



Didactic model of information and communication competence formation of future specialists of economic

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ABSTRACT

In the higher economics education faces a principally new task – the creation of an integrative model of formation of future specialists in economics, who possess the skills of using the information and communication technologies, operating in a digital economy as well as displaying professional mobility. Therefore, the context of digital transformation of the Ukrainian society calls for the improvement of professional training of future specialists of economic profile in the university educational environment; their personal and professional formation and creation of information and communication competence acquires special importance. The authors have revealed and experimentally tested the effectiveness of the didactic conditions of the formation of information and communication competence of future economic professionals in the educational environment of the university: 1) creation of electronic educational resources; 2) introduction of the training studio «Digital technologies in the work of an economist»; 3) complex pedagogical influence by means of coaching. The didactic model of formation of information and communication competence of future economists in the educational environment of the university is developed and scientifically substantiated, as incorporating the following structural blocks: motivational-target, information-content, operational-effective and diagnostic-effective. It is experimentally proven that the implementation of certain didactic conditions has positively affected the effectiveness of the formation of information and communication competence of future economic professionals in the educational environment of the university.

Keywords: model, information and communication competence, conditions, resource-based learning

INTRODUCTION

Nowadays the global trend of the digital world economy is entering a dynamic phase of its development. Ukraine is becoming an active participant in the implementation of the concept of «Industry 4.0», the introduction of digital technologies at both the state and corporate levels – in government programs and business strategies. In 2019 the Ministry of Digital Transformation of Ukraine was created. Its activities are aimed at

forming and implementing state policy in the field of digitalization, digital economy, digital innovations, e-government and democracy, information society development, causing updates and changes in higher economics education, which faces a fundamentally new task – creating an integrative model of formation of future specialists in economics, who possess the skill of using the whole spectrum of information and communication technologies, operating in a digital economy as well as displaying professional mobility, prompt response to constant changes in professional activities. Therefore, the context of digital transformation of the Ukrainian society calls for the improvement of professional training of future specialists of economic profile in the university educational environment; their personal and professional formation and creation of information and communication competence acquires special importance. Consequently, the search of effective tools of developing the information and communication competence of future specialists of economic profile is conducted in accordance with the normative documentation at the state level: the National Doctrine of Education (2002), the Strategy of Innovative Development of Ukraine for 2010-2020 in the context of globalization challenges (2009), the draft Concept of Education Development of Ukraine for the period 2015-2025 (2014), the Law of Ukraine «On Higher Education» (2014), the project «Digital Agenda of Ukraine – 2020» (2016), the Concept of Development of Digital Economy and Society of Ukraine for 2018-2020 (2018). However, despite the significance of the researched issues concerning the information and communication competence formation for economists (Adeyemon, 2009; Balovsyak, 2006; Boitsova, 2011; Boliubash, 2011; Ferrari, 2011; Ilomäki, Kantosalo, & Lakkala, 2011; Kononets, Ilchenko, & Mokliak, 2020; Kononets, Baliuk, & Novopysmennyi, 2020; Mann, 2018; Poiasok, 2009), the problem of this competence formation for future specialists of economic profile in the university educational environment is still insufficiently clarified in Ukrainian didactics.

MATERIALS AND METHODS

The aim of the study is to identify, experimentally test the effectiveness of didactic conditions and to model the process of acquiring the information and communication competence by future economic profile specialists in the educational environment of the university.

The pedagogical experiment lasted during 2017-2020 (ascertaining – 2017-2018, formative – 2018-2020) on the basis of Poltava University of Economics and Trade, Kremenchug National University named after Mykhailo Ostrogradsky, Kharkiv National University named after V. N. Karazin, Kyiv National Economic University named after Vadym Hetman. 269 four-year students of specialty 051 Economics and 14 professors took part in the experiment. Students' majors are Educational Cybernetics, Enterprise Economics, Business Economics and Economic Analytics. The control group (CG) consisted of 134 students, the experimental group (EG) – 135 students.

