миколаїв: Вид-во МДГУ ім. П. Могили, с. 249-250.

[419] ГРЕБЦОВА, И. С. (2015). Материалы о деятельности братьев Виктора и Адама Арцимовичей в фондах научной библиотеки Одесского национального университета. Вісник Одеського національного університету. Серія: Бібліотекознавство, бібліографознавство, книгознавство, том 20, випуск 2, с. 53.

schools needed updating. Considering the need to significantly increase the number of schools and the amount of state assistance to them, A. Artsymovych, recommended to establish associations for the proper financial maintenance of existing specialized schools. He paid a lot of efforts to improve the activity of Jewish elementary schools, to open a central Bulgarian specialized school in Komrat (Bessarabia) with teaching in the native language, to establish the Mykolaiv gymnasium and the Odesa Commercial School.

In 1865, Trustee Artsymovych implemented a reform of the Odesa gymnasiums. As an abolition supporter of any class restrictions on the children education in different types schools, he transformed the privileged gymnasium at the Richelieu Lyceum into a school, which could be attended by all, without regard to social origin and religion that led to a significant increase in the number of gymnasium students. During his District leadership, there were opened the following institutions: women's first-rank specialized schools in Kishinev, Simferopil, Taganrog, Ekaterinoslav, Kherson and Mykolaiv; several second-rank schools for girls; parish both male and female specialized schools.[420]

In the atmosphere of innovations in the Odesa Educational District, teachers and students of the Richelieu Lyceum were eagerly awaiting the transformation of the Lyceum into a university; however, the implementation of the decision made in 1862 was delayed. The classes at the Richelieu Lyceum continued, but the school experienced not the best of times: many departments remained vacant; the total number of students was extremely low. The Lyceum froze in anticipation of change. A. Artsymovych was not tired to remind the minister of education about the need to implement a decision. Finally, on July 11, 1864, Alexander II signed a decree on the opening the Imperial Novorossia University in Odesa. It was solemnly opened on, May 1, 1865.

However, despite theachievements in development of regional education and establishment of the University in Odesa, the clouds over A. Artsymovych thickened in the following year. On May 3, 1866, Minister of Public Education D. Tolstoy issued an order, which stated that the supervision of teaching in schools could be relied solely on the Orthodox denomination persons. Being a Catholic, A. Artsymovych found it necessary to resign, although the order did not touch him directly. P. Kotseb, governor-general, vigorously sought from the government a fair assessment of Trustee Artsymovych's activity, listing in the letter to Minister all his merits. Newerhteless, resignation of the District head was accepted on June 17, 1866. His place was embraced by S. Golubtsov, newly appointed trustee. The government also limited the pension granting to A. Artsymovych in 2 thousand rubles per year.

Despite all mentioned above, four years of A. Artsymovych's activity were highly appreciated by the regional residents and Governor-General Kotseb, who claimed that the results of Trustee's District managing would remain notable forever. Nevertheless, at the end of 1866, the persistent appeals of the governor-general to the ministry had the following results: the former Trustee of the Odesa Educational District, Legal Statutory Advisor Artsymovych was elected by the Council of Novorossia University and then approved by the Ministry as "an honorary member of the University".[421]

Thus, Novorossia University became the educational and scientific life's stronghold for the public of Southern Ukraine during many years. Polish professors embraced the departments of virtually all its faculties, but the vast majority of them worked at the Faculty of Physics and Mathematics, mainly, at the Department of Natural Sciences. It was not surprising, because such activity was socially demanded in those years.

Since its foundation, the University had established a materialistic-dialectical approach to understanding the phenomena of nature, which guided and was developed by such world-renowned biological scientists as I. Mechnykov, I. Siechenov, O. Kovalevsky, L. Tsenkovsky, F. Kamensky,

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[420] САМОЙЛОВ, О., & САМОЙЛОВ, Ф. (2008). А. А. Арцимович – попечитель Одеського учбового округу, с. 250-252.

[421] ГРЕБЦОВА, И. С. (2015). Материалы о деятельности братьев Виктора и Адама Арцимовичей в фондах научной библиотеки Одесского национального университета, с. 53-55.

O. Yanovych, M. Vakhtel, V. Rotert, O. Volkov, L. Rishavi, O. Nabokykh, M. Albov, B. Grinevetsky and others.

From the very beginning of the University establishment, *Lev Semenovych Tsenkovsky [Leon Cienkowski] (1822-1887)*, – a botanist, physiologist, bacteriologist, founder of microbiology in the Russian Empire, – began to work there. At the University, he started research in the field of microbiology, laid the foundations ofscientific directions that were developed in the experiments of such scientists as F. Kamensky, F. Porodko, I. Serbinov and A. Lebedev.[422] In 1865-1871, L. Tsenkovsky was appointed the ordinary (full) professor of botany at the Department of Morphology and Systematics of Plants and became the first elected chairman of the Novorossian Society of Naturalists (NSN). His scientific and organizational work and implementation of the microbiological research results into the Southern Ukraine agriculture practice are no less significant. On January 22, 1870, at the NSN meeting, the professor supported a decision of the Second Congress of Naturalists and Doctors of the Russian Empire to establish a biological station in Sevastopol. According to history, the station was created, and it became the basis of the future Institute of Biology of the Southern Seas, NAS of Ukraine.

For the first time in the Russian Empire, L. Tsenkovsky not only created, but also implemented a vaccine against anthrax into the practice of the Kherson Governorate agriculture. The Kherson landowner H. Skadovsky organized an experiment holding point in Belozirka and gave at the disposal of L. Tsenkovsky an unlimited number of sheep for experiments.[423] The vaccination method found by the scientist reduced the number of deaths among the sheep up to 0.5%. The problem of protection against anthrax remains relevant today, and L. Tsenkovsky's contribution, made to this field, is invaluable.

