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# Theoretical and methodological bases of designing the educational institution information and consulting environment

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**Abstract.** In article the definition of the educational institution information and consulting environment has been formulated. It was found the such environment is a relevant part of the information education society, within which it becomes possible exchange of information and consultative support of subjects of the educational process via the computer focused technologies. The semantic and functional content of an educational institution information and consulting environment have been specified. Its social, spatial-object, psychological and pedagogical components have been analyzed. The criteria for assessing the quality of the information and consulting environment have been described. The main factors and leading pedagogical technologies of organizing and forming of the information and consulting environment have been determined. The pattern of the educational institution information and consulting environment covering organizational, technical methodical resource areas have been established. Based on the results of empirical research with use of content analysis and factor analysis the benefits and risks of the educational institution information and consulting environment have been reviewed and summarized. It is concluded that the organization of the educational institution information and consulting environment will promote increase the efficiency of the educational process and the quality of educational services.

## 1. Introduction

A modern and efficient education system that capable of satisfying the social mandate of society and training competitive personnel, is one of the main directions of the state socio-economic policy. It undoubtedly determines the role of the country in the world community.

It should be noted the former education system has been quite successful in training highly qualified staff for the country throughout many decades. However, the time requirements and the widespread ICT, rapid growth of standards to the level of their mastery, the openness of educational systems, the popularity and demand for electronic educational resources in general and in the terms of pandemic the COVID-19 in particular [8], all of these require changes in approaches to the organizing of study process



in vocational education institutions [24], [44], [47]. Today's realities claim from specialist not only a high level of professional education, but also a new type of intelligence, way of thinking, quickness in communication and professional mobility [55]. In the end this will change him/her attitude to the rapidly variable economic, technological, social and informational factors of production and the world around them.

Conceptual changes in the vocational education system are prompted by the widespread of new computer-based technologies including distance learning [49], data personalization [31], virtual classrooms [57], cloud [32] and Internet technology [35], autonomous learning and information consulting [25], and whatever. Successful modernization of educational systems with the use of ICT is possible within a lot of projects. One of which is the creation of a united educational institution information and consulting environment which will provide effective support the specialists' professional formation. This environment does not mean a simple replacement of paper workflow with electronic one. This process involves a radical restructuring of consulting services on basis of a personal and activity approach, change ways of working with information and clients, reconstruction the channels of accumulation, exchange, storage and processing of data via ICT and tools.

*The purpose* of the paper is to determine the essence and content of the educational institution information and consulting environment to find out the main factors of its successful organizing and forming in the vocational educational institution, as well as its trends for development.

## 2. Materials and methods

Recently, in the process of studying different levels pedagogical systems, researchers tend to comprehensively assess the formative factors that can initiate the personality development. A such viewpoint about realizing possibilities of an environment approach for creating the special space and initiation by means of it the qualitative and various influence on the subject vital activity is quite substantiated one. Mariia M. Levina [27], Iurii S. Manuilov [30], Sergei F. Sergeev [46], Viktor I. Slobodchikov [52], Viktoriia V. Zhelanova [66] and others established that such approach allows to diagnose, design and produce certain circumstances into a specially organized space to make qualitative positive changes in the personality structure.

In the scientific literature there are a lot of deserving research models of environments for different purposes. Among them, such relevant environments as information, consultative, educational, upbringing ones and others are distinguished for the educational area. At the same time, rapid changes in the information society space require constant updating the educational institution environment, the search for new organizational, legal and other mechanisms of its function.

Valerii Yu. Bykov [4], Nataliia I. Klokar [17], Iryna S. Mintii [33], Iulii A. Shreider [50], Serhiy O. Semerikov [34], Mariya P. Shyshkina [43], Vitold A. Iasvin [13], Irina G. Zakharova [64] consider the issues of management of the education system and its innovative potential in light of modern information technologies introduction, as well as modeling and design of information-educational and information-communication educational environment. Dmytro Ye. Bobyliev [2], István Lénárt [26], Kateryna V. Polhun [42], Tetiana V. Prydacha [5], Myroslav J. Syvyi [56], Iryna M. Trubavina [59], Tetiana A. Vakaliuk [60], Nataliia P. Volkova [58] and others study various aspects of the of distance learning and e-learning organizing. Problems of consulting support of the educational process are studied by Therese S. Christiani [6], Rickey L. George [6], Alla Y. Kapska [15], Alla O. Krasneichuk [63], Valentyna I. Saiuk [45], Alona P. Tsyganenko [15], Serhii V. Zahorodniuk [63] and others.

Therefore, elaborating the content of the educational institution information and consulting environment the semantic analysis of the constituting categories has been used; the content and functional filling of the information and consulting environment has been specified, by virtue of analysis of primary sources and own researches (they included content analysis and factor analysis) the main factors of its successful organizing and forming in the educational institution has been selected; its evolvement prospects has been predicted.

### 3. Theoretical background

At the heart of understanding the essence and designing the content of the information and consulting environment is the *environment conception*. For the first time its scientific interpretation as a special functional system was given by Iurii S. Manuilov [30]. The system includes: the conceptual apparatus, a number of semantic statements (principles) and pragmatic provisions (rules). The key concept of the approach is the “environment”, which is being analyzed in the context of its impact on the individual’s functioning and elaborating. The category “environment” is source to the “mediating”, “averaging” and “facilitating” concepts. Iurii S. Manuilov defines the functional environment as a certain space in which the subject is, and through which his/her way of life is formed. The environment mediates the subjects’ development, averages them to the typical indicators of space, but doesn’t standardize and unify them ([30], p. 22).

The environmental conception apparatus is also represented by the “way of life” notion (it way of being into an environment) and the “action” one. They are basis for understanding the way the subject interacts with the environment and its transformation into a means of personal development. Important for the design of the educational institution information and consulting environment is the study and interpreting of various types of management actions, including diagnostic, design and educational ones, and also such that initiate the environment.

Describing the environment structure, Iurii S. Manuilov singles out certain substances, namely: “niches”, “elements” and “marked” by them individuals. “Niche” means a limited space for opportunities of a particular individual (natural, social and cultural ones) which mediate his/her development. In contrast to the niche, the “element” refers to all sorts of dynamic processes that occur in environment and also affect the individual’s life. “Marked” individuals are representatives of environmental substances, potential carriers of any changes in it. The niches of the educational institution environment are the architectonics and infrastructure, a virtual educational space, socio-cultural groups created within the institution. “Marked individuals” who are able to influence changes are teachers, students, administrative and support staff. The main control mechanism in the educational environment is a purposeful resonant impact on the marked individuals by the environmental tools ([30], pp. 21–23).