The research hypothesis claims that the process of formation of information and communication competence of future economists will prove effective in the educational environment of the university provided that the didactic conditions enabling the positive dynamics of this process are implemented: creation of electronic educational resources aimed at the formation of information and communication competence of future specialists of economic profile; introduction of the training studio «Digital technologies in the work of an economist» as a means of continuing education in the training of future specialists in economics; complex pedagogical influence on the goal-setting, motivational, information-cognitive, activity sphere of the personality of future specialists of economic profile by means of coaching; focusing the educational process on the application of technology-oriented learning; involving students in the development and implementation of network projects.

To test the hypothesis, a set of the following research methods has been used:

theoretical – analysis of scientific literature and normative documentation, synthesis, comparison, generalization and systematization of data to compare different views of scientists on the problem of formation of information and communication competence of future economic specialists in the educational environment of the university, clarification of «information and communication competence of future economists» concept, definition of structural components of the researched competence, clarification of specific features of future economists training in the educational environment of university, substantiation of didactic conditions; modeling – to develop a didactic model;

empirical – pedagogical observation, questionnaires, testing, conversation; pedagogical experiment – for experimental verification of the effectiveness of didactic conditions; computer modeling – to evaluate the effectiveness of the didactic model;

mathematical statistics – for quantitative and qualitative analysis of the results of the study and proving their statistical reliability.

RESULTS

On the basis of educational programs analysis, research of the standard of higher education for training students of specialty 051 Economics, it has been revealed that for future experts of economic profile integral, general and professional competences which provide end-to-end formation of information and communication competence

are allocated. Analysis of scientific sources of national and foreign scientists (Adeyemon, 2009; Bikov, 2011; Boitsova, 2011; Gurevich, Kademiya, & Shevchenko, 2012; Twist & Withers, 2007; Vuorikari, Punie, Carretero Gomez, & Vanden Brande, 2016; Kononets et al., 2021) regarding the problem of researching the essence of information and communication competence and related concepts «electronic competence», «digital competence», «information literacy», etc., made it possible to identify common characteristics in their interpretation as important human ability to solve various problems using information and communication technologies (ICT) in the information society of today.

Based on the review of the author's interpretations of the studied pedagogical phenomenon, covered in national and foreign pedagogical practice, information and communication competence of future economists is determined in the study as the ability and interest of students to work with information, navigate its inexhaustible flows, ability to obtain information from different sources, to use ICT, digital technologies in branches of economy for the solution of professional problems.

Theoretical analysis of scientific sources on the formation of information and communication competence of future specialists in economics has been performed. Among them are works of (Balovsyak, 2006; Barnes, 2003; Kononets et al., 2020; Mann, 2018; Poiasok, 2009; Twist & Withers, 2007), which contributed to the identification of competence components:

- cognitive-informational, which represents a system of knowledge that is necessary for effective work with information in all forms of its presentation and the ability to build knowledge;
- computer-technological, which reflects a totality of skills and abilities to work with modern computer tools and software for processing economic information;
- procedural-analytical, which determines the ability to use modern ICT tools to work with information, analyze it and solve various professional problems;
- motivational and cognitive, which reflects a set of motives for mastering ICT, digital technologies and active learning and cognitive activities with a focus on lifelong learning.

In the process of undertaken scientific works analysis it has been established that the formation of information and communication competence of future specialists of economic profile according to the four above-mentioned components is a gradual process that unfolds in four interdependent directions and is based on the following didactic principles:

- scientific (organization of the learning process with due regard for the achievements of modern science in the fields of economics, ICT, digital technologies);
- system and consistency (updating of previously studied material from the disciplines of the training cycle, which directly or indirectly relates to ICT, taking into account the signs of similarity with the new educational material – the cycle of computer disciplines);
- accessibility (set of knowledge about digital society and economy, ICT, digital technologies should be clear to all students in conformity with the level of their mental development);
- consciousness and learning activity (requires students to understand and reflect on the phenomenon of digital economy and information society, profound study of scientific concepts and their development);
- clarity (harmonious combination of textual educational information with different means of clarity, providing conditions for figurative and visual perception of educational material);
- strength of knowledge (the process of building the knowledge required to solve professional problems using ICT and digital technologies);
- connection of theory and practice (unity of theoretical knowledge and practical skills of using ICT, digital technologies in the future professional activity of an economist);
- emotionality (providing students with positive emotions as a motivating force in educational activities to master ICT and digital technologies);
- control and correction of knowledge (effective educational interaction between professors and students, obtaining objective information about their academic achievements and implementation of corrective measures);
- optimization of education (search for optimal conditions for the development of students' independent cognitive activity, their creative realization in education and the future occupation in economics).

