TETYANA LEPEYKO, Doctor of Sciences
in Economics, Professor, Head of Management and Business Department, Simon Kuznets Kharkiv National University of Economics,
61166, 9A Nauka Ave., Kharkiv, Ukraine,
ORCID: 0000-0001-8667-509X
lepeyko.tetyana@gmail.com

OLEKSANDR PUSHKAR Doctor of Sciences
in Economics, Professor, Head of Komputer Sciences and Technologies Department, Simon Kuznets Kharkiv National University of Economics,
61166, 9A Nauka Ave., Kharkiv, Ukraine,
ORCID: : 0000-0003-3592-3684

ROBERT KARASZEWSKY, Doctor of Sciences in Economics, Professor, American University in the Emirates, 503000, Dubai International Academic City, Dubai, UAE,
ORCID: 0000-0002-8980-4392

PROCESS AND COMPETENCE E-LEARNING ORGANIZATION: CASE OF BUSINESS EDUCATION

Abstract. The urgency of the problem. The change in the nature of the activities of employees at enterprises, the emergence of new trends in on-the-job training, the entry into the market of new e-learning tools require a review of the conceptual provisions for the creation of e-learning systems at the workplace.

The purpose of the article is to justify the new concept of creating e-learning systems on the example of business administration.

To achieve the goal of the research, general scientific methods of analysis, synthesis and generalization, the method of semantic compression, formalization methods, structural modeling, recognition methods (cluster analysis), the method of structuring educational material according to the logical model "result - activity - means" were used. The evaluation of the effectiveness of pedagogical tools was carried out on the basis of methods of personal questionnaires and factor analysis.

Main results. A fundamentally new approach to the organization of electronic learning space, based on the author's concept, is proposed and substantiated. It has been established that there is a certain differentiation of formal, informal and informal education technologies. Didactic scenarios and individual learning trajectories are based on andragogic and acmeological paradigms. In order to build an information space and e-learning, scenarios for taking into account cross-cultural features and differences in perception during learning the material are proposed. The model of the subject area of knowledge is built as a multi-level network structure, based on the principle of conceptualization, which involves abstracting from minor details of the properties of objects to a single metaobject - a concept.

The results of the study can be applied in practice by teachers by taking into account the provisions of the concept in the process of creating electronic learning systems.

Keywords: e-learning space, model of semantic information compression, e-pedagogic tools effectiveness.

Acuality of the research and problem statement. The internationalization of social life, the dynamic development of the economies of various countries, and the reduction of the field of unskilled and low-skilled labor put forward new requirements for the quality of the training of specialists and their professional competence. Integration into the European space, the COVID 19 pandemic and the war in Ukraine determined the need to improve the quality and level of education in our country. In this context, the search for new forms and methods of training specialists for modern business, taking into account the realities of the digital global economy, becomes of priority.

E-learning has become an integral part of the modern educational process. However, since the development of digital capabilities is moving like an avalanche and rapidly, there is a need to constantly summarize the experience of working with

electronic educational resources, to consider the issue of online and offline communication formats of participants in the educational process. The presence and specifics of filling the content of the learning space, the introduction of modern visual tools in the formation of an individual learning trajectory require constant monitoring. Changing nature of employees' activities at the enterprises and firms, emergence of new trends in on-the-job training, entry of new e-learning tools into the market require a revision of the conceptual provisions for creating e-learning systems at work. So let's consider the main tendencies and trends that dictate new requirements for the concept of training organization.

Literary Review. Theoretical and methodological aspects of the e-learning organization are now in the focus of interest to many scientists, since this process in the society digitalization is becoming even more multiprocessed and requires a systematic research of a complex approach to its implementation.

Scientists such as S. Tkachenko [4],   I. Gavrilova [5] and others, defined the stage of learning process, factors and methods of it organisation. The analysis of education materials ant it structure based on IGI study [7]. Authors such as V. Ponomarenko [9] and O. Pushkar [11] revealed the structure and features of learning space took into account the difference of modern tools and forms. Researchers [12] note that the education space should be transformed for individual trajectories based and cultural values and features. The general questions of innovations in the educational process and pedagogical technologies under the influence of crisis phenomena and global digitalization and sharing economy were presented in the works by C. Bratiani [14], and N. Makhynia [15], who are mainly concentrated on the theoretical generalization and trend analysis.

In the work by V. Bolotina [1] was reflected a rather extensive list of technologies that will determine the development of e-learning systems in the near future. They are: VR / AR- technology and VR- training, blended learning (full-time +

online), automated assessment, personalization of learning, virtual coach (work automation), robot-tutor, training during the working time (according to the needs). Interrelation of education and a career path, gamification in the real world / motivational tamagotchi (skyeng, lingualeo), learning efficiency assessment, transfer of services to "clouds ", offline access to learning are also among the technologies of the future. Increasingly widespread virtual classrooms, massive use of augmented reality, virtual reality, TinCanApi and xApi as the next generation of SCORM – more data, more information about the users:" a virtual pen", editing real-time video, drawing in webinars online, designers as an option to simplify development tools (for example, Tilda website builder) should be taken into account as well.

Many new types of teaching tools, using information technologies, have appeared in recent years. They are described in [2], a summary of their characteristics is given in Table 1. Such systems have fundamentally different functions as compared to the standard e-learning: they are able to recommend a type of education, find courses and teach. They often use micro-learning technology, when a large course is divided into short cognitive blocks, the so-called "on-demand education".

Table 1.

