Digital competence of pedagogical university student: definition, structure and didactical conditions of formation

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Abstract. The article defines and substantiates didactic conditions of digital formation competences of students of pedagogical universities: actualization of motivational value training of students of pedagogical universities; organization of interaction between students and teachers of pedagogical universities on the Internet through the creation of digital information educational environment; creation of individual educational trajectories of students.

Keywords: digital competence; pedagogical university students; training; professional readiness; new pedagogical technologies.

1 Introduction

The current pace of digitalization of the world requires a shift to a higher quality of using digital technologies in education. One of the factors of the development of information society in Ukraine is the formation of the digital competence of the individual.

The key concepts of our research are “competency” and “competence”. Foreign scientists consider these concepts to be synonymous, Ukrainian scholars do not, but all interpret them differently [20]. The analysis of the scientific literature gives grounds to claim that a competency is a possession of a relevant competence that contains a personal attitude to the subject matter, and competence is a set of interrelated personal qualities (knowledge, abilities, skills, activities) [21; 22; 28; 30; 38].

The task of a teacher who teaches students of pedagogical universities is not only to give students knowledge of the curriculum, but also to develop important skills of finding, collecting and processing the necessary information, working at a team, taking on responsibility, present the results of your work, independently master new technologies and tools. Therefore, the problem of pedagogical university students’

digital competence formation is gaining relevance.

Theoretical analysis of scientific researches and publications on the problem of professional training of specialists in higher education shows that this matter of building a coherent concept formation of digital competence of students of pedagogical universities has not been studied separately in domestic pedagogy. Usually, they investigate either professional competence in general, or preparing future teachers for professional activities by means of digital educational technologies, the nature and structure of digital competencies and digital culture of future teachers as aim-setting categories (Andrii M. Hurzhii [8], Nataliia V. Morze [21], Oksana V. Ovcharuk [22], Yurii S. Ramskyi [27], Oleg M. Spirin [30], Vasyl V. Yahupov [36], Myroslav I. Zhaldak [38], and others).

One of the effective ways of solving the problem of preparing future teachers is regarded by Liudmyla I. Bilousova [3], Olga V. Bondarenko [11], Valerii Yu. Bykov [4], Tetiana H. Kramarenko [16], Olena O. Lavrentieva [25], Maiia V. Marienko [18], Iryna S. Mintii [34], Serhii A. Rakov [26], Serhiy O. Semerikov [19], Mariya P. Shyshkina [29], Aleksander V. Spivakovsky [31], Ivan M. Tsidylo [33], Vladyslav Ye. Velychko [35], Olga G. Yaroshenko [37], Myroslav I. Zhaldak [39] and other scientists as the introduction of ICT, in particular mobile learning tools.

Considering that, the purpose of this article is to define and justify the didactic conditions of digital formation competences of students of pedagogical universities.

2 Results and discussion

In accordance with the recommendation of the European Commission [6], competence is defined as a combination of knowledge, skills, and attitudes where:

- knowledge is a composition of established facts and figures, concepts, ideas and theories that necessary for understanding a particular subject area;
- skills are defined as the ability and capability to perform actions and to apply knowledge to achieve results;
- attitude describes the inclinations, preferences, and mind-set that determine the mode of action or reactions to ideas, personalities or situations.

Competence, including digital competence, is a category that belongs to the sphere of relations between knowledge and practical activity of the person. It integrates knowledge, skills and assimilated modes of activity in relation to specific conditions, in a particular situation [8]. So, the influence of the environment, the conditions and the way of life of the individual, their society have a significant impact on directions of formation of digital information competence.

The study has found that digital competence is a purposeful use of ICT to create, search, process, share information in the virtual space, information and media literacy, web and internet security skills cybersecurity, understanding the ethics of working with information in the student preparation process pedagogical universities.