Professor Tsenkovsky also drew I. Mechnikov's attention to the possibility of biological pest control in agriculture. As a result, a method for the control of wheat pest (AnisopliaaustriacaHrbst) was elaborated in detail by I. Mechnikov and M. Krasylnyk. The role of L. Tsenkovsky in creating the Kharkiv Bacteriological Institute was also significant.[424]

Professor *Franz Mikhailovich Kamensky [Franciszek Dionizy Kamieński] (1851-1912)*, who has been working at Novorossia University from 1886 until his death on September 16, 1912, could be mentioned among the outstanding biologists of Polish descent. F. Kamensky was born on September 27, 1851, in Lublin. He received higher education in the University of Warsaw. After graduating, as a student, he attended lectures of A. de Bary in Strasbourg and F. Kon in Breslavl [Wrocław], and worked in their laboratories. In 1875, in Strasbourg, he defended his thesis on comparative anatomy (*Zur Vergleichenden Anatomie der Primmeln*). From 1877 to 1833, Franz Mikhailovich worked as an assistant professor at the university, polytechnic academy, and veterinary institute in Lviv. In 1882, he passed the examination for the Master's Degree at Novorossia University and a year later defended his Master's thesis. In 1886, in Saint-Petersburg, he received the Doctoral Degree in botany and was appointed first to the assistant professor post, and from October 1888 he occupied the position of professor in Novorossia University.[425]

In the late 1880s, the idea of creating a special society, which subject would be mountains, emerged in the environment of Southern Ukraine naturalists. At the end of 1889, the idea was practically implemented and such a club was opened in Odesa. F. Kamensky was a long time club management member and did a lot to develop its activities.[426] The Crimean (later Crimean-

[422] РУДИШИНА, О. С. (2010). Внесок фізіологів рослин Новоросійського університету в розвиток гормональної теорії тропізмів на початку XX ст. Історичний архів, 4, с. 107-108.

[423] МІРОНОВА, І. (2008). Культура та розвиток вільної преси серед польського населення Півдня України в XIX – на початку XX ст., с. 203-204.

[424] САВЧУК, В. (2008). Поляки на Півдні України: незримі фахові угруповання та їхня діяльність (на прикладі вчених-біологів), с. 238-239.

[425] ВАСИЛЬЄВА, Т. В., & КОВАЛЕНКО, С. Д. (2005). Каменський Франц Михайлович. Ботанік. In В.А. Сминтина (Ed.) In Професори Одеського (Новоросійського) університету: біографічний словник, том 3. Одеса: Астропринт, с. 24-25.

[426] МІРОНОВА, І. (2008). Культура та розвиток вільної преси серед польського населення Півдня України в XIX – на початку XX ст., с. 204.

Caucasian) Mountain Club can be considered as the first nature conservation organization in Ukraine as well as in the whole Russian Empire. The system of protection and preventive measures for the preservation of Crimean rare caves could be highlighted as an example of its work in the mentioned direction. In addition, that association was, probably, the first in Ukraine and the Russian Empire, which organized tourist routes for adults and children, maintaining close relations with foreign travel companies.

The contribution of F. Kamensky to the work of other socially significant structures of Southern Ukrainian was also substantial. He was s director of the Botanical Garden of Novorossia University (since 1895), a vice-president of the Novorossian Society of Naturalists, a member of the Lecture Committee that initiated systematic science courses; made a significant contribution to the flora studies of Poland, Crimea and Northwest Black Sea Coast.

Among the scientific achievements of F. Kamensky, it could be pointed out the core thing that perpetuated his memory in the history of world biology. It was connected with the microscopic fungi biology research. The scientist discovered the phenomenon of a mutualistic (mutually beneficial) symbiotic association between fungi and roots of higher plants. Only five years later, the phenomenon was rediscovered by a German botanist A. Frank.[427] In the last years of his life, F. Kamensky became indifferent to the Botanical Garden and scientific work. His death was caused by an accident on September 12, 1912, in Odesa.[428]

Outstanding scientific results were achieved by *Bronislav Fortunatovich Verigo [Bronisław Verigo] (1860-1925)*, who worked at Novorossia University from 1897 to 1914. From 1900, he headed the Department of Physiology, created a laboratory of physiology and a mechanical workshop, which produced unique equipment for physiological research. He created and experimentally substantiated the saltator (hopping) theory of nerve impulse conduction and developed study of the cathodic depression (prolonged decrease in excitability) phenomenon. In 1905-1910, he published a textbook *Fundamentals of the Physiology of Man and the Higher Animals*. After the February events of 1917, the scientist was invited to the University of Odesa again, but he chose the newly created Perm University. By the way, B. Verigo's son, Alexander Verigo, was a well-known Soviet cosmic-ray research physicist.[429]

A star of the first magnitude on the natural science sky was *Vladislav Adolfovich Rotert [Władysław Rothert] (1863-1916)*. In 1902-1908, he was worked at Novorossia University, first as an ordinary professor, then – as a head of the Department of Plant Anatomy and Physiology and the Botanical Laboratory, which was created by him. In 1905-1907, V. Rotert advocated fervently for the democratic foundations of the high school. Thus, he earned the reputation of 'unreliable' one that forced him to resign and go abroad in 1908. The fact that he was an active participant of the Academic Union, which united the advanced professorship, also contributed to the situation.[430] In 1910-1914, V. A. Rotert worked as a professor at the Department of Plant Physiology at Jagiellonian University (Poland) and returned to Ukraine again as a professor at Kyiv University (1915).[431]

V. A. Rotert is considered to be the first in science to restore Ch. Darwin's priority on the material nature of phototropic stimulation. The scientist gave much effort to develop scientific base of botanical research. After some time, under his leadership, the Botanical Laboratory of Novorossia University was not inferior to not only domestic but also foreign university laboratories. He also organized a research greenhouse and a museum, which collections were based on his own