Comparison of new e-learning tools

Tools	Characteristic
Digital Experience Platform (DXP)	Software platform that enables you to build and deliver integrated, optimized user experiences across all digital channels, all audiences (though with the customer at the center), and all stages of the user / customer lifecycle
Virtual reality (VR)	Artificial environment that is created with software and presented to the user in such a way that the user suspends belief and accepts it as a real environment.
Artificial intelligence (AI)	Is the simulation of human intelligence processes by machines, especially computer systems. These processes include learning (the acquisition of information and rules for using the information), reasoning (using rules to reach approximate or definite conclusions) and self-correction.
Massive open online course (MOOC /mu:k/)	An online course aimed at unlimited participation and open access via the web.
"Micro-learning platforms"	Micro-learning breaks down instructional content into brief modules, typically a lesson the learner undertakes in minutes instead of hours.

Source: Generalized by authors based on [2]

The analysis of the latest developments shows that views on the electronic learning space organization are changing significantly with the emergence of new tools and learning technologies. Based on the analysis of literary sources, it can be noted that the issue of substantiating the scientific and methodological approach to the creation of a modern digital space for e-learning requires more detailed attention. It is necessary to study and practically substantiate the methods and tools of its organization, which meet the needs of quality training in the workplace in the conditions of the modern educational space. Taking responsibility for oneself and your group, as well as communication with the audience is among the advantages of such education, making it a joint, not a competitive activity. Rapid development of information technologies and emergence of new tools make it necessary to substantiate a fundamentally new approach to the organization of e-learning space, which can be implemented on the basis of the presented provisions of the author's concept.

Materials and Methods. To achieve the goal of the research, general scientific methods of analysis, synthesis and generalization were used, based on these methods the use of such concepts as cultural and educational environment, process-competence organization of e-learning, learning process, metadata of e-learning content, and basic models of educational content were clarified and substantiated.

The author's concept of the process-competence organization of e-learning is built in the form of eleven provisions containing either a certain hypothesis or a proposed method or model for implementing the corresponding statement of the concept. It is proposed to use the model recommended by the Council of Europe for the formation and description of the educational space focused on the formation of competences (Provision 1). The formation of the information space of e-learning is proposed to based on the structuring of educational material about phenomena and processes using the logical model "result - activity - tools" (Provision 2). To make decisions regarding the choice of pedagogical technologies in the system of electronic learning space, the

authors suggested using the "knowledge-learning methods" matrix model (Provision 3). To build didactic (pedagogical) learning scenarios, an adaptive strategy for building and functioning of an electronic learning space is used, taking into account the provisions of the andragogic paradigm, which provides more adequate recommendations for adult education (Provision 4). When building the information space and pedagogical e-learning scenarios, models of cross-cultural features were used in the perception and assimilation of the material, which can also be strengthened by the use of G. Hofstede's instrumental concept (Position 6). Templates of information and cognitive maps (imaginary representations of the work structure) are proposed to be collected in a single repository in the form of a database of templates for the most important and frequently performed works (Provision 7) has a different degree of usefulness per unit of information message and, therefore, has the following sequence. To increase the usefulness of individual items of the subject of e-learning, the authors use the method of semantic compression. Based on the use of the formalization method, structural modeling of the procedures for semantic compression of educational information was carried out. The leading role is played by the task of qualitative analysis of the structures of educational content, which involves the assessment of their stability, sensitivity and flexibility. The generation and analysis of robustness and sensitivity is carried out using recognition methods (cluster analysis) (Provision 8).

The content module of e-learning is defined as a unit of information resource that is the basis for the formation of metadata of e-learning content. The choice of method of content metadata generation is determined by a specific business situation or the nature of business processes for which a certain set of competencies must be formed (Provision 9). To form the content of the informational educational space, basic models are used - certain templates, which the scientist (educator) fills with information about the researched object or phenomenon, and which are then transformed into models of the corresponding theory that describes this object or phenomenon. The verification of

the hypothesis that the effectiveness of pedagogical means of building the information-learning process is directly dependent on the adequacy of the student's perception of these means was carried out on the basis of the personal questionnaire method with further processing of the results by the method of factor analysis (Provision 10).

To form the content management of the educational process, a model of the content structure of e-learning was used, which is presented in the form of an informational cognitive map (provision 11).

The formalization method was used for the structural modeling of procedures for semantic compression of educational information (Provision 8).

Main scientific results

Provision 1

The space is focused on the formation of competencies (competence approach). The list can be based on the recommendations of the Council of Europe, which identified the following six universal competences: to Study, Search, Think, Cooperate, Get down to business, Adapt. [3]

Provision 2

Formation of e-learning information space is based on the structuring of educational material on the phenomena and processes (Hypothesis 1).

In this paper, let'rely on basic interpretations of the notion of a process, given in [4, 5 ,6]. Their analysis shows that the definition of the learning process as a transition of the competence space that the learner has from a state with some characteristics (input) to a state with others (output) is most closely associated with the concept of competence, which the learner should get in the learning process. Thus, based on the peculiarities of the learning process, the working material should be structured, taking into account the following logical chain: "how to achieve the result from the activity – what programs and tools are used to achieve it".

This article is based on the main interpretations of the concept of the process given in [4, 5, 6]

Provision 3

Pedagogical technologies in the system of e-learning space are built around the matrix "knowledge-teaching methods" (Table 2).

Table 2.