Iurii S. Manuilov identified the main provisions of the environment conception which formed its semantics and can be used in the design of a particular environment, such as:

1) the environment averages or typifies the personality. This pattern allows to shape a form and project the result of environmental impact on the individual;

2) the environment mediates the person by a range of opportunities, that is able to either enrich or, conversely, burden him/her. Took into account this provision it be possible to design and create certain environmental “niches” for the individua’s necessary qualities development;

3) the environment contributes to lifestyle changes in the direction due to the elements. Therefore, it is necessary to diagnose, design and produce formative influences with the help of dynamic processes that specially initiated in the educational institution environment;

4) the environment becomes a means of individual development only if it has the appropriate parameters, the values of which are determined by the characteristics of niches and elements. This pattern demands the working up criteria and indicators of the educational institution information and consultation environment;

5) the shaping of the environment with the appropriate values of parameters is a corollary of the subject’s creative actions into the environment. It means that the environment is not created spontaneously, but is the result of purposeful subject’s activity. Hence, there is a potential possibility of creating an environment with certain designed characteristics ([30], p. 23).

The philosophical concept outlined above was the basis for both the elaboration of general provisions of the environment approach and the design of various environments to solve special research and practical problems.

Based on the works of Iurii S. Manuilov [30], Sergei F. Sergeev [46], Viktoriia V. Zhelanova [66] and others we define *an environment* as a system of conditions that created within a certain space in

which the subject's activities take place. For its part, we consider *the environment conception* as a strategy based on managing of personal development process through the creation of a definite environment ([66], p. 102).

In course of designing pedagogical systems, which include the educational institution information and consulting environment, the application of the environment approach has a number of advantages, namely: 1) it allows to get results naturally through the creation of the environment; 2) enables to implement others methodological approach; 3) shifts the focus and mediates the collaboration between subjects by means of their interaction with the environment ([66], p. 114).

The development of ICT and information and consulting technologies is crucial in the organization of the educational institution environment. Their use in this process has the following benefits:

1. It improves the quality of education through the use of special information and expanding the range of information needs of different categories of students and teachers, ensures transparency and objectivity of education quality monitoring systems.

2. It eliminates the territorial barriers in education due to distance technologies, provides motivated students' independent work during the profession acquisition.

3. It significantly accelerates the movement of management information, automats the organizing and management of educational process.

4. It greatly reduces the cost of education as a result of the combined action of previous factors, which contributes to the further development of the educational process in the institution and improve its quality [64].

Based on the environmental approach positions and the facts concerning the spread of informatization in educational sphere, next it will outline the concept of the educational institution information and consulting environment.

## 4. Results and discussion

### 4.1. Semantic analysis of the essence of the information and consulting environment

In the previous text it was emphasized the need for semantic analysis of the constituting categories to the information and consulting environment concept. These are, first of all, "information educational environment" and "consulting".

The *educational environment* is defined as a set of objective external conditions, factors, social objects necessary for the successful functioning of education [13]. The content of the educational environment should be considered from the standpoint of the subject and object of educational activity, namely:

- from the subject's standpoint it's a system of influences and conditions of personality shaping, as well as opportunities for his/her development which are contained into the social and spatial-objective environment;

- from the object's standpoint it's a set of objective external conditions, factors, social objects necessary for the successful functioning of education.

It ought to emphasize the concept of "education" has a multifaceted meaning now. This is a process, a result, a social institution that provides intellectual and moral development of a personality. Among the variety interpretations in the context of designing the educational institution information and consulting environment, it is necessary to accentuate another modern understanding of education as a service sector.

In Sergey I. Ozhegov's Dictionary, the meaning of the token "service" is "an action that brings benefit and does a help to others" [37]. Educational service in this sense is a purposeful activity of education management bodies, educational institutions and establishments to meet the educational needs of social customers. For the consumer of educational services, the education quality is one of the important elements of life quality. A harmony is undoubtedly possible if the society interests and the individual coincide and when the influences, initiated in the educational environment, accommodate one another and overlap.

And if the educational environment is a more or less clearly defined phenomenon, then the concept of the information environment until now is under working up. It was first proposed by Iulii A. Shreider [50]. The scientist considered the information environment not only as a conductor of information, but also as an active source that affects its participants. In particular, Iulii A. Shreider proposed a semantic approach to the description of the information phenomenon and the mechanism for determining the degree of semantic information (as a way to change the a person's thesaurus under the influence of incoming data), as well as the concept of information-and-knowledge potential (these are knowledge accumulated in society, data available through the information environment, the means of knowledge transfer, processing, storage, retrieval and transmission of information) [50].

Nowadays, the *information educational environment* is contemplated as a set of components ensuring the systematic integration of information technology in the educational process in order to increase its efficiency, as well as those that are a means of creating the personal focused pedagogical systems. Researchers (Olga V. Bondarenko [3], Tetiana M. Derkach [19], Olena G. Glazunova [7], Roman M. Horbatiuk [9], Oleksandr H. Kolgatin [18], Olga V. Korotun [20], Olena O. Lavrentieva [39], Alona T. Litvinchuk [22], Svitlana H. Lytvynova [28], Andrii V. Morozov [36], Larysa M. Petrenko [40], Olga P. Pinchuk [41], Yevhenii B. Shapovalov [48], Mariya P. Shyshkina [51], Nataliia V. Soroko [53], Aleksander V. Spivakovsky [54], Serhii A. Voloshynov [61], Irina G. Zakharova [64], Snizhana O. Zelinska [65] and others) define such an environment as a united information space of an educational institution that combines information both in traditional format and electronical one; computer-telecommunication and study-methodical complexes, and technologies of pedagogical interaction. It is a pedagogical system of a new level support covering logistical, financial and economic, and regulatory aspects. The environment can function at following levels:

- it's information and communication educational environment of the educational institution inserting in all communication tools;
- it's subject information environment that support the teaching subjects or a cycle of disciplines;
- these are individual information and communication environments formed by each student in the course of study activities withing environments of the two previous levels [13].

What is impotent is that the more diverse the information educational environment, the more effective the study process. In this case, as Iraida S. Iakimanskaia notes, the environment constructs in line with individual capabilities of each students, his/her interests, inclinations, and subjective experience [12].

The main purpose of the educational institution information environment is to bring it to a new level, to increase the standard of information culture and information awareness, to form of intellectually and creatively developed personality of students, teachers, and education managers. That is, the subjects of such an environment must be ready to use ICT and tools in management activity, as well as in methodological, teaching, educational and self-educational scopes. The environment actually unites all participants of educational process among themselves the corresponding information streams.

In the information environment it is possible to combine high economic efficiency and flexibility of the educational process, a significant resource provision, sizeable expansion of traditional study forms, prospects for creating new effective forms and methods of teaching and learning. The unified educational institution information environment allows to optimally and qualitatively solve a number of issues, including:

- planning the study process according to different curriculums, levels and forms of education;
- organizing the teaching and educational events in electronic form;
- submission an educational material and reference information;
- transition from the dominating reproductive study activities to creative and consultative one;
- providing access to participants in the educational process to data related with planning, organizing and monitoring of study activities;
- ensuring communicative interaction between teachers, students and management;
- effective using and constantly operative updating of study and methodical complexes and materials [38].