[427] САВЧУК, В. (2008). Поляки на Півдні України: незримі фахові угруповання та їхня діяльність (на прикладі вчених-біологів), с. 240-241.
[428] ВАСИЛЬЄВА, Т. В., & КОВАЛЕНКО, С. Д. (2005). Каменський Франц Михайлович. Ботанік, с. 26.
[429] САВЧУК, В. (2008). Поляки на Півдні України: незримі фахові угруповання та їхня діяльність (на прикладі вчених-біологів), с. 241-242.
[430] Ibid, с. 242-243.
[431] РУДИШИНА, О. С. (2010). Внесок фізіологів рослин Новоросійського університету в розвиток гормональної теорії тропізмів на початку XX ст., с. 108.

botanical pickings, as well as pickings donated by M. Monteverde, M. Tsinger (or Zinger), O. Shenkel and other well-known botanists.[432]

V. Roterthas died from pneumonia in 1916, during an influenza pandemic. His works are widely known in the field of plant physical physiology and cytology. In the field of cytology, hisexplorationsbelong to studies on the shell structure of plant vessels, crystalline inclusions of plant cells, and chromoplasts.[433]

It is necessary to note the activity of another talented scientist *Fedor Mykhailovych Porodko (1877-1948)*, who has worked as an assistant at the Botanical Laboratory of Novorossia University since 1904. After defending his doctoral dissertation in 1916, he became a professor in the Department of Plant Anatomy and Physiology, where he worked until 1948.[434] His research formed a basis of the two-volume work *Chemotropism of Roots*. The findings of the scientist regarding the nature of chemotropisms were included in many plant physiology textbooks.[435]

The well-known botanist of Southern Ukraine, a native of Poland (Międzyrzecu Podlaskim, Siedlce Guberni) was *Boleslav Boleslavovych Grinevetsky [Bolesław Hryniewiecki] (1875–1963)*. On the eve of World War I, he moved to Odesa and since 1915 occupied the position of ordinary professor of botany at Novorossia University. In order to deepen knowledge, B. Grinevetsky repeatedly went to foreign business trips and, in 1910, participated at the Third International Congress of Botanists at Brussels.[436] During World War I, he was actively involved in civic activities, assisting Polish refugees. Until 1919, B. Grinevetsky headed the council of the Polish organizations of Odesa, representing Polish interests in the City Council.[437]

Scientific works of B. Grinevetsky were dedicated to the flora and vegetation of the Caucasus, Poland and Lithuania. In Odesa, he not only worked as the professor of the Department of Botany, but also supervised the work of the Botanical Garden in 1915-1919. Recalling the time of revolution and the Civil War, when many collections were destroyed and the greenhouses were devastated, it was necessary to talk about the great courage of the scientists, who continued their work, classifying and expanding the collections.

In 1919, B. Grinevetsky was invited to head a department at the University of Warsaw. During the period between the First and Second World Wars, much attention was paid to the Lithuanian flora historical review; he founded and edited the botanical journal *PlantaPlonica* at the Warsaw Scientific Society. From 1952, he was an honorary member of the Polish Academy of Sciences, and since 1957 – its full member; published about 40 works on the history of botany and a series of biographical essays on activities of the most outstanding Polish botanists and natural scientists.

B. Grinevetsky was one of the founders and the first chairman of the Polish Botanical Society and the Nature Conservation League. His works on the respiration anatomy, where he described the new funnel-like type, which is typical for the dicotyledons, became classic.[438]

An astronomer *Leopold Khomych Berkevych [Leopold Berkevič] (1828-1897)* worked at Novorossia University from the first year of its existence. After defending his Master's thesis in astronomy in Saint-Petersburg, in 1865, he was appointed as associate professor of the Novorossia

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[432] МІРОНОВА, І. (2008). Культура та розвиток вільної преси серед польського населення Півдня України в XIX – на початку XX ст., с. 205.

[433] ЩЕРБАКОВА, А. А. (1961). История цитологии растений в России в XIX веке. Москва: Изд-во Академии наук СССР, с. 170.

[434] ДЬОМІН, О. (2008). Польська професура Новоросійського університету (1865-1920 рр.). In Поляки на півдні України: історія та сьогодення, том 1. Жешов; Київ; Миколаїв: Вид-во МДГУ ім. П. Могили, с. 170.

[435] РУДИШИНА, О. С. (2010). Внесок фізіологів рослин Новоросійського університету в розвиток гормональної теорії тропізмів на початку XX ст., с. 109-110.

[436] ВАСИЛЬЄВА, Т. В., & КОВАЛЕНКО, С. Д. (2005). Гриневецький Болеслав Болеславович. Ботанік. In В. А. Смінтина (Ed.) In Професори Одеського (Новоросійського) університету: біографічний словник, том 1. Одеса: Астропринт, с. 355.

[437]Д ЬОМІН, О. (2008). Польська професура Новоросійського університету (1865-1920 рр.), с. 170.

[438] ВАСИЛЬЄВА, Т. В., & КОВАЛЕНКО, С. Д. (2005). Гриневецький Болеслав Болеславович. Ботанік, с.355-356.

University Department of Astronomy. In Odesa, he defended the Doctoral dissertation and became an ordinary professor in 1869.[439]

In 1866, L. Berkevych created the Cabinet of Astronomy at the Department of Astronomy and raised the question of the University Astronomical Observatory restructuring. In 1867, the issue was supported by the University Council, and the following year, together with an architect P. Yodko, he developed two construction projects for the future astronomical observatory. The scientist also proposed to the Odesa City General Council the practical works that would be performed by the observatory for Odesa and received extra funding from the city (additionally to the state one) for the observatory construction, which started in 1870. On August 3, 1871, the Astronomical Observatory of Novorossia University was solemnly opened. L. Berkevych, its first director, was leading it from its very inception to the end of 1880.

For that case, L. Berkevych became a founder of higher astronomical education and astronomical research in Odesa. He taught astronomy courses for students of Novorossia University and trained staff of scientists and teachers for the Department of Astronomy and Astronomical Observatory of the Imperial Novorossia University. The basic lecture courses in astronomy, initiated by L. Berkevych, are read nowadays, allowing to prepare the specialists in this field of science.