"Knowledge-teaching methods" matrix

Methods / Knowledge	Formal learning	Non-formal learning	Informal learning
Formal knowledge (FK)	Traditional technology of knowledge transferring	Virtual study, open online course platforms	"Experience platforms"
Non-formalized knowledge (NFK)	Knowledge transferring in the process of study interaction	E-learning, virtual reality system	System based on Artificial intelligence

Source: developed by the authors

Formal knowledge is the knowledge obtained within the framework of classical science, containing concepts, definitions, properties of objects and processes of the studied area, laws, methods and techniques (definition is given in the interpretation of [7]). Non-formalized knowledge is knowledge about the experience of interaction and work with objects and processes of the subject area of specific people, teams and organizations, representing the experience of specific workers, which can be filled with impressions, emotions, reflections, generalizations (the definition is given in the interpretation [7]).

In the framework of this matrix, informal learning is understood as an individual cognitive activity that accompanies everyday life and is not necessarily targeted; spontaneous education, implemented due to the individuals' own activity in the surrounding cultural and educational environment (the definition is given in the interpretation [8]).

Provision 4

Didactic (pedagogical) learning scenarios are built taking into account provisions of the andralogical paradigm, which gives more adequate recommendations on adult education.

If the e-learning space is intended for the on-the-job training of adult personnel at the enterprises, they should be taught taking into account their age, socio-psychological, national and other features. In this connection, Hypothesis 2 of the concept is that the basic models of the e-learning space should be based on the recommendations of andragogy in the interpretation of M. Sh. Knowles [9]: personal self-realization throughout a man's life on the basis of continuous and adaptive learning. In this case, the main function of the e-learning space is to assist the student in identifying, systematizing, formalizing personal experience, adjusting and replenishing his knowledge, mostly practical. Computer support for solving these pedagogical tasks is provided using an adaptive strategy for building and operating e-learning space. On the one hand, it seeks to adapt the e-learning space to the individual characteristics of students. On the other hand, this support should take into account scientific, technological e and cultural changes and challenges in the environment that requires flexibility, giving it qualities of variability, openness, focus on the learner's needs.

Building e-learning space requires removal or deactivation of outdated experience and individual mental models that conflict with new goals, skills and demands. The use of special techniques and methods of learning, memorizing material, formation of competencies is also mandatory. As many authors [9, 10, 11] note, adult learners perceive and assimilate competences based on the same educational material in different ways. This leads to the need to build various control mechanisms of mastering the material under study as part of e-learning space, differentiated according to the types of education. In business education, course material is centered around typical work needs and focused on real-world tasks in a real context. Adult learners'

educational needs are most strongly associated with the need to solve practical, production problems as well as that of personal and professional development.

Provision 5

The informal aspect of learning in the created e-learning space is proposed to be implemented on the basis of the acmeological pedagogical paradigm. The main difference between informal, formal and non-formal education is in the fact that the process of acquiring knowledge does not take place in educational institutions. It occurs in other social institutions by trial and error, through spontaneous self-education, mutual learning in the course of joint work, obtaining information from the Internet, working under the guidance of an experienced specialist or a coach.

Provision 6

When building information space and pedagogical e-learning scenarios, it is necessary to take into account cross-cultural peculiarities of perception and mastering of the material. This should include cross-cultural differences in perception (for example, perception of color and faces), individual memory (the content of memory and the mechanisms of its functioning). The main questions can be formulated as follows: do people from different cultures think in the same way or do they think differently and have different intellectual abilities depending on the characteristics of a particular language and particular intellection of its speakers? When building e-learning space, you can use G.Hofstede's instrumental concept.

For input testing https://www.hofstede-insights.com/country-comparison can be used to identify the features of information perception by representatives of different countries. Thus, the didactic interface should allow the user to choose the most appropriate channel for the delivery of educational content (visual, audio, or a combination of them), and may also include mental maps as an element.

Provision 7

Templates of information-cognitive maps (ICC) are collected in a single repository. The information worker - the manager, technologist, designer, marketing specialist, etc. – works with them. The purpose of ICC constructing is to create a database of ICC templates for the most important and frequently performed work. The ICC templates are a mental representation of the work structure, supporting the process of its performance by the employees of the enterprise.

Provision 8

E-learning subject matter has a different degree of utility per unit of informational message and, therefore, has the following sequence of increasing utility as semantic compression (Fig. 1).

The authors propose to build a knowledge domain model as a multilayered network structure, based on the conceptualization principle. This principle involves abstraction of minor details of the objects' properties and development of the mathematical characteristics allowing you to move from a family of objects to a single meta-object - concept. The models are defined as structures on the sets of elements in the system and environment. The structures reflect three types of relationships: causal; non-cause (correlation); quasi-causal. Quasi-causal or functional bonds in turn are subdivided into limiting, determining and compositional ones. Uncoupled connections are represented by subclasses: correlations and connections reflecting the rate of change.
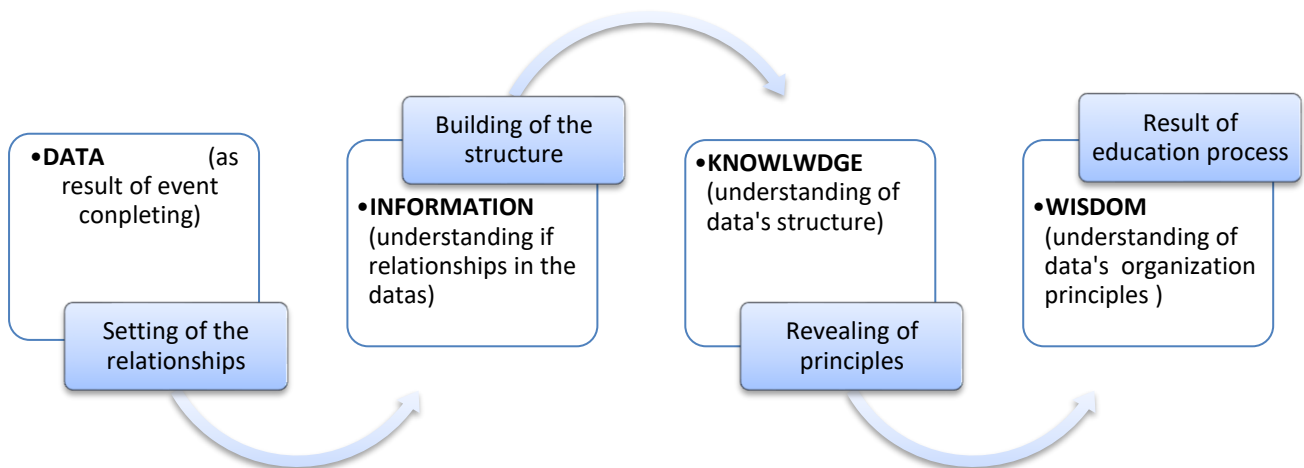
Figure 1. Process of semantic compression

