



# **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*

### 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.<sup>268</sup> 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).<sup>269</sup>

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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<sup>268</sup> <https://undocs.org/ru/A/RES/70/1>

<sup>269</sup> Romanova, O. (2019): Educational trends in the training of Odessa polytechnics / O. Romanova // Innovations in humanities: restarting / ed. A. Ostenda, N. Rybka, V. Zharkyykh. – 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<sup>270</sup>. Therefore, *digital* technologies make it possible to get education outside of the University, since many universities open their programs following the main education development vectors. 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 constants are: 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 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 epoche 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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<sup>270</sup> 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-dlygach-didigitalizaciya-obshchestva>

- 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<sup>271</sup> 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.<sup>272</sup>

According to E. F. Kirov<sup>273</sup>, 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<sup>274</sup> "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

<sup>271</sup> 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.

<sup>272</sup> 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.

<sup>273</sup> 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.

<sup>274</sup> 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<sup>275</sup>, 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.<sup>276</sup>

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<sup>277</sup>, 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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<sup>275</sup> Klushina N. I. (2015): Internet stylistics in Russia. Problem statement. – Ibid. – Pp. 31-34.

<sup>276</sup> 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>.

<sup>277</sup> Akishina A. A., Tryapelnikov 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.<sup>278</sup>

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.<sup>279</sup>

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.<sup>280</sup>

**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.

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<sup>278</sup> 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.

<sup>279</sup> Kolkova, 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>.

<sup>280</sup> 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.<sup>281</sup>

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. Kolkova, 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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<sup>281</sup> 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"<sup>282</sup>.

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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<sup>282</sup> Standard of higher education of Ukraine, the first (bachelor) level, branch of knowledge 12 "Information technologies", specialty 125 "Cybersecurity" (2018).

## 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 Stavskaya. 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 materials made 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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