Information services in the educational institution cover various types of permanent and one-time services provided to interested parties. With their help it is possible to present the activities of the educational institution, to get acquainted with practical and theoretical developing's, to solve various current and future problems about organizing of an educational process.

As practice shows, for the efficient use of ICT and the effective functioning the educational institution information environment the network coordinators – consultants, executives, education managers are necessary. These consultants create an informational educational environment, launch and complete various telecommunications projects and provide the essential advice. It should take into account the information service is a valuable direct service for the client and a source of new contacts and development for the institution. With the help of this service a client can not only receive certain information, but also recommend the consultant to study it in order to implement in a practice. In that way, it would seem appropriate to considerate a consultation as a specific activity into the information and consulting environment.

*Consultation* (from the Latin it is translated as “advice”) has a broad semantic meaning. This is a form of training (it is teacher’s assistance to students in mastering the discipline or gaining competencies), and expert advice on any issue, and the name of the institution that ensures assistance and advice (there are professional consultation, legal consultation, children’s consultation, etc.), and a specific advice providing by a specialist (it is conversation with the client on the elaboration of educational projects, didactic materials and whatever). In any case it is realized specially trained specialists (professional consultants) or a person who has experience in solving a specific situation or problem and can give an advice ([45], p. 12).

Professional consultants, thanks to their knowledge, competencies and education, themselves determine the specifics and methods of activity by which they solve the problems of the client (student or teacher) at the professional level.

A type of professional counseling is a *pedagogical consultation*. It is the provision of consulting services by qualified professional (consultant) in the field of education to the managers and staff of educational institutions, and various relevant groups. It can be issues about professional pedagogical activities and development, about information support, assistance, identification and analysis of professional or pedagogical problems, as well as elaboration references for their solution, promoting the implementation of the recommendations [63].

Unlike other types, pedagogical consultation is carried out by specialists in the field of pedagogy, including high school teachers, supervisors and consultants of educational projects, methodologists of educational institutions, independent experts. The main purpose of pedagogical consultation is to solve problem situations of professional direction, namely: evolution of educational institutions; professional development of teaching staff; optimization of interaction between parents and students; increasing the level of study achievements, education and development; overcoming the learning difficulties of children and students, and so on ([45], pp. 12–14).

Valentyna I. Saiuk singles out three main areas of pedagogical consulting where professional counselors are working. It’s following:

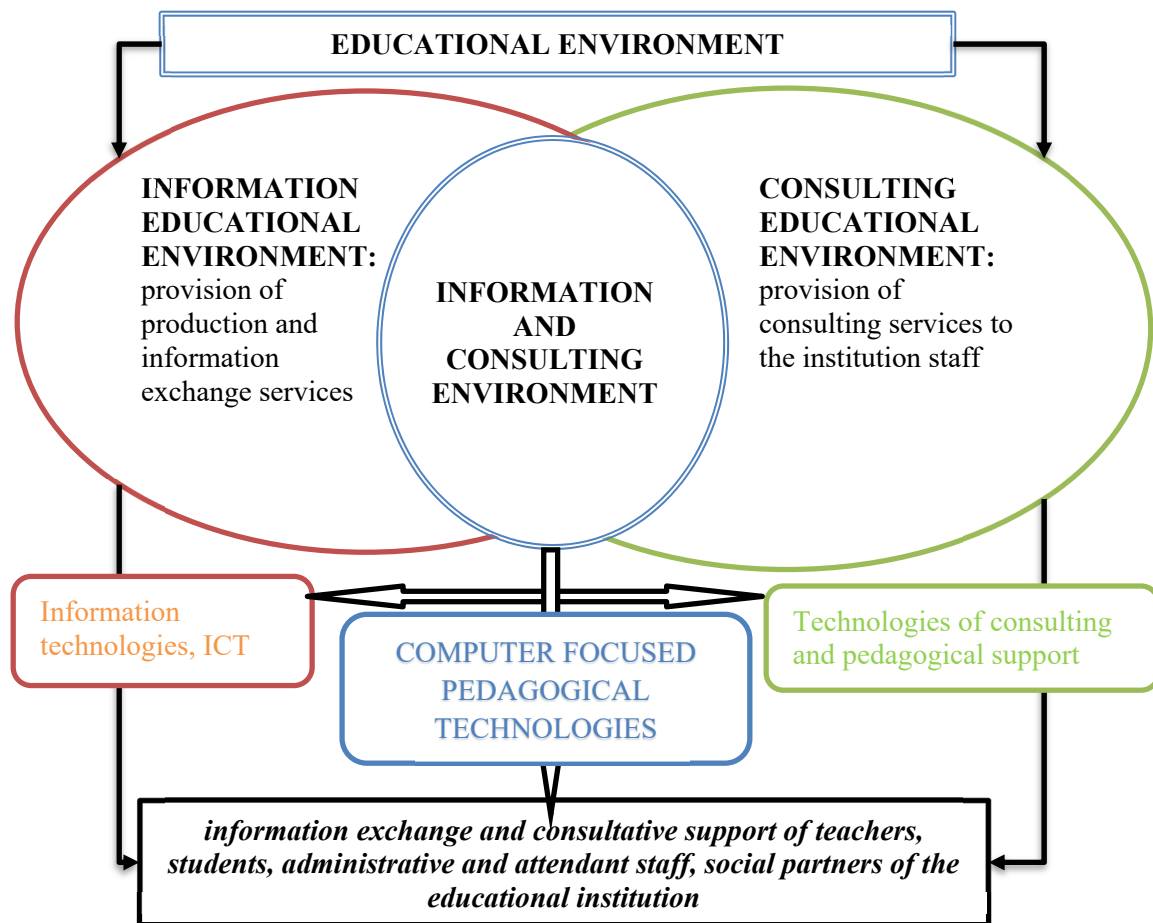
- accompanying the students in the educational process and providing their with consulting assistance in solving problems related to educational activities and personal development in general;
- provision of counseling services to various person involved into the educational environment (parents, relevant groups, social partners);
- scientific and methodological support of professional activity of heads of educational institutions and pedagogical staffs [45].

Obviously, the pedagogical consulting is a type of social service provided to a particular client. Consulting services, according to Alla Y. Kapska, have to improve the client’s relationship with the social environment creating psychological comfort in society and in the workplace [15].

In socio-pedagogical activities consulting is the technology of supply the social assistance through targeted informational impact on a person or a small group in order to socialize, restore and optimize social functions, landmarks, development of social norms for communication [6].