Source: [12].

Let us further consider the methodological approach proposed by the authors to implement semantic compression procedures in the information e-learning space. Each object of the network structure in the chain "data - information - knowledge - wisdom" is represented as a concept associated with other concepts in one of the following relationships: $R_i, i=1,6$: R_1 – structuring relationship ("enter...", "belong to..."); R_2 – causality; R_3 – quasi-causative limiting relation; R_4 – quasi-causative determining relation; R_5 – correlation; - R_6 – quasi-causative determining multi-parameter ratio. The second layer of the structure consists of list structures that characterize the parameters of the concept, expressed as indicators reflecting the elements of competencies. List structures are represented as a predicate model of the type $q_a(\tau_{1,...,}\tau_m)$, where q_a predicate "contains" τ_j term, reflecting the value of the j-th indicator. The qualitative nature of the relationship between terms of different concepts is represented by the relations between indicators $\tau^k_{aj} = \varphi(\tau^n_i)$ where τ^k_{aj} is the j-th term of the k-th concept; τ^n_i – i-th predicate term in n-th concept. The nodes of S_z network model in the subject domain will be characterized by the state of the node's certainty, i.e. as far as the node: is ready to participate in the procedure of forming the corresponding element of competence; is

adequate to educators' ideas about the relationships and state of the subject area's concepts.

One of the two neighboring interacting structures can predetermine the properties and configuration. Such a leading structure can be called a parent structure, and a slave one - a supporting structure. Then, in a general case, the problem of qualitative analysis of semantic compression of educational material is reduced to an assessment of possible use of the supporting structure with changes in the generating structure. Here, for example, "information" is the generating structure for providing the "knowledge" structure.

Tasks of a qualitative analysis of structures, involving the assessment of their stability, sensitivity and flexibility play the leading role in the structural modeling of procedures for semantic compression of educational information. Generation and analysis of structures' stability and sensitivity is carried out using recognition methods (cluster analysis). Let us consider one of possible substructures that make up the structure. To be more definite, let's consider the structure of the educational subject of strategic management. The environment external to it (in terms of the model of Fig. 1 - "data") includes a multitude of product consumers, characterized by the following integrated parameters: territory, demand, consumer preference factors, technology satisfying this demand, and other substructures. Over time, this external environment undergoes certain changes. Let it be described in the information e-learning space at every moment of time t by some vector of parameters ξ_t from the space of the external environment's possible conditions Ξ. Having fixed some moment of time t0, than follow the change of ξ_t vector during the time interval, $[t_0, t_1]$. During $\Delta t = t_1 - t_0$ time in the space of possible states of the external environment Ξ, the trajectory of the external environment consisting of sets ξ_t, $t \in [t0, t1]$ will be formed. The time interval is denoted $[t_0, t_1] = T$. If the laws of changes in the external environment are known and it is possible to unambiguously determine its behavior on the interval T, then in all further considerations

one can use the concept of "trajectory of data change on the subject area of the discipline". The predicted set of states of the environment is determined by the necessary degree of forecast fulfillment probability and depends on the initial state of the knowledge system on the subject area.

Let's consider one of the generating structures (for example, *SIII*). As a result of the subject area development in the time interval $[t_0, t_1] = T$, the structure of the *SIII* undergoes changes. If the trajectory of the knowledge subject area development is set, then it is possible to unambiguously determine the behavior of the *SIII* structure on interval *T* and, as a result - existence of trajectory *G* in structure *SIII*. The multitude of all structures *SIII* is the variety of S^T_{III} structures, which correspond to the trajectory *G* on the interval *T*. The variety S^T_{III} is characterized by volume V_{SIII}, the value of which depends on the degree of *SIII* variability. For the supporting structure, similar characteristics are introduced - S^T_{II} variety and V_{SII} volume. The meaning of V_{SII} volume is that it reflects the degree of diversity of the supporting *SII* structures, which must be built to achieve *SII* compliance with the *SIII* generating structure at each time interval *T*. Since there is a reflection φ_2 that allows you to synthesize the structure SII on the current state of the generating structure, you can write:

$$\varphi_2(S^T_{III}) = S^T_{II}.$$

(1)

Let's call the set of predicted states of the external environment on the interval *T* the multitude of the external environment ΞT. Volume $V\Xi$ of this multitude will be determined by the variability of external environment, the parameters describing it, and the accuracy of the forecast. The value $V\Xi$ will be used further to build the concepts of stability and sensitivity. The specific form of this quantity depends on the structure under consideration and its external environment and needs further specification.