According to the results of the content analysis, procedural, didactic and information-educational components of university educational environment (Balovsyak, 2006; Barnes, 2003; Ben Youssef & Dahmani, 2008; Hrytsai, Diachenko-Bohun, Grynova, Grygus, & Zukow, 2019; Kononets, & Baliuk, 2020), which directly reflect the didactic tools for the formation of information and communication competence in the learning process, it has been established that this process demands improvement at the level of all components, since the didactic instruments do not take into account all the contemporary requirements and do not fully exploit the potential of modern ICT, digital technologies in the organization the of future economists training (Kononets et al., 2021).

Considering the content of components and determining the features of future economic specialists training in the educational environment of the university, didactic conditions have been substantiated, the conceptual basis of which is the concept of continuing education, competence, resource-oriented, integrated, problem-oriented, coaching, network and system approaches, didactic and specific (principles of coaching and pedagogy of

partnership, information and educational principle, the principle of updating the construction of knowledge, the principle of integrity and continuity, the principle of intensifying the search for information and its analysis, the principle of mobility) principles:

- 1) creation of electronic educational resources for the formation of information and communication competence of future economic specialists;
- 2) introduction of the training studio «Digital technologies in the work of an economist» as a means of continuing education in the training of future specialists of economic profile;
- 3) complex pedagogical influence on the goal-setting, motivational, information-cognitive, activity sphere of the personality of future specialists of economic profile by means of coaching;
- 4) the orientation of the educational process on the application of resource-based learning technology;
- 5) involvement of students in the development and implementation of network projects.

The process of formation of information and communication competence of future economists in the educational environment of the university is modeled.

The didactic model consists of structural blocks: motivational-target, information-content, operational and diagnostic-effective (Fig. 1).