On December 15, 1880, L. Berkevych filed a resignation petition and retired. In 1882, he left Odesa first to Vilnius and then – to Saint-Petersburg, where he practiced privately. There, he became a member of the Russian Astronomical Society in 1897. He was awarded the Order of Saint Anne of the second class (1870) and the Order of Saint Anne of the second class with imperial crown (1872). L. Berkevych died on May 12, 1897, in Ryazan and was buried in a cemetery of the Holy Trinity Monastery.[440]

An activity of the chemist *Oleksandr Andriiovych Verigo [Alexander Verigo] (1835-1905)*, a native of the Vitebsk Governorate, became significant for the Polish world of Novorossia University. In 1860, he graduated from the Faculty of Physics and Mathematics of Saint-Petersburg University, and, in 1866, after defending his Master's thesis, started working at Novorossia University.[441] At that time Professor Sokolov, who was elected as the first dean of the Faculty of Physics and Mathematics, arrived from Saint-Petersburg to Odesa. He found the chemical laboratory left over from the Richelieu Lyceum in a rather miserable state and began to complete it with everything necessary for the lessons. O. Verigo was appointed laboratory assistant at that institution. In 1871, he defended his Doctoral dissertation at Kyiv University and was elected professor of Novorossia University in 1873.

In 1877, O. Verigo began exploring two Odesa estuaries – Kuyalnik and Hadjibey. Summarizing the results of his work, the scientist concluded that the estuaries contained seawater, which penetrated from the sea into the estuary through capillary spaces, contacting hard fresh water along the way that resulted in the formation gypsum and soda or magnesium oxide between them. Thus, the uniqueness of the water in estuaries was explained. O. Verigo also studied the composition of estuarine mud and showed its suitability for balneological use. For that case, Professor Verigo can be considered the scientific founder of the resort business in Odesa.

In 1869, the city government was concerned about solving the problem of city water supply and ordered the University in the person of Professor Verigo to make an analysis of well and spring waters in the Odesa vicinity. It should be noted that in the first years after the University opening, the city services often applied to the University as a competent institution for solving certain issues of urban economy. Professor Verigo eagerly assisted the city, both with his knowledge and work. The same thing happened with water analyzes. Water in all springs and wells was unsuitable for consumption because of its extreme rigidity; and the Dniester water was at the proper level of

[439] ДЬОМІН, О. (2008). Польська професура Новоросійського університету (1865-1920 рр.), с. 171.
[440] КАРЕТНІКОВ, В. Г. (2005). Беркевич Леопольд Хомич. Астроном. In В. А. Сминтина (Ed.) In Професори Одеського (Новоросійського) університету: біографічний словник, том 1. Одеса: Астропринт, с. 102-104.
[441] ДЬОМІН, О. (2008). Польська професура Новоросійського університету (1865-1920 рр.), с. 171.

drinking water. Those studies had a significant impact on the decision to supply Odesa with water from the Dniester. The water supply system was opened in 1873.

The problem of sewage treatment arose with the construction of water supply and sewerage. The Odesa city authorities had to decide where to drain the city sewage and how to recover wastewater. Professor Verigo scrutinized the soil of Peresyp and proved that the sandy soils were quite suitable for the purpose of oxidation and irrigation, due to their permeability and inclusion of a significant amount of calcareous sand. Moreover, he has pointed to 300 *desiatynas* of non-saline soil area that could be prepared for cultivation of garden plants, and today these fields are occupied by vegetable gardens.

O. Verigo has increasingly been addressed by both city services and individuals for various scientific and practical issues. Therefore, in 1880, he founded on his own funds the first private laboratory in the Russian Empire for the analysis of food. Initially, the laboratory under his managing worked without any city support, and then the city authorities began to allocate a small subsidy for purchasing instruments and reagents. Subsequently, the laboratory was greatly enlarged. In 1896, when it was abandoned by its founder, the laboratory remained a fully organized institution.

In the same year, after a 30-year term of service, O. Verigo left the University and set up a chemical laboratory of the Ministry of Finance at the personal request of Minister Witte. In just a year, he was able to equip the laboratory and to train the staff for research on special issues. At the same time, he was concerned with the denatured alcohol applying for various purposes, – lighting, heating, operating of internal combustion engines, – as well as methods for determining fuseloils in alcohol.

Thus, Professor Verigo devoted his life to three following things: chemistry, the University and Odesa. He is fairly considered one of the founders of Odesa University Faculty of Chemistry.[442]

The study of flora and fauna, as well as the conditions for agriculture in Ukraine began with natural and historical museums. It so happened that the museum business in Southern Ukraine was also formed by Poles. It was from the economic needs of the Southern region that the Kherson and Tavria Natural and Historical Museums emerged. Their founders and directors were biologists J. Pachoski and S. Mokrhetsky.[443]

Joseph Pachoski [Jósef Paczoski] (1864-1942) was born in Volyn. After receiving special biological education and improving his work under the direction of I. Schmalhausen in Kyiv University, he was working for some time (1895–1897) as a botany assistant at the Higher School of Agriculture near Lviv (Dubliany or Dublany). Later his life and activities (from 1897 to 1923) passed in the Kherson Governorate. There, his selfless work, marked in the history textbooks, gave descendants examples of his work's consequences. One of them is the activity on the natural steppe complex protection.

It is known that F. Falz-Fein began protecting the first section of the virgin steppe as early as 1889, but its location was not chosen well enough because it coincided with the former chumak way. In 1898, on the advice of J. Pachoski, F. Falz-Fein laid new protected areas in 500 and 120 desiatynas, and later – several more in the brothers' estate [Yelyzavetfeld].