Let *Sn* be the space of all possible structures of one purpose (for example, all possible production structures). We assume that the structure under consideration

should correspond to the state of the external environment. Then, some structure *St* from *Sn* will correspond to each point ξ_t of the trajectory of the environment in space Ξ . The combination of these structures is the trajectory of the structure during the period of time T. The predicted set of states of the environment is defined as the variety of structures *ST* , the set of all structures *St*, corresponding to the variety points of external environment. Thus, if ά is a reflection allowing structure *S* to be constructed from the current state of the external environment ξ :

$$\alpha : \Xi \to S , \quad \alpha(\Xi_T) = S_t \tag{2}$$

Where :Si → Si displays acts as α (ΞT), transforming one of the substructures into another. Displays fr have analytical or statistical expression or they are methods and algorithms for a structure construction.

Provision 9

Let'sdefine the e-learning content module as a unit of information resource. By e-learning content metadata can be understanded as the totality of content modules of an appropriate quantity, quality and type of media (electronic, in the form of staff's knowledge, etc.) ensuring proper execution of the corresponding pedagogical scenario.

Formation of content modules metadata is carried out according to one of the three schemes: 1) Functions → Tasks → Informational work → Content modules; 2) Business processes → Informational work → Content modules; 3) Employees → Informational work → Content modules. In this regard, the choice of the method to generate the content metadata is determined by the specific business situation, which requires execution of the corresponding pedagogical scenario or the nature of business processes for which a specific set of competencies should be formed.

Provision 10

The content of the information educational space should be formed on the preferential use of a set of basic models.

The idea of base models in the study of systems was expressed in the work [13], where the decomposition object should be compared with each element of the base model. At the same time, the base model can display the object under study. For the content of the e-learning space it is proposed to use a variety of basic foundation models, to be learned by the students before they start working with the required content of the studied disciplines. These basic models should become tools for learning and developing their competencies. It is proposed that a variety of basic models should include: Models "What is?" And "How should it be?": Concept models: dynamic scenarios; clusters of objects; task: Models of self-organization; nonlinear models; models of nonlinear worlds; models of the holographic universe; holistic patterns; Visual models of the process, phenomenon, object; Basic decision-making models (in a deterministic, uncertain and probabilistic environment). There is an example of using the cluster model to build the content of the information educational space on the specialty business education.

Hypothesis 3: Effectiveness of pedagogical instruments for informational-learning process constructing is in direct relationship to the adequacy of perception of these instruments for the learner.

In order to test hypothesis, the method of personal questionnaire was applied. Questionnaire was made in Simon Kuznets Kharkiv National University of Economic (Ukraine), the respondents was full time and part-time students of BA program. Results of the questionnaire have allowed to group learners according to such characteristics as: age, gender, year of study, type of settlement and previous education. As an example in the Table 3 distribution of learners according to the age is given.

<div align="right">**Table 3.**</div>

Distribution of responds according to the age

Age	Amount of responds	Share out of responds'total amount
18 - 23	237	39,50%
24 - 30	72	12,00%
30 - 45	218	36,33%
45 and more	73	12,17%
Total	600	100,00%

Source: developed by the authors

Based on this distribution recommendation on choice of instrument according generation theory and different philological characteristic of each generation representatives ([14, 15]) can be developed.

In order to test the third hypothesis factor analysis was applied. Statistical method of analysing dependency between the evaluation of the instruments' effectiveness and adequacy of these instruments among all responders has shown correlation coefficient equal to 0,89. Such number is providing evidence for direct dependency between the appearing frequency and effectiveness of the instrument. Distribution of responders according their characteristics has allowed forming clusters of learners, main of which are presented in Table 4 and Figure 2.

<div align="right">**Table 4.**</div>

Main learner clusters

Cluster	Age	Gender	Number of study years'	Type of settlement	Previous education	Respondents	
						Number	Share
A	18-23	Female	none	City	School	125	20,83%
B	18-23	Male	1	City	School College	107	17,83%
C	24 - 30	Female	2	City	College	83	13,83%
D	30 - 45	Male	3	City	University	61	10,17%
E	30 - 45	Female	2	City	College	55	9,17%
F	45 and more	Female	4	Urban Village	University	52	8,67%
Total						483	80,50%