Analysis different interpretations allows to conclude that a *consultation* should understand as a specially organized information interaction between the counselor and those who need help to solve the problem and make positive changes in the activities of an individual or organization as a whole. Into the information and consulting environment a such service is provided via computer focused technologies.

Consequently, the *educational institution information and consulting environment* is relevant for the information society part of the space within which it becomes possible to exchange information and advisory support of the subjects of the educational process and other stakeholders by means of computer focused technologies. Our vision of the essence of the educational institution information and consulting environment is presented in figure 1.



**Figure 1.** The essence of the educational institution information and consulting environment.

The information and consulting environment can be presented as a system, which has such properties like integrative, emergence, orderliness, structuredness, development, stability and reliability ones. Integrating the qualities of both kinds of educational environment, the information and consulting environment is able to enhance the benefits and compensate for the separate issues of each of them. Among problems, in particular, are those related to the insufficient level of digital competence of the subjects of an educational process and the degree of their openness and readiness to accepting consulting services. Computer focused pedagogical technologies used for the purposes provide follow:

- round-the-clock pedagogical support whenever and wherever, and with simultaneous coverage by various methods of counseling for several customers' typological groups;
- personalized feedback and interactions;
- expanding the range of tools and aspects of consulting services;



- variation of rate and volume of the provided information together with orientation on needs of each client;
- giving to consultations for physically challenged persons;
- increasing the information channels capacity and diversity, as well as individual support in accessing to them;
- dynamism, interactivity, gamification, a qualitatively new level of visualization of reference and support information and the consulting process;
- positive emotional background and friendly interface;
- potential opportunity to combine information and consulting resources of different educational institutions, organizations, research centers, and whatever.

Accordingly, into the information and consulting environment there are objective opportunities for social and professional adaptation and personal development of all subjects of the educational process.

#### 4.2. *The content of the educational institution information and consulting environment*

The educational institution information and consulting environment can be presented as a spatial surrounding where all participants of the educational process, including teachers, students, parents, entrants and others stakeholder, can receive qualified advice, information assistance, pedagogical support in solving specific problems with the use modern ICT and tools.

First of all, a such environment is educational one (Viktor I. Slobodchikov [52], Iraida S. Iakimanskaia [12], Vitold A. Iasvin [13]). Furthermore, this is informational (Liubov F. Panchenko [38]), communicatively focused (Alla S. Lobanova [14]), professionally oriented (Viktoriiia V. Zhelanova [66]), developmental (Iurii S. Manuilov [30]), reflexive-contextual (Sergei F. Sergeev [46]) and reflexive-active environment of innovative promotions.

The above semantic analysis of the essence of the educational institution information and consulting environment makes it possible to form its *content* as a set of certain components that are inextricably linked with a person as a subject of the educational process. Among them are the following *components*:

- *social* one that provides satisfaction and development the needs of subjects of educational process advisory assistance of the learning and teaching, and professional activities organizing;
- *spatial-objective* one which determines the environmental design with the interconnectedness of different functional elements, as well as hardware and software of ICT;
- *psychological and pedagogical* one covering pedagogical and methodological support for the implementation of the goals of the environment ([27], p. 101).

The *criteria for assessing the quality of the information and consulting environment* could be defined; they cover following ([10], p. 161; [46]; [52]):

- an immersion is involvement of subjects' emotional and cognitive structures into the environment,
- it is a presence as the experience of being into the environment,
- an interactivity is the participation of subjects in changes and the forming of the environment content,
- a saturation is the environmental resource potential,
- a structuredness is a way of the environment organizing,
- it is an openness to external and internal consumers of consulting services,
- a scalability is the number and scope of services, information and consulting resources;
- it is an integration with various institution structures or social partners;
- it is an adaptability to the demands of a particular consumer of consulting services.

The information and consulting environment is a multicomponent set of educational resources and technologies that provide informatization and automation of consulting services. For these aims the environment creates opportunities for the implementation of a number of computers focused pedagogical technologies. First of all, ICT that is widely used in the information educational environments, among them [23]:

*Multimedia technologies* functioning on base of audiovisual and suggestive methods of counselling organizing with use a computer support [57]. Such technologies create certain sensorimotor stimuli for

better perception, processing and reprocessing of information, allow to manipulate information, create a positive emotional background and friendly interface, enable to provide inclusive counseling using all possible information channels.

*Hypertext technologies* that transform text from a linear form into a hierarchical one and thus provide fast navigation, control, correction and feedback within consulting services.

*Internet technologies* are technologies and services allowing for pedagogical interaction via the Internet. These primarily include e-mail, electronic pagers, communicators, thematic websites dedicated to the transmission of information and providing consulting services.

*Cloud technologies* are a variety of hardware and software, methodologies and tools that are demined to the user as Internet services for the implementation of goals, objectives, and projects. The cloud storage can save up-to-date background or study information, document templates, samples of tasks solving and other things that customers can get with regulated access rights. Today's cloud technologies include the simultaneous work and editing of various documents with the ability to support the consultant in synchronous and asynchronous modes, as well as conducting surveys, collecting data, organizing meetings and conferences at any level. Such technologies significantly expand the educational institution information environment and improve the quality and range of consulting services.

*Web technologies* are technologies of web-resources creation and application (sites, models, virtual environments, events and meetings) for consulting purposes. To their well-known advantages should be added the capability to involve external consultants, and, what is more, specialized thematic and educational sites, portals, Internet projects, planetary classes, virtual universities created specifically to provide consulting services.

*Telecommunication technologies* are ways of intersubjective interaction organizing on the basis of multifunctional network multimedia study complexes and automated educational systems. These technologies provide multimedia-enabled video communications and widely use scribing and computer visualization to enhance the quality of the counseling process.

*Automated library and information systems* are technologies for managing information resources at all stages of their life cycle in the library, as well as automation of main library and bibliographic processes [11]. Their use allows to make the consulting process mediated by ICT. Technologies let automating the search for answers to the most typical customer requests, supply access to relevant information "in one click", register and solve clients' problems with help of a moderator if it necessary.

*SMART technologies* are an interactive study and consulting complex that permits to create, edit and distribute information in a multimedia format. In the era of massive smartphones and other gadgets distribution, various information boxes and displays exploit, such technologies are becoming more widespread.

*Document automation and management systems* are information systems and technologies ensuring the process of creating, controlling access and distribution of electronic documents, as well as control over documentation procedure in the organization [62]. They allow educational institutions to minimize information entry, to do time and financial savings due to decreased paper handling, document loading, storage, distribution of manuals and guidance for clients' needs.