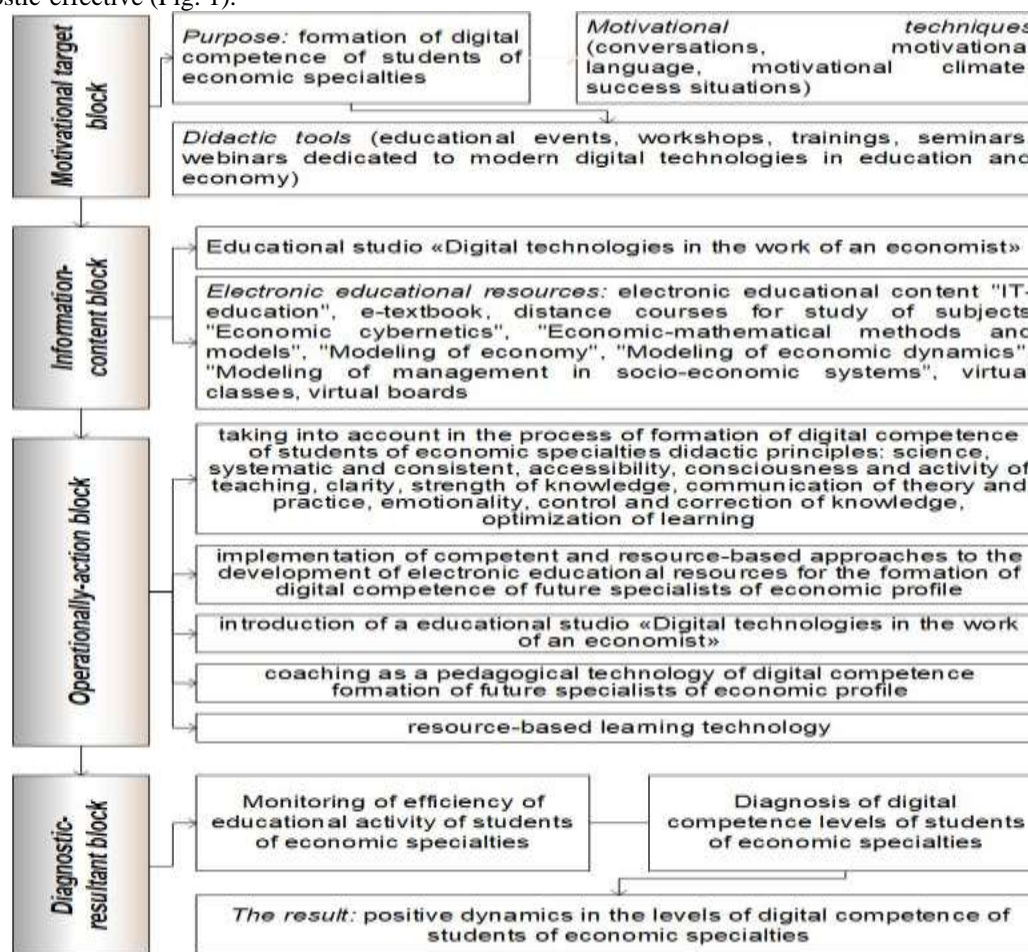


Fig.1: Didactic model [author's development]

The motivational-target block is conditioned by the social demand, which is regulated by the requirements of the standard of higher education 051 Economics and by employers; it reflects the purpose, tasks, didactic and motivational tools which are aimed at increasing positive motivation and forming information and communication competence of students.

The information and content block contains the content of the educational studio «Digital technologies in the work of an economist» and a number of electronic educational resources.

The operational block is represented by the implementation mechanisms of didactic conditions: forms, methods and means of teaching that contribute to the formation of information and communication competence of future economists in the educational environment of the university.

The diagnostic-effective block ensures monitoring of efficiency of students' educational activity as well as the diagnostics of levels of their information and communication competence formation.

The block is based on the criteria among which are cognitive-informational, computer-technological, procedural-analytical, motivational-cognitive, and on their indicators and levels (basic, professional and higher) of the formation of the researched competence (Fig. 2).

At the ascertaining stage of the experiment the state of problem development in didactic discourse is investigated; teachers of computer cycle disciplines were selected to conduct the experiment and their preparation for research and experimental work was carried out; compliance with organizational and methodological conditions, which serve as a guide for the successful organization of the process of formation of information and communication competence of students in the educational environment of the university during the pedagogical experiment (professors' readiness to ensure the formation of information and communication competence of future economic specialists; professors' motivation for professional development with an emphasis on ICT, digital technologies in professional activities); the initial level of formation of information and communication competence of students is clarified.

Statistical processing of empirical data of the observational experiment showed that the highest level of formation of information and communication competence is displayed by 12 (8.96%) students of CG and 13 (9.63%) EG; by 43 students of CG, which corresponds to 32.08%, and by 45 students of EG, that means that 33.33%, reached the professional level; the baseline level was found in the majority of participants in the experiment, namely in 79 (58.96%) CG students and 77 (57.04%) EG students.

At the formative stage of the experiment, the experimental didactic model was tested and the effectiveness of the proposed didactic conditions was assessed.