Source: developed by the authors

(a)   (b)
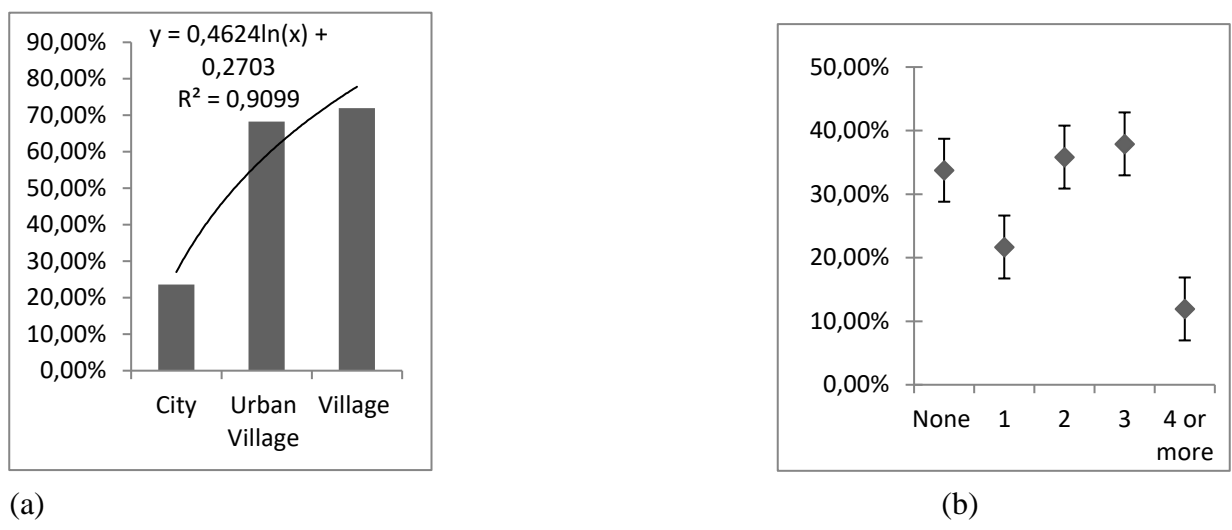
Figure 2. Learning cluster's examples: (a) Description of what is contained in the first panel; (b) Description of what is contained in the second panel.

Source: developed by the authors

Thereby, as it is presented in Table 4, there are 6 main consumer clusters, which are forming more than 80% of total responds. Summarizing, we can propose the instruments that effecting for each learning clusters – Table 5.

As it is shown in Table 5, evaluation of the effectiveness of the instruments managing learner behaviour in information learning space differs among learner clusters. So, we have shown evidence of Hypothesis 3.

Table 5.

Most effective instrument for each consumer cluster

Cluster	Instrument	Share of "very effective" respond for the instrument
A	Virtual reality, artificial intellect system	45,60%
B	Virtual reality, artificial intellect system	47,66%
C	DXP, virtual reality, "micro-learning platforms"	44,58%
D	DXP, "micro-learning platforms"	34,43%
E	DXP, "micro-learning platforms"	36,36%
F	open online courses platforms (MOOC), "micro-learning platforms"	50,12%

Source: developed by the authors

Provision 11

Formation of content management is based on the content structure model of e-learning. The e-learning content structure model is presented in the form of an information cognitive map.

Based on the fact that the content of the pedagogical scenario from the point of view of the used e-learning content in most cases is a weakly structured task, according to the author, the method of cognitive maps can be an effective way to build an e-learning content model. The e-learning content structure model (in the form of ICC information-cognitive card) has the following form (Fig. 3):

Competences, obtained as a result of education, are determined by a set of contents of various types and degrees of processing, separated from all e-learning contents, in order to achieve the goals of a specific pedagogical scenario. An information-cognitive map shows all the information necessary to perform a specific pedagogical scenario.

The required content is selected by keywords in human-machine search systems using both internal information resources and those that are publicly available.
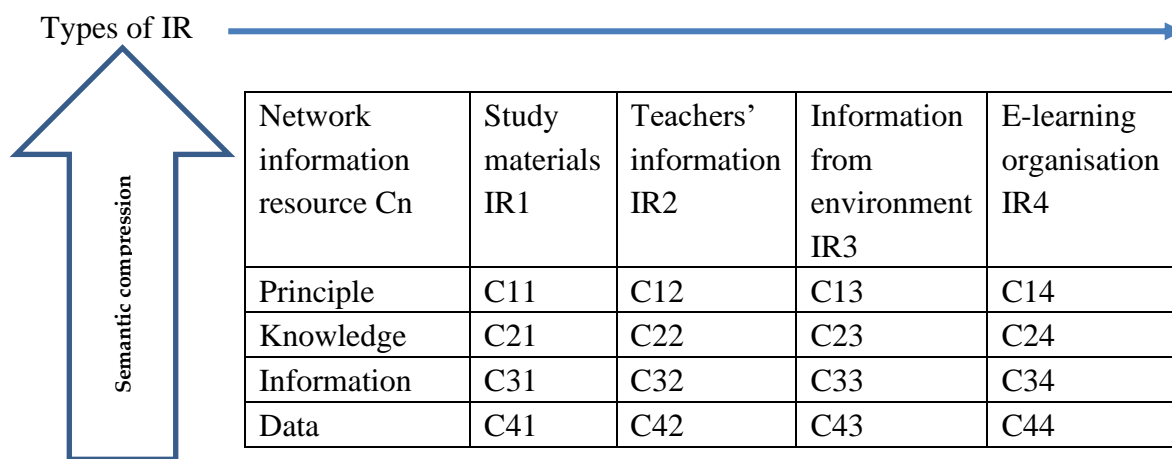
Types of IR

Semantic compression

Network information resource Cn	Study materials IR1	Teachers' information IR2	Information from environment IR3	E-learning organisation IR4
Principle	C11	C12	C13	C14
Knowledge	C21	C22	C23	C24
Information	C31	C32	C33	C34
Data	C41	C42	C43	C44

Figure 3. Model of e-learning content cognitive cart, Cij –- set of key words for searching engine (Result of different resource information IRnn)

Source: [16].

Conclusions. The current state of the economy of culture, human development is the cause of changes in paradigms in all spheres of life, which leads to transformations in the educational paradigm using e-learning technologies. The article formulates the conceptual provisions for constructing the educational space of e-learning, based on the process-competence approach and semantic compression of information.