To this list it ought to be added those pedagogical technologies that provide the appropriate level of advisory services, namely:

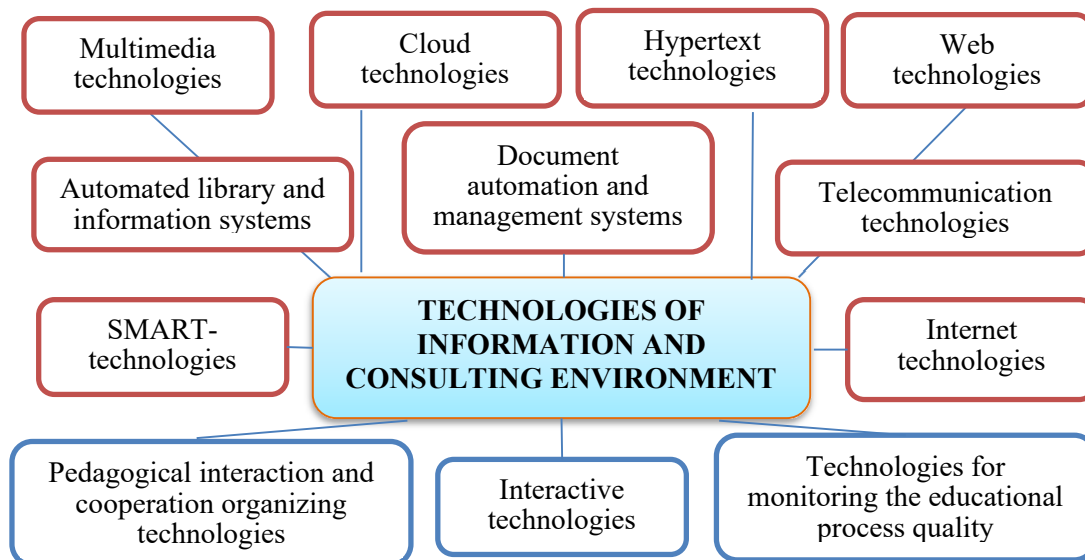
*Interactive technologies* that support pedagogical interaction in the mode of dialogue [1], [16], [21], [29]. Their varieties are group work technologies, coaching and training ones.

*The pedagogical interaction and cooperation organizing technologies* ensure the coincidence of the direction of pedagogical influence and the appropriate reaction of educational environment subjects aimed in order to develop their personality in solving educational tasks.

*Technologies for monitoring the educational process quality* are technologies for the arrange of purposeful activities for the collection, storage, systematization, generalization and use of information about the state and development trends of the of the manpower. They also include test and reflexive

technologies, portfolio (portfolio of achievements, portfolio of process, portfolio of result, presentation portfolio), case-study [29].

The spectrum of technologies is presented in figure 2.



**Figure 2.** Computer focused pedagogical technologies of information and consulting environment.

Based on the analysis of primary sources the *pattern of the educational institution information and consulting environment* have been established; it covers the following main areas:

- *organizational area* to construct an educational institution organizational structure (service, council, center, whatever) to ensure the creation, operation and development of the environment, to working out its regulatory framework;
- *technical area* to support technical and technological solutions;
- *methodical area* to form the training system and to prepare methodological guidance for work into the environment;
- *resource area* for development, support and improvement of information and consulting resources [17].

Therefore, in order to implement innovations, educational institutions need to implement ICT in study and administrative processes, to create information and consulting environments and centers for the transfer of educational and industrial technologies. Finally, it will improve the quality and accessibility of educational services.

#### 4.3. Review and analysis of the benefits and risks of the educational institution information and consulting environment

The overview of the open information resources, sites and other presentation and working materials reflects significant achievements in the direction of expanding the range of educational and consulting services provided within the functioning of educational institutions. We supplemented the review with our own research on the state of the problem of organizing the educational institution information and consulting environment. Our research involved 50 educators and 60 students of Kryvyi Rih State Pedagogical University and Drohobych Ivan Franko State Pedagogical University, as well as Kryvyi Rih Professional Mining and Technological Lyceum. Among them were 15 representatives of the administrative apparatus and management of institutions.

Based on the survey results it is established that creating of the modern information and consulting environment is not only demands of the times but also necessity for survival and promotion educational

institution. This idea was confirmed by 96% educators and 83% students. According to the 82% respondents' viewpoint the development of educational systems and professional counseling based on the use ICT considerably improves the quality of the educational process, greatly expands the possibilities of giving both on basic and additional educational services. By means of information and consulting environment students have the opportunity to plan independently, do training by their own trajectory, at any time to receive pedagogical support and qualified counseling, receive answers to current and future requests, and even get around to personality and professional evolution.

The managers and leaders of the educational institutions which took part in our research called a number of advantages the information and consulting environment. We summarized them into the following types:

- to organize a reasonable and rational document automation and management systems within the institution, to implement ICT in the management of educational institutions;
- to introduce a system of collecting, processing information about various aspects of the educational process;
- to carry out detailed monitoring of the institution activities;
- to create electronic databases of pedagogical staff and student body;
- to support the educational institution website, web pages of educational projects;
- to organize a distance learning;
- to expand information interaction and social partnership with other institutions and potential employers;
- to provide the consulting services in the context of educational, public, advertising, volunteering activities to stakeholders outside to the educational institution.

Thus, the creation of a united information and consulting educational environment will promote the development of study, pedagogical, managerial activities of educational institutions. Due to the survey results the functioning scheme of the educational institution information and consulting environment was made; it shown in the figure 3.

As the figure 3 demonstrates, the united educational institution information and consulting environment is a system in which all subjects of the educational process (administration, teachers and students) are involved at the information level and interconnected by the relevant information flows.