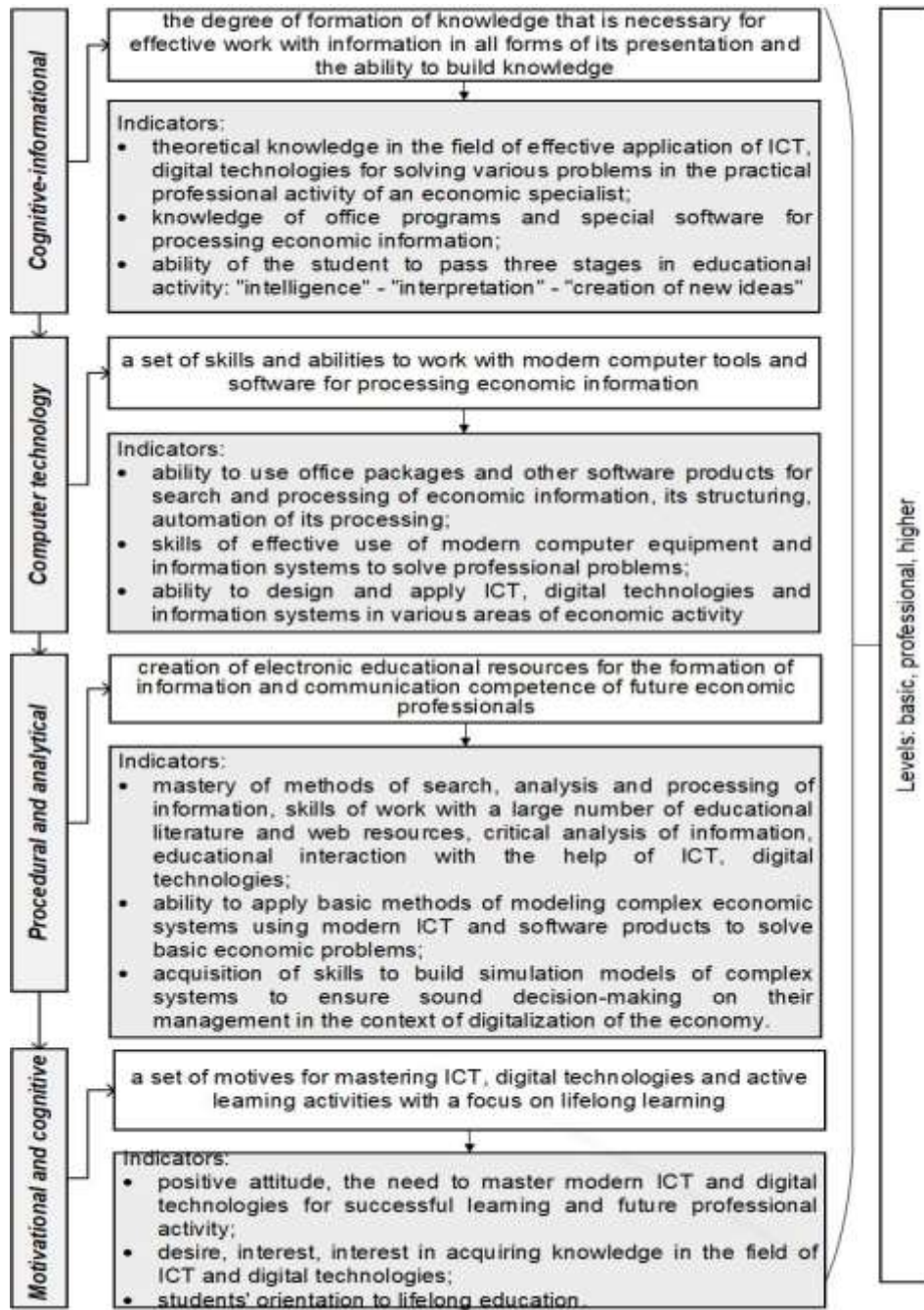


Fig.2: Criteria for the formation of information and communication competence of future economic professionals [author's development]

In the context of the implementation of the first didactic condition – the creation of electronic educational resources for the formation of information and communication competence of future economists and taking into account competency, resource-oriented and integrated approaches, we developed a set of electronic educational resources, which included: training studio site (Fig. 3), e-learning content «IT education», e-textbooks «Economic Cybernetics», «E-Commerce», distance learning courses «Informatics and Computer Engineering», «Economic Modeling», «E-Commerce», «Economic Cybernetics», «Organization of databases», «Information business», «Information systems and technologies in the fields of economy», as well as virtual classes, virtual boards for organizing the learning process of these disciplines in remote mode (distance learning, blended learning as traditional learning with elements of distance learning).



Fig.3: Training studio «Digital technologies in the work of an economist» [author's development]

In the process of training EG students with the aim of strengthening and improving the process of formation of information and communication competence of future economists author study studio «Digital technologies in the work of an economist» was introduced as means of continuing education in training future economics (implementation of the second didactic condition). Training of EG students is organized in a distance form with the help of the site of the educational studio «Digital technologies in the work of an economist» and its functionality, as well as with a virtual classroom Google Classroom. EG students performed computational and situational tasks in Microsoft Office programs, spreadsheet environments, database management systems, Microsoft Visio, computer algebra Maple, MathCad, programs AnyLogic, Deductor, Microsoft Project.