At the same time, current research has several limitations that could be covered in future researches: learner behaviour of investigated respondents clusters together with these clusters themselves may significantly differ between countries and cultures or even regions, while current research was collecting responds only in one geographical area (one university and one program). Formed in current research learner clusters should be verified for another subject area and different countries. Finally, future research should investigate the perception and application of studied instruments managing learner behaviour among the teachers and administrators of learning process.

Further research in this area is to differentiate the e-learning space, taking into account cross-cultural differences and generational characteristics of the students.

References

1. Bolotyna V. Levellab: e-learning trendы 201. http://e-lpro.blogspot.com/2017/12/levellab-e-learning-2015.html

2. Dzhosh Bersyn HR Technology Disruptions 2018 Report/ http://marketing.bersin.com/HR-Technology-Disruptions-Report-Reg.html

3. Council Recommendation on Key Competences for Lifelong Learning. https://ec.europa.eu/education/education-in-the-eu/council-recommendation-on-key-competences-for-lifelong-learning_en

4. Tkacheva S.S. Evoliutsiia protsesnoho pidkhodu do operatsiinoi ta upravlinskoi diialnosti pidpryiemstv./ Visnyk SumDU. Seriia"Ekonomika", No22012, r. 69-74 - http://www.certicom.kiev.ua/proc.html

5. Melnychuk Yu.Ie. Neformalna osvita: vid teorii do praktyky. /Mizhnarodnyi naukovyi zhurnal «Hraal Nauky» No232022, s. 380-383

https://www.researchgate.net/publication/367338380_NEFORMALNA_OSVITA_VID_TEORII_DO_PRAKTIKI

6. ISO 9001:2015 - Quality management systems / https://www.iso.org/standard/62085.htm

7. IGI Global/ Disseminator of knowledge / https://www.igi-global.com/dictionary/formal-knowledge/11382

8. Paradigm Shift in Business Education: A Competence-Based Approach / C. Bratianu, S. Hadad, R. Bejinaru. - Sustainability 2020, 12(4):1348, pp. 2–17 https://www.researchgate.net/publication/339424878_Paradigm_Shift_in_Business_Education_A_Competence-Based_Approach

9. Ponomarenko V. Some problems of the education system in Ukraine: analytics / V. Ponomarenko. – Kharkiv: PC Technology Center, 2021. – 172 p.

10. Haharin O.O., Tytenko S.V. Doslidzhennia i analiz metodiv ta modelei intelektualnykh system bezperervnoho navchannia // Naukovi visti NTUU "KPI". – 2007. – № 6(56). – S. 37-48.

11. Upravlenye ynformatsyonnoi deiatelnostiu predpryiatyi v эkono-myke znanyi. / pod red. dokt. эkon. nauk, professora A. Y. Pushkaria. – Kh.: Yzd. KhNЭU, 2012. – 560s.

12. Computational modelling of stochastic processes for learning research Oleksandr H. Kolgatin1 , Larisa S. Kolgatina2 and Nadiia S. Ponomareva3, (2022) CEUR Workshop Proceedings, 3083, 1-15 (Proceedings of the 9th Illia O. Teplytskyi Workshop on Computer Simulation in Education (CoSinE 2021) held in Kherson, Ukraine, October 1, 2021 (pp. 1-15).

13. Lepeyko T., Batkhuu G. Asian leadership model: a case of Mongolia/ Economic Annalas –XXI. 2017, №165 (5-6), s. 19-22(SCOPUS)

14. Bratianu, C. The crazy new world of the sharing economy. In Knowledge Management in the Sharing Economy:A Cross-Sectoral Insight into the Future of Competitive Advantage; Vatamanescu, E.M., Pinzaru, F.M., Eds.;Springer International Publishing: Cham, Switzerland, 2018; pp. 3–19. https://clutejournals.com/index.php/AJBE/article/view/4594

15. Makhynia N. Innovations in the educational process and pedagogical technologies under the influence of crisis phenomena and global digitalization / N. Makhynia, Y.Kichuk, O.Ptashchenko, K.Kyrylenko, K.Horchynska, V. Riznyk // Estudios de Economía Aplicada. – 2021. – Vol. 39. – No. 5. – 10 P.

16. Pushkar A.Y. Upravlenye ynformatsyonnoi deiatelnostiu predpryiatyi v эkonomyke znanyi. Nauchnoe yzdanye / A. Y. Pushkar, S. A. Nazarova, K. S. Sybylev; pod red. dokt. эkon. nauk, professora A. Y. Pushkaria. – Kh.: Yzd. KhNЭU, 2012. – 560 s.

Лепейко Тетяна Іванівна, доктор
економічних наук, професор, завідувач кафедри менеджменту та бізнесу
Харківського національного економічного університету,
61166, Харків, проспект Науки,9а,
ORCID: 0000-0001-8667-509X

Пушкар Олександр Іванович, доктор
економічних наук, професор, завідувач кафедри комп'ютерних систем і
технологій; Харківського національного економічного університету,
61166, Харків, проспект Науки,9а,
ORCID: : 0000-0003-3592-3684

Роберт Карашевський, доктор
економічних наук, професор, Американський Університет в ОАЕ,
503000, Міжнародне Академічне Місто в Дубаї, Дубаї, ОАЕ
ORCID: 0000-0002-8980-4392

ПРОЦЕСНО-КОМПЕТЕНТНІСНА ОРГАНІЗАЦІЯ ЕЛЕКТРОННОГО НАВЧАННЯ: ПРИКЛАД БІЗНЕС-ОСВІТИ

Анотація. Актуальність проблеми. Зміна характеру діяльності працівників на підприємствах, поява нових тенденцій у навчанні без відриву від виробництва, вихід на ринок нових засобів електронного навчання вимагають перегляду концептуальних положень створення систем електронного навчання на робочому місці.