The Askania-Nova destiny ran like a red thread through the whole life of J. Pachoski. In 1917, there was a threat of its destruction. However, a certain place in the fight against that prospect took the scientist, who, in early June 1917, was appointed commissioner of the Provisional Government to protect the park with rare animals endangered species of the Askania-Nova estate. By October 1917, facing the continuous political change, J. Pachoski made a great deal of effort to preserve the unique reserve. Since 1922, he had been heading the Botanical Department of scientific-steppe reserve station 'Chaplia' ('Heron') – the former Askania-Nova. Scientific achievements of

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[442] ВЕДУТА, В. В., & КРАСНОВА, Е. А. (2015). Жизнь и научная деятельность профессора Александра Андреевича Вериго. Вісник Одеського національного університету. Серія: хімія, том 20, випуск 3 (55), с. 95-101

[443] МІРОНОВА, І. (2008). Культура та розвиток вільної преси серед польського населення Півдня України в XIX – на початку XX ст., с. 205.

J. Pachoski include flora, vegetation and weeds studies, explorations on etymology and plant protection, nature protection issues, ornithological studies, etc.

J. Pachoski has devoted more than 20 years to his museum work. One of the most remarkable natural monuments of the Kherson region and the whole Southern Ukraine is the Kherson Natural and Historical Museum, created by a scientist, who has made it a real museum of nature, with the help of the zemstvo. The Kherson flora herbarium of J. Pachoski has included 22 thousand sheets.

Generally, the creation and activities of the zemstvo natural and historical museums has played a significant role in the socio-economic and cultural life of Southern Ukraine. According to V. Savchuk, it is primarily due to the fact that the region has become the state breadbasket; various branches of agriculture has been developed here. Their operation has raised many issues related to plant protection, pest control and so on. The existing system of agricultural research and research institutions did not fully meet the needs of agriculture. Therefore, there was a need for some conservation, conservation of the fauna and flora of the region, and the scientific and practical problems solution on the natural and historical museums creation basis.[444]

Sigismund Mokrzhetsky [Zygmunt Atanazy Mokrzecki] (1865-1936) is another, but unfortunately more forgotten figure, who has made a significant contribution to the museum and natural science of Southern Ukraine. This person can rightly be considered one of the founders of agricultural entomological science in Ukraine and its practical application in the Tavria Governorate, especially in the Crimea.

S. Mokrzhetsky originated from the Polish gentry family. He was born in 1865 on the 'Dzitryki' estate in the Lida county of Vilnius Governorate [Powiat Wileński]. S. Mokrzhetsky graduated from the Saint-Petersburg Forestry Institute. He worked in the Ekaterinoslav and Kharkiv regions, was taught by such entomologists as V. Yaroshevsky and V. Reinhard. From the 1890s to the 1920s, he first worked in the Crimea as a provincial entomologist, then –as a director of the Natural and Historical Museum of Tavria. S. Mokrzhetsky's scientific activity was devoted to the biology study in plants pests, to elucidation of their natural enemies and parasites, and to gardens protection measures.[445] S. Mokrzhetsky was elected honorary and full member of dozens of institutions and societies, he was a founder, a chairman and an editor of periodicals of the Crimean Society of Naturalists and Nature Lovers.[446] Those two institutions, – the museum and the society, – played a significant role in the development of the Crimea science and culture, given that the first higher education institution (Taurida University) was founded only in 1918. By the way, S. Mokrzhetsky was directly related to its foundation and functioning. For some time, he also headed the Tavria Scientific Association, which emerged in the spring of 1917, bringing together all the scientific institutions and societies of the Crimea. It was S. Mokrzhetsky, who designed a project of the Salhirpomological station. The creation of Salhir station has its own history and is largely obligated to Professor Mokrzhetsky. The end of the described story proved to be a happy one. On July 9, 1912, there was the highest adoption decree on establishing, from January 1, 1913, a fruit-growing experimental station at the 'Salhirka' state-owned estate near Simferopol.[447]

Undoubtedly, a considerable number of Polish descent scholars, attracted by the South of Ukraine, remains outside the review. Thus, I. Vytkovskyi, M. Ptashytskyi, I. Sletshynskyi, O. Ordynskyi, L. Berkevych, S. Shatunovskyi, Ts. Russian, Ye. Bunytskyi, D. Piaskovskyi occupy a substantial place among mathematicians and astronomers; V. Dzerzhynskyi, V. Porai-Koshyts, V. Vysokovych, Yu. Penskyi, T. Openkhovskyi, I. Sytsianko – among the physicians; the humanities were represented by V. Yurkevych, Ya. Sobestianskyi, S. Milkovskyi, I. Mikhnevych,

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[444] САВЧУК, В. (2008). Поляки на Півдні України: незримі фахові угруповання та їхня діяльність (на прикладі вчених-біологів), с. 243-244.

[445]Ibid, pp. 244–245.

[446] МІРОНОВА, І. (2008). Культура та розвиток вільної преси серед польського населення Півдня України в XIX – на початку XX ст., с. 205.

[447] САВЧУК, В. (2008). Поляки на Півдні України: незримі фахові угруповання та їхня діяльність (на прикладі вчених-біологів), с. 245.

B. Markevych, A. Halytskyi, P. Biliarskyi, Y. Pekhanovskyi, L. Kormachevskyi, L. Voievodskyi, V. Hryhorovych, Ye. Vaskovskyi, L. Fedorovych and many others.[448]

Thus, even such an incomplete list of scientific, organizational scientific, and practical activities of the Polish descent scholars in Southern Ukraine testifies to the significance of their contribution to the educational, cultural and socio-economic development of this region. Their input to the natural sciences, especially biological ones, is substantial. The list can be continued, and, undoubtedly, it will be supplemented, as the Polish historians, scientists, biologists, writers, creators and cultural figures have made an invaluable contribution to the cultural and scientific life of not only the South, but all of Ukraine. Their names are included in the cohort of the most prominent people in the world history.

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[448] Ibid, pp. 246.