David Bawden [2] states that the term “digital information competence” is broad and general. This term covers competencies such as networking competence, internet-

competency, hyper-competency, and multimedia competence. The analysis of the literature allows us to identify the ten competencies that are necessary for mastering digital competence. These include:

- the ability to systematize and summarize information found on-line (art critical thinking on the Paul-Elder system [24]);
- the ability to read and understand in the dynamic and inconsistent hyper-text environment;
- the ability to build information bases from different sources, relying on ability to collect and evaluate facts and judgments without prejudice;
- search skills related to Internet search service;
- the ability to manage "multimedia flow" using information filters and agents;
- ability to create a "personal information strategy" and carry out a portfolio-approach to selecting sources and delivery mechanisms;
- awareness of collaboration with other participants in the process and the ability to find contacts with them to discuss issues and get help;
- understanding of the problem and the ability to develop a system of questions that will allow you to find and obtain the necessary information;
- understanding of supporting traditional forms of content information through telecommunication means;
- understanding the relativity of judgments regarding the validity and significance of reference material with hypertext links.

According to Volodar V. Kraevskii and Andrei V. Khutorskoi [15], we have identified such a structure digital competence:

- motivational value (target);
- cognitive;
- operating activity;
- personally-reflexive components.

The *motivational value* component includes the purpose, set of motives, interests, values orientations, professional abilities, focus on implementation in vocational training, needs for improvement, self-education, self-development, value installations of updating in professional activity, stimulates creative expression of a person in professional activity. He characterizes the presence of interest in professional activity, which means a person's need for knowledge in mastering effective ways of organizing professional activity.

The *cognitive* component is a set of professional knowledge, skills and their correspondence to professional competences, practical readiness to exercise professional activities. It provides fluency in information processing and handling skills information objects that also influence the improvement of professional knowledge and skill. The level of development of the cognitive component is determined by completeness, depth, a system of knowledge in the subject area.

The *active* component is the active use of information technology and computer technology in professional activity as a means of cognition and development, self-

improvement, and creativity. In the business component of digital competence students of the pedagogical university can be divided into two levels: basic and subject-oriented. The basic level is the knowledge, skills, and abilities common to students of all specialties and necessary for solving educational problems by means of computer general-purpose technologies. It includes the use of modern information technologies (computer, multimedia, Internet, electronic media information, mobile phones, etc.) to search, access, store, create presentations and exchange information, as well as to communicate between people using the Internet. The subject-oriented level is the development and formation of readiness for implementation in the educational activities of specialized technologies and resources developed for the specific educational subject.

Personally-reflexive component of a pedagogical university student's digital competence is a set of personal qualities and self-reflection important for the professional pedagogical activities. It is determined by the relation to oneself and to the world, to their practical activity. It includes self-awareness, self-control, self-esteem, understanding their own importance in the team and understanding the results of their activities and responsibility for them, knowledge of oneself and self-realization in professional activity by means of ICT.

The development of each component of digital competence is linked to the formation of its characteristics and properties as a part of a coherent system. Digital competence involves confident, yet critical use of ICT to create, search, process, share information at work, in public space, and in private communication. Information and media literacy, programming basics, algorithmic thinking, working with databases, Internet security and cybersecurity skills. Understanding the ethics of working with information (copyright, intellectual property, etc.). Organization of the new educational environment requires the widespread use of new ICT in the educational process and the management of institutions and the education system must come to pass a tool for ensuring the success of the New Ukrainian School. The introduction of ICT is what the educational industry needs to move from one-off projects to a systematic process that covers all types of activities. ICTs significantly expand the capacity of the teacher, optimize management processes [23].

Preparation of students of pedagogical universities for professional activity according to the State standards should be implemented by forming their professional competence, which means a set of knowledge, skills, abilities, and experience that together enables them to effectively carry out activities or perform certain functions, ensuring that they can solve problems and achieve some meaningful results in the future professional activity [7; 13].

A specific feature of the concept of "didactic conditions" is that it includes elements of all components of the learning process: purpose, content, methods, forms, means. Iurii K. Babanskii identifies the following pedagogical conditions for the effectiveness of the educational process: methodological and theoretical training of teachers; creation of a certain base (preparation and creation of educational-methodical literature, technical means, visual aids); moral and psychological conditions [1]. That is, "didactic conditions" are conditions under which the components of the learning process are represented in their best relationship.