Мета статті полягає у обґрунтуванні нової концепції створення систем електронного навчання на прикладі бізнес-адміністрування.

Для досягнення мети дослідження були використані загальнонаукові методи аналізу, синтезу та узагальнення, метод семантичної компресії, методи формалізації, структурного моделювання, методи розпізнавання (кластерний аналіз), метод структурування навчального матеріалу за логічною моделлю «результат – діяльність – засоби. Оцінка ефективності педагогічних засобів проводилась на основі методів особистісного анкетування та факторного аналізу.

Основні результати. Запропоновано й обґрунтовано принципово новий підхід до організації електронного навчального простору, заснований на авторській концепції. Встановлено, що існує певна диференціація технологій формальної, неформальної та інформальної освіти. Дидактичні сценарії та індивідуальні траєкторії навчання базуються на андрагогічній та акмеологічній парадигмах. Для побудови інформаційного простору та електронного навчання запропоновано сценарії врахування кроскультурних особливостей та відмінностей у сприйнятті під час засвоєння матеріалу. Модель предметної

області знань побудована як багаторівнева мережева структура, заснована на принципі концептуалізації, яка передбачає абстрагування від незначних деталей властивостей об'єктів до єдиного метаоб'єкта – концепту.

Результати дослідження можуть бути застосовані на практиці педагогами шляхом врахування положень концепції в процесі створення систем електронного навчання.

Ключові слова: простір електронного навчання, семантична модель стиснення інформації, ефективність електронних педагогічних засобів.

Використана література

1. Болотина В. Levellab: e-learning тренды 201. http://e-lpro.blog-spot.com/2017/12/levellab-e-learning-2015.html

2. Джош Берсин HR Technology Disruptions 2018 Report/ http://market-ing.bersin.com/HR-Technology-Disruptions-Report-Reg.html

3. Council Recommendation on Key Competences for Lifelong Learning. https://ec.europa.eu/education/education-in-the-eu/council-recommendation-on-key-competences-for-lifelong-learning_en

4. Ткачева С.С. Еволюція процесного підходу до операційної та управлін-ської діяльності підприємств./ Вісник СумДУ. Серія"Економіка", No2'2012, p. 69-74 - http://www.certicom.kiev.ua/proc.html

5. Мельничук Ю.Є. Неформальна освіта: від теорії до практики. /Міжнародний науковий журнал «Грааль Науки» No23'2022, с. 380-383 https://www.researchgate.net/publication/367338380_NEFORMALNA_OSVITA_VID_TEORII_DO_PRAKTIKI

6. ISO 9001:2015 - Quality management systems / https://www.iso.org/stand-ard/62085.htm

7. IGI Global/ Disseminator of knowledge / https://www.igi-global.com/diction-ary/formal-knowledge/11382

8. Paradigm Shift in Business Education: A Competence-Based Approach / C. Bratianu, S. Hadad, R. Bejinaru. - Sustainability 2020, 12(4):1348, pp. 2–17 https://www.researchgate.net/publication/339424878_Paradigm_Shift_in_Business_Education_A_Competence-Based_Approach

9. Ponomarenko V. Some problems of the education system in Ukraine: analyt-ics / V. Ponomarenko. Kharkiv: PC Technology Center, 2021. 172 p.

10. Гагарін О.О., Титенко С.В. Дослідження і аналіз методів та моделей інтелектуальних систем безперервного навчання // Наукові вісті НТУУ "КПІ". 2007. № 6(56). С. 37-48.

11. Управление   информационной   деятельностью   предприятий   в

экономике знаний. / под ред. докт. экон. наук, профессора А. И. Пушкаря. Х.: Изд. ХНЭУ, 2012. 560с.

12. Computational modelling of stochastic processes for learning research Oleksandr H. Kolgatin1, Larisa S. Kolgatina2 and Nadiia S. Ponomareva3, (2022) CEUR Workshop Proceedings, 3083, 1-15 (Proceedings of the 9th Illia O. Teplytskyi Workshop on Computer Simulation in Education (CoSinE 2021) held in Kherson, Ukraine, October 1, 2021 (pp. 1-15).

13. Lepeyko T., Batkhuu G. Asian leadership model: a case of Mongolia/ Economic Annalas –XXI. 2017, №165 (5-6), с. 19-22(SCOPUS)

14. Bratianu, C. The crazy new world of the sharing economy. In Knowledge Management in the Sharing Economy:A Cross-Sectoral Insight into the Future of Competitive Advantage; Vatamanescu, E.M., Pinzaru, F.M., Eds.;Springer International Publishing: Cham, Switzerland, 2018; pp. 3–19. https://clutejournals.com/index.php/AJBE/article/view/4594

15. Makhynia N. Innovations in the educational process and pedagogical technologies under the influence of crisis phenomena and global digitalization / N. Makhynia, Y.Kichuk, O.Ptashchenko, K.Kyrylenko, K.Horchynska, V. Riznyk // Estudios de Economía Aplicada. 2021. Vol. 39. No. 5. 10 P.

16. Пушкарь А.И. Управление информационной деятельностью предприятий в экономике знаний. Научное издание / А. И. Пушкарь, С. А. Назарова, К. С. Сибилев; под ред. докт. экон. наук, профессора А. И. Пушкаря. Х.: Изд. ХНЭУ, 2012. 560 с.