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ANNOTATION

Part 1. THE ECONOMIC COMPONENT OF SUSTAINABLE DEVELOPMENT

1.1. Nataliia Hembarska, Khrystyna Danylkiv, Khrystyna Gorbova. SOCIAL RESPONSIBILITY FOR BUSINESS AS AN INTEGRATED SUSTAINABLE DEVELOPMENT

The essence of the concept of sustainable development and the components that provide it in the process of doing business have been clarified. Priorities in achieving the desired results of sustainable development have been identified. The interpretation of the concept of corporate social responsibility by international organizations is considered. The characteristics of sustainable development have been isolated and their alignment with the components of business social responsibility according to international standards has been carried out. The models of corporate social responsibility are indicated. The conclusions about the causes and purpose of the concept of corporate social responsibility and its impact on sustainable development are made.

1.2. Nadiya Dubrovina, Oksana Tulai, Erika Neubauerova. TENDENCIES OF FUNDING HEALTH CARE IN EU COUNTRIES: THE FEATURES AND PERSPECTIVES

The article considers the problems of functioning and financing mechanisms of national health care systems in the EU countries. The characteristics of the distribution of total government expenditure on health as percentage of GDP were studied on the sample of the values for EU countries for period of 2000-2018. The tendencies of the dynamics of total government expenditure on health as percentage of GDP were analyzed by means of linear trends and Holt's models and predicted values for next time period were given.

1.3. Nataliia Ivasyshyna, Anton Palchyk. EVALUATION OF THE TOURIST ROUTE OPTIONS

The article describes the method of comparison of options of choice of tourist routes is considered in the work. A method of comparing passenger transportation routes with regard to the cost of transportation and the socio-economic cost of time spent by passengers is proposed. The cost of transporting passengers by bus depends on many factors: geometric elements of the highway, weather conditions and type of buses. It is suggested to take into account the speed reduction in settlements, at pedestrian crossings. The end result will be the sum of the cost of transportation and the monetary expression of the time spent by the bus passengers.

1.4. Olha Khaietska. INVESTMENT ATTRACTIVENESS OF UKRAINIAN REGIONS IN CURRENT CONDITIONS

Attracting foreign investment is an important and topical issue for Ukraine. Improved investment attractiveness will lead to the emergence of new opportunities for the development of promising industries and regions of the country, improving economic stability, increasing business activity, will ensure the country's GDP growth.

The article defines the integral assessment of the investment attractiveness of the region and the factors that influence it. The importance of the factors and indicators that determine the investment attractiveness of the region is noted. The dynamics of capital investment by regions of Ukraine presented and analyzed, places of individual regions of Ukraine for the assessment of capital investments has identified, and it have noted that it is necessary to make a region in order to get a high rating.

The strategic goals and guidelines for enhancing the investment attractiveness of the national economy and the stages of the process of development of the investment infrastructure of the region are proposed.

1.5. Olena Polova. CONCEPTUAL FOUNDATIONS OF UKRAINE AGRARIAN SECTOR DEVELOPMENT

The emergence of global economic chains has led to an intensification of competition between countries. For Ukraine, the agro-industrial complex has traditionally remained a priority and strategically important sector of the economy. The full utilization of the export potential of the country's agro-industrial complex plays an important role in its integration into the world economic space. Therefore, it is relevant to determine the conceptual basis for the development of the agricultural sector of Ukraine in the conditions of increased international competition. Ensuring the sustainable development of the agrarian sector of the economy is based on the realization of its multifunctional mission as a whole and the harmonization of the main components (economic, social and environmental) in particular.

1.6. Valentyna Smachylo, Taras Nalyvaiko. ADAPTIVE CONTROL OF THE PERSONNEL OF THE ENTERPRISES: THE THEORETICAL ASPECT

The category "adaptive control" was identified, the basic approaches to its conception were determined and the author's vision statement was provided. The concept "the personnel of the enterprise" was defined. The structural and logical scheme of adaptive control was suggested, and also the hierarchy of adaptive control of the personnel of the enterprise was defined.

1.7. Yulia Stavska. THE COMMUNICATION COMPETENCE AS THE BASIS OF PROFESSIONALISM IN SOCIO-ETHICAL MARKETING

The article examines the views of domestic and foreign scientists on the reorientation of production from the mass to the individual consumer; In a context where job creation in manufacturing is usually preceded by marketing research on individual demand, social communications begin to fulfill the functions of the "central nervous system", which provides vitality for the economy as a whole organism. The essence of the category "social and ethical marketing" is considered. It is proved that in the theory of social communication it is accepted to distinguish between practical and proper communicative effectiveness of social interaction. It is determined that the communication competence of the personal sale operator is defined as the system unity of four factors: communication knowledge, creativity, responsibility, initiative.

Part 2. THE ROLE OF EDUCATION IN SUSTAINABLE DEVELOPMENT

2.1. Inna Siaska. THE CONCEPT OF SUSTAINABLE DEVELOPMENT AS A METHODOLOGICAL BASIS FOR THE ECOLOGICAL OF EDUCATION IN HIGHER PEDAGOGICAL INSTITUTIONS

The article highlights the main approaches to understanding the concept of sustainable development in education. Its realization in higher pedagogical education of other countries is analyzed. The characteristic features of education for sustainable development are highlighted. The ways of introduction of education for sustainable development in the system of professional training of future teachers are established.

2.2. Zhanna Chernyakova, Mikhail Lyannoy, Tetiana Buhaienko, Yurii Kurnyshev. KEY COMPETENCIES IN THE CONTEXT OF EDUCATION FOR SUSTAINABLE DEVELOPMENT

The main aim of the scientific study is to analyze the normative documents and recommendations in order to define the essence of the term «education for sustainable development». The pedagogical approaches to the education for sustainable development have been

described: the competence approach, the emancipatory approach. On the basis of analysis of normative documents and literature the classification of the key competencies is presented in the research. The characteristics of the competencies (systems thinking, anticipatory, normative, strategic, collaboration, critical thinking, self-awareness, integrated problem-solving)are offered.The pedagogical methods which help to foster the mentioned competencies are characterized and outlined in the study.