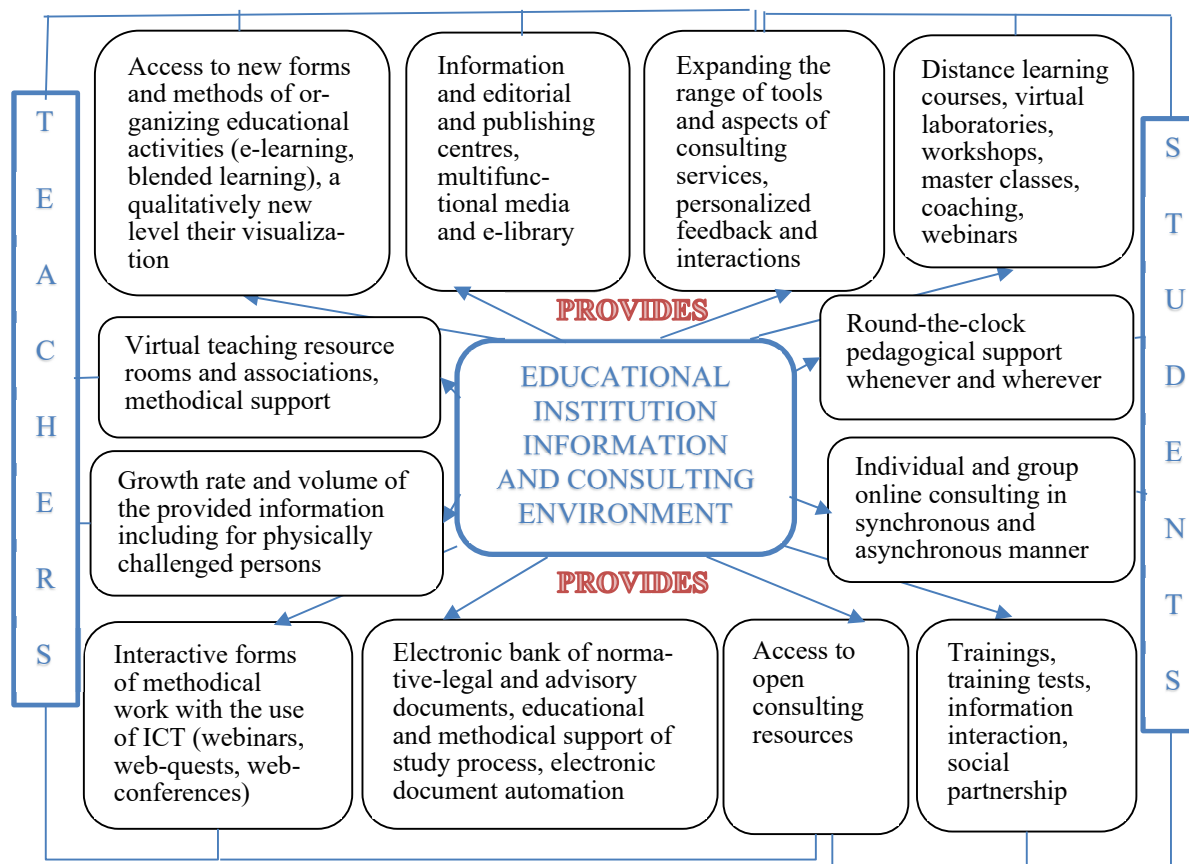
Properly organized and functional information and consulting environment automates and modernizes the study process and makes it more accessible, flexible and attractive to young people. We share standpoint of Halyna B. Hordiichuk [10] and regard that such an environment is able to achievement the implementation of information, consulting, diagnostic, interactive, coordinating, professional and developmental functions and the function of pedagogical and educational support.

Meanwhile, researchers emphasize certain risks and problematic issues in the functioning of the educational institution information and consulting environment. We summarized them and offered respondents to rate the level of their influence on a ten-point scale. The factor was considered significant if it scored more than 7 points on average. The results are presented in table 1.

However, these and other problematic issues can be solved by creating a scientifically sound concept of the educational institution information and consulting environment. In this context it's important not only the current state of the educational environment, but also the strategy of its development, a specific program of action that reflects the general quality culture of the educational institution.

## 5. Conclusions

The article reveals the essence and content, as well as the main approaches to the forming of the educational institution information and consulting environment. At the heart of the presented research is the environment conception. In this regard, the environment is a system of conditions that created within a certain space in which the subject's activities take place. And the environment conception is defined as a strategy based on managing of personal development process through the creation of a definite environment.



**Figure 3.** Functional capabilities of the educational institution information and consulting environment.

Reasoning from a semantic analysis of the constituting categories it was found that the educational institution information and consulting environment is relevant for the information society part of the space within which it becomes possible to exchange information and advisory support of the subjects of the educational process and other stakeholders by means of computer focused technologies. Integrating the qualities of both kinds of educational environment, the information and consulting environment is able to enhance the benefits and compensate for the separate issues of each of them. Such an environment is educational, informational, communicatively focused, professionally oriented, developmental, reflexive-contextual, and reflexive-active environment of innovative promotion.

The information and consulting environment can be presented as a system, which has such properties like integrative, emergence, orderliness, structuredness, development, stability and reliability ones. At the same time, it is a multicomponent set of educational resources and technologies that provide informatization and automation of consulting services. These include computers focused pedagogical technologies (multimedia, hypertext, cloud, telecommunications, Internet technologies, web-technologies, smart-technologies, automated library and information systems, document automation and management systems) and technologies that provide the appropriate level of advisory services (interactive technologies, pedagogical interaction and cooperation organizing technologies, and technologies for monitoring the educational process quality).

The components of the information and consulting environment, inextricably linked with the person as a subject of an educational process, are social component, spatial-subjective, psychological and pedagogical ones. The pattern of environment covers the organizational, technical, methodical, and resource areas.

**Table 1.** Risks, threats and problematic issues in the functioning of the educational institution information and consulting environment.

<i>Environment component</i>	<i>Problem field</i>
<i>social component:</i>	Competition from other educational structures in shaping the image of the institution Insufficient orientation to the typical demands of society Negative impact on the institution reputation due to imperfect information campaign
<i>spatial-objective component:</i>	Incomplete information and physical infrastructure Threat of irreversible loss of electronic data bank due to viruses or cyber-attacks Violation of confidentiality and threat to intellectual property over open information flows Failure or information delay through the use of imperfect software Problems of recognition and confirmation of the received information during document circulation The need to restructure the organizational of the institution
<i>psychological and pedagogical component</i>	Information and cultural barrier Insufficient subjects' digital competence Resistance from the subjects of the educational process in the implementation of ICT to consulting services Lack of initiative in the development of consulting services Distortion the results of monitoring educational services due to the overly formalized and automated procedures Cyberbullying due to the leakage of personal information Risk of refusal or reduction of consulting services quality Reducing the level of subjects' independence during the search and processing of information Absence or reduction the personal contacts

Based on the analysis of primary sources and held own researches (including the use of content analysis and factor analysis) it is established that properly organized and functional information and consulting environment automates and modernizes the study process and is able to achievement the implementation of information, consulting, diagnostic, interactive, coordinating, professional and developmental functions and the function of pedagogical and educational support. The significant advantages in the functioning of the educational institution information and consulting environment which are able to compensate for certain non-critical shortcomings, have also been shown.

The concept of the educational institution information and consulting environment, principles and methodological approaches, tools of pedagogical counseling through computer focused methods, techniques, forms and technologies still need further development.