Based on the theoretical generalization of the above aspects, we can determine that formation of digital competence of students of pedagogical universities is the most important depends on the following didactic conditions: **actualization of the motivational value component** training of students of pedagogical universities; **organization of interaction of subjects of the educational process in the information-digital learning environment** based on individual student support; **creation and support of individual student education trajectories.**

Let's consider these conditions in more detail and determine their role in the process of forming pedagogical university students' digital competences.

Actualization of the motivational and value component of pedagogical university students' preparation. One of the main areas of modern higher education is vocational education orientation of the future specialist, which reflects the system of educational and professional motivation, interest in future professional activity, professionally important qualities, value orientations. The theoretical and practical value of knowledge and skills, their importance for personality development, value for future professional activity, need for mastery for this purpose, the methods of cognitive activity are the main motives of cognitive activity [28].

The cognitive activity of the future specialist is the basis of the motivational and value sphere of the personality. The need that becomes a motive contributes to the formation of different levels of motivation for the professional development of personality, and one of the most important elements of the motivation system is of interest.

Scientists identify three areas of interest: intellectual – interest associated with knowledge of the surrounding reality, that is, intellectual human activity; emotional - interest in a person is what particularly attracts attention and causes positive emotions; the third direction treats interest from the standpoint of personal volitional activity, according to which the interest is the stimulus of activity and is manifested in the desire of a person for the subject that interests them.

At a certain stage, interest causes the need to master the missing knowledge, that is, a cognitive interest. The essence of cognitive interest is that it's the object is the very process of cognition, characterized by the desire to grasp the essence of phenomena (not just being the consumer of information about them), knowledge of theoretical, scientific basics of a certain area of knowledge, a relatively stable desire for continuous deep study [10].

Therefore, professional interest is formed on the basis of cognitive awareness of lack of knowledge that drives the student to search, analyze new professionally significant information primarily in the Internet, i.e. cognitive interest arises as pedagogical university students' awareness of the need to develop informational-digital competence.

The second pedagogical condition is the **organization of interaction of subjects of the educational process in the information-digital learning environment.**

Valerii Yu. Bykov [5] defines the learning environment as an artificially constructed system, the use of structure and components which contribute to the achievement of the goals of the educational and educational process.

According to the scientists [17], the learning environment is an environment on the

basis of which educational process is carried out, and the necessary conditions sufficient for its participants to ensure effective and safe achievement of training and education goals are provided.

At the level of common understanding, human support is a social interaction with other people whose functions of influence are the development of that person in the life path, in a variety of personal and social situations. Such support may be of a different nature.

Pedagogical support, first, contains the features of social interaction, secondly, it has its specificity. This specificity is the nature of support, the purpose of which is purposeful the development of the person being accompanied and carried out by means of special pedagogical systems (education, upbringing, training) in their institutional (structural) design.

We distinguish the main points of the concept of student support: the complexity of the approach to solving problems posed to students (individual trajectories, interaction student and teacher in remote mode); the need to accompany, not to guide the student's development, reinforcing his or her ability to make decisions independently; improving information support by solving the problem.

The current situation of a teacher's professional activity is defined as the set of internal and external factors that influence the logic of the activity and its results. The internal changes include the personal and professional development of the employee, external characteristics of the political, economic, social, environmental environment.

The intensive development and implementation of ICT in the educational process creates some difficulties for their timely mastering by future teachers, so the method of guiding is a necessary component of supporting all innovation processes as it emerged as a method of providing help and solving tasks for an employee.

During the research, it was found that the process of individual support involves an active position of the student in obtaining the required amount of knowledge, skills, and methods gaining experience of independent cognitive activity.

The next pedagogical condition is the **creation and support of individual educational institutions student trajectories**. Professional training of future specialists in higher educational establishments of Ukraine is oriented to the European dimension, where readiness for individualization of programs, self-improvement, and self-development, and the ability to acquire knowledge and productively use it in a professional activity are crucial. Research on issues related to the individualization of education in educational institutions of different types and levels has been going on for a long time [9]. But the question of introducing individual educational trajectories in them remains insufficiently disclosed.