2.3. Tetiana Khrystova, Yevhen Karabanov, Inessa Rebar. IMPROVEMENT OF PROFESSIONAL COMPETENCE OF PHYSICAL CULTURE TEACHER IN THE SYSTEM OF POSTGRADUATE PEDAGOGICAL EDUCATION

Based on the systematic analysis of scientific and pedagogical literature and generalization of own experience, the pedagogical conditions are grounded, which determine the level of professional competence of the teacher of physical culture in the postgraduate education system. A detailed description of each pedagogical condition is provided and its informative components are revealed, which positively influence the professional development, self-development and self-improvement of the teacher of physical culture during the period of advanced training, pedagogical staff. The generalized algorithm of technology of organization and holding of master classes in physical education at secondary school, which most effectively influence on dynamics of professional competence development of the teacher, is given.

2.4. Kateryna Kovalova. COMMUNICATIVE COMPETENCE IN THE SYSTEM OF EDUCATIONAL TRAINING OF FUTURE ENGINEERS-AGRARIANS

The communicative competence in the system of professional training of future engineers-agrarians is studied. The structure of the professional competence of a specialist in which scientists distinguish communicative competence is examined. It is shown that the communicative competence is a necessary component of the professional development of future engineers-agrarians, which promotes their professional success, career growth and helps to meet the modern requirements of society. The specialists' communicative competence should include knowledge of professional terminology, the ability to use it in oral and written professional speech, based on their own internal motivation and experience, recognizing the need for self-improvement. In the article we define the model of formation of the communicative competence of a student. It includes motivational-emotional, gnostic, conative and reflexive components.

2.5. Olena Lakomova, Daria Shyian. TOURISM EDUCATIONAL PRACTICES AS THE TOURISM INDUSTRY SUSTAINABLE DEVELOPMENT GUARANTEE

Tourism educational practice use as the guarantee of tourism industry sustainable development is analyzed in the article. The practice organization and completion basic stages are discussed, the main tourist sites are highlighted according to the different tourism types, the professional skills and abilities acquired by the students during the tourism educational practice are clarified.

2.6. Diana Lohvinova, Oleksandr Lohvinov. THE PROBLEM OF COGNITIVE PROCESSES STUDY THROUGH THE USE OF COMPUTER TECHNOLOGIES

This article is devoted to the problem of attention development at school age, as well as the problem of development of methodological tools for studying its properties. The article presents a computerized method "Corrective Test", which allows to obtain quickly reliable data of concentration, switching and distribution of attention in a large sample of examined people, as well as to receive empirical data of high school students in relation to their educational progress at school.

2.7. Oksana Loiuk, Tetyana Gritchenko. THE ALGORITHM OF SCIENTIFIC CONCEPTS FORMATION IN THE JUNIOR PUPILS IN THE LEARNING PROCESS

The article reveals the urgency of the problem of scientific concepts formation in junior pupils. The algorithm for the scientific concepts formation in junior pupils has been based on the synthesis of M. Maslova's concept of thinking integrity; Y. Ponomariov's research on the inner action plan; Yu. Kulyutkin and G. Sukhobskaya's position on transition from the operational components of visual-thinking to the content components of the conceptual, research psychologists (O. Kulchytska, O. Luk, O. Molyako, etc.) about the creative process structure; P. Halperin and N. Talyzina's research results concerning mental actions and concepts formation.

The conclusions about the algorithm effectiveness for the scientific concepts formation in junior Pupils in the process of studying the disciplines "I am in the world" and "Natural science" have been presented.

2.8. Svitlana Skvortsova, Anastasiia Ishchenko, Tetiana Britskan. USING OF INFORMATION AND COMMUNICATION TECHNOLOGIES IN THE PRIMARY SCHOOL TEACHER'S PROFESSIONAL ACTIVITY

The article is devoted to the study of peculiarities of the use of information and communication technologies (ICT) by primary school teachers in their professional activities, in particular, with regard to the use of various online services for teachers. The work functions of the Ukrainian primary school teacher have been studied and on this basis a set of online services has been selected to help the teacher in his professional activity. The advantages and disadvantages of using the online services included in the complex are revealed. The results of a survey of teachers of primary school of Odessa region on the use of ICT in professional activity are presented. The results of diagnostics are analyzed and the main reasons that hinder the implementation of ICT in the professional activity of primary school teachers are found out.

2.9. Yuriy Slysarchuk, Olha Slyusarchuk. FORMATION OF COMPETENCES IT-PROFESSIONALS DURING PROJECT STUDY

The ways of solving the problem of improving the quality of bachelor education in IT specialties are offered. Formation of competencies of future specialists is based on the technology of project-oriented study. Evaluation of competency formation indicators is made using scrum methodology

Part 3. APPLIED ASPECTS OF SUSTAINABLE DEVELOPMENT

3.1. Oleksandr Nepsha, Olga Levada, Iryna Arsenenko, Larysa Donchenko, Larysa Prokhorova. ENVIRONMENTAL ASPECTS OF SUSTAINABLE DEVELOPMENT

Limited natural resources are now becoming one of the most acute environmental problems. Solving environmental management tasks requires not only knowledge of the functioning of ecological systems, but also a certain moral education and awareness of the need to restructure social production and consumption. Environmental monitoring allows you to quantify all of the negative processes in nature that cause human activity. It also allows you to see the positive results of environmental measures.

3.2. Vadym Abyzov. SUSTAINABLE DESIGN. INNOVATIVE GREEN BUILDING MATERIALS

The need of creating a harmonious environment and solving diverse and complex aspects related to its development and construction in line with the concept of sustainable development is a major and urgent task in front of modern architecture and construction science.In this regard, the

article discusses and summarizes the features and advantages of using innovative building materials, and in particular such as: recycled materials; traditional natural building materialsmade on the basis of modern technologies; nanomaterials. Various examples of their successful application in modern buildings are given.