## References

- [1] Babakina O O, Otroshko T V, Shcherbak I V 2021 Using interactive scribe-presentations when teaching Ukrainian *Journal of Physics: Conference Series* In press
- [2] Bobyliev D Y and Vihrova E V 2021 Problems and prospects of distance learning in teaching fundamental subjects to future Mathematics teachers *Journal of Physics: Conference Series* In press
- [3] Bondarenko O V, Pakhomova O V and Lewoniewski W 2020 The didactic potential of virtual information educational environment as a tool of geography students training *CEUR Workshop Proceedings* **2547** 13–23

- [4] Bykov V, Gurzhiy A and Kozlakova G. 1994 Development of computer education in Ukrainian higher technical schools *IFIP Transactions A: Computer Science and Technology (A-52)* pp 678–81
- [5] Franchuk N P and Prydacha T V 2021 Organization and conduct of classes in educational institutions during distance learning *Journal of Physics: Conference Series* In press
- [6] George R L and Cristiani T S 1994 *Counseling: Theory and Practice* 4th ed (London: Pearson) p 320
- [7] Glazunova O, Voloshyna T, Korolchuk V and Parhomenko O 2020 Cloud-oriented environment for flipped learning of the future IT specialists *E3S Web of Conferences* **166** 10014 URL <https://doi.org/10.1051/e3sconf/202016610014>
- [8] Hamaniuk V, Semerikov S and Shramko Y 2020 ICHTML 2020 – How learning technology wins coronavirus *SHS Web of Coferences* **75** 00001 URL <https://doi.org/10.1051/shsconf/20207500001>
- [9] Horbatiuk R M, Bilan N M, Sitkar O A and Tymoshchuk O S 2021 The formation of educational environment in foreign language training of energy engineering students by means of project technology *Journal of Physics: Conference Series* In press
- [10] Hordiichuk H B 2015 *Use of information educational environment of the educational institution for the purpose of future specialists' professional training* (Lviv: BSU BDZ) pp 159–62
- [11] Humenchuk A, Michanyyn N, Novalska T and Trach O 2020 Strategy of the scientific educational libraries of Ukraine network digitalization *CEUR Workshop Proceedings* **2616** 237–46
- [12] Iakimanskaia I S 1996 *Personal focused education in a modern school* (Moscow: September) p 96
- [13] Iasvin V A 2001 *Educational environment: from modeling to design* (Moscow: Smysl) p 365
- [14] Kalashnikova L V, Lobanova A S, Hrabovets I V, Chernous L S and Chorna V O 2021 Modern information and communication technologies in professional training of sociology students: the mainstreaming of the needs and significance *Journal of Physics: Conference Series* In press
- [15] Kapska A and Tsyganenko A 2015 Social and educational counseling in social activities the teacher as an important factor in conflict prevention seniors *Naukovyi chasopys Natsionalnoho pedahohichnoho universytetu imeni M. P. Drahomanova. Seriya 11: Sotsialna robota. Sotsialna pedahohika* **23** 36–41
- [16] Kazhan Yu M, Hamaniuk V A, Amelina S M, Tarasenko R O and Tolmachev S T 2020 The use of mobile applications and Web 2.0 interactive tools for students' German-language lexical competence improvement *CEUR Workshop Proceedings* **2643** 392–415
- [17] Klokar N I 2008 Development of information and educational environment of the region educational system in the context of ensuring equal access to quality *Narodna osvita* **6** URL [https://www.narodnaosvita.kiev.ua/Narodna\\_osvita/vupysku/6/statti/1klokar/klokar.htm](https://www.narodnaosvita.kiev.ua/Narodna_osvita/vupysku/6/statti/1klokar/klokar.htm)
- [18] Kolgatin O H, Kolgatina L S, Ponomareva N S and Shmeltser E O 2019 Systematicity of students' independent work in cloud learning environment *CEUR Workshop Proceedings* **2433** 184–96
- [19] Konovalenko Yu, Garkavenko S, Derkach T and Morgulets O 2020 Demand and Learning Environment to Provide English-Language Learning at Technical Universities in Ukraine *CEUR Workshop Proceedings* **2732** 996–1011
- [20] Korotun O V, Vakaliuk T A and Soloviev V N 2020 Model of using cloud-based environment in training databases of future IT specialists *CEUR Workshop Proceedings* **2643** 281–92
- [21] Kravtsov H and Pulinets A 2020 Interactive Augmented Reality Technologies for Model Visualization in the School Textbook *CEUR Workshop Proceedings* **2732** 918–33
- [22] Kupchyk L and Litvinchuk A 2021 Constructing personal learning environments through ICT-mediated foreign language instruction *Journal of Physics: Conference Series* In press
- [23] Kyslova M A, Semerikov S O and Slovak K I 2014 Development of mobile learning environment as a problem of the theory and methods of use of information and communication technologies in education *Information Technologies and Learning Tools* **42** 1–19 URL

- <https://doi.org/10.33407/itlt.v42i4.1104>
- [24] Lavrentieva O O, Arkhypov I O, Krupskiy O P, Velykodnyi D O and Filatov S V 2020 Methodology of using mobile apps with augmented reality in students' vocational preparation process for transport industry *CEUR Workshop Proceedings* **2731** 143–62
- [25] Lavrentieva O O, Rybalko L M, Tsys O O and Uchitel A D 2019 Theoretical and methodical aspects of the organization of students' independent study activities together with the use of ICT and tools *CEUR Workshop Proceedings* **2433** 102–25
- [26] Lénárt I 2021 Comparative Geometry in distance education *Journal of Physics: Conference Series* In press
- [27] Levina M M 2001 *Technology of professional teacher education* (Moscow: Academy) p 272
- [28] Lytvynova S H 2018 Cloud-oriented learning environment of secondary school *CEUR Workshop Proceedings* **2168** 7–12
- [29] Malchenko S L, Mykoliuk D V and Kiv A E 2020 Using interactive technologies to study the evolution of stars in astronomy classes *CEUR Workshop Proceedings* **2547** 145–55
- [30] Manuylov Yu 2008 Conceptual foundations of the environmental approach in education *Bulletin of Kostroma State University. Series: Pedagogy. Psychology. Sociokinetics* **14** 21–6
- [31] Marienko M, Nosenko Y, Sukhikh A, Tataurov V and Shyshkina M 2020 Personalization of learning through adaptive technologies in the context of sustainable development of teachers' education *E3S Web of Conferences* **166** 10015 URL <https://doi.org/10.1051/e3sconf/202016610015>
- [32] Merzlykin P V, Popel M V and Shokaliuk S V 2018 Services of SageMathCloud environment and their didactic potential in learning of informatics and mathematical disciplines *CEUR Workshop Proceedings* **2168** 13–9
- [33] Mintii I S 2020 Using Learning Content Management System Moodle in Kryvyi Rih State Pedagogical University educational process *CEUR Workshop Proceedings* **2643** 293–305
- [34] Modlo Ye O and Semerikov S O 2018 Xcos on Web as a promising learning tool for Bachelor's of Electromechanics modeling of technical objects *CEUR Workshop Proceedings* **2168** 34–41
- [35] Modlo Ye O, Semerikov S O, Shajda R P, Tolmachev S T, Markova O M, Nechypurenko P P and Selivanova T V 2020 Methods of using mobile Internet devices in the formation of the general professional component of bachelor in electromechanics competency in modeling of technical objects *CEUR Workshop Proceedings* **2643** 500–34
- [36] Morozov A V and Vakaliuk T A 2021 An electronic environment of higher education institution (on the example of Zhytomyr Polytechnic State University) *Journal of Physics: Conference Series* In press
- [37] Ozhegov S I 2014 *Explanatory Dictionary of the Russian Language* 28th ed (Moscow: Peace and Education) p 1376
- [38] Panchenko L F, Korzhov H O, Kolomiets T V and Yenin M N 2021 PhD student training: principles and implementation *Journal of Physics: Conference Series* In press
- [39] Pererva V V, Lavrentieva O O, Lakomova O I, Zavalniuk O S and Tolmachev S T 2020 The technique of the use of Virtual Learning Environment in the process of organizing the future teachers' terminological work by specialty *CEUR Workshop Proceedings* **2643** 321–46
- [40] Petrenko L M, Varava I P and Pikilnyak A V 2020 Motivation readiness of future software engineer's professional self-improvement and prospects of its formation in college cloud environment *CEUR Workshop Proceedings* **2643** 626–47
- [41] Pinchuk O P, Sokolyuk O M, Burov O Yu and Shyshkina M P 2019 Digital transformation of learning environment: aspect of cognitive activity of students *CEUR Workshop Proceedings* **2433** 90–101
- [42] Polhun K, Kramarenko T, Maloivan M and Tomilina A 2021 Shift from blended learning to distance one during the lockdown period using Moodle: test control of students' academic achievement and analysis of its results *Journal of Physics: Conference Series* In press
- [43] Popel M V, Shokalyuk S V and Shyshkina M P 2017 The Learning Technique of the