Within the framework of the third didactic condition – complex pedagogical influence on the goal-setting, motivational, information-cognitive, activity sphere of personality of future specialists of economic profile by means of coaching – teachers are acquainted with coaching methods and focused on its use while teaching various disciplines of computer cycle. A methodical video conference «Coaching as a pedagogical technology for the formation of information and communication competence of future economists» was held for teachers. While working with EG students, coaching sessions and a number of methods were used: «Making a contract», specific situations; positive assessment of the situation; creating a situation of informative discussion; coaching conversations; emotional stimulation; projects; «Mosaics»; modification of experience; time line algorithm; «Board of directors». During the classes special attention was paid to the use of various means of pedagogical influence: attention, trust, support, respect, encouragement, empathy, EG students' inner achievement motivation, personal example, example of successful professionals in the field (meetings with famous entrepreneurs, business owners, banks owners; attending economic forums, watching and discussing movies, etc.), a positive and friendly atmosphere of communication.

In order to implement the fourth didactic condition – the orientation of the educational process on the use of resource-based learning technology – a series of master classes was organized and conducted for university professors on the general topic «Pedagogical aspects of resource-oriented learning in education». For the sake of successful implementation of the stages of technology (preparatory, organizational and methodological, procedural, control and analytical), teachers are acquainted with the basic principles (informational, educational, actualization of knowledge, integrity and continuity, intensification of information retrieval and analysis, mobility) which were the base for building the process of teaching EG students. Activities of computer science professors and university librarians were consolidated, resulting in jointly instructions of students how to work effectively with various information sources, printed and electronic literature; methods of data mining Web mining, Text Mining technology, visualization methods, contextual search in documents were introduced to class activities (Hrynova et al., 2019; Kononets et al., 2020).

In connection with other didactic conditions, the fifth didactic condition is realized – involving the students in the development and implementation of network projects. EG students are offered a number of network projects: «Design and develop the structure of the future site of the online store using mental map technology», «Develop a site for the online store», «Develop a business project according to the B2C concept», «Develop a

business project according to the concept B2B», «Develop a business development project based on the B2G concept», during which with the help of the Microsoft Project the goals and charter of the project, tasks and necessary resources, deadlines, economic feasibility of its implementation were determined, its financial viability was assessed.

Comparative diagnostics results of levels of information and communication competence formation of future specialists of economics before and after the experiment are presented in Figure 4.

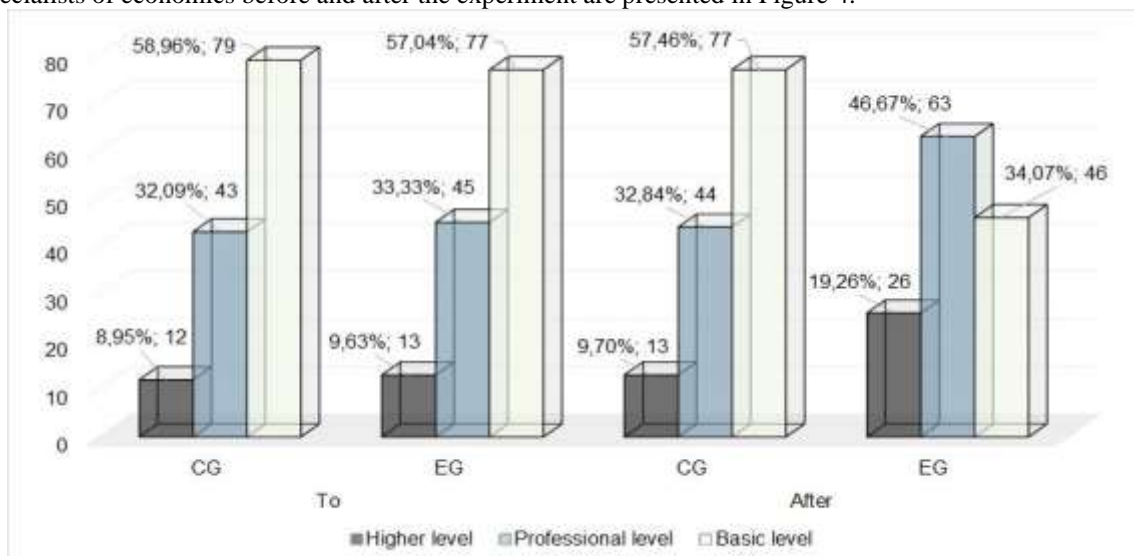


Fig.4: The results of experimental work [author's development]

The generalized final results of the formative experiment convincingly testify to a significant increase in the formation of information and communication competence of students in the experimental groups as compared to the control one.