3.3. Ina Isac, Ana Simac. ENHANCING INTERDISCIPLINARY CONNECTIONS BY APPROACHING THE ARTISTIC POTENTIAL

The transmission of the values produced by experience from one generation to another gives rise to new needs, such as those of raising, socializing and culturalizing the younger generations. Educational systems reforms around the world are oriented towards global transformations with maximum efficiency in the educational process – what is learned should be attractive, easy to assimilate and useful. The development of creative-human skills allows the growth of an intelligent and praxiological generation. Arts have a substantial role in the realization of the meaning of learning contents and offer students an abundant source of means of self-expression in arts – both mental and communicative. These are essential for formulating their own meaning, but also for understanding the messages transmitted from outside and act as a link between all the cultural and scientific fields in school.

3.4. Tetiana Koliada-Berezovska, Olga Romanova. DIGITALIZATION OF EDUCATION FOR THE SUSTAINABLE DEVELOPMENT SAKE: LINGUISTIC ASPECT

The education is considered in the context of modern society's basic processes digital transformation, therefore analyzed are that digitization communicative, terminological, and linguistic aspects. Attention is paid to the most debatable categories of scientific discourse, new trends and opportunities in linguistics, while emphasizing the fact that digital technologies in the course of teaching a non-native language contribute to the sustainable development of the independent, extra-curricular work skills, since these types of educational activities are specific with their developing, stimulating and researcher functions, and the classes' distant-learning format gives every ground to speak here about a fundamentally new principle of linguistic-educational activity organization, based on a motivated attitude towards self-education and self-improvement as sustainable personal development components.

3.5. Andrii Lagun, Nataliia Kukharska. INTERDISCIPLINARY CONNECTS FOR EDUCATIONAL PROGRAMS IN THE SPECIALTY "CYBERSECURITY"

The nowadays issues of modern society is tied with cybernetic threats and terrorism and tell the universities requirements of quality of studies for future information security professionals. In this article it is considered features of creating the new education program following the new Ukrainian standard for preparation bachelors in the specialty "Cybersecurity". Also there are full analysis of interdisciplinary connects and features for creating new fundamental and professional modules using educational program. These modules were coordinated by employers.

3.6. Iryna Mironova. EDUCATION DEVELOPMENT OF THE POLISH POPULATION IN SOUTHERN UKRAINE (FROM IMPERIAL TIMES TO THE PRESENT)

The article covers the development of Polish community education in Southern Ukraine in the imperial, Soviet and modern epochs. It is specified number of the Polish population, the percentage of educated persons and the number of Polish educational institutions in the region by census results 1897, 1926 and 2001. The primary focus is on the opening of Polish language teaching schools. The negative ideological pressure of the imperial and Soviet governments on Poles' education, aimed at the continuous Russification of the population, is revealed. The role of the independent Ukraine government and non-governmental organizations in reviving the language, education and culture of the Polish population in the country is shown.

3.7. Tatiana Spirina, Marina Sytnik. AGGRESSIVE BEHAVIOR OF TEENAGERS: CAUSES AND CONSEQUENCES

In today's conditions of much more liberal values, a certain level of individual aggression becomes a factor not only of social adaptation and the survival of a part of the population. And in this context, an important role is played by the study of forms of its manifestation, which, in particular, may include criticism, humor, attempts to build a career by identifying the shortcomings of their competitors, unwillingness to start a family, participating in protests and active position in social networks. The article deals with the analysis of various manifestations of aggression and aggression in the teenage environment, and analyzes the causes and consequences of adolescent aggressive behaviour.

3.8. Inna Pidbereznykh. INTERNATIONAL EDUCATION STRATEGY IN THE ASEAN COUNTRIES' POLICIES

The current study explores contemporary trends, challenges, and opportunities in the ASEAN (Association of Southeast Asian Nations) region toward developing a culture of harmonization among all nations and determining how the internationalization of higher education can assist in this process. Explores different reform agendas undertaken by policy-makers of some South-East Asian countries and examines the development of the regionalization and inter-regionalization processes of higher education as a challenge to the narrow focus of a center-periphery framework. The internationalization of higher education over the last two decades has transformed the education sector into a globalized, interconnected knowledge-based society. Higher education institutions and national governments have been compelled to pay more attention to academic relations and knowledge exchange opportunities with partners in other countries, particularly in the same region. The current study aims to investigate the role of higher education internationalization in Southeast Asian nations for the development of a more harmonized region. An exploratory comparative approach has been used to identify and investigate recent internationalization trends in ASEAN member countries. The internationalization of higher education is a compelling and logical approach to increasing harmonization at the intra-regional and interregional levels. ASEAN has looked to the architecture and initiatives of the European Higher Education Area as a source of inspiration. Should it wish to, the approach to the development of an ASEAN Higher Education Area will be qualitatively different. This has as much to do with the paradigmatic differences between these two regional communities as their structural differences.

3.9. Nataliia Shevchenko. THE CONTRIBUTION OF POLISH SCIENTISTS TO THE DEVELOPMENT OF EDUCATION AND SCIENCE IN THE SOUTH OF UKRAINE (SECOND HALF OF XIX – BEGINNING OF XX CENTURIES)

The article highlights the contribution of Polish scientists to the development of education and science in Southern Ukraine in the second half of the XIX and early XX centuries. In particular, it is disclosed an activity of A. Artsymovych, as appointed trustee of the Odesa Educational District, his work in the course of reforming higher, secondary and elementary education in the region, as well as the opening of Novorossia University in Odesa. Particular attention is paid to the scientific activity in the field of natural sciences of the following professors of the University: L. Tsenkovsky, F. Kamensky, B. Verigo, V. Rotert, F. Porodko, B. Grinevetsky, L. Berkevych, O. Verigo. The role of J. Pachoski and S. Mokrzhetsky in the foundation of the Kherson and Tavria Natural and Historical Museums is shown.

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