Firstly, professional training based on individual educational trajectories allows implementing the personal approach in the education of students which most efficiently takes into account their intellectual abilities, and, secondly, determines the personal trajectory of development education in the process of mastering the educational program. In this case, the personal educational process is implemented as an individual educational trajectory when using functional opportunities for pedagogical support.

Andrei V. Khutorskoi considers the individual educational trajectory as one's own way of realization of the personal potential of each student in education [12].

Nadezhda N. Surtaeva treats individual educational trajectories as a certain sequence of elements of the educational activities of each student aimed to achieve their own educational goals that correspond to their abilities, opportunities, motivations, interests, exercised in coordinating, organizing, consulting activities of the teacher in interaction with parents [32].

Tamara P. Korostiianets believes that the individual educational trajectory is purposeful an educational program that provides student positions for the subject of choice, development, the implementation of the educational standard when teaching teacher support, self-determination and self-realization [14].

Let us follow the last interpretation. The concept of an individual education trajectory should be understood as the individual path of the student, which they choose to implement as their educational standard and which depends on the individual characteristics of the student.

Consider some general provisions regarding the construction of individual education trajectories. Tetiana L. Hodovaniuk [9] believes that they are necessary in the construction of the individual educational trajectories are the consideration of such elements of the educational paradigm as values: teaching for self-realization, for manifestation and development of one's personal qualities, for realization individual purpose; motives: the interest of learners in the process of learning, enjoyment of educational results; teacher's interest in student development, enjoyment of communication with them; norms: students take on responsibility for your teaching; The teacher's authority is created at the expense of his personal qualities and self-development of professional and personal competences, thus the goals are: focus on mastering the foundations of human culture and key competencies: value-meaning, information, cognitive, communicative, etc.; awareness of the student's and master's rights to personal educational goals; positions participants of the educational process: the teacher creates the conditions for independent learning; mutual partnership between teacher and student forms and methods: democratic, dynamic forms organization of the educational process; emphasis on independent work of students; remedies: traditional textbooks are supplemented with resources of information and telecommunication systems and media; control and assessment: shifting emphasis on student self-control and self-esteem. The process of creating an individual educational trajectory is characterized by three stages:

- psychological and pedagogical study of personal characteristics, needs, interests, requests students, analysis of results. Identification of capable students and students with learning problems. Diagnosis of their ability to work in the individual program mode;
- development of the content of the program by directions, introducing students to it, discussion of forms of work;
- monitoring and correction of the program.

The structure of the individual trajectory contains the components: target (definition of goals education based on state standards, students of pedagogical universities motives and needs); meaningful (content structure and selection, systematization and grouping, cross-domain linking) diagnostic (system definition maintenance diagnostics);

organizational and pedagogical (conditions and ways of achieving the goal).

In constructing the educational trajectory of students of pedagogical universities in the process study of subjects and passing of educational practices it is possible to use such an algorithm: diagnostics of the level of development and degree of formation students' personal qualities. At this stage, one identifies basic needs and motives of students, their readiness for mobile learning, students' initial level of knowledge and skills. In the second step, each student or group of students presents their learning outcomes, their collective discussion is held. Further work is organized to identify deficiencies, problems faced by students.

3 Conclusions

The analysis of the scientific literature provided a basis for the determination of the essence of the concept competence as a set of knowledge, skills, skills, and experience that together enables a person to effectively carry out activities or perform certain functions, ensuring that one can solve problems and achieve some meaningful results in the future professional activity. The study has found that digital competence has a purposeful use of ICT to create, search, process, share information with virtual space, information and media literacy, security skills in the Internet, understanding the ethics of working with information in the student preparation process of pedagogical universities. Selected competence structure: motivational value (target), cognitive, operational-activity, and personality-reflexive components.

Didactic conditions of information-digital formation are defined and substantiated competences of students of pedagogical universities: actualization of motivational value component training of students of pedagogical universities; organization of interaction of educational process subjects in a digital-based learning environment for individual student support; creation and support of individual student education trajectories.

We see the prospects for further scientific research in determining ways of implementing didactic conditions of the formation of digital competence of pedagogical university students.

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