The obtained statistically significant difference in the levels of formation of information and communication competence of students of experimental groups before and after the formative stage of the study showed that in experimental groups, in contrast to control ones, the number of students with basic level of formation of information and communication competence decreased significantly (in CG it decreased to 1.50 %, and in EG – by 22.97 %), at the same time the number of students with vocational level showed results as in CG increased by 0.75 %, and in EG – by 13.34 % and higher level in CG increased by 0,75 %, and in EG – by 9.63 %.

Confirmation of the reliability of the experimental data was performed by the Pearson homogeneity criterion. The study of the effectiveness of developed didactic model of information and communication competence formation of future economic specialists in the university educational environment was carried out with the help of pedagogical experiment computer modeling method using a special software environment BPwin (Kononets et al., 2020).

The whole process of forming information and communication competence of future economic specialists was illustrated with the help of a specialized type of Node Tree chart (automated report), which allows to demonstrate the relationships between all charts in the form of a hierarchy of blocks in the model, permitting to consider it as a whole (Fig. 5).

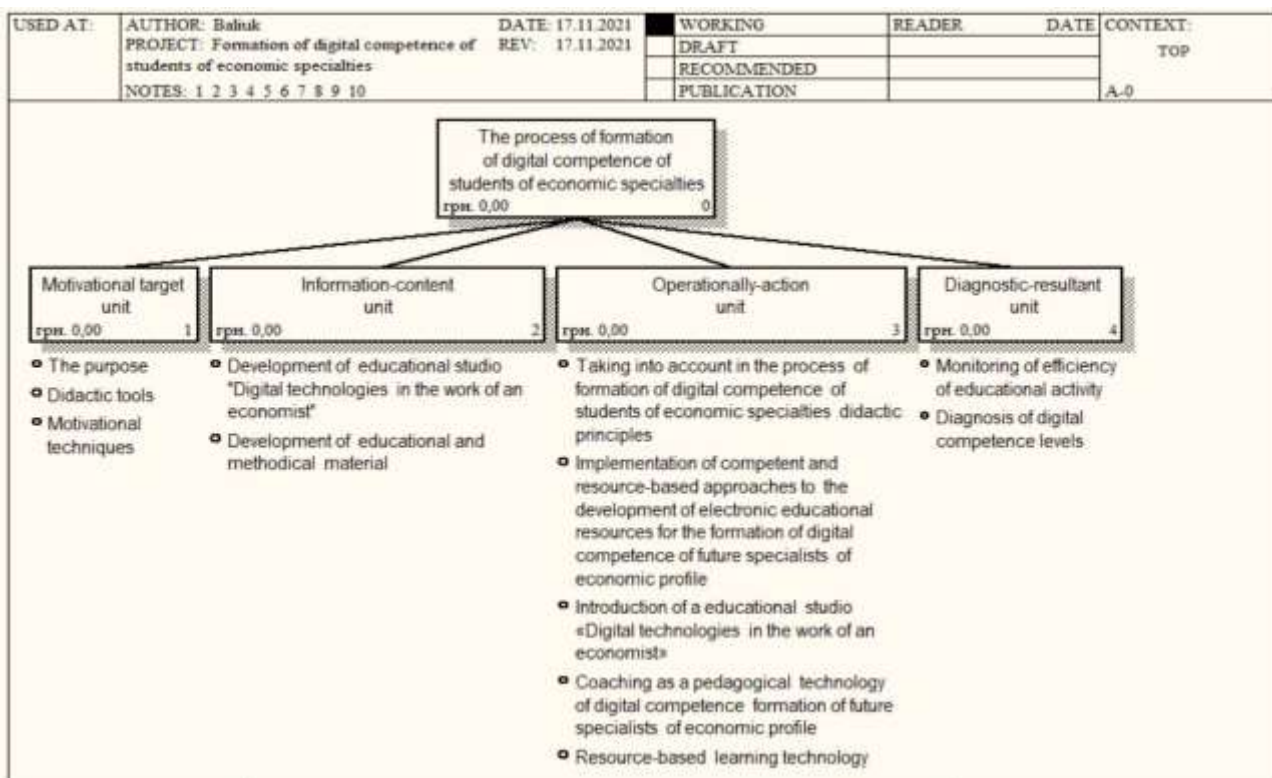


Fig.5: Node Tree diagram [author's development]

DISCUSSION

Summarizing the results of computer modeling in BPwin allows the conclusion that all blocks of the developed model are interconnected, and therefore, the proposed didactic model of information and communication competence formation of future economic professionals in the educational environment of the university is an effective mechanism for improving the level of researched competence, quality of students' education and their readiness for professional activity in the conditions of society and economy digitalization.