- SageMathCloud Use for Students Collaboration Support *CEUR Workshop Proceedings* **1844** 327–39
- [44] Radkevych V, Kravets S, Herliand T, Radkevych O and Kozak A 2021 Modern technologies in the development of professional competence in teachers from professional (vocational) education schools *Journal of Physics: Conference Series* In press
- [45] Saiuk V I 2015 *Pedagogical counseling as a professional activity* (Kyiv: NPU) p 24 URL <http://enpuir.npu.edu.ua/handle/123456789/14319>
- [46] Sergeev S and Burmistrov I 2019 Immersive media in simulators of complex ergatic systems *IOP Conference Series: Earth and Environmental Science* **337** 012052
- [47] Sergeieva L M and Stoychik Tf I 2021 Quality control modelling of competitive professionals' training at vocational education institutions *Journal of Physics: Conference Series* In press
- [48] Shapovalov Ye B, Shapovalov V B and Zaselskiy V I 2019 TODOS as digital science-support environment to provide STEM-education *CEUR Workshop Proceedings* **2433** 232–45
- [49] Shokaliuk S V, Bohunencko Ye Yu, Lovianova I V and Shyshkina M P 2020 Technologies of distance learning for programming basics on the principles of integrated development of key competences *CEUR Workshop Proceedings* **2643** 548–62
- [50] Shreider Iu A 1976 Information processes and the information environment *Scientific and technical information* **1** 28–35
- [51] Shyshkina M P 2018 Service models of the cloud-based learning environment of the educational institution *CEUR Workshop Proceedings* **2168** 1–6
- [52] Slobodchikov V I 1997 Educational environment: the implementation of the educational goals into the culture space *New values of education: cultural models of schools* **7** 177–184
- [53] Soroko N V, Mykhailenko L A, Rokoman O G and Zaselskiy V I 2020 Educational electronic platforms for STEAM-oriented learning environment at general education school *CEUR Workshop Proceedings* **2643** 462–73
- [54] Spivakovsky A, Petukhova L, Kotkova V and Yurchuk Yu 2019 Historical Approach to Modern Learning Environment *CEUR Workshop Proceedings* **2393** 1011–24
- [55] Striuk M I, Semerikov S O and Striuk A M 2015 Mobility: a systems approach *Information Technologies and Learning Tools* **49** 37–70 URL <https://doi.org/10.33407/itlt.v49i5.1263>
- [56] Syvyi M J, Mazbayev O B, Varakuta O M, Panteleeva N B and Bondarenko O V 2020 Distance learning as innovation technology of school geographical education *CEUR Workshop Proceedings* **2731** 369–82
- [57] Tkachuk V, Yechkalo Yu, Semerikov S, Kislova M and Khotskina V 2020 Exploring Student Uses of Mobile Technologies in University Classrooms: Audience Response Systems and Development of Multimedia *CEUR Workshop Proceedings* **2732** 1217–32
- [58] Tokarieva A V, Volkova N P, Degtyariova Y V and Bobyr O I 2021 E-learning in the present-day context: from the experience of foreign languages department, PSACEA *Journal of Physics: Conference Series* In press
- [59] Trubavina I, Vorozhbit-Gorbatyuk V, Shtefan M, Kalina K and Dzhus O 2021 From the experience of organizing artistic and productive activities of older preschool children by means of distance education in the conditions of quarantine measures for the spread of COVID-19 *Journal of Physics: Conference Series* In press
- [60] Vakaliuk T A, Spirin O M, Lobanchykova N M, Martseva L A, Novitska I V and Kontsedailo V V 2021 Features of distance learning of cloud technologies for the organization educational process in quarantine *Journal of Physics: Conference Series* In press
- [61] Voloshynov S A, Popova H V, Yurzhenko A Y and Shmeltser E O 2020 The use of digital escape room in educational electronic environment of maritime higher education institutions *CEUR Workshop Proceedings* **2643** 347–59
- [62] Wikipedia 2021 Document automation *Wikipedia* URL [https://en.wikipedia.org/wiki/Document\\_automation](https://en.wikipedia.org/wiki/Document_automation)
- [63] Zagorodnyuk S V and Krasniychuk A A 2006 Consulting as a service form of public

- administration organs *Derzhavne upravlinnia: teoriia ta praktyka* **3** URL <http://academy.gov.ua/ej/ej3/txts/TEKNOLOGIYA/07-ZAGORODNYUK-KRAYSNECHUK.pdf>
- [64] Zakharova I G 2003 Forming of information educational environment of higher educational institution *Thesis* URL <https://elib.utmn.ru/jspui/handle/ru-tsu/440>
- [65] Zelinska S O, Azaryan A A and Azaryan V A 2018 Investigation of Opportunities of the Practical Application of the Augmented Reality Technologies in the Information and Educative Environment for Mining Engineers Training in the Higher Education Establishment *CEUR Workshop Proceedings* **2257** 204–14
- [66] Zhelanova V V 2016 Environmental approach in higher education: the essence and scope of implementation *Theory and practice of professional skills in terms of purposeful learning* ed Dubasenyuk O A (Zhytomyr: Ruta Publishing House) pp 98–115 URL <http://elibrary.kubg.edu.ua/id/eprint/16295/>