It is obvious that BPwin models served as a basis for in-depth conceptualization of the process of information and communication competence formation of future economic specialists in the educational environment of the university, they also allowed to fully systematize and analyze all stages of implementation and experimental verification of didactic model. It is additionally established that all the defined above blocks and their components of the model contribute to the achievement of the goal – the successful formation of information and communication competence of future economic specialists in the educational environment of the university, which testifies to its effectiveness.

CONCLUSIONS

The generalization of the study results allowed to formulate the following conclusions:

On the basis of scientific literature analysis regarding the researched issues, it is concluded that the essence of the concept of «information and communication competence» is revealed by scientists according to the competence and integrated approaches. The concept of information and communication competence of future economic specialists was clarified, deepened and specified as the ability and interest of students to work with information, navigate its inexhaustible flows, the ability to obtain information from different sources, use different media, use ICT, digital technologies in fields of economy to solve professional problems. The structure of information and communication competence of future economists is clarified as consisting of cognitive-informational, computer-technological, procedural-analytical and motivational-cognitive components.

The criterion base and levels of information and communication competence formation of future economic specialists are specified. Cognitive-informational criterion reflects the degree of formation of knowledge required for effective work with information in all forms of its presentation and the ability to build knowledge; computer-technological criterion reflects a set of skills and abilities to work with modern computer tools and software for processing economic information; procedural-analytical criterion determines the ability to apply modern ICT tools to work with information, to analyze it and solve various professional tasks; motivational and cognitive criterion reflects a totality of motives for mastering ICT, digital technologies and active learning activities with a focus on lifelong learning. On the basis of a comprehensive consideration of criteria and indicators, three levels of formation of information and communication competence of future economic

specialists are characterized: basic, professional and higher.

Didactic conditions that contribute to the effectiveness of the formation of information and communication competence of future economic professionals in the educational environment of the university are revealed, namely: the creation of electronic educational resources for the formation of information and communication competence of future economic professionals; introduction of the training studio «Digital technologies in the work of an economist» as means of continuing education in the training of future economic professionals; complex pedagogical influence on the goal-setting, motivational, information-cognitive, activity sphere of the personality of future economists by means of coaching; orientation of the educational process on the application of technology-oriented learning; involving students in the development and implementation of network projects. The didactic model of formation of information and communication competence of future economists in the educational environment of the university is developed and scientifically substantiated, as incorporating the following structural blocks: motivational-target, information-content, operational-effective and diagnostic-effective.

It is experimentally proven that the implementation of certain didactic conditions has positively affected the effectiveness of the formation of information and communication competence of future economic professionals in the educational environment of the university. The dynamics of the level characteristics of the researched competence indicates that there have been positive changes in the experimental group, namely: 9.63 % increase in the number of future economic professionals with a higher level of formation of the studied phenomenon; with vocational level – an increase by 13.34 %, respectively, the number of applicants with the base level decreased by 22.97 %. The analysis of experimental testing results of didactic conditions effectiveness for the formation of information and communication competence of future economic professionals in the educational environment of the university by methods of mathematical statistics (Pearson's homogeneity criterion) confirmed the feasibility of the authors' work.

Educational and methodological support for the formation of information and communication competence of future economic specialists in the educational environment of the university is developed, in particular, the work program of the author educational studio «Digital technologies in the work of an economist» and a site for its study, e-learning educational content «IT education», electronic manuals «Economic Cybernetics» and «E-Commerce», distance learning courses «Informatics and Computer Engineering», «Economic Modeling», «E-Commerce», «Economic Cybernetics», «Organization of Databases», «Information Business», «Information systems and technologies in the branches of